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ABSTRACT

THE EFFECT OF GOAL IMPORTANCE ON COUNTERFACTUAL ACTIVATION

by

Ryan J. Walker

Despite the vast literature exploring the antecedents and consequences of counterfactual thought, no work has examined if and how goal importance influences the counterfactual thought process. In the current work, three studies investigated if goal importance activates counterfactual thought. In addition to exploring the direct relationship between goal importance and counterfactual activation (Pilot Study), these studies also explored the potential mechanisms for this hypothesized relationship (Studies 1 and 2). Although the causal mechanisms did not receive support in the current studies, all three studies provided partial, correlational support to two of the proposed models, with the negative affect model receiving the strongest support. Possible explanations as well as the implications of these findings are discussed.

THE EFFECT OF GOAL IMPORTANCE ON COUNTERFACTUAL ACTIVATION

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Counterfactual thinking, or simulating alternative realities to past events, is often evoked following negative outcomes (Byrne, 2002, 2016; Roese, 1997). Whether it is missing the bus to work, doing poorly on an exam, or the dissolution of a relationship, people often imagine how some situation might have resulted in a different outcome (Summerville & Roese, 2008). This thought process has been associated with a wide variety of constructs, ranging from affect (Markman & McMullen, 2003; Roese, 1994) to reasoning (Goldinger, Kleider, Azuma, & Beike, 2003; Spellman & Mandel, 1999; Wells & Gavanski, 1989) to motivation and behavior (Epstude & Roese, 2008; Markman, Gavanski, Sherman, & McMullen, 1993; Roese, 1994). Despite this vast area of research investigating the antecedents and consequences of counterfactual thought, no work has explored how an influential dimension of goal pursuit, goal importance, impacts counterfactual thought. In the current work, I examined if goal importance increases counterfactual activation as well as four potential mechanisms.

Counterfactual Thinking

Counterfactual thought is deeply entwined with goal pursuit, as simulating an alternative reality to a past event has implications for future behavior and can help one address problems in the goal pursuit process (Epstude & Roese, 2008; Markman & McMullen, 2003; Roese, 1997). Epstude and Roese (2008) describe how counterfactual thoughts serve this behavior regulating function via two pathways. In the content-specific pathway, counterfactuals directly influence future behavior by facilitating the formation of behavioral intentions, whereas in the content-neutral pathway, counterfactuals influence future behavior more indirectly by generally increasing motivation or persistence. Both the content-specific (Epstude & Jonas, 2015; Page & Colby, 2003; Roese, 1994; Smallman, 2013; Smallman & Roese, 2009; Walker, Smallman, Summerville, & Deska, 2016) and content-neutral (Galinsky & Kray, 2004; Galinsky & Moskowitz, 2000; Kray & Galinsky, 2003; Kray, Galinsky, & Wong, 2006; Markman, Lindberg, Kray, & Galinsky, 2007; Markman, McMullen, & Elizaga, 2008; Nasco & Marsh, 1999; Roese et al., 1999) pathways have received significant support in the literature, suggesting that, on average, counterfactuals are beneficial (Epstude & Roese, 2008; Roese, 1997).

Counterfactuals are able to facilitate motivation and beneficial behavioral changes because of their structure. Counterfactuals occur when an individual specifies how some

alternative action or inaction might have resulted in a different outcome. For instance, after failing an exam one might think, "If I had studied more, then I would have done better on the exam." In this example, the individual is specifying how an alternative action (studying more) might have helped him or her reach the desired goal state (performing better on the exam). Although it is possible for counterfactual thoughts to focus on alternative outcomes that are objectively worse (i.e., downward counterfactual thinking), a vast majority of counterfactuals highlight the discrepancy that exists between a current state and some better alternative reality (i.e., upward counterfactual thinking; Roese & Hur, 1997; Summerville & Roese, 2008; Walker, 2015). By focusing on the discrepancy between the current state and a better alternative state, counterfactuals motivationally prepare individuals to reduce discrepancies that exist between a current state and a desired goal state, an example of a control system or feedback loop (Bargh, Lee-Chai, Barndollar, Gollwitzer, & Trötschel, 2001; Carver & Scheier, 1998; Gollwitzer, 1990; Kruglanski, Chernikova, Rosenzweig, & Kopetz, 2014; Smallman, 2013; Walker et al., 2016).[1]

Although counterfactuals have the potential to benefit individuals in goal pursuit, not all events are equally likely to elicit these thoughts in the first place. In their two-stage model of counterfactual thinking, Roese and colleagues (Epstude & Roese, 2008; Roese, 1997; Roese, Sanna, & Galinsky, 2005) outline how the recognition of a problem and negative affect activate the counterfactual thinking process. That is, when an individual recognizes that there is a problem in the environment and experiences an increase in negative affect in response to the problem, counterfactuals are most likely to be generated (Sanna, 1998; Sanna, Turley-Ames, & Meier, 2000; Schwartz, 1990). In the second stage, the content stage, a number of determinants influence the actual content of the counterfactual (e.g., normality; Roese, 1997; Roese et al., 2005). Much of the research on counterfactual thought has focused on the content stage (e.g., Markman & Miller, 2006; Roese et al., 1999; White & Lehman, 2005) or the downstream implications of counterfactual content (e.g., Markman et al., 2008; Roese, 1994; Smallman, 2013). Moreover, most of the work on counterfactual activation has focused on the link between

[1] Counterfactual thoughts can also have dysfunctional effects on reasoning and behavior (Sherman & McConnell, 1995). In some situations, counterfactuals can lead to incorrect causal inferences (Goldinger et al., 2003), memory distortions (Petrocelli, Seta, & Seta, 2013), and can result in biased reasoning (e.g., hindsight bias; Petrocelli & Sherman, 2010), which can impede learning and performance (e.g., Petrocelli, Seta, Seta, & Prince, 2012). Therefore, the utility of a counterfactual thought depends on the type and quality of the information that is activated.

negative affect and counterfactual frequency, showing that negative (as opposed to positive) outcomes increase counterfactual thought (Davis, Lehman, Wortman, Silver, & Thompson, 1995; Gilovich, 1983; Sanna & Turley, 1996), and negative affect mediates the relationship between outcome valence and counterfactual activation (Roese & Hur, 1997). Although there is consensus in the literature that negative affect elicits counterfactual thought, counterfactuals are generated relatively infrequently (Davis et al., 1995; Roese & Hur, 1997; Summerville & Roese, 2008). Thus, in an attempt to better explain the variability of when and why counterfactuals are generated after negative events, I examine the effect of goal importance on counterfactual activation.

Goal Importance

Although previous work in the counterfactual literature has examined goal-related constructs, this past work has explored how differences in goal content (i.e., types of outcomes individuals approach or avoid) influence counterfactual content (Rim & Summerville, 2014; Roese et al., 1999; White & Lehman, 2005) and how counterfactuals can facilitate or thwart goal attainment (Markman et al., 1993; Roese, 1994; Smallman, 2013). For example, if one is motivated to pursue the mastery of a task (i.e., self-improvement motivation), upward counterfactuals are more likely to be generated than downward counterfactuals (Rim & Summerville, 2014; White & Lehman, 2005). However, other dimensions on which goals vary, like importance, have not been explored.

Goal importance is broadly defined as the degree to which an individual is energized to pursue a goal (Austin & Vancouver, 1996; Locke & Latham, 2002), although the exact definition varies (Brehm & Self, 1989; Feather, 1988, 1992; Hyland, 1988; Roberson, 1989). Not surprisingly, this construct has robust effects in the goal pursuit process, and many effects are bounded by goal importance—people pursue goals that they highly value (Förster, Liberman, & Friedman, 2007). For example, the effects of priming depend on goal value (Aarts, Gollwitzer, & Hassin, 2004; Förster et al., 2007; Strahan, Spencer, & Zanna, 2002). Moreover, when goals are viewed as important (relative to not important), people are more committed to the goal (Gollwitzer, 1993), less likely to disengage from the goal (Carver, 2003), more likely to alter the mental representation of a goal to motivate goal pursuit (Huang, Zhang, & Broniarczyk, 2012), more prone to goal-related intrusions (Zeigarnik, 1927; see also Masicampo & Baumeister, 2011), and intentions are more likely to influence behavior (Gollwitzer & Brandstätter, 1997;

Sheeran, Webb, & Gollwitzer, 2005). Together, this evidence demonstrates that the effects of goals are strongest when a goal is highly valued.

The Effects of Goal Importance on Counterfactual Thinking

Considering that goal importance has such robust effects on cognition and behavior, it is plausible that increases in goal importance will activate counterfactual thought. That is, when goals are important to the self (relative to not important), counterfactuals may be more likely to be generated. As noted previously, recognizing a problem and experiencing negative affect are two main features that determine whether counterfactuals are generated (Epstude & Roese, 2008). Critically, goal importance is associated with both of these constructs.

First, goal importance is strongly associated with negative affect. In short, as goal importance increases, negative affect also tends to increase in response to a lack of goal progress (Carver & Scheier, 1990; Lavallee & Campbell, 1995). Important goals are more central to one's sense of self, which means that individuals experience increases in negative affect when discrepancies exist between a current state and a desired goal state (Lavallee & Campbell, 1995; Moberly & Watkins, 2010). With evidence showing that negative affect increases the frequency with which individuals generate counterfactuals (Roese & Hur, 1997), these relationships suggest that goal importance should increase counterfactual activation.

Aside from negative affect, goal importance is also closely related to recognition of a problem in the goal pursuit process. Specifically, after experiencing difficulties in goal pursuit, goal importance leads to increases in recurrent thoughts about a situation focused on the problem itself (Moberly & Watkins, 2010). In other words, when goals are considered to be important (relative to not important), people experience more recurrent, difficult-to-eliminate thoughts about a problem and its potential causes (Martin & Tesser, 1996; McIntosh, Harlow, & Martin, 1995; Millar, Tesser, & Millar, 1988). These thoughts are in the service of goal attainment, such that individuals tend to direct their attention at the problem in order to determine how to address the lack of goal progress (Martin & Tesser, 1996).

As individuals start to direct a greater amount of attention at a problem, it is likely that they will begin to possess a greater number of causally relevant details of that event (Sherman, Beike, & Ryalls, 1999). Somewhat recent evidence suggests that an increase in the number of details one possesses about a specific event increases the frequency with which he or she generates counterfactuals (Petrocelli & Sherman, 2010). Petrocelli and Sherman manipulated

how much detail participants possessed about a negative event (e.g., horse race, blackjack, trivia test). In one study, after betting on the outcome of a horse race, participants either watched the horserace (high detail) or only learned about the outcome of the race (low detail). Counterfactual thinking was more likely when participants were in high detail situations relative to low detail situations. With evidence showing that goal importance increases the attention one directs at a problem (Moberly & Watkins, 2010) and that increases in event detail increase counterfactual frequency (Petrocelli & Sherman, 2010), it is possible that goal importance will increase counterfactual activation. However, given the complex interrelationships between these various constructs (i.e., goal importance, negative affect, attention on the problem, and event details), there are a number of possible ways in which these factors may independently or collectively cause an increase in counterfactual activation.

Model 1: Negative affect. Negative affect is one mechanism that should explain the goal importance counterfactual activation relationship. Specifically, increases in goal importance should cause an increase in the negative affect one experiences, and this should activate counterfactual thinking (see Figure 1).

Past research provides support to this conceptualization of the goal importance counterfactual activation relationship. Aside from the studies revealing that increases in goal importance lead to increases in negative affect (e.g., Lavallee & Campbell, 1995; Moberly & Watkins, 2010), negative affect increases the frequency with which individuals generate counterfactuals (Roese & Hur, 1997). Negative mood states can alert an individual to a problem in the environment (Carver & Scheier, 1990; Schwartz, 1990; Taylor, 1991), and counterfactual thought is one process that can—and often does—help address those problems (Epstude & Roese, 2008). This affect-as-information perspective (Schwartz, 1990) is one reason why negative affect may independently explain the goal importance counterfactual activation relationship.

Model 2: Attention on the problem. A second possible mechanism that may explain the goal importance counterfactual activation relationship is an increase in attention directed at the problem. Specifically, it is possible that increases in goal importance will increase attention directed at understanding features of the event that may explain the outcome (Carver, Scheier, & Weintraub, 1989; Martin & Tesser, 1996; Moberly & Watkins, 2010). By directing more attention on the problem and its potential causes, the individual should, in turn, identify a greater

number of causally relevant details that might help him or her understand what contributed to the negative outcome. This increase in the number of causally relevant details one possesses should lead to counterfactual activation (see Figure 2).

The first path of this serial mediation model is supported by past theory and findings. Martin and Tesser (1996) described how discrepancies in goal pursuit lead to increases in the attention one directs to potential causes of a problem (see also Millar et al., 1988). In their model, Martin and Tesser describe this increase in attention as conscious, recurring thoughts about the causes and situational features of the event. One boundary condition to this increase in attention on the problem is goal importance. That is, as goals increase in importance, people tend to experience an increase in the amount of attention they direct to the problem (Moberly & Watkins, 2010).

Work in the counterfactual literature provides additional support to the attention on the problem, causally relevant details, and counterfactual activation pathways of these models. In order for a counterfactual to be generated following a negative event, a mutable antecedent condition must be present in the situation (Kahneman & Miller, 1986). One factor that increases the ease with which one can generate a counterfactual is the attention that is directed at a specific attribute of the situation. Individuals are more likely to mutate an event when they direct more attention towards features of event. This occurs because as individuals direct more attention at features of negative event, they start to possess a greater number of details that can be mutated (Sherman et al., 1999). For example, if an individual fails an exam and spends a significant amount of time focusing on the problem and its causes, the individual should have knowledge of several specific features of the event that might explain that poor exam grade (e.g., study-related actions or inactions, behavior while taking the exam, the behavior of the professor before the exam). This increase in causally relevant details should mean that it is much easier to simulate an alternative reality to the event relative to an individual who did not direct much attention on the problem (and therefore only possesses knowledge of more general features of an event; Sherman et al., 1999). If a detail is not causally relevant, such as a thought about one's current affective state, it will not be any easier to simulate an alternative reality since that feature cannot be mutated. This claim received empirical support from Petrocelli and Sherman (2010), who demonstrated that increases in the amount of detail to which participants have access increase the number of counterfactuals that are generated. Together, these connections suggest that as goals

increase in importance, individuals should increasingly attend to possible causes of the negative outcome. This problem-focused attentional shift should cause individuals to identify a greater number of causally relevant details, which should result in an increase in counterfactual activation.

Models 3 and 4: Serial mediation models. The evidence described above suggests that negative affect and attention on the problem should both independently explain the goal importance counterfactual activation relationship. However, it is entirely possible that these factors are interrelated and therefore operate in serial to explain the goal importance counterfactual activation relationship. For instance, it is possible that an increase in negative affect leads to an increase in the extent to which an individual directs attention at the problem and this, in turn, leads to an increase in the number of causally relevant details that are identified after an event (Sherman et al., 1999; Model 3; see Figure 3). On the other hand, it is possible that as individuals focus on causal features of the problem to a greater extent and therefore possess more causally relevant details, negative affect is amplified (Nisbett & Ross, 1980; Model 4; see Figure 4). In the current work I will compare the fit of the four models to determine which model or models best explain the goal importance counterfactual activation relationship.

Alternative explanation. In the current work I posit that an increase in goal importance increases the attention one directs at a problem and its causes. Although this hypothesis is derived from previous work (Martin & Tesser, 1996; Moberly & Watkins, 2010), an increase in goal importance may cause a more general increase in thought. That is, when individuals encounter problems in the goal pursuit process, it is possible that all types of thought increase when goals are highly important (not just thoughts focused at understanding a problem and its causes) and this overall increase in thought explains the relationship between goal importance and counterfactual activation. This general increase in thought alternative mechanism is particularly problematic for the models that include attention on the problem (Models 2, 3 and 4), since I argue that goal importance specifically increases attention directed at the problem (not all types of thought). The current work attempted to rule out this alternative explanation by assessing other types of thought (aside from attention on the problem) that participants might experience after encountering a problem in the goal pursuit process (e.g., thoughts focused on feelings, thoughts focused on non-causally relevant features of the event).

Summary of Current Work

To summarize, the current work investigated the goal importance counterfactual activation relationship as well as potential mechanisms in three studies. The Pilot Study investigated the direct relationship between goal importance and counterfactual activation. Study 1 further explored this relationship by testing if goal importance causes negative affect to increase, and also if goal importance causes a change in the extent to which an individual directs attention on the problem. In addition to testing these causal relationships, Study 1 tested if the hypothesized mediators explain the goal importance counterfactual activation relationship via any of the four possible models described above. Study 2 manipulated participants' attention following a negative event to examine the causal role that attention directed at the problem and negative affect play in the goal importance counterfactual activation relationship.

Pilot Study

The Pilot Study was conducted to establish the relationship between goal importance and counterfactual activation. In addition to assessing counterfactual frequency, the Pilot Study offered an opportunity to explore the negative affect mechanism and possible confounds (e.g., overall thinking, perceptions of unexpectedness and severity).

Participants

A sample of 264 undergraduates (M_{age} = 18.72, SD_{age} = 0.86; 68.82% female) was recruited from the Miami University psychology participant pool. Participants received credit toward their research requirement in an introductory course for their participation in this study.

Materials

Goal importance manipulation. Goal importance was manipulated by asking participants to recall a very important goal (high importance condition) or slightly important goal (low importance condition) they had over the past year (adapted from Shah, Friedman, & Kruglanski, 2002; see Appendix A). After thinking of the goal of their choice, participants were asked to describe this goal in an essay textbox.

Negative event recall. Participants recalled a negative event that occurred related to the goal they described (see Appendix B). Specifically, participants were asked to recall an event in the last year in which they did something or did not do something that led to a negative outcome related to the goal they previously described. After thinking of the negative event of their choice, participants described this negative event in a large essay textbox.

Open-ended thought listing. Since the current work investigated if goal importance activates counterfactual thought, participants were not directly asked to generate counterfactual thoughts. Rather, participants were asked to list the thoughts that were "running through their mind" at that moment (see Appendix C). Participants were not given a time limit for this task. This provided an opportunity to assess whether participants naturally generated counterfactual thoughts when thinking about the negative event. Participants listed these thoughts in a large essay textbox.

Negative affect. Participants rated the negative affect they experienced when recalling the event (adapted from Roese, 1994) on a bipolar 11-point scale ranging from -5 (*very negative*) to 5 (*very positive*; see Appendix D).

Manipulation check. Participants were asked to rate the importance of the goal they previously described on a 7-point scale ranging from 1 (*not at all*) to 7 (*extremely*; see Appendix D).

Possible confounds.

***Time spent writing*.** As noted in the introduction, it is possible that an increase in goal importance generally increases overall thought and this explains the relationship between goal importance and counterfactual activation. As an initial attempt to rule out overall thinking as a mechanism for the hypothesized goal importance counterfactual activation relationship, the negative event recall task and spontaneous counterfactual elicitation task were timed. In addition, the number of words written in each of these two tasks was computed. The negative event timing, counterfactual writing timing, the negative event word count, and the counterfactual writing word count variables were significantly correlated (rs > .37, ps < .001). The data were log-transformed to correct for skewed distributions (skewness = 1.83, 1.86, 2.82, 1.38), standardized, and a composite *time spent writing* variable was calculated (α = .83).

On inspection of the timing data, it was clear some participants spent little time on the various writing tasks (e.g., describing a negative event in less than 5 seconds). The experimenters running the study also noted concerns about some participants going through the study at unrealistic speeds (e.g., completing the entire study in 1 minute). For this reason, it was apparent that some participants should be excluded from analyses. Participants were excluded from analyses if they skipped the negative event task without writing anything (5 participants) or if the experimenters noted that the participant went through the study at an unrealistic speed (i.e.,

approximately 1 minute; 7 participants). This resulted in 12 participants being excluded from all remaining analyses. The pattern of results was unchanged when these participants were included.

Severity. It is also possible to argue that goal importance influences perceptions of severity (Carver & Scheier, 1990). That is, individuals who view a goal as high in importance (relative to low in importance) may perceive the negative event to be more severe, which may influence negative affect and, in turn, the likelihood of counterfactual thoughts. To investigate this potential relationship participants answered three questions assessing the severity of the negative event they described (see Appendix D), including how negative, bad, and severe the event was ($\alpha = .89$). Responses were on 7-point scales ranging from 1 (*not at all*) to 7 (*very negative; very bad; very severe*; adapted from White & Lehman, 2005).

Unexpectedness. It is also possible to argue that goal importance influences the unexpectedness of an event. Compared to low importance goals, when an individual experiences a negative event in a domain in which the goal is high in importance, that negative event may be perceived as more unexpected and abnormal (Eccles & Wigfield, 2002). Although perceptions of unexpectedness should primarily influence the content of a counterfactual thought (Roese & Hur, 1997; Sanna & Turley, 1996), this construct was included as a potential confound. Participants answered three questions assessing how unexpected, typical, and predictable the event was on 7-point scales ranging from 1 (*not at all*) to 7 (*very unexpected; very typical; very predictable*; see Appendix D). The typical and predictable questions were reverse-scored ($\alpha = .65$).

Procedure

Participants came to the lab for a study about "how people react to different events." The entire study took place on a computer. After providing written informed consent, participants were seated in an individual computer cubicle. The computer software randomly assigned participants to the high or low goal importance condition. Based on this random assignment, participants were asked to recall a high or low importance goal they had over the past year. After describing the goal, participants moved to another screen, which asked them to think about a related negative event that occurred to them in the domain of the described goal. Participants described this negative event using as much space and time as needed. Next, participants rated the negative affect they experienced when recalling the event, before moving on to the open-ended thought listing task, in which participants were asked to write about their reactions to the

event. Finally, participants completed the manipulation check, answered the questions assessing event severity and unexpectedness, and were debriefed.

Results

Coding of counterfactuals. Trained coders (two per thought) blind to condition and hypotheses coded for counterfactual direction (upward versus downward). For instance, if a participant wrote, "if only I studied more, then I would have performed better on the exam," this would be coded as one counterfactual that is upward. The inter-rater reliability was good (κ = .81, $p < .001$). 16.67% of participants generated counterfactuals (40 were upward and 2 were downward in direction).

Preliminary analyses. See Table 1 for the descriptives and correlations for the Pilot Study variables. The manipulation check confirmed that the goal importance manipulation was successful, such that participants in the high importance condition recalled significantly more important goals (M = 6.32, SD = 1.04) than participants in the low importance condition (M = 4.69, SD = 1.16), $t(250) = 11.76$, $p < .001$, d = 1.48.

Preliminary analyses also explored if goal importance influenced participants' perceptions of the recalled event (i.e., event severity, unexpectedness). Participants in the high importance condition viewed the negative event as significantly more severe (M = 4.31, SD = 1.47) than participants in the low importance condition (M = 3.46, SD = 1.27), $t(250) = 4.93$, $p < .001$, d = .62. Additionally, participants in the high importance condition rated their negative event as significantly more unexpected (M = 4.13, SD = 1.23) than participants in the low importance condition (M = 3.54, SD = 1.26), $t(250) = 3.81$, $p < .001$, d = .47.

Goal importance and counterfactual frequency. The main purpose of this Pilot Study was to demonstrate that goal importance influences counterfactual frequency. To test if goal importance predicted counterfactual frequency, a Poisson regression analysis was conducted. First, counterfactual frequency was regressed onto the dichotomous goal importance condition variable (0 = low importance, 1 = high importance). As expected, this analysis revealed that condition was a significant predictor of counterfactual frequency, β = .58, p = .04, when frequency was regressed on condition independently. An additional analysis was conducted controlling other potentially influential variables. Specifically, counterfactual frequency was regressed onto event severity and unexpectedness (covariates), as well as the goal importance condition variable. This analysis revealed that condition was not significantly related to

counterfactual frequency when controlling for these covariates, β = .49, *p* = .11, and the covariates of severity (β = -.07, *p* = .55) and unexpectedness (β = -.06, *p* = .57) were not related to counterfactual frequency.

A second analysis was conducted using the manipulation check variable as a predictor (as opposed to the dichotomous condition variable). First, counterfactual frequency was regressed onto the manipulation check variable. As expected, the manipulation check variable significantly predicted counterfactual frequency, β = .26, *p* = .02, when frequency was regressed on the manipulation check variable independently. An additional analysis was conducted in which counterfactual frequency was regressed onto event severity and unexpectedness (covariates), as well as the manipulation check variable. As expected, the manipulation check variable was significantly related to counterfactual frequency when controlling for these covariates, β = .24, *p* = .04, and the covariate covariates of severity (β = -.10, *p* = .44) and unexpectedness (β = -.06, *p* = .57) were not related to counterfactual frequency. Thus, consistent with hypotheses, rated goal importance predicted counterfactual frequency in three of four analyses.

These analyses were repeated using counterfactual presence/absence as the dependent variable. When using the condition variable as the predictor, the relationship between condition and counterfactual presence/absence dropped to nonsignificance, *p* = .28. However, the manipulation check marginally predicted counterfactual presence/absence, *p* = .08.

Negative affect and counterfactual thought. I then examined if negative affect is one mechanism through which goal importance influences counterfactual activation. I first tested if goal importance influenced negative affect. Consistent with hypotheses, participants in the high goal importance condition reported significantly more negative affect (*M* = -2.52, *SD* = 2.02) than participants in the low goal importance condition (*M* = -1.65, *SD* = 1.45), *t*(225.79) = 3.93, *p* < .001, *d* = .50. Next, I regressed counterfactual frequency onto negative affect. Against predictions, negative affect did not significantly predict counterfactual frequency β = -.14, *p* = .09. This nonsignificant relationship between negative affect and counterfactual frequency precluded a test of the indirect effect.

Negative affect did, however, predict counterfactual presence/absence, *p* = .02, such that as negative affect increased, counterfactuals were more likely to be generated. The confidence interval around the indirect effect did not contain zero (95% CI [.0455, 0754]), indicating that

negative affect mediated the relationship between goal importance and counterfactual presence/absence.

Overall thinking alternative explanation. Lastly, I examined if goal importance influenced participants' overall time spent writing about the event. An independent samples *t* test was conducted to test if participants in the high importance condition spent more time writing than participants in the low importance condition. This analysis revealed that there was no difference between the high and low goal importance conditions, $t(250) = 1.48$, $p = .14$, $d = .29$. Additionally, overall time spent writing did not significantly predict counterfactual frequency, $\beta = 1.06$, $p = .09$. This pattern did not change when using counterfactual presence/absence as the dependent variable.

Discussion

The findings from the Pilot Study provided initial evidence that goal importance influences counterfactual frequency. That is, when individuals viewed a goal as important to the self, they were more likely to generate counterfactual thoughts. The Pilot Study also offered some initial insight into why goal importance influences counterfactual frequency. First, this study provided preliminary evidence that overall thinking about an event is not a mechanism through which goal importance influences counterfactual frequency. It is possible to argue that goal importance generally makes people think more and counterfactuals happen to increase as a result of this general increase in thought. However, the nonsignificant overall time spent writing relationships suggest that more specific changes in cognition (as opposed to a general increase) may explain why goal importance predicts counterfactual activation. The current study also suggested that negative affect may be a mechanism through which goal importance influences counterfactual frequency. With counterfactual frequency as the dependent variable, all hypothesized relationships were significant except for the relationship between negative affect and counterfactual frequency. Moreover, with counterfactual presence/absence as the dependent variable, negative affect mediated the relationship between goal importance and counterfactual activation. This provides partial support to Model 1, and suggests that a more controlled design that manipulates a negative event in the lab (rather than a recalled negative event) may provide a better test of this mechanism.

As suggested above, the Pilot Study had some limitations that needed to be addressed in subsequent studies. First, the negative event was not controlled, as participants were able to

select their negative event of choice. The events that participants selected may have differed on a number of dimensions aside from goal importance (e.g., goal complexity, temporal distance of the negative event; Austin & Vancouver, 1996; Rim & Summerville, 2014). Moreover, because participants selected their own goal and negative event, it is possible that participants valued the relevant goal differently than the initial goal they described. For instance, if a participant listed academics as the highly important goal but then described a negative event that occurred in a class that is not related to his or her major, then it is possible that the relevant goal was less important to the self than the study actually captured. It is also possible that participants described a negative event that was related to multiple goals (i.e., goal multifinality; Kruglanski et al., 2002). For example, a participant may have listed staying fit as his or her low importance goal and then described gaining a few pounds as the negative event. Even though gaining a few pounds is related to the goal of staying fit, this negative event may also be related to goals that are more important to the self, such as one's relationship with a significant other. Thus, the lack of experimental control over the negative event and relevant goal may have been a less than ideal design to examine the relationship between goal importance and counterfactual frequency. In order to address these concerns, Study 1 employed an experimental negative event paradigm from the counterfactual literature.

Study 1

The Pilot Study provided initial support to the prediction that goal importance increases counterfactual activation. Using an experimentally controlled design, Study 1 examined if manipulated goal importance has a causal effect on the mediators of negative affect and attention on the problem. Study 1 also attempted to replicate the goal importance counterfactual activation relationship obtained in the Pilot Study and test the indirect effects of the four models. I predicted that participants in the high goal importance condition would direct attention on the problem to a greater extent and experience more negative affect than participants in the low goal importance condition. Moreover, I predicted that these mediators would explain the relationship between goal importance and counterfactual activation. That is, an increase in goal importance would cause participants to direct attention on the problem to a greater extent, which would lead to an increase in causally relevant details identified (listed in an open-ended thought listing task), which would increase counterfactual activation. In addition, I predicted that an increase in goal importance would cause negative affect to increase, which would lead to an increase in

counterfactual activation. Finally, Study 1 offered an opportunity to compare the model fit of the four possible models to determine which model or models provide a superior fit.

Participants

A sample of 193 participants was recruited from Amazon's Mechanical Turk worker pool (M_{age} = 34.25, SD_{age} = 10.52; 55.21% male). Participants volunteered for the study on a first-come, first-served basis and were compensated financially for their time. Participation was limited to U.S. workers only, and participants needed to have a 90% approval rating or higher to qualify for the study.

In order to calculate the a priori sample size, a power analysis was conducted. Given that most studies assessing counterfactuals explicitly ask participants to generate counterfactual thoughts, estimating the number of counterfactuals that would be generated per participant in each condition proved to be a challenge. A few studies assessing spontaneous counterfactual thought report a mean counterfactual frequency of approximately one thought per participant (Roese & Hur, 1997; Sanna & Turley, 1996). However, in the Pilot Study, counterfactuals were significantly less frequent than one per participant, although the Pilot Study used recalled negative events (*M* counterfactuals high goal importance participants = .27; *M* counterfactuals low goal importance participants = .15). Thus, taking these findings into account, I estimated that there would be 0.54 counterfactuals per person in the high importance condition and 0.30 counterfactuals per person in the low goal importance condition. G*Power 3.1 indicated that in a logistic regression framework at 95% power, 183 participants would be required. Furthermore, in the Pilot Study, 4.5% of participants were excluded for not attending to the study. I therefore oversampled by 9 participants (Mechanical Turk collected an additional participant), which resulted in a final sample size of 193.

Adequate sample size has been the subject of much debate recently in the SEM literature. It had been previously recommended that researchers obtain 20 participants per parameter (Tanaka, 1987), although scholars have recently suggested that the 20 participants per parameter estimate is unrealistically high (Kenny, 2015) and it can result in samples so large that some fit indices (e.g., chi-square) should be disregarded (Moss, 2016). Thus, the a priori sample size estimates for Study 1 (approximately 17 participants per parameter) provided adequate power to test the four models. Because exclusions were higher than anticipated, there were only 13 participants per parameter, which is still considered adequate to test model fit.

Materials

Goal importance manipulation. The instructions for the anagram task (see below) were identical between conditions except for a small change in the description of the task. In order to manipulate the importance of the goal in an online setting, participants in the high importance condition were told, "this task will determine whether you are eligible to participate in future studies from our lab with substantially higher pay rates. In order to qualify for our future studies, you must perform well on this task." Participants in the low importance condition were not given these additional instructions (see Appendix E).

Anagrams. The anagrams (Shah, Higgins, & Friedman, 1998) and the task (Dyczewski & Markman, 2012; Roese, 1994) were adapted from previous research (see Appendix F). Participants were presented with ten 5-letter anagrams, and each anagram contained between zero and four solutions (e.g., LPSIL has the solutions SPILL and PILLS). Some anagrams contained zero solutions because participants needed to believe their performance was below average. Participants were told that they had 60 seconds to solve each anagram, and the computer was going to award them points for how quickly they correctly solved each anagram. Specifically, the instructions informed participants that they could receive a maximum of 60 points per anagram. However, the longer it took participants to solve the anagram, the fewer points they would receive for correctly solving the anagram (1 point was deducted per second). After 60 seconds elapsed, the computer automatically advanced participants to the next anagram. Participants were instructed that if the 60 seconds passed without an answer being submitted, an extra 25 points would be deducted from their total score. This provided participants with the incentive to skip an anagram if they did not think they could solve it. In addition to the point values, participants were ostensibly given the opportunity to select the difficulty level of the anagram task they would complete ("easy" vs. "difficult"). Participants were told that, if they chose the difficult task, they would receive 10 bonus points for each correctly solved anagram. In actuality, all participants completed the same anagram task. These extra components were added to the task in order to maximize the number of features that participants could potentially mutate. Upon completion of the anagram task, a "calculating" screen appeared ostensibly calculating the participant's anagram score. All participants received feedback indicating that they performed poorly compared to other participants in the study.

Although participants were led to believe that there were two trials of the anagram task, there was no second trial. Participants were led to believe there was going to be a second anagram task so they had reason to reflect on their performance on the initial anagram task (Markman et al., 1993; Roese & Olson, 1995; Roese & Summerville, 2005; Summerville, 2011). If participants did not have reason to continue to pursue the goal of performing well on the anagram task (e.g., because there is no future opportunity), they likely would disengage from that goal (Klinger, 1977).

Attention on the problem. In order to assess attention directed at the problem, participants answered three questions (see Appendix D). Specifically, participants were asked to rate their agreement with the following questions: "I am focused on my anagram performance"; "I am thinking about the causes and situational features that may have contributed to my performance"; "I am thinking about the strategies I used while completing the anagrams." Responses were rendered on a 7-point scale ranging from 1 (*not at all*) to 7 (*very much so*; adapted from Moberly & Watkins, 2010; $\alpha = .71$).

Since it is possible that participants may not be consciously aware of this shift in attention and the self-report measure may not be an adequate method of assessing attention on the problem (cf. Martin & Tesser, 1996), Study 1 also included a non-self-report, behaviorally-based measure of attention on the problem. Participants completed a measure that assessed what information they were interested in viewing prior to the second anagram task. Presumably, if participants were directing their attention towards understanding causes of the problem, they would be most interested in viewing information that would help them understand that problem. Participants were provided with a number of short titles referring to information that they ostensibly would be able to view before the second anagram task. One title described information that almost certainly would provide causally relevant details ("Common anagram mistakes"), whereas the remaining 3 titles referred to information that most likely would not provide causally relevant details ("How the point scoring system was designed", "How the anagrams were selected", "Figure depicting how past participants have performed"). As with the second anagram set, participants were not presented with any of this information.

Overall increase in attention and thinking. As noted in the introduction, it is possible that an increase in goal importance causes all types of thinking to increase, and this overall increase explains the goal importance counterfactual activation relationship. In order to rule out

this alternative explanation using a different methodology than the Pilot Study, participants completed a 5-item measure assessing other types of thinking (aside from attention directed at the problem) one might experience after the negative event (see Appendix D). Specifically, participants were asked to rate the extent to which they were focused on their feelings (2-items; Nolen-Hoeksema, 1991) and the extent to which they were focused on aspects of the task that would not provide causally relevant details (3-items; e.g., "I am thinking about who designed these anagrams"). Responses were rendered on a 7-point scale ranging from 1 (*not at all*) to 7 (*very much so*). An exploratory varimax rotated principal components analysis was conducted to examine if this 5-item measure formed a single composite variable of "other thinking." This analysis indicated a single factor solution (λ=2.59) and moderate reliability was observed (α = .77). Thus, a single composite variable of overall thinking was created.

Open-ended thought listing. Participants were asked to list the thoughts they were currently having about the negative event in order to assess counterfactual activation as well as causally relevant details identified (see Appendix C).

Manipulation check. Participants rated how important the goal of performing well on the anagram task was on a 1 (*not at all*) to 7 (*extremely*) scale (see Appendix D).

Attention check. Because there were a number of participants who did not attend to the task in the Pilot Study, an attention check was added in Study 1, asking participants to respond to the following question: "Please select option '5' below." Responses for the attention check were rendered on 1 (*not at all*) to 7 (*extremely*) scale. Two participants failed this attention check and were excluded from analyses. Including these participants did not change the pattern of results.

Negative affect. Affect was assessed via two measures. First, participants rated their affect on a bipolar 11-point scale ranging from -5 (*very negative*) to 5 (*very positive*; Roese, 1994). In addition, participants completed the negative affect items from the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; see Appendix D). Responses to the PANAS questions were rendered on a 1 (*very slightly or not at all*) to 5 (*extremely*) scale (α = .92).

Severity. As in the Pilot Study, participants answered three questions assessing how negative, bad, and severe the event was on 7-point scales ranging from 1 (*not at all*) to 7 (*very negative; very bad; very severe*; see Appendix D; α = .88).

Unexpectedness. As in the Pilot Study, participants answered three questions assessing how unexpected, typical, and predictable the event was on 7-point scales ranging from 1 (*not at all*) to 7 (*very unexpected; very typical; very predictable*; see Appendix D; $\alpha = .67$).

Funneled debriefing. Participants were asked if anything was unusual about the study. In addition, participants were asked if they left the study at any point (and why) as well as if they used an anagram solver or another tool to help them during the anagram task. Participants were told that their responses to these questions would not impact their ability to participate in future studies from our lab or their payment. A total of 43 participants fit these exclusion criteria. Specifically, 32 participants indicated that they did not believe the task or their score, 8 participants indicated that they cheated on the task, and 3 participants admitted to leaving the task to do other things. Additionally, coders agreed that 6 participants did not put effort into the task (e.g., only writing expletives in the open-ended thought listing). In combination with the participants who failed the attention check (2), these exclusions resulted in a final sample size of 142. Participants in the high goal importance condition were no more likely to be excluded than participants in the low goal importance condition, $p = .48$.

Procedure

Participants volunteered for a study about verbal reasoning. At the beginning of the study, all participants were informed that they would complete two separate trials of an anagram task. Half of the participants were randomly assigned to the high goal importance condition and half were assigned to the low goal importance condition. After receiving the instructions for their respective conditions, participants completed the anagram task. All participants then received false feedback indicating that they performed poorly on the task relative to other participants in the study. Participants were instructed to click the continue button when they were ready to move on. Next, participants responded to the attention on the problem questions, the overall increase in attention and thinking questions, and rated their negative affect. Participants continued to a new page in which they listed any thoughts they had about the event (open-ended thought listing). Next, participants were asked to select which one of the four pieces of information they would like to view before the second anagram task began. Again, participants were not actually presented with this information. This information selection task followed the open-ended thought listing in order to prevent priming participants with the titles, since those titles could have encouraged participants to direct attention towards certain features of the task. Finally,

participants completed the manipulation check, attention check, questions assessing event severity and unexpectedness, and the funneled debriefing. Finally, participants were debriefed and informed that there was no second anagram task, that the feedback was predetermined, and that the task was rigged for failure.

Results

Preliminary analyses. See Table 2 for the descriptives and correlations for the Study 1 variables. An independent samples *t* test was conducted to ensure the manipulation was successful. Participants in the high goal importance condition did not differ in ratings of the importance of performing well on the task (M = 4.80, SD = 1.68) from participants in the low goal importance condition (M = 4.34, SD = 1.73), $t(140) = 1.60$, $p = .11$, $d = 0.27$.

Additional independent samples *t* tests were then conducted to examine if there were differences between conditions on perceptions of severity and expectedness, as observed in the Pilot Study. Participants in the high goal importance condition did not view the event as more severe or unexpected relative to participants in the low goal importance condition, ts < 1.65, ps >.10, ds < 0.28.

Coding of counterfactuals. Two trained coders blind to condition (one of whom was blind to hypotheses) coded for counterfactual direction to assess counterfactual activation. The inter-rater reliability for the counterfactual coding was excellent ($\kappa = 1.00$, $p < .001$). Through this coding, it became apparent participants infrequently generated counterfactual thoughts, as only 6.3% of participants generated a counterfactual thought (all were upward in direction).

In addition to coding the counterfactuals, the coders evaluated the thought listing for the number of distinct causally relevant details (e.g., situational features, possible causes of the outcome) that participants listed. A feature was coded as a causally relevant detail if the coder believed the participant was describing a feature of the event that might have caused the outcome. In order for a feature to qualify as causally relevant, it was required that the participant explicitly state or imply that the feature in question contributed to the outcome. For instance, if a participant wrote, "I think I went a little bit too fast when completing the first few anagrams," this was counted as one causally relevant detail since the participant is suggesting that his or her speed may have played a role in the outcome. The features could be about the event itself, the participants' action or inactions, or the participant's own life (e.g., how s/he is feeling). However, for a statement to qualify as a causally relevant detail, the participant must have cited a

specific feature. If a participant wrote, "I screwed up on the first anagram," this would not count as a causally relevant detail since the participant did not clearly identify a feature of the event that might have contributed to his or her performance. Inter-rater reliability for the causally relevant detail coding was excellent ($\kappa = .94$, $p < .001$). The coders resolved disagreements via discussion (while blind to condition).

Analytic strategy for counterfactual activation. Counterfactuals were generated infrequently in Study 1, as only 6.3% of participants generated a counterfactual. The scarcity of the event of interest can create a problem for logistic regression models with smaller sample sizes (King & Zeng, 2001). That is, when the outcome is dichotomous and one of those events is much more infrequent than the other, a logistic regression model can underestimate the probability of the rare event. In order to reduce the amount of bias in logistic regression models in these cases it is recommended that researchers employ the Firth method (also referred to as penalized likelihood; King & Zeng, 2001) to reduce small-sample bias in maximum likelihood estimation. In the upcoming logistic regression analyses, I employed this method in order to reduce the amount of bias in those models.[2] When the logistic regression analyses were conducted using the standard maximum likelihood method, the results were nonsignificant.

Model 1. In order to test the effect of goal importance on counterfactual activation, one of the steps in Model 1 (see Figure 1), I conducted a logistic regression, using the Firth method (King & Zeng, 2001), in which counterfactual presence/absence was regressed onto the dichotomous goal importance condition variable (0 = low importance, 1 = high importance). Contrary to predictions, this analysis indicated that goal importance condition was not a significant predictor of counterfactual presence/absence, $\beta = .54$, $\chi^2 = 0.66$, $p = .42$, OR = 1.72 (4.5% of participants [n=3] in the low importance condition and 8% of participants [n=6] in the high importance condition generated counterfactuals). A similar analysis was conducted including the covariates of severity and unexpectedness. In this analysis, counterfactual presence/absence was regressed onto event severity and unexpectedness (covariates), as well as

[2] Standard maximum likelihood regression suffers from small sample-size bias and the degree of bias is strongly dependent on the number of cases in the less frequent category. The fewer cases in that less frequent category, the less accuracy the model will have in predicting the likelihood of the rare outcome. To reduce the amount of bias in the model, the Firth method incorporates a penalty term in the regression equation. The effect of the penalty term is to shrink the final estimates away from the maximum likelihood estimates in order to predict the rare outcome.

the goal importance condition variable. This analysis revealed that goal importance was not related to counterfactual activation, β = .36, χ^2= 0.27, *p* = .60, OR = 1.43, nor was unexpectedness, β = -.21, χ^2= 0.82, *p* = .34, OR = 0.81. However, event severity significantly predicted counterfactual presence, β = 0.47, χ^2= 4.49, *p* = .03, OR = 1.60. As perceptions of event severity increased, counterfactual activation also increased. Using the manipulation check as a continuous measure of goal importance partially changed this pattern of results. The continuous measure of goal importance was marginally related to counterfactual presence/absence without the covariates in the model, β = .41, χ^2= 3.08, *p* = .08, OR = 1.50, but was not related to counterfactual presence/absence with the covariates in the model, β = .31, χ^2= 1.28, *p* = .26, OR = 1.37. In sum, one of four analyses revealed that goal importance was marginally related to counterfactual activation.

In order to test if goal importance increased participants' negative affect, one of the steps in Model 1, I conducted an independent samples *t* test examining if negative affect differed between goal importance conditions. Against predictions, negative affect did not differ between goal importance conditions when measured by the PANAS, *t*(140) = 1.28, *p* = .20, *d* = 0.22 (high importance *M* = 1.99, *SD* = 0.93; low importance *M* = 1.80, *SD* = 0.83), or the bipolar measure of negative affect, *t*(140) = 0.20, *p* = .84, *d* = 0.03 (high importance *M* = -1.45, *SD* = 2.34; low importance *M* = -1.37, *SD* = 2.54). Using the manipulation check as a continuous measure of goal importance did not change the pattern of results for the bipolar measure of negative affect, β = -.13, *t*(140) = -1.58, *p* = .12. However, the manipulation check was significantly related to negative affect measured by the PANAS, β = .30, *t*(140) = 3.67, *p* < .001, such that as goal importance increased, negative affect also increased.

In order to test if negative affect increased counterfactual presence/absence, the next step in Model 1, I regressed counterfactual presence/absence onto negative affect. Consistent with predictions, this analysis revealed that negative affect, measured by the PANAS, significantly predicted counterfactual presence, β = .07, χ^2= 4.55, *p* = .03, OR = 1.07. Additionally, negative affect, when assessed by the bipolar measure, significantly predicted counterfactual presence, β = -.39, χ^2= 5.63, *p* = .02, OR = 0.68. Replicating past work (e.g., Roese & Hur, 1997), both of these analyses indicated that as negative affect increased, counterfactual activation also increased.

Finally, I tested the indirect effect of goal importance (measured by the manipulation check) on counterfactual presence/absence via negative affect (PANAS). Against predictions, the confidence interval around the indirect effect contained zero (95% CI [-.0008, .2084]), indicating that negative affect did not mediate the relationship between goal importance and counterfactual presence/absence.

Model 2.

Goal importance attention on problem direct effect. In order to test if goal importance increased attention on the problem, one of the steps in Model 2, I conducted an independent samples *t* test examining the difference in self-reported attention on the problem between goal importance conditions. Contrary to predictions, attention directed towards the problem did not differ between the low ($M = 4.21$, $SD = 1.60$) and high ($M = 4.40$, $SD = 1.38$) importance conditions, $t(140) = 0.73$, $p = .47$, $d = 0.12$. However, there was a relationship between goal importance and attention on the problem when using the manipulation check as a continuous measure of goal importance, such that an increase in rated goal importance was associated with an increase in attention on the problem, $\beta = .55$, $t(140) = 7.76$, $p < .001$.

I also examined if goal importance impacted the non-self-report measure of attention on the problem. That is, I examined if there was a relationship between goal importance condition and what information participants wanted to be presented with before the second anagram task. I conducted a 2 (condition: high vs. low importance) X 2 (information: problem-focused [common mistakes] vs. not problem-focused [point system, anagram selection, others' performance]) chi-square analysis, which revealed that there was no relationship between condition and information, $\chi^2(1,N=141) = .82$, $p = .36$ (47.8% of participants [n=32] in the low importance and 54.7% of participants [n=41] in the high importance condition selected the problem-focused information). Similarly, when using the manipulation check as a continuous measure of goal importance as a predictor, there was not a relationship between importance and type of information, $\beta = .08$, $t(140) = 0.99$, $p = .33$

These analyses provide inconsistent evidence that goal importance influences participants' attention directed at the problem, as only the manipulation check and self-reported measure of attention were related. Despite these inconsistent results, the two measures of attention directed on the problem did appear to be internally valid, as the self-report measure of attention on the problem was marginally related to the dichotomous information selection

variable (not problem-focused = 0, problem-focused = 1), β = .16, $t(139) = 1.91$, $p = .06$. Participants reported directing more attention towards the problem when they selected the problem-focused information (relative to the non-problem-focused information).

Attention the problem causal details direct effect. In order to test if attention on the problem increased causal details identified, one of the steps in Model 2, I regressed causal details identified onto the self-report attention on the problem variable. In support of predictions, this relationship was significant, β = .21, $t(140) = 2.56$, $p = .01$, such that as self-reported attention directed on the problem increased, so did the number of causally relevant details generated. The non-self-report measure of attention on the problem was not included in this analysis, as that variable was unrelated to goal importance, which is a requirement for Model 2.

Causal details counterfactual activation direct effect. In order to test the effect of causal details identified on counterfactual activation, one of the steps in Model 2, I regressed counterfactual presence/absence onto the causal details identified variable using the Firth method. This analysis revealed that the number of causal details identified significantly predicted counterfactual activation β = 1.80, $\chi^2 = 16.53$, $p < .001$, OR = 6.04. That is, as causal details increased, counterfactual activation also increased.

Goal importance causal details via attention on problem indirect effect. I then tested the indirect effect of goal importance on causal details identified via attention on the problem, one of the steps in Model 2. The confidence interval around the indirect effect did not contain zero (95% CI [.0105, 0881]), indicating that self-reported attention on the problem mediated the relationship between goal importance and the number of causal details identified.

Attention on problem counterfactual activation via causal details indirect effect. I then tested the indirect effect of attention on the problem on counterfactual activation via causal details identified, one of the steps in Model 2. The confidence interval around the indirect effect contained zero (95% CI [−.0004, .4397]), revealing that the indirect effect of attention on the problem on counterfactual activation through causal details was not significant.

Serial mediation indirect effect. The above analysis revealed that the indirect effect of attention on the problem on counterfactual activation via causal details identified was not significant. This nonsignificant component of Model 2 precluded a test of the full serial mediation model (i.e., goal importance → attention on the problem → causally relevant details → counterfactual activation).

Model 3. Study 1 offered the opportunity to test the full serial mediation Model 3. Many of the relationships for Model 3 are described above (see Model 2 analyses). Specifically, Model 3 is the similar to Model 2, except in Model 3 negative affect mediates the relationship between goal importance and attention shift. In order to complete the remaining simple effect analyses in this model, I examined if negative affect was related to attention on the problem. Negative affect when measured by the PANAS significantly predicted the self-report measure of attention on the problem, $\beta = .348$, $t(140) = 4.39$, $p < .001$. However, the bipolar measure of negative affect was unrelated to the self-report measure of attention on the problem, $\beta = -.05$, $t(140) = -.65$, $p = .52$. Both measures of negative affect were also unrelated to the non-self-report measure of attention on the problem, βs < .02, ts < 0.24, ps > .81. I therefore tested the indirect effect of goal importance (manipulation check) and attention on the problem (self-report) via negative affect (PANAS). The confidence interval around the indirect effect did not contain zero (95% CI [.0117, .1102]), indicating that negative affect (PANAS) mediated the relationship between goal importance (manipulation check) and attention on the problem. However, the indirect effect of negative affect (PANAS) on causal details via attention on the problem was not significant (95% CI [.0003, .0097]). Also, as described in the Model 2 analyses, the indirect effect of attention on the problem and counterfactual activation via causal details identified was not significant, precluding a test of the full serial mediation model.

Model 4. Study 1 also offered the opportunity to test the full serial mediation Model 4. Model 4 is similar to Model 2, except in Model 4 negative affect mediates the relationship between causally relevant details and counterfactual activation. Thus, most of the simple effect analyses are describe above (see Model 2). In order to complete the simple effect analyses for Model 4, I examined if causal details identified predicted negative affect. Causal details identified significantly predicted the bipolar measure of negative affect, $\beta = -.19$, $t(140) = -2.23$, $p = .03$, but causal details was unrelated to the PANAS measure of negative affect, $\beta = .11$, $t(140) = 1.32$ $p = .19$. I therefore examined the indirect effect of attention on the problem and negative affect (bipolar) via causal details identified. The confidence interval around the indirect effect did not contain zero (95% CI [-.1889, .0085]), indicating that causal details mediated the relationship between attention on the problem and negative affect. I also examined the indirect effect of causal details identified and counterfactual activation via negative affect (bipolar). The confidence interval around the indirect effect contained zero (95% CI [-.0917, .8257]), indicating

that negative affect (bipolar measure) did not mediate the relationship between causal details identified and counterfactual activation. This nonsignificant indirect effect precluded a test of the full serial mediation model.

Summary of models. The results described above provided partial, yet inconsistent, support for the proposed models. Goal importance was largely unrelated to counterfactual activation, as only one of four analyses revealed that goal importance was marginally related to counterfactual activation (goal importance manipulation check without covariates). In Model 1, only one of four analyses revealed that goal importance was related to negative affect (goal importance manipulation check and PANAS). Although both measures of negative affect predicted counterfactual activation, the indirect effect of goal importance (manipulation check) and counterfactual activation via negative affect (PANAS) was not significant.

In Model 2, goal importance predicted attention on the problem in only one of four analyses (goal importance manipulation check with self-report attention on the problem measure). However, attention on the problem was significantly related to causal details identified, and causal details identified significantly predicted counterfactual activation. The indirect effect of goal importance (manipulation check) and causal details identified via attention on the problem was significant, but the indirect effect of attention on the problem and counterfactual activation via causal details identified was not significant.

In Model 3, the relationship between negative affect and attention on the problem was significant in one of two analyses (PANAS measure of negative affect). Although the indirect effect of goal importance (manipulation check) on attention on the problem via negative affect (PANAS) was significant, the indirect effect of attention on the problem and counterfactual activation via causal details identified was not significant.

In Model 4, the relationship between causal details identified and negative affect was significant in one of two analyses (bipolar measure of negative affect). However, the indirect effect of causal details identified and counterfactual activation via negative affect (bipolar) was not significant.

Comparing model fit. The above summaries suggest that Models 1 and 2 would have the most acceptable model fit, whereas Models 3 and 4 would have poor fit for the fit indices. I compared the model fit of the four models using MPlus (see Table 3 for model fit statistic summary). The following values were considered indicative of an acceptable fit: values less than

or equal to .06 for the root mean square error of approximation (RMSEA), values less than or equal to .08 for standardized root mean square residual (SRMR), values greater than or equal to .95 for the comparative fit index (CFI), and a chi-square value with $p > .05$ (Hu & Bentler, 1999; Schermelleh-Engel, Moosbrugger & Müller, 2003). For Model 1, goodness of fit indices suggested an acceptable fit for three of the four fit indices (all except SRMR) when using either the PANAS or bipolar measures of affect as the independent mediator. For Model 2, goodness of fit indices suggested an acceptable fit for two of the four fit indices (except SRMR and chi-square). For Model 3, goodness of fit indices suggested an acceptable fit for two of the four fit indices (except SRMR and chi-square), but only when the PANAS was included in the model; when the bipolar measure of negative affect was included in Model 3, goodness of fit indices suggested a poor fit for all of the fit indices. Finally, for Model 4, goodness of fit indices suggested a poor fit for all of the fit indices. Chi-square differences between the models indicated that the Model 1 fit was significantly better than Models 2, 3 and 4, ps < .001. Additionally, chi-square differences between the models indicated that the Model 2 fit was significantly better than both Models 3 and 4, ps < .01. In sum, Models 1 and 2 offer superior fit relative to Models 3 and 4, with Model 1 offering the best fit to these data.

Alternative overall attention and thinking mechanism. In order to rule out the alternative explanation that an overall increase in thinking explains the relationship between goal importance and counterfactual activation, I examined if the self-report measure of overall thinking differed between goal importance conditions. Consistent with the Pilot Study, this analysis revealed that overall thinking did not differ between the high ($M = 3.58$, $SD = 1.46$) and low ($M = 3.50$, $SD = 1.37$) importance conditions, $t(140) = -0.37$, $p = .71$, $d = 0.06$. Additionally, I regressed counterfactual presence/absence onto overall thinking, which also revealed that overall thinking did not predict counterfactual presence/absence, $\beta = 0.02$, $\chi^2 = 0.01$, $p = .94$, OR = 1.02. This finding demonstrates that an increase in overall thinking (as opposed to a specific increase in attention on the problem) does not explain the relationship between goal importance and counterfactual presence/absence.

Discussion

The findings from Study 1 failed to provide full support for the proposed models. The goal importance manipulation did not produce differences in how important participants viewed the task or the mediators of attention on the problem and negative affect. However, Models 1 and

2 received partial, correlational support in Study 1. First, in partial support of Model 1, goal importance (measured by the manipulation check) significantly predicted negative affect (measured by the PANAS), and negative affect (both the bipolar and PANAS) predicted counterfactual activation. Although this indirect effect was not significant, these relationships provide partial support to Model 1. Second, in partial support of Model 2, attention on the problem predicted causal details identified, and causal details identified predicted counterfactual activation. That is, as attention on the problem increased, participants identified more causally relevant details, and as causally relevant details increased, counterfactual activation also increased. However, this indirect effect was not significant. Additional support for Models 1 and 2 was provided by the model fit analyses, such that both Models 1 and 2 offered superior fit relative to Models 3 and 4.

Despite these findings regarding Models 1 and 2, the fact that manipulated goal importance had no impact on negative affect or attention on the problem precludes causal inferences from being made in Study 1. It is possible that the methodology employed in Study 1 may not have been sufficient to capture the predicted effects. Although much of the methodology was adapted from previous work, one possible reason why the goal importance manipulation may not have worked as intended is because of the online sample of participants. The online participants may not have been influenced by the manipulation and negative feedback as strongly as anticipated, and this is supported by the fact that there were no differences between goal importance conditions on the manipulation check or negative affect. Additionally, many participants appeared skeptical of the task and feedback, and this was reflected in the higher than anticipated exclusion rate (22% of participants explicitly stated they did not believe the task or they cheated).

In Study 2, I altered the sample and methodology in order to provide a separate test of the proposed models. Rather than manipulating goal importance, Study 2 manipulated what participants focused on following a negative event, in an attempt to show that changes in attention (i.e., directing attention on the problem or feelings) can influence counterfactual activation. Second, Study 2 used a sample of undergraduate participants in a controlled laboratory environment, rather than an online sample. The purpose of this study was to show that what participants direct attention towards following a negative event causes a change in counterfactual activation.

Study 2

Study 2 aimed to provide causal evidence for the impact of attention on the problem and negative affect on counterfactual activation. Using a trivia test paradigm, Study 2 manipulated what participants directed attention towards following the negative event. Specifically, after receiving negative feedback from the trivia task, participants were randomly assigned to one of three conditions: focus on causes of the problem, focus on feelings, and no instructions (control). Since Models 1 and 2 received the strongest support in Study 1, some participants were instructed to focus on their feelings in order to determine if this increased negative affect (Matthews & Wells, 2004; Nolen-Hoeksema, 1991) and counterfactual activation relative to a control condition (see Model 1). Other participants were instructed to direct attention to possible causes of the problem in order to determine if this increased causally relevant details identified and counterfactual activation relative to a control condition (see Model 2)

To summarize, Study 2 examined if attention directed at the problem and negative affect are causally related to counterfactual activation. I predicted that participants instructed to focus on causes of the problem or on feelings would generate counterfactuals significantly more frequently than participants in the control condition. Consistent with Model 1, which received the strongest support in Study 1, I predicted that negative affect would mediate the relationship between focus on the feelings and counterfactual activation. Consistent with Model 2, which received the second strongest support in Study 1, I predicted that increases in causally relevant details would mediate the relationship between focus on causes of the problem and counterfactual activation. Importantly, I predicted that negative affect would not mediate the relationship between focus on causes of the problem and counterfactual activation, and causally relevant details would not mediate the relationship between focus on feelings and counterfactual activation (see Figure 5).

Participants

A sample of 194 undergraduates was recruited from the Miami University psychology participant pool (M_{age} = 19.22, SD_{age} = 1.08; 60.31% female). Participants received credit toward their research requirement in an introductory course for their participation in this study.

In order to calculate the a priori sample size, a power analysis was conducted. In past work using the trivia paradigm, counterfactual frequency was greater than in the anagram task. For this reason, I estimated that there would be 0.70 counterfactuals per person in the focus on

causes of the problem and focus on feelings condition and 0.4 counterfactuals per person in the control condition. G*Power 3.1 indicated that in a logistic regression framework at 95% power, 119 participants would be required. Assuming 4.5% of participants would fail the attention check, I planned on oversampling by 6 participants to account for these exclusions. Also, as described in the Procedure below, I excluded international students since they were likely to be unfamiliar with several trivia question topics. Since university demographic data suggests that 13.4% of participants would be non-U.S. residents, I oversampled by an additional 16 participants to account for these exclusions. Therefore, the final a priori sample size was 141 participants, with a stop rule of collecting data for as many whole weeks as it took to exceed 141 participants.

Materials

Trivia test. A 20-question multiple choice trivia test was adapted for this study (Petrocelli & Sherman, 2010; see Appendix G). Although each question only had one correct answer, each question was designed such that all response options were perceived to be feasibly correct (Petrocelli & Sherman, 2010). For instance, participants were asked, "Of the following fruits, which contains the most calories? A. Orange B. Pear C. Plum." Similar to the Study 1 task, participants were ostensibly given the option to take the "easy" or "difficult" trivia task. Participants were told that if they chose the difficult task, they would be given 10 bonus points for each correctly solved question. However, all participants were presented with the same questions. In addition, participants were told that they have 60 seconds to answer each question, and the computer was going to award them points for how quickly they correctly solved each question. Instructions informed participants that they could receive a maximum of 60 points per question. However, the longer it took participants to answer the question, the fewer points they would receive for a correct answer (1 point was deducted per second). After 60 seconds elapsed, the computer automatically advanced participants to the next question. Participants were instructed that if the 60 seconds passed without an answer being submitted, an extra 25 points would be deducted from their total score. This provided participants with the incentive to guess on a question if they did not know the answer. These extra components were added to the task in order to maximize the number of features that participants could mutate. Upon completion of the anagram task, a "calculating" screen appeared ostensibly calculating the participant's score. All

participants received feedback indicating that they performed poorly compared to other participants in the study.

Similar to Study 1, participants were led to believe there was a second trivia task so they had reason to think about their performance on the initial trivia test (Roese & Summerville, 2005). Because the trivia questions required students to be familiar with items relevant to the United States (e.g., geography, brands), 22 international students were excluded from these analyses.

Focus manipulation. Participants were asked to spend two minutes thinking about the causes of the problem, their feelings, or they were not given specific focus instructions (see Appendix H). In the focus on causes of the problem condition, participants were asked to think about the factors that might have contributed to their performance on the task. In the focus on feelings condition, participants were asked to think only about the feelings that they were currently experiencing. Participants in the control condition were instructed to think about whatever comes to mind. Participants were instructed to record all their thoughts in a textbox as they came to mind.

Negative affect. Affect was assessed via two measures. First, participants rated their affect on a bipolar 11-point scale ranging from -5 (*very negative*) to 5 (*very positive*; Roese, 1994). In addition, participants completed the negative affect items from the PANAS (Watson et al., 1988; see Appendix D). Responses to the PANAS questions were rendered on a 1 (*very slightly or not at all*) to 5 (*extremely*) scale ($\alpha = .90$).

Open-ended thought listing. As in Study 1, participants were asked to list the thoughts they were currently having about the negative event in order to assess counterfactual activation as well as causally relevant details identified (see Appendix C).

Manipulation check. In order to confirm that the manipulation was successful, participants were asked to rate the extent to which they were focused on causes of the problem and the extent to which they were focused on their feelings (see Appendix D). The attention directed at the problem (3-items; $\alpha = .74$) and attention directed at feelings (2-items; $\alpha = .84$) measures from Study 1 were used to assess both constructs. Ratings for these two sets of questions were rendered on a 1 (*not at all*) to 7 (*very much so*) scale.

Other thinking. Participants also completed the 3-item measure from Study 1 assessing the extent to which participants were focused on aspects of the task that would not provide

causally relevant details (e.g., "I am thinking about who designed these trivia questions"). Responses for these questions were rendered on a 7-point scale ranging from 1 (*not at all*) to 7 (*very much so;* $\alpha = .59$). This is measure was included in order to test if participants in the focus on causes of the problem and feelings conditions only experienced an increase in the type of thought noted in their instructions (not a more general increase in thought).

Attention check. As in Study 1, participants were asked to respond to an attention check question. Participants were asked to "Please select option '5' below." Responses for the attention check were rendered on 1 (*not at all*) to 7 (*extremely*) scale. One participant failed this attention check and was excluded from analyses. Including this participant did not change the pattern of results.

Goal importance measure. Participants rated how important the goal of performing well on the trivia task was on a 1 (*not at all*) to 7 (*extremely*) scale (see Appendix D). This provided another avenue of testing the goal importance predictions that were not supported in Study 1.

Funneled debriefing. Participants were asked if anything was unusual about the study. If participants mentioned that they did not believe the task was real or they did not believe their feedback, they were excluded from analyses. A total of 13 participants fit these exclusion criteria. Additionally, coders agreed that 6 participants did not put effort into the task (e.g., not writing anything in the open-ended thought listing task). In combination with the attention check (1) and international student exclusions (22), these criteria resulted in a final sample size of 155.

Procedure

Participants came to the lab to participate in a study about verbal reasoning. All participants were informed that they would complete two separate trivia tests. After receiving instructions for the trivia task, participants completed the set of twenty trivia questions and then received false feedback indicating that they performed poorly on the task relative to other participants. Participants were randomly assigned to either the focus on causes of the problem, focus on feelings, or the no specific instructions condition. After receiving the failure feedback, participants moved to a new screen in which they were instructed to either focus on causes of the problem, their feelings, or they were not given specific focus instructions. After writing for two minutes, participants were automatically advanced to a new screen in which they rated their affect, and then they were asked to list the thoughts that were currently running through their mind (open-ended thought listing). Finally, participants completed the manipulation check,

overall increase in thinking measure, attention check, measure of goal importance, as well as the funneled debriefing. Lastly, participants were debriefed and informed that there was no second trivia test, that the feedback was predetermined, and that the task was rigged for failure.

Results

Coding of counterfactuals. Two trained coders blind to condition (one of whom was blind to hypotheses) coded the open-ended responses for counterfactual thoughts. The inter-rater reliability for the counterfactual coding was good ($\kappa = .89$, $p < .001$). Despite the change in the methodology and participants, counterfactuals were generated infrequently; similar to Study 1, only 5.2% of participants generated counterfactual thoughts (all were upward in direction). For this reason, the logistic regression analyses in Study 2 employed the Firth method (King & Zeng, 2001).

In addition to coding the counterfactuals, coders evaluated the open-ended thought listing for the number of distinct causally relevant details that participants listed. Inter-rater reliability for this measure was excellent ($\kappa = .91$, $p < .001$). The coders resolved disagreements via discussion (while blind to condition).

Preliminary analyses. See Table 4 for the descriptives and correlations for the Study 2 variables. In order to confirm that the manipulation check was successful, a 3 (condition: causes of problem vs. feelings vs. control) X 2 (manipulation check question: problem vs. feelings) mixed-model ANOVA was conducted. Although the main effect was nonsignificant as predicted, $F(1, 152) = 0.61$, $p = .44$, $\eta_p^2 = .01$, contrary to predictions the interaction was also not significant, $F(2, 152) = 1.67$, $p = .19$, $\eta_p^2 = .02$ (problem manipulation check: problem condition $M = 3.70$, $SD = 1.50$, feeling condition $M = 3.65$, $SD = 1.39$, control condition $M = 3.25$, $SD = 1.20$; feeling manipulation check: problem condition $M = 3.38$, $SD = 1.63$, feeling condition $M = 3.65$, $SD = 1.58$, control condition $M = 3.35$, $SD = 1.54$). Because there were no significant differences in self-reported attention on problems versus feelings between conditions, this suggests that the manipulation may not have worked as designed.

I also tested if condition caused an increase in other types of thought. I conducted a one-way ANOVA testing if attention directed towards aspects of the task that should not provide causal details differed between conditions. As expected, there were no differences between conditions on this measure of other thinking, $F(2, 152) = 1.43$, $p = .24$ (problem condition $M = 3.08$, $SD = 1.16$, feeling condition $M = 3.31$, $SD = 1.25$, control condition $M = 3.48$, $SD = 1.16$).

A series of one-way ANOVAs were then conducted on negative affect (bipolar and PANAS). Against predictions, the negative affect analysis revealed no differences between conditions on either the one-item measure of affect or PANAS measures, *F*s < .74, *p*s >.48 (PANAS: problem condition *M* = 1.67, *SD* = 0.71, feeling condition *M* = 1.84, *SD* = 0.77, control condition *M* = 1.74, *SD* = 0.67; bipolar: problem condition *M* = -1.27, *SD* = 1.86, feeling condition *M* = -1.55, *SD* = 1.51, control condition *M* = -1.40, *SD* = 1.93). I then assessed if causally relevant details listed by participants differed between conditions using a chi-square analysis. Against hypotheses, there were no differences between conditions on the number of causally relevant details generated by participants, $\chi^2(2,N=155) = 3.28$, $p = .19$.

I then conducted a 3 (condition: causes of problem vs. feelings vs. control) x 2 (counterfactuals: present vs. not present) chi-square to examine if condition was related to the presence/absence of counterfactual thinking. Although it was predicted that participants in both the focus on causes of the problem and focus on feelings conditions would be particularly likely to generate counterfactuals, this analysis revealed that only participants in the focus on feelings condition were likely to generate counterfactuals, $\chi^2(2,N=155) = 6.24$, $p = .04$, see Table 5). In other words, consistent with Model 1, participants in the focus on feelings condition were most likely to generate counterfactuals relative to other conditions, although counterfactuals were overall generated infrequently. The lack of counterfactuals in the focus on the problem condition failed to provide evidence for the hypothesis that instructing participants to focus on the problem increases counterfactual thought (Petrocelli & Sherman, 2010; Sherman et al., 1999).

Goal importance. Prior to examining the mediation predictions, I used the measure of goal importance to retest the goal importance predictions from Study 1. First, I examined if goal importance predicted negative affect. As expected, goal importance was related to both the PANAS measure of negative affect, $\beta = .52$, $t(153) = 7.62$, $p < .001$, as well as the bipolar measure, $\beta = -.24$, $t(153) = -3.03$, $p < .01$. That is, as the goal of performing well on the trivia task increased, negative affect also increased. Since attention was manipulated in Study 2, it was not possible to directly examine the relationship between goal importance and attention on the problem. However, I tested if goal importance interacted with condition to influence the number of causally relevant details identified. I would expect that participants in the focus on the problem condition would be particularly likely to generate causal details when they highly valued the goal of performing well on the task. Neither the focus on the problem nor focus on

feelings conditions interacted with goal importance to predict causally relevant details identified by participants, *p*s > .33, indicating that condition did not influence the extent to which goal importance related to causal details identified. Finally, I examined if goal importance predicted counterfactual activation. Against predictions, this analysis revealed that goal importance was not related to counterfactual activation, $\beta = .21$, $\chi^2 = 1.11$, $p = .29$, OR = 1.23.

Mediation analyses. In the first mediation analysis (see Figure 5), I sought to examine if the relationship between focus on feelings and counterfactual activation was explained by an increase in negative affect (Model 1). I predicted that an increased focus on feelings would lead to an increase in negative affect and, in turn, counterfactual activation. For the IV in this model, the focus on feelings condition was paired with the control condition (0 = control, 1 = focus on feelings). However, when paired with the control condition, neither the focus on feelings or focus on problem condition was related to affect (bipolar and PANAS), βs < .07, *t*s < 0.70, *p*s > .48. Similarly, there was no relationship between the bipolar measure of affect and counterfactual activation, $\beta = 0.06$, $\chi^2 = 0.08$, $p = .78$, OR = 1.06, or between the PANAS and counterfactual activation, $\beta = 0.06$, $\chi^2 = 1.95$, $p = .16$, OR = 1.06.

In the next mediation analysis (see Figure 5), I sought to examine if the relationship between focus on causes of the problem and counterfactual activation was explained by an increase in causally relevant details identified by participants (Model 2). For the predictor in this model, the focus on causes of the problem condition was paired with the control condition (0 = control, 1 = focus on causes of problem). The relationship between condition and causally relevant details was not significant, $\beta = -.11$, $t(100) = -1.11$, $p = .27$, nor was the relationship between condition and counterfactual presence/absence, $\beta = -.04$, $\chi^2 = 0.00$, $p = .97$, OR = 0.96. However, the relationship between the mediator of causally relevant details and the outcome of counterfactual presence/absence was significant, $\beta = 1.44$, $\chi^2 = 7.27$, $p < .01$, OR = 4.20. As causally relevant details increased counterfactual thought also increased. The other nonsignificant pathways precluded a test of the indirect effect. I then repeated this analysis with the focus on feelings condition as the dichotomous independent variable (0 = control, 1 = focus on feelings). As expected, there was no relationship between the focus on feelings condition and causally relevant details, $\beta = 0.30$, $\chi^2 = 0.00$, $p = .99$, OR = 1.35. However, focus on feelings was marginally related to counterfactual activation, $\beta = 1.51$, $\chi^2 = 3.32$, $p = .068$, OR = 4.52.

Discussion

Study 2 largely failed to provide support for my predictions. Against predictions, the attention manipulation did not cause a change in causal details identified or negative affect, meaning both mediational models failed to receive support. Additionally, participants in the focus on the problem condition were no more likely to generate counterfactuals relative to participants in the control condition. However, in support of Model 1, there was an effect of focus on feelings on counterfactual activation, such that participants in the focus on feelings condition were significantly more likely to generate counterfactual thoughts compared to participants in the control and focus on the problem conditions. Despite this significant effect of focus on feelings on counterfactual activation, negative affect was not associated with counterfactual activation.

In addition to the partial support for Model 1, two other findings were consistent with my predictions. First, in partial support of Model 2, there was a significant relationship between causal details identified and counterfactual activation, such that as causal details increased, so did counterfactual activation. Additionally, measured goal importance predicted negative affect, such that as rated goal importance increased, so too did negative affect.

Although some paths received support in Study 2, the failure of the attention manipulation check is problematic for establishing conclusions from this study. In other words, because participants did not report a shift in attention, it is not possible to determine if the failure of the manipulation led to the null findings or if the proposed models do not accurately describe the causal interrelationships between goal importance, attentional shifts, negative affect, and counterfactual activation. Given the theoretical foundation of the hypotheses in this work and the partial support for Models 1 and 2 in the previous studies, I posit that the failure of the manipulation is the primary reason why the hypotheses did not receive support. It might be the case that manipulating attention following a negative event is difficult to successfully employ in the lab. Asking participants to direct their attention at a specific feature may require them to suppress other types of thought or attention, which can be quite challenging (Wegner, Schneider, Carter, & White, 1987). Thus, the null findings in Study 2 may be more indicative of the manipulation rather than the model structure.

General Discussion

The current series of studies examined if goal importance, attention on the problem, and negative affect explain when and why counterfactuals are activated through four possible mediational models. Overall, the three studies provided little experimental support to the proposed models. Against predictions, experimentally manipulated goal importance did not influence the mediator of attention on the problem, and manipulated goal importance only influenced the mediators of negative affect and counterfactual activation in the Pilot Study. Additionally, the experimentally manipulated mediators in Study 2 failed to influence causal details identified, negative affect, and counterfactual activation. Despite these null findings for several of the causal paths, the current studies did provide partial correlational support to the model with negative affect as an independent mediator (Model 1) as well as the model with attention on the problem and causal details operating in serial (Model 2), with Model 1 receiving the strongest support. Additionally, both Models 1 and 2 were shown to have a superior fit relative to the models with negative affect, attention on the problem, and causal details operating in serial (Models 3 and 4).

Of central interest in the current work was the hypothesized relationship between goal importance and counterfactual activation, which was derived from the extensive literature demonstrating that goal importance has robust implications for goal-relevant outcomes ranging from mental representations of goals (Huang et al., 2012) to behavioral intentions (Gollwitzer & Brandstätter, 1997). Considering that counterfactuals are closely connected to goal pursuit processes (Epstude & Roese, 2008), it was predicted that increases in goal importance would increase the frequency with which counterfactuals are generated following negative events. The three studies in the current work found only tentative support for this prediction. In both the Pilot Study and Study 1, subjective experiences of goal importance were associated with counterfactual activation, although only the Pilot Study provided limited experimental support to this relationship, and none of the goal importance analyses were significant in Study 2. While this limited experimental evidence prevents causal inferences from being made, the current work does nevertheless suggest that goal importance and counterfactual activation are related.

A primary purpose of the current work was to better explain the variability of when and why counterfactuals are generated after negative events. Although goal importance and counterfactual activation were shown to be associated, the novelty of this relationship is limited

by the fact that the negative affect mediational model (Model 1), a mechanism already outlined and supported in past work (Roese, 1997; Roese & Hur, 1997), received the strongest support across the three studies. All three studies revealed that an increase in measured (not manipulated) goal importance was related to an increase in negative affect. Additionally, both the Pilot Study and Study 1 demonstrated that negative affect predicts counterfactual activation, although only one indirect effect was significant (Pilot Study). Although these effects were not consistent across studies (e.g., the goal importance manipulation check marginally predicted counterfactual activation in Study 1 and not Study 2) and these effects did not replicate with all measures of negative affect (e.g., the goal importance manipulation check predicted negative affect as measured by the PANAS and not the bipolar measure in Study 1), together they provide support for Model 1. When these findings are combined with previous work showing the interrelations between goal importance, negative affect, and counterfactual activation (Lavallee & Campbell, 1995; Moberly & Watkins, 2010; Roese & Hur, 1997), this work is consistent with the dominant theory in the field that negative affect plays an important role in counterfactual activation (Epstude & Roese, 2008; Roese, 1997; Roese & Hur, 1997).

The finding that negative affect played a role in the counterfactual activation process is not surprising given the various ways in which negative affect influences cognition. From an affect as information perspective, negative affect signals to the individual that there is a problem in the goal pursuit process and counterfactual thoughts can be a helpful step to understanding and addressing the problem (Schwartz, 1990; Schwartz & Clore, 1983). Even the framework of broad-and-build theory, which predominately focuses on the impact of positive emotions on cognition, describes how negative emotion results in narrowed attention focused on addressing immediate stressors in the environment, whereas positive emotions broaden awareness, exploration, and creativity (Fredrickson, 2004). By thinking about how some past action or inaction may have changed the negative outcome that produced the negative affect, an individual can gain insights that may help resolve or prevent similar problems in the future. Thus, this work further supports the conclusion that counterfactual thinking is one of the many attentional and cognitive processes is elicited by negative affect (Bodenhausen, 1993; Moons, & Mackie, 2007; Taylor, 1991).

A second prediction that received partial support in the current work is the role that attention on the problem plays in the relationship between goal importance and counterfactual

activation. Both Studies 1 and 2 demonstrated that an increase in causal details identified after a negative event increased counterfactual activation. Study 1 also provided some evidence that subjective experiences of goal importance are associated with increased attention on the problem, and attention on the problem mediates the relationship between goal importance and causal details identified. While the support for these relationships is mixed, the current studies suggest that causally relevant details play a role in the counterfactual activation process, which parallels past work (Petrocelli & Sherman, 2010).

From a theoretical standpoint, there are clear reasons why causal details should influence counterfactual activation. By definition, a counterfactual thought is a mental representation of an alternative reality describing how some past action or inaction may have caused an alternative outcome. Therefore, knowledge of a detail that may have influenced a previous outcome is a prerequisite for counterfactual thought. The more effort one directs at understanding the factors that may have caused the outcome, the more likely it is that he or she will possess knowledge of details that are necessary for a counterfactual thought to occur (Martin & Tesser, 1996; Petrocelli & Sherman, 2010; Sherman et al., 1999). Thus, counterfactuals are one of the many potentially functional cognitive consequences that may result from a change in attention or processing following a negative event (Bodenhausen, 1993; Bodenhausen, Sheppard, & Kramer, 1994; Moons, & Mackie, 2007; Taylor, 1991).

While some evidence in the current work and past theory suggests that causal details specifically play a role in counterfactual activation, it is worth revisiting the alternative theory that a general increase in thought (not just an increase in attention on the problem and causal details) explains when and why counterfactuals are activated. This alternative perspective holds that individuals experience a broad increase in cognition following negative events and counterfactual thought increases as a result. While the data from the current work were mixed regarding the central models of interest, no measure of overall thinking in this work predicted counterfactual activation. In the Pilot Study and Study 1, the overall thinking measures were unrelated to measures of goal importance and counterfactual activation, which provides evidence that a general increase in thought does not explain why goal importance is related to counterfactual activation. The finding that it is specifically an increase in attention directed at a problem and causal details that increase counterfactual activation (as opposed to a general increase in thought) makes sense when considering the steps that need to occur for a

counterfactual to be generated. If an individual experiences a general increase in thought and does not think specifically about what may have contributed to the problem (e.g., his or her feelings, details about the day unrelated to the event), those other thoughts do not necessarily contain details about the event that can be mutated. For counterfactual thinking to take place, an individual needs to connect pieces of information to form inferences about negative outcome (Byrne, 2016). It is when thoughts are directed at understanding a problem and its causes that these inferences are more likely to be made (Kahneman & Miller, 1986; Petrocelli & Sherman, 2010).

Limitations and Future Work

Despite the partial support to Models 1 and 2, the nonsignificant findings, particularly the failure of the manipulations, warrant further discussion and suggest that the current work has several limitations. One limitation of the current work was that the manipulation in Study 1 did not impact negative affect or attention on the problem, and the manipulation in Study 2 did not impact negative affect or causal details identified. The fact that some of these paths (e.g., goal importance and attention on problem) received correlational support but little experimental support has a few possible explanations. First, it is possible that a lack of statistical power contributed to the null manipulation findings. Between-subjects conditions have less statistical power than continuous predictors and the final sample size in Study 1 was substantially lower than the a priori target. In addition to a power explanation, the data suggest that participants in Studies 1 and 2 were suspicious of the manipulation and task, particularly in Study 1. Although similar tasks have been used in past work (Dyczewski & Markman, 2012; Petrocelli & Sherman, 2010; Roese, 1994), the high rate of suspicion may have been a reason why participants were not influenced by the manipulations. Regardless of the cause of the failed manipulations, the null experimental findings make it difficult to fully elucidate the role that goal importance plays in counterfactual activation. Future work studying if goal importance influences counterfactual thought should take steps to reduce the suspicion encountered in the current work. For example, the tasks could be modified to increase the believability of the negative feedback (e.g., increase the difficulty of the solvable anagrams) and online samples should be avoided due to the lack of experimental control over the participant environment. Future work should also consider using other methods to increase participants' goal importance (e.g., providing monetary performance incentives or studying these processes in a real classroom).

Another finding that warrants further discussion was the low frequency with which participants generated counterfactuals, as this may have contributed to the null findings in the current work (i.e., a floor effect). The current work necessarily measured spontaneous counterfactual thought, which is one reason why counterfactual frequency was low. However, other past studies assessing spontaneous counterfactuals report higher frequencies (e.g., Roese & Olson, 1997; White & Lehman, 2005). There are two possible explanations for this low frequency. First, as suggested above, the methodology employed in the current work may explain the low frequency. For example, participants may have been less engaged in the tasks than anticipated, particularly in the online sample, and many participants were skeptical of the feedback. While these features may have contributed to the low frequency of counterfactuals, it is also possible that counterfactuals are generated less frequently than what scholars currently believe. Most studies investigating counterfactual thought explicitly ask participants to generate these thoughts (Markman et al., 2008; Nasco & Marsh, 1999; Roese, 1994). Moreover, of the studies investigating spontaneous counterfactuals, many place participants in scenarios that maximize the likelihood of counterfactual generation (e.g., a game of blackjack, Monty Hall Problem; Markman et al., 1993; Petrocelli & Harris, 2011) or they prime participants to generate counterfactuals by first describing how people can learn from past events to improve in the future (e.g., Petrocelli, & Crysel, 2009; White & Lehman, 2005). Games like blackjack and the Monty Hall Problem result in conditions in which there are only two possible decisions (action or inaction) and the decision occurs seconds before the outcome is realized. In these situations, it is relatively easy to connect pieces of information to form inferences about that negative outcome (e.g., "If only I had stuck with my original door, I would have won that car!"). Moreover, when a counterfactual elicitation suggests one can learn from the situation, think in a way to lift one's spirit, or think about how the situation might have turned out differently, counterfactuals are no longer truly spontaneous since participants are primed to think counterfactually. While these techniques certainly make it easier to study counterfactuals, it is possible that counterfactuals occur relatively infrequently following many other negative events. For example, it seems plausible that counterfactuals may be less common following a trivia task in a laboratory with no substantial incentive when contrasted with a gambling situation with monetary rewards or an exam in a classroom that has implications for one's career. Future work should investigate counterfactual thought using new paradigms and in real world situations (e.g.,

classrooms) to better understand how frequently these thoughts are elicited in everyday life (Summerville & Roese, 2008).

There are also other related avenues of research that are worth exploring. Just as goal importance has implications for attention and negative affect, it also influences cognition in other ways that might impact counterfactual thought. One way in which goal importance influences cognition is that individuals *expect* to perform better when they value the goal (see Pilot Study; Eccles et al., 1983; Eccles & Wigfield, 2002; Feather, 1988, 1992; Wigfield, 1994; Wigfield et al., 1997), which may influence the content of the counterfactuals that people generate.[3] Kahneman and Miller's (1986) norm theory describes that normality is a major determinant of the type of counterfactuals that are generated. Individuals tend to mutate abnormal events back towards normality (e.g., "If only I had taken the normal route home…"). If an individual has greater expectations of success when a goal is important, this means that failure in the goal pursuit process should be more unexpected. The unexpectedness of the event might result in qualitatively different counterfactual comparisons compared to events that are not as unexpected. For example, when a goal is highly valued and the event is more unexpected, people may be *more* likely to generate upward counterfactual thoughts that focus on controllable antecedents to the negative event (e.g., "If only I studied more last night, then I would have received my usual A"; Markman, Gavanski, Sherman, & McMullen, 1995). On the other hand, if a goal is not as important and the negative event is not as unexpected, the counterfactuals generated may be *less* functional. Rather than generating functional comparisons, people might protect the self and generate counterfactuals about situational features of the event (e.g., "If only the professor provided a study guide, then I would have done better on the exam"; McCrea, 2007). In support of this perspective, people tend to generate more additive counterfactuals (i.e., adding an event that did not occur) when an event is unexpected relative to subtractive counterfactuals (i.e., subtracting an event that took place; Sanna & Turley, 1996). Critically, additive counterfactuals tend to have greater functional implications (Epstude & Roese, 2008), suggesting that increases in goal importance may result in more functional counterfactuals.

In addition to impacting the content of counterfactual thought, it is possible that goal importance has implications for other types of mental simulation, such as prefactuals (i.e., an if-

[3] The low frequency of counterfactuals in the current study precludes an accurate examination of counterfactual content.

then proposition about an action-outcome linkage; e.g., If I do X, then Y would happen). One of the most consistent findings in the current work was the association between goal importance and negative affect—as goal importance increased, negative affect also tended to increase. Although negative affect has functional implications for goal pursuit (e.g., Schwartz, 1990), it is nonetheless an aversive experience. One interesting cognitive process that occurs more frequently in response to increases in goal importance is *bracing* (Shepperd, Findley-Klein, Kwavnick, Walker, & Perez, 2000; Sweeny & Shepperd, 2007). In short, bracing refers to a process through which an individual prepares for a negative outcome by judging that the negative outcome is more likely to occur than what evidence would suggest. By preparing for the undesired outcome, an individual can reduce the negative affect associated with that undesired outcome. However, in addition to reducing potential negative affect, bracing can also encourage one to take steps to reduce the likelihood of that undesirable outcome occurring in the first place (Carroll, Sweeny, & Shepperd, 2006). One such way that one can reduce the likelihood of the undesirable outcome is via a prefactual thought. Consistent with this perspective, defensive pessimists, or individuals who consistently brace for the worst, tend to engage in more upward prefactual thinking compared to optimists (Sanna, 1996). These connections suggest that as goals increase in importance, the likelihood of functional prefactual thinking should also increase. Future work should explore the impact that goal importance has on prefactual thought and other types of mental simulation.

Conclusion

In sum, the current work provided tentative support to the proposed goal importance and counterfactual activation models. Although the goal importance counterfactual activation relationship was inconsistent across the three studies, Models 1 and 2 received partial support, with Model 1 receiving the strongest support. Together, these studies suggest that we may be able to gain a more nuanced understanding of counterfactual activation by incorporating the constructs of goal importance and attention on the problem into future research. Considering that counterfactuals have a robust impact on affect, reasoning, motivation, and behavior (Markman & McMullen, 2003; Spellman & Mandel, 1999; Epstude & Roese, 2008; Smallman, 2013), increasing our understanding of the process through which counterfactuals are activated is critical.

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Table 1. Correlations and Descriptives for Pilot Study Variables

	M	*SD*	1	2	3	4	5	6
1. Condition[a]	-----	-----	-----					
2. Negative affect	-2.08	1.80	-.24*	-----				
3. Manipulation check	5.50	1.37	.60*	-.20*	-----			
4. Time spent writing	-----	-----	.10	-.10	.05	-----		
5. Severity	3.50	1.57	.27*	-.39*	.34*	.06	-----	
6. Unexpectedness	3.87	1.76	.20*	-.24*	.28*	.10	.39*	-----

[a] Dichotomous variable (high goal importance = 1, low goal importance = 0)
* $p < .05$

Table 2. Correlations and Descriptives for Study 1 Variables

	M	*SD*	1	2	3	4	5	6	7	8	9	10
1. Condition[a]	----	----	----									
2. Attention on problem (5-item)	4.31	1.49	.06	----								
3. Attention on problem (info)[b]	----	----	.08	.16	----							
4. Overall thinking	3.54	1.41	.03	.64*	.02	----						
5. Manipulation check	4.58	1.71	.13	.55*	.08	.43*	----					
6. Negative affect (bipolar)	-1.42	2.43	-.02	-.05	-.02	-.10	-.13	----				
7. Negative affect (PANAS)	1.90	0.88	.11	.35*	.00	.45*	.30*	-.31*	----			
8. Severity	3.28	1.51	.14	.38*	.10	.48*	.47*	.35*	.61*	-----		
9. Unexpectedness	4.47	1.33	.02	.28*	-.06	.20*	.34*	-.03	.43*	.18*	----	
10. Causal details	0.30	0.57	-.02	.21*	.19*	.06	.05	-.19*	.11	.03	-.02	----

[a] Dichotomous variable (high goal importance = 1, low goal importance = 0)
[b] Dichotomous variable (causally relevant info = 1, non-causally relevant info = 0)
* $p < .05$

Table 3. Study 1 Model Fit Statistics

	df	RMSEA[a]	SRMR[b]	CFI[c]	Chi-Square[d]
Model 1 (PANAS)	3	0.00*	0.27	1.00*	6.36*
Model 1 (bipolar)	3	0.00*	0.32	1.00*	6.94*
Model 2	6	0.00*	0.27	1.00*	27.49
Model 3 (PANAS)	10	0.00*	0.50	1.00*	47.71
Model 3 (bipolar)	10	0.11	0.93	0.69	40.95
Model 4 (PANAS)	10	0.18	1.36	0.29	47.71
Model 4 (bipolar)	10	0.10	0.86	0.74	40.95

[a]A value less than or equal to .06 was considered indicative of an acceptable fit
[b]A value less than or equal to .08 was considered indicative of an acceptable fit
[c]A value greater than or equal to .95 was considered indicative of an acceptable fit
[d]A nonsignificant chi-square value was considered indicative of an acceptable fit
* Value was indicative of an acceptable fit

Table 4. Correlations and Descriptives for Study 2 Variables

	M	*SD*	1	2	3	4	5	6
1. Focus on feelings vs. control[a]	-----	-----	-----					
2. Focus on problem vs. control[b]	-----	-----	-----	-----				
3. Negative affect (bipolar)	-1.41	1.76	-.04	.04	-----			
4. Negative affect (PANAS)	1.75	0.71	.07	-.05	-.33*	-----		
5. Goal importance	3.48	1.76	.22*	.15	.24*	.54*	-----	
6. Causal details	0.15	0.42	.05	-.11	-.10	.10	.08	-----

[a] Dichotomous variable (focus on feelings = 1, control = 0)
[b] Dichotomous variable (focus on problem = 1, control = 0)
* $p < .05$

Table 5. Study 2 Counterfactual Frequencies

	No counterfactual	Counterfactual
Focus on problem	51	1
Focus on feelings	47	6
Control	49	1

Figure 1. Model 1

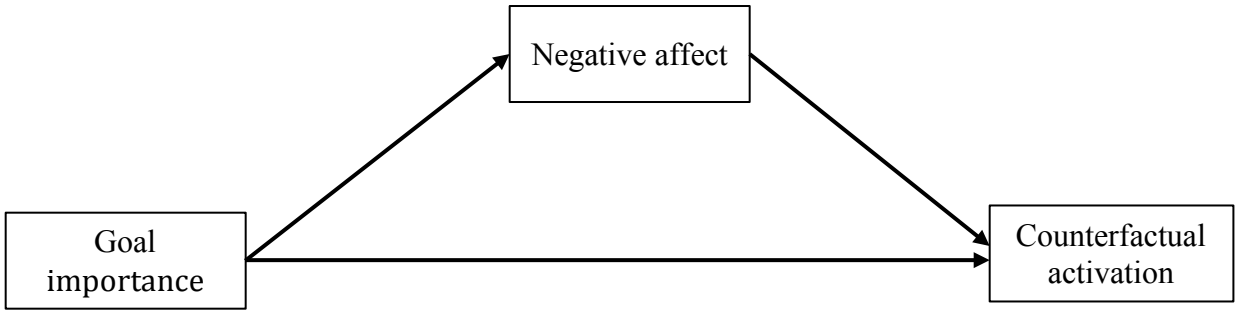


Figure 2. Model 2

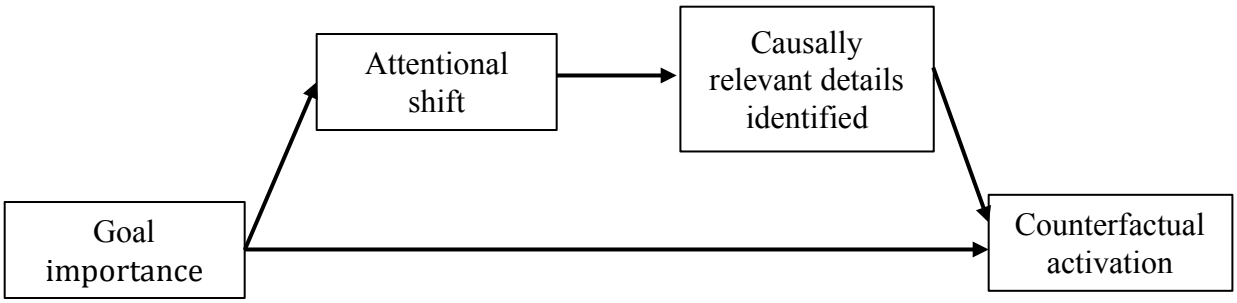


Figure 3. Model 3

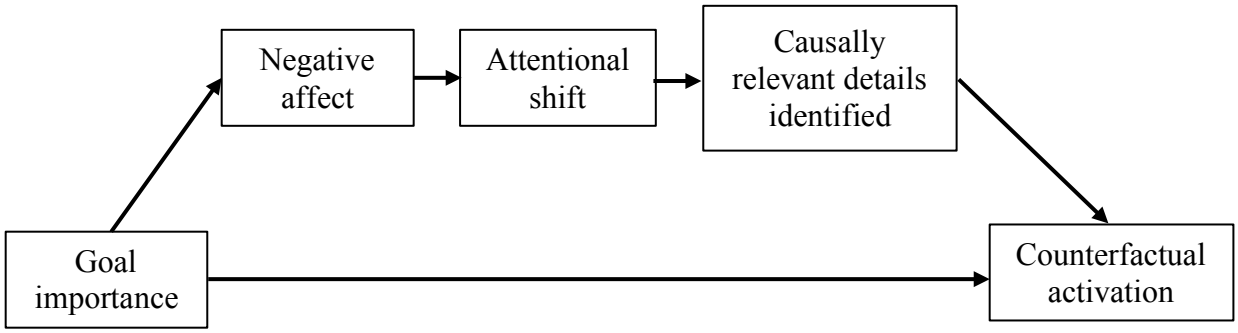


Figure 4. Model 4

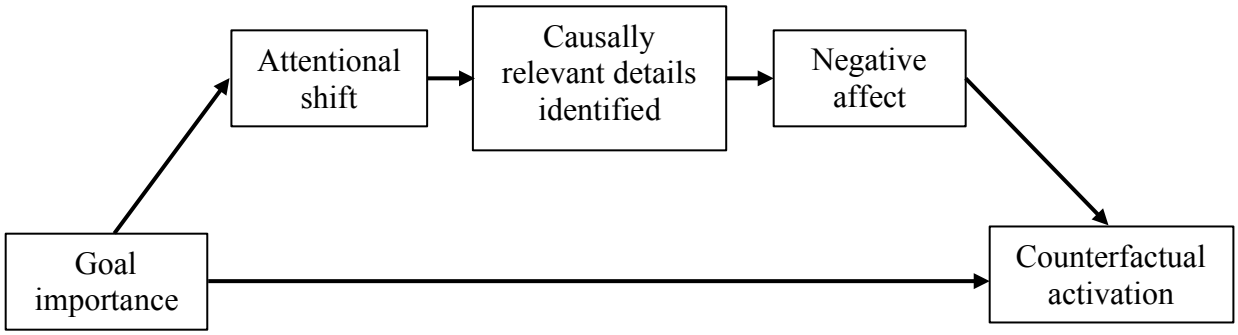
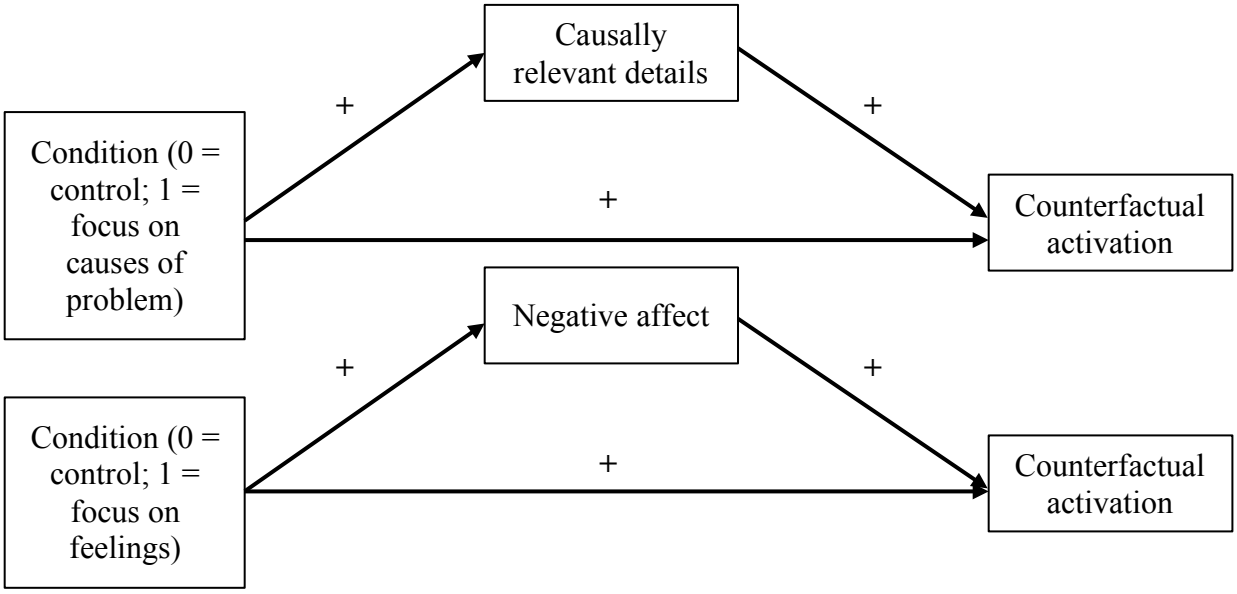


Figure 5. Mediation in Study 2.



Appendix A

Goal Importance Manipulation

High importance: Please take a moment to think about a goal you have had during this past year that has been very important to you. You may select any goal you would like. However, please ensure that this goal has been very important to you personally during this past year. When selecting your very important goal, it might help to select a broad category of goals (e.g., academics, health, etc.).

Once you have selected a very important goal, please click the ">>" button.

Next screen

Please describe your very important goal below. You may use as much or as little space as needed. When you are finished describing the goal, please click the ">>" button.

Low importance: Please take a moment to think about a goal you have had during this past year that has been slightly important to you. (Do NOT select a goal that has been very important to you.) You may select any goal you would like. However, please ensure that this goal has been only slightly important to you personally during this past year. When selecting your slightly important goal, it might help to select a broad category of goals (e.g., academics, health, etc.).

Once you have selected a slightly important goal, please click the ">>" button.

Next screen

Please describe your slightly important goal below. You may use as much or as little space as needed. When you are finished describing the goal, please click the ">>" button.

Appendix B

Negative Event Recall

We would now like you to think about a negative event that occurred to you related to this goal that you just described. Did you do something (or not do something) in the last year that led to a negative outcome when you were pursuing this goal? This negative event can be anything, as long as it is related to the goal you previously described.

The [very/slightly] important goal you described is copied here for your reference: [Participant's previously described goal here]

Once you have selected a negative event, please click the ">>" button.

Next screen

Please describe this negative event below. As you describe the negative event, please ensure you are imagining what happened during the event. You may use as much or as little space as needed to describe this event. When you are finished, please click the ">>" button.

The [very/slightly] important goal you described is copied here for your reference: [Participant's previously described goal here]

Appendix C

Open-Ended Thought Listing

We now would like you to take a moment to list your thoughts and feelings about this negative event you just [described/experienced]. What are your reactions to this negative event? What thoughts are running through your mind right now?

In the space below, please list as many thoughts as come to mind naturally, without repetition. Start each thought on a new line (by clicking "enter"). You may use as much or as little space as needed. When you are finished describing your thoughts, please click the ">>" button.

Appendix D

Additional Questions from the Studies

Negative Affect (bipolar**)**: How do you feel when recalling this negative event?

Negative Affect (PANAS): Please indicate the extent to which you are experiencing the following feelings

1. Irritable
2. Distressed
3. Ashamed
4. Upset
5. Nervous
6. Guilty
7. Scared
8. Hostile
9. Jittery
10. Afraid

Manipulation Check (Pilot Study): Earlier in this study you described a goal that you have had over the past year. How important is/was this goal to you?

Manipulation Check (Study 1): In this study you completed an anagram task. How important was it to you personally that you performed well on this task?

Severity:

(1) How negative was the negative event you described?

(2) How bad was the negative event you described?

(3) How severe was the negative event you described?

Unexpectedness:

(1) How unexpected was the negative event that you described?

(2) How typical was the negative event that you described?

(3) How predictable was the negative event that you described?

Attention on the Problem (Study 1; manipulation check Study 2):

(1) I am focused on my anagram [trivia task] performance.

(2) I am thinking about the causes and situational features that may have contributed to my performance.

(3) I am thinking about the strategies I used while completing the anagrams [trivia task].

Overall Increase in Attention and Thinking (Study 1):

Focused on Feelings (also manipulation check Study 2)

(1) I am spending time thinking about the feelings I am currently experiencing after receiving that feedback.

(2) I am trying to understand my emotional reaction to this event.

Focused on Other Aspects of the Task (not causally relevant)

(1) I am thinking about who designed these anagrams [the trivia task].

(2) I am spending time thinking about the order of the anagrams [trivia questions].

(3) I am generally trying to understand the purpose of this study.

Goal Importance Measure (Study 2): When thinking of the trivia task you just completed, how important was it to you personally that you performed well on this task?

Appendix E

Anagram Instructions and Goal Importance Manipulation

Please read the following instructions carefully

In this study you will be completing two separate anagram tasks. Anagrams are scrambled word combinations—solving them simply means unscrambling them into an actual word. For example, "YHAPP" is an anagram, and its solution is "HAPPY". Some of the anagrams you will be presented with have multiple solutions, whereas others only have one solution. You have a total of 60 seconds to solve each anagram. After the 60 seconds has elapsed, the computer will automatically advance to the next anagram (unless you have already submitted your response for that anagram).

For each anagram you correctly solve, you will receive a certain number of points. Specifically, for each anagram you can receive a maximum of 60 points. The longer it takes you to solve the anagram, the fewer points you will receive (1 point will be deducted per second). Thus, if you take 30 seconds to submit a correct response, you will receive 30 points for that anagram. If you take 45 seconds to submit a correct response, you will receive only 15 points for that anagram. You receive 0 points if you submit an incorrect response. After 60 seconds has elapsed, the computer will automatically advance you to the next anagram. Importantly, if you fail to enter a response within the 60 seconds, an extra 25 points will be deducted from your total score. This means it is a good idea to skip over anagrams that you are cannot solve, in order to minimize the number of points that are deducted from your total score.

After you complete the first task (containing ten 5-letter anagrams), the computer will calculate your total score and tell you how your performance compares to other participants in the study. You will then answer some questions before moving on to the second anagram task. [*High importance condition*: **Your performance on this task will determine whether you are eligible to participate in future studies from our lab with substantially higher pay rates. Thus, in order to qualify for our future studies, you must perform well on this task**.]

Please note, because we are examining your performance, it is important you not be engaged in any other tasks during the study.

Now you are moving on to the first anagram task. Please select the anagram task that you would like to complete. If you select the difficult anagram task, you will receive 10 bonus points for each correctly solved anagram.

Choices:

Easy Difficult

Appendix F

Anagrams

Anagrams	Solution(s)
NELMO	MELON, LEMON
ILESM	SMILE, LIMES, MILES, SLIME
OLSPO	POOLS, SPOOL, LOOPS, POLOS
NIEDM	DENIM, MINED
HRBOT	THROB, BROTH
IDFEL	FILED, FIELD
VEERL	REVEL, LEVER
ORKES	No solution
YESID	No solution
ROTIW	No solution

Appendix G

Trivia Test

1. Of the following fruits, which contains the most calories? (answer: B)

A. Orange

B. Pear

C. Plum

2. Of the following states, which is the largest? (answer: A)

A. Virginia

B. Kentucky

C. Tennessee

3. Which king in a standard deck of cards doesn't have a mustache? (answer: C)

A. Diamonds

B. Clubs

C. Hearts

4. Which of the following universities has the greatest number of students enrolled? (answer: B)

A. Princeton

B. Harvard

C. Yale

5. Which of the following soaps uses the "Clean as a whistle" slogan? (answer: A)

A. Irish Spring

B. Coast

C. Zest

6. Which of the following U.S. cities receives the highest annual average of inches of rainfall? (answer: B)

A. Honolulu, Hawaii

B. Boston, Massachusetts

C. Seattle, Washington

7. Of the following sandwiches, which contains the most calories? (answer: A)

A. Burger King's Whopper

B. McDonald's Quarter Pounder with Cheese

C. Wendy's Big Bacon Classic

8. Which of the following animals can reach the fastest speed? (answer: A)

A. lion

B. kangaroo

C. greyhound

9. Which of the following causes of death is most frequent in the United States among people of all ages? (answer: C)

A. HIV/AIDS

B. Homicide

C. Influenza

10. Which of the following amounts of U.S. coins possesses the greatest total weight? (answer: B)

A. 16 Quarters

B. 20 Nickels

C. 44 Dimes

11. Which of the following countries was second to the United States in the total number of medals won in the 2004 Summer Olympics? (answer: B)

A. China

B. Russia

C. Germany

12. Of the following human body parts, which contains the greatest number of bones? (answer: A)

A. a single hand

B. a single foot

C. the spine

13. Which of the following names is the most common among men in the United States? (answer: C)

A. William

B. David

C. James

14. If one were to fly directly from Indianapolis to London, then fly directly from London to Miami, Florida, and then fly directly from Miami to Indianapolis, which of the following mile totals would he or she cover? (answer: C)

A. 6007 miles

B. 8231 miles

C. 9437 miles

15. Which of the following states was not named after a Native American tribe? (answer: A)

A. Oregon

B. Oklahoma

C. Ohio

16. If a penny were dropped from the top of the Empire State Building, how long would it take before it hit the ground? (answer: C)

A. 30 seconds

B. 20 seconds

C. 10 seconds

17. Which of the following wrist watch companies uses the slogan, “It takes a licking and keeps on ticking”? (answer: C)

A. Bulova

B. Casio

C. Timex

18. Which of the following letters is the most common first letter for the names of countries of the world? (answer: B)

A. A

B. B

C. C

19. According to the Antiques Roadshow, which of the following antiques is most highly valued in price? (answer: A)

A. a 1952 mint condition Mickey Mantle baseball card

B. an authentic menu from the last luncheon served aboard the Titanic

C. a mint condition Confederate Army officer Civil War era sword

20. Which of the following weights is the closest approximation for the weight of a gallon of milk? (answer: C)

A. 4 pounds

B. 6.5 pounds

C. 8 pounds

Appendix H

Focus Manipulation

Focus on Causes of Problem: We would now like you to spend 2 minutes thinking about your performance on the trivia test. Specifically, we want you to spend this time thinking about the factors that might have contributed to your performance on this task (e.g., things you did or did not do that might have contributed to your performance, situational features that might have influenced your performance, etc.).

You will be automatically advanced to the next screen where you will spend the next 2 minutes thinking about (and recording) the factors that might have contributed to your performance on this task.

Next screen

Please spend 2 minutes thinking about the factors that might have contributed to your performance on this task. Record all of these thoughts in the textbox below. The screen will automatically advance once the 2 minutes has elapsed.

Focus on Feelings: We would now like you to spend 2 minutes thinking about the feelings you just experienced on/after the trivia test (e.g., how did you *feel* when working on the task, when receiving feedback, how do you feel now, etc.).

You will be automatically advanced to the next screen where you will spend the next 2 minutes thinking about (and recording) the feelings that you experienced.

Next screen

Please spend 2 minutes thinking about the feelings you just experienced on/after the trivia test. Record all of these thoughts in the textbox below. The screen will automatically advance once the 2 minutes has elapsed.

Control: We would now like you to spend 2 minutes thinking about whatever comes to mind. You will be automatically advanced to the next screen where you will spend the next 2 minutes thinking about (and recording) about whatever comes to mind.

Next screen

Please spend 2 minutes thinking about (and recording) whatever thoughts come to mind. Record all of these thoughts in the textbox below. The screen will automatically advance once the 2 minutes has elapsed.