MENTAL SIMULATION AND PERCEPTIONS OF PROBABILITY:
HOW COUNTERFACTUALLY REFLECTING UPON THE PAST
ALTERS PERCEPTIONS OF MEANING

BY

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ABSTRACT

Increasing research attention has been given to the psychological construct of meaning and how its perception can be altered through mental simulation. Research suggests that counterfactual thinking can increase the perceived meaning of an event, but the influence of semifactuals on meaning has not yet been evaluated. This research examines the effect of counterfactual and semifactual simulation on perceptions of probabilities and meaning, and explores the role of meaning beliefs. Participants read either counterfactual or semifactual statements regarding a story of how two friends met. Following this manipulation, participants rated the perceived meaning associated with the friendship outcome. Participants also rated the perceived likelihood of the actual outcome and an alternative outcome, as well as the degree to which they believe likely and unlikely events signify meaning. As hypothesized, counterfactual and semifactual thinking led to contrasting perceptions of outcome likelihood. Interestingly, however, both counterfactual and semifactual thinking led to increased meaning ratings.
INTRODUCTION

Holocaust survivor and psychiatrist, Viktor Frankl (1963), believed that meaning was not only a necessary component to wellness, but that the desire to find meaning was one of the major forces driving human survival. From his time in Auschwitz, Frankl (1963) concluded that a sense of meaning was one the primary factors that determined survival through the concentration camp. Frankl (1963) believed that meaning could be found under any circumstances, due to the human ability to choose how to react to a situation. It is broadly accepted that having a sense of meaning – that life has significance and purpose, and that life functions in an understandable way (Baumeister, 1991; Heintzelman & King, 2014) – is a positive and valuable experience (McAdams, 2013).

Aside from the intuitive belief that meaning in life is worth seeking, a variety of positive outcomes have been empirically linked to the feeling and the belief that life has meaning. Positive physical outcomes linked with an increase in health promoting behaviors, and decrease in indicators of poor health, are positively associated with meaning and purpose in life (see Roepke, Jayawickreme, & Riffle, 2014 for a review). The presence of meaning in life also positively correlates with positive psychological outcomes, such as positive affect, satisfaction with life (Steger, Oishi, & Kashdan, 2009), and subjective well-being (Zika & Chamberlain, 1987).

Though meaning has been a central focus of positive psychology (see Steger, 2009), the challenge of defining the concept may be responsible for the seemingly inhibited progress of its understanding within the field. In recent years, however, the interest in meaning appears to be expanding into multiple areas of psychology (Leontiev, 2013). A recent volume exploring the present state of research and theoretical
perspectives on the psychology of meaning offers a glimpse at the range of ideas that psychologists are exploring to better understand the construct (Markman, Proulx, & Lindberg, 2013), including the structure of meaning; its multiple forms (Peterson, 2013), and varying levels within a person’s life (Burton & Plaks, 2013), how perceiving meaning functions to direct life choices (Janoff-Bulman, 2013; McAdams, 2013; Steger, 2013; Walker & Skowronski, 2013), and aid in coping (Anderson, Kay, & Fitzsimmons, 2013; Park, 2013; Silver & Updegraff, 2013). Though the field is making great strides to elucidate the construct of meaning and to understand the ways it operates and influences people, this complex and valuable construct provides a wealth of empirical questions to be tested.

In order to examine meaning as an antecedent or consequence, it is necessary to manipulate perceptions of meaning. Comparing participants who are randomized to conditions equal in all ways, aside from their influence on perceptions of meaning, allows for cause and effect relationships to be established. Fortunately, general meaning has proven to be surprisingly easy to experimentally manipulate. For instance, merely being excluded from a computerized game of catch can lead to increased ratings of meaninglessness in life (Stillman et al., 2009). Conversely, priming participants with positive emotional words and sentences to induce positive affect can increase perceptions of meaning (King, Hicks, Krull, & Del Gaiso, 2006). Due to meaning’s benefits and malleability, it is vital to better understand how subtle mental activities may influence the perception of meaning.

Mental simulation (i.e., the process of mentally projecting the self, others, or objects into alternative temporal, spatial, social, or hypothetical realities) is one mental
activity that has been linked to subjective ratings of meaning. In a series of compelling studies, Waytz, Hershfield, and Tamir (2015) inflated meaning perceptions by asking participants to imagine another time or location (Waytz et. al, 2015). Recent evidence also suggests there is a positive link between a particular type of simulation, counterfactual thinking (i.e., imagining how a previous event could have gone differently), and perceptions of meaning (Ersner-Hershfield, Galinsky, Kray, & King, 2010; Heintzelman, Christopher, Trent, & King, 2013; Kray et al., 2010).

Of central importance to the current investigation is the research conducted by Kray et al. (2010), which explored how counterfactual thought influences the meaning derived from life events. Kray and colleagues asked their participants to consider a previous life event, such as the first time they met a good friend, and to either write about counterfactual alternatives to the event or to write about how the event had actually occurred. Their participants then completed a measure of subjective meaning associated with the event. Friendships were rated as more meaningful after participants wrote counterfactually about the event (how it could have not occurred) than after writing about how it had factually occurred. One study revealed that the link between counterfactual thinking and meaning was mediated by perceptions that an event was due to fate. The prediction that counterfactual thinking increases perceptions of meaning was predicted on the basis that counterfactual reflection leads to the perception that the actual event was unlikely. It is suggested that consideration of what might have happened leads to the perception that what actually occurred is so improbable, that it “was meant to be” (Kray et. al., 2010). Though estimates of likelihood were implicated in Kray et al.’s research, it did not include a direct measure of probability perceptions. Following the work of Kray
et al. (2010), the present research examines how imagining how previous life events could have gone differently may alter perceptions of meaning by modifying subjective probability estimates. It is proposed that not all forms out counterfactual thought will increase meaning, and that the effect of counterfactual thinking on meaning is dependent upon the variety of alterations imagined. It is expected that the type of counterfactual thinking engaged in will cause life events to appear more or less exceptional, thereby influencing perceived meaning in different directions.

**Meaning**

Despite the lack of difficulty in linking meaning to a variety of benefits, defining meaning for scientific study has proven to be a challenge. Due to the lack of a concise and broadly accepted definition, some researchers propose that meaning is somewhat undefinable and choose to rely on study participants’ intuitive understanding of the construct (Heintzelman & King, 2013). However, given the importance that a sense of meaning can have in life, the challenge to articulate a precise definition should not preclude experimental psychology from seeking an understanding of how it functions. Though there is no universal definition of meaning, three themes – coherent associations, purpose, and significance – are common among a variety of definitions (Heintzelman & King, 2014).

**Meaning as a Framework**

Heine, Proulx, and Vohs (2006) developed a *meaning maintenance model* based on one long held position that considers meaning to be a framework of expected associations, and a coherent representation of how things (people, objects, natural laws) interact with one another (also see Proulx, 2013). Just as infants are confused when
watching a person appear to use a shoe as a cup (Onishi, Baillargeon, & Leslie, 2007), humans desire reliable schemas, and expect some level of natural order to exist in their lives. The meaning maintenance model proposes that there are multiple domains in which people utilize these frameworks. When an event does not align with expectations, alternative frameworks are sought such that people maintain their view of the world as a predictable place (Heine et al., 2006).

A similar framework view of meaning has been considered in the coping literature (Park & Folkman, 1997). Furthermore, accommodating and adjusting a framework has been supported by empirical research as an effective form of coping (Guo, Gan, & Tong, 2013; Park, Riley, & Snyder, 2012). For instance, victims of natural disasters exemplify how a meaning framework can be shaken. Guo, Gan, and Tong (2013) found that for earthquake victims, whose foundational beliefs about life may have been called into question by the destruction of their home or the loss of a loved one, a focus on determining the meaning of the event was more beneficial than focusing on addressing the problem or the negative emotions it caused.

**Meaning and Purpose**

Though the two are different, it is important to consider how purpose and meaning in life are connected. Baumeister (1991, 1996) examined meaning by considering the requirements for an individual to experience meaning. Specifically, Baumeister (1996) theorized that, rather than finding an ultimate purpose that connects all of life’s events, it may be more plausible to choose several purposes that can together form a framework and unite most of life’s actions and decisions across time. He divided meaning into four components, or needs, including: the need for purpose, the need for
value and justification, the need for efficacy, and the need for self-worth (Baumeister, 1996). Meaning would then be experienced if events and actions fulfill these purposes. Similarly, McAdams (2013) proposed that the particular role in life an individual is playing in a given moment – that of social actor, motivated agent or autobiographical author (McAdams & Cox, 2010) – may influence what is determined to be meaningful. From this perspective, the actor finds meaning in successfully playing a particular social role, the agent finds meaning it in goal pursuit, and the author finds it meaningful to create a coherent life narrative (McAdams, 2013).

**Mental Simulation**

Mental simulation is the human ability to experience cognitive representations of different times, places, or realities. The ability to mentally simulate, or imagine an alternate reality, allows humans to mentally leave the present and project themselves, others, or objects into different times, locations, and perspectives (Waytz et al., 2015). The mental simulations of humans are thought to be unique in their complexity. It has even been argued that mental simulation – allowing us to learn from the past, plan for the future, and empathize with others – is what makes complex human social interactions possible and is the most adaptive aspect of conscious thought (Baumeister & Masicampo 2010).

Mental simulation comes in many forms, though looking back through memories, imagining the future, and employing other self-projecting imaginings are all related, and all utilize the same brain network (Buckner & Carroll, 2007). Mental simulation enables one to predict how things should interact within a given set of circumstances (Markman & Gentner, 2001), or how they should have interacted. The ability to mentally simulate
makes it possible for judgments, decisions, and feelings to be influenced by an imagined hypothetical experience and has proven to have profound effects on present attitudes and behavior.

The range of influences mental simulation can have has been illuminated through a variety of compelling psychological studies. For instance, simulation of contact with a member of a social out-group has been shown to be an effective intervention to reduce intergroup prejudice (Crisp & Turner, 2009). After imagining an interaction with an elderly person, college students’ attitudes, both explicit and implicit, toward the elderly were significantly more positive than those of a control group. Studies (e.g., Driskell, Copper, & Moran, 1994) have also found that performance on different tasks, both cognitive and physical, can be improved through mental rehearsal. Importantly, as stated above, mental simulation has also been shown to have an effect on subjective perceptions of meaning (Kray et al., 2010; Seto, Hicks, Davis, & Smallman, 2015; Waytz et al., 2015).

**Meaning and Mental Simulation**

Though the topics of meaning and mental simulation have been explored extensively, the effects of mental simulation on meaning have recently received increased attention. In a compelling series of studies, Waytz et al. (2015) linked the act of mental simulation to amplified perceptions of meaning in life. In one study, asking participants to examine their past or consider their future enhanced reported meaning in life when compared to those who focused on the present. A second study found imagining an event occurring in an alternate location led to increased ratings of meaning for the event when compared to those who imagined the event in the present location. Finally, simply asking
participants to imagine completing a measure of meaning in another location also increased ratings for meaning in life (Waytz et al., 2015).

Walker and Skowronski (2013) posited that mentally simulating past events can help to build a general framework of life events and help to find their place in the life narrative (Walker and Skowronski, 2013). The different ways people use autobiographical memories was explored through factor analysis, and reflection on the past appears to have 3 functions, including: to direct future actions, to maintain self-continuity, and to function socially (Bluck, Alea, Habermas, & Rubin, 2005). Olivares (2010) argued that these three functions are related and work together to generate a relational framework to make sense of life (i.e., meaning-making) by making the life narrative coherent.

Empirical research has also discovered several different ways that details of mental simulations can influence perceptions. Libby, Shaeffer, Eibach, and Slemmer (2007) found that simulating a visit to the polls from a third-person perspective, rather than a first-person perspective, led to an increased likelihood of actually voting. Research also suggests that the greater the imagined physical and temporal distances – or psychological distances – mentally traveled when considering an event, the more abstract analysis of the event becomes (Trope & Liberman, 2010).

The way that people consider previous life events has proven to have surprising effects as well. Compared to considering how an event actually occurred, research suggests that affect, meaning, and well-being can be altered by thinking about events counterfactually, or imagining how past events could have gone differently (Kahneman & Tversky, 1982).
**Counterfactual Thinking**

Counterfactuals are conditional statements or thoughts about the past that include an alternative antecedent (e.g., “If I had studied more…”) and a consequent or outcome (e.g., “…then I would have gotten a better grade” see Roese, 1994). When imagining how a previous event could have unfolded in different way, there are a number of ways one might mentally alter details of the original memory. These differences can determine the function or effect of the thought on subsequent affect, cognition, and behavior. Sometimes the antecedent, or precursor to an event, is altered in such a way that it produces an alternative outcome, but sometimes it does not (e.g., “I could be wearing my red sweatshirt instead of my green one, and she still would not have noticed me,” see Roese, 1997).

Counterfactual thoughts can be further classified by direction and structure. **Downward counterfactuals** are mental simulations of outcomes that are worse than the actual outcome. Such counterfactuals can be used to comfort a person about an undesirable outcome, often leading to feelings of relief. **Upward counterfactuals** are mental simulations of outcomes that are better than the actual outcome. Such counterfactuals are often used as prescriptions to improve future decision making and performance (Markman, Gavanski, Sherman, & McMullen, 1993).

Structurally, a second antecedent can be added, or some aspect of the actual antecedent can be removed to produce an additive or subtractive counterfactual (Roese & Olson, 1993). Research also suggests that **additive counterfactuals** (e.g., “If only I had remembered my umbrella, then I would not have gotten so wet.”) are more commonly generated than **subtractive counterfactuals** (e.g., “If only it had not rained, then I would
not have gotten so wet.”) when considering how to improve upon a past failure (Roese & Olson, 1993). However, counterfactuals are not always used adaptively. Imagining how things could have gone better through upward counterfactuals is often associated with regret (Kahneman & Miller, 1986; Wells & Gavanski, 1989) and social anxiety (Monforton, Vickers, & Antony, 2012). The inability to limit counterfactual thinking has also been found to inhibit experiential learning (Petrocelli, Seta, & Seta, 2013).

Another type of counterfactual thought, of importance to the current research, is that of semifactual thinking in which people mentally simulate counterfactual antecedents that do not alter the outcome (e.g., “Even if I had left an hour earlier, I still would have missed my flight.” see McCloy & Byrne, 2002; Roese, 1997). Much of the literature on counterfactual thinking has explored how things could have gone differently to change an outcome, but much less is known about the effects of semifacts.

Though the research is very limited, research conducted by McCloy and Byrne (2002) revealed some of the varying effects caused by counterfactual and semifactual thinking. Semifactual thoughts, or “even-if” thinking, weakened negative emotional responses to vignettes with undesirable outcomes, while “if-then” counterfactuals strengthened emotional responses (McCloy & Byrne, 2002). For example, it may lead one to a more negative emotional response to consider the counterfactual, “If I had gone to the study group, then I would have passed my test.” relative to considering the semifactual “Even if I had gone to the study group, I would not have passed my test.” McCloy and Byrne (2002) suggested that the semifactual may serve to weaken the causal connection between an antecedent and outcome.
Kahneman and Tversky (1982) began what has become an extensive exploration of counterfactual thinking in psychology with their proposal of the simulation heuristic. Their findings supported predictions that the ease of generating a counterfactual simulation is used as a simplified method to mentally determine the perceived likelihood of an event’s outcome and the perceived likelihood of a particular antecedent being causal of an event’s outcome. Their work also highlighted some of the biases and limitations of using the simulation heuristic. What people perceive to have nearly happened, what they believe usually happens, and what actually happened, all weigh in to influence regret, surprise, and ascriptions of causality (Kahneman & Miller, 1986; Kahneman & Tversky, 1982). The more recent an antecedent’s occurrence is prior to an outcome, the more commonly that antecedent is considered counterfactually. Ease in counterfactual generation can facilitate perceptions of causality and misplaced blame (Miller & Gunasegaram, 1990).

Norm theory (Kahneman & Miller, 1986) adds to the ideas proposed by the simulation heuristic to further explore surprise, or perceived norm violations. One of Kahneman and Miller’s key arguments is that norms are determined after an event has occurred, and only then are alternatives, or counterfactuals, generated. These imagined ad hoc alternatives are compared to what actually occurred and can influence affect, judgments, and ascriptions of causality.

**Counterfactual Thinking and Perceptions of Meaning**

Experimentally induced counterfactual thinking can dramatically alter how people perceive life events and meaning (Kray et al., 2010). Counterfactual reflection about positive life events, contrary to one’s expectations, has been found to increase positive
affect more than reflecting only on the event as it occurred (Koo et al., 2008). Thinking counterfactually about a country or company’s origin story increased participants’ ratings of commitment to their nation or organization (Ersner-Hershfield et al., 2010). Well-being ratings, which included a meaning in life questionnaire, were higher for those who wrote about their birth counterfactually when compared to those who wrote about it as it occurred (Heintzelman et al., 2013).

Similar to the investigations outlined above, but more pertinent to the present investigation, is the research conducted by Kray et al. (2010). In a series of four studies Kray et al. examined the effect that considering life events counterfactually had on the meaning found in life events. Undergraduate participants were asked to write about the steps leading up to different life events. Kray et al.’s second study then asked participants to write either counterfactually (i.e., “Describe all the ways things could have turned out differently” (Kray et al., 2010, p. 108), or factually about a life event. Their participants rated the outcome of a life event (e.g., the first time meeting a friend, the college chosen to attend, and pivotal life events) as more meaningful after considering how the event could have gone differently than after reporting how the event actually occurred. Interestingly, however, research conducted by Seto et al. (2015) only replicated the counterfactual thinking/meaningfulness link among participants with a high belief in free will.

The current research attempts to replicate the findings of Kray et al. (2010), using similar methods. The current research was also designed to explore the role that perceived probability of mentally simulated alternatives to autobiographical memories
may have in mediating the link between specific forms of mental simulation and perceptions of meaning.

**Theoretical Overview**

**Support Theory**

In an effort to explain previous findings suggesting that probability estimates seem illogical, Tversky and Koehler’s (1994) *support theory* proposed that small alterations in the way an event is described influences subjective probability estimates of the event occurring. Support theory suggests that probability judgments are made based upon the strength of support or evidence for a particular event. The findings consistent with support theory suggest that people do not always “unpack,” or consider, all of the possibilities of a category (e.g., all of the possible trajectories of an event) when they are tasked with determining probability, but instead rely on examples provided, or those which easily come to mind (Tversky & Koehler, 1994). For example, being asked to determine the likelihood that a given student is a science major would be made easier by including a list of all possible science degrees offered. If one is not provided with such a list or a “nudge” to unpack the greater set of possibilities, he/she may only readily think of biology and chemistry, and ultimately underestimate the probability. Similarly, once a possibility is unpacked, people have a tendency to overestimate the overall probability. This is known as the subadditivity effect and, contrary to the common saying, this causes the whole to be determined as less than the sum of its parts (Tversky & Koehler, 1994).

One example of the subadditivity effect comes from research in consumer error (Johnson, Hershey, Meszaros, & Kunreuther, 1993). Specifically, Johnson et al. (1993) asked their participants to report how much they would pay for different types of
insurance. One insurance option was said to cover hospitalization for “any disease or accident,” while another covered hospitalization for “any reason” (Johnson et al., 2013, p. 40). Participants reported a willingness to pay more than twice as much for the coverage in which they had unpacked two common reasons one may need to be hospitalized (e.g., disease or accident), despite the fact that it covered fewer services (Johnson et al., 1993).

Although not readily apparent, Kray et al.’s (2010) participants entertained the thought of alternatives to reality, leading them to unpack the ways that events could have unfolded to prevent their friendship from ever beginning. Consistent with support theory, such mental activity may have led to the perception that meeting the friend was an improbable event, increasing the overall meaning associated with the event. That is, considering all the routes that lead to never meeting a friend, through counterfactual thinking, would be expected to increase the perceived probability that something else could have occurred. Such mental activity would make the actual event outcome (i.e., meeting the friend) seem relatively unlikely – so unlikely perhaps, that people perceive it as “meant to be” (Kray et al., 2010). Interestingly, it has also been demonstrated that the perception that something is rare imbues it with a greater sense of value (King, Hicks, & Abdelkhalik, 2009).

The current research examined the effect of unpacking alternatives that led to a different outcome as well as the effect of unpacking alternatives that led to the same or actual outcome. Unpacking how things could have gone differently, but not prevented friends from meeting, through semifactual thinking, should make the friends meeting seem likely. The less rare the event appears to be, the less meaning it should hold (see}
Figure 1. Very little research has explored the potential link between probability estimates for actual and alternative event outcomes and the event’s subjective meaning.

Figure 1
Proposed model for the divergent effects of counterfactual and semifactual simulation on meaning by way of subjective outcome likelihood

<table>
<thead>
<tr>
<th>Counterfactual Thoughts: Unpack alternatives</th>
<th>Enhanced perception of alternative outcome: “These friends met against all odds”</th>
<th>Meaning increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semifactual Thoughts: Unpack outcome</td>
<td>Enhanced perception of actual outcome: “These friends would have met anyway”</td>
<td>Meaning decrease</td>
</tr>
</tbody>
</table>

However, research conducted by Heintzelman et al. (2013) considered probability estimates as a mediator between counterfactual thoughts about one’s birth and ratings of well-being. Though their results were not statistically significant, mentally subtracting one’s very own existence may be one of the important exceptions to the link between counterfactual thinking and meaning through the mediation of perceived probability estimates.

Overview of Studies

Two studies were conducted to examine the effect of two kinds of mental simulation on meaning. The second study also explores the role of perceived probability and how individual beliefs about the type of event which signals meaning (likely or unlikely) may influence this effect. Study 1 examined the effect of factual, counterfactual, and semifactual thinking about a past event on perceptions of the event’s
meaning. Though Kray and colleagues (2010) explored how counterfactuals, which undo the outcome and the antecedent, affect meaning, research has yet to explore how a special case of mental simulation – semifactual thinking – may influence perceptions of meaning.

Study 2 was designed to determine if different simulation conditions alter perceptions of probability, and whether or not such variance in perceived probability is relevant to subjective meaning. Specifically, it will be determined if the effect of simulation on meaning depends upon whether mentally simulated antecedents leading to the event’s actual outcome, or to an alternative outcome, are unpacked. This study also explores whether participants’ beliefs about whether highly likely or highly unlikely events signal meaning will moderate the effect of mental simulation (counterfactual thinking vs. semifactual thinking) on perceptions of meaning.

Study 1

In Study 1, all participants read the same scenario explaining details about how two friends first met. Participants assigned to the factual condition simply rated the perceived meaning of the event after reading the scenario. Participants assigned to the semifactual and counterfactual simulation conditions were first presented with thought-statements expressed by one friend who allegedly considered how the event could have gone differently. Semifactual and counterfactual thought condition participants then rated the level of meaning they believed this friend associates with the event (i.e., meeting the friend).
Hypotheses

On the basis of support theory (Tversky & Koehler, 1994), it is hypothesized that the perceived probability of the event’s outcome and of an alternative outcome will depend upon which possibility is unpacked. It is predicted that unpacking an alternative outcome by considering counterfactual thoughts will increase the perceived likelihood of an alternative outcome actually occurring and thereby decrease the perceived likelihood of the actual outcome. However, unpacking the actual outcome by considering semifactual thoughts is expected to increase the perceived likelihood of that actual outcome and cause an alternative outcome to appear unlikely (see Figure 1). Consistent with the findings of Petrocelli, Percy, Sherman, and Tormala (2011), the impact of mental simulations on cognitive and affective reactions should depend in part on the perceived likelihood of the alternatives, as well as the perceived likelihood of reality. In line with Kray et al. (2010), it is predicted that making the event outcome seem unlikely through counterfactual thinking would encourage greater subjective ratings of meaning associated with the event. On the other hand, it is expected that reading semifactual thoughts would have the opposite effect, as it involves unpacking the actual outcome and making the actual event outcome appear more likely.
METHOD

Design

Study 1 included a single between-subjects variable, in which participants were randomly assigned to one of three Simulation Conditions (counterfactual simulation, semifactual simulation, or factual simulation). The dependent variable was a measure of Subjective Meaning.

Participants

Four hundred and four participants were recruited using Amazon Mechanical Turk (MTurk) and paid $0.25 for completing a questionnaire. Twenty four participants were removed due to missing data. The final sample consisted of 380 participants (128 in the counterfactual condition, 129 in the semifactual condition, and 123 in the factual condition) ranging in age from 18 to 74 years old ($M = 20.3, SD = 12.99$). The study was listed on MTurk as restricted to those who did not speak English.

Materials

Simulation condition. Participants in all conditions read a scenario explaining how two friends met (see Appendix A). After reading this scenario, those in the factual condition continued to the Perceived Meaning measure. For those in the counterfactual condition, this scenario was followed by one friend’s considerations of how different antecedents could have led to different outcomes, preventing the friends from meeting:

“Kathryn sometimes thinks of how things leading up to meeting Nicole could have gone differently. Considering how busy college students are with the many courses they take and extracurricular activities they become involved with, Kathryn has thought: “If I had not taken that biology class, then I never would
have met Nicole,” “If I had not asked her to be my partner for the group project, then I never would have met Nicole,” and “If Nicole had not been sitting next to me, then I never would have met her.”

In the Semifactual Simulation Condition, participants also read considerations of how things could have gone differently, but not prevented the friends from meeting:

“Kathryn sometimes thinks of how things leading up to meeting Nicole could have gone differently. Considering how busy college students are with the many courses they take and extracurricular activities they become involved with, Kathryn has thought: “Even if I had not taken that biology class, I still would have met Nicole,” “Even if I had not asked her to be my partner for the group project, I still would have met Nicole,” and “Even if Nicole had not been sitting next to me, I still would have met her.”

**Perceived meaning.** Participants were then asked to rate the following four meaning statements based on the questions asked by Kray and colleagues (2010). Specifically, they were asked to rate how true they believe one friend, Kathryn, would find the statements to be on an 11 point scale from 0 = Not at all true to 11 = Entirely True: “Meeting Nicole was one of the most meaningful events of my life,” “Befriending Nicole was one of the most significant choices of my life,” “My friendship with Nicole has had an impact on who I am,” “My friendship with Nicole has added meaning to my life.” The average of the four meaning items (α = .92) was used to create a single Perceived Meaning rating ($M = 7.18$, $SD = 2.20$).
Procedure

Qualified participants registered for the study through MTurk and were then provided with a link to complete the online questionnaire. All study materials were presented in Qualtrics, which allowed participants to move through the questions at their own pace. Participants were randomly placed into one of the three Simulation Conditions (factual, counterfactual, semifactual) and presented with a scenario about how two friends met. Participants in counterfactual and semifactual conditions were also shown considerations about how the event could have gone differently. After reading about the event, participants were asked to rate the meaning of the event and friendship. After providing demographic information (age and gender), participants were presented with a debriefing statement and given the code needed to secure their payment through MTurk.
RESULTS

A one-way between subjects ANOVA was conducted to compare the effect of mental simulation on perceptions of meaning in the factual, counterfactual and semifactual conditions and suggested significant differences $F(2, 379) = 26.13, p < .001$ between conditions. Tukey’s post hoc tests revealed that the difference in meaning ratings between conditions was significant only when comparing the factual condition to counterfactual and semifactual conditions (see Table 1). Reading a scenario followed by counterfactual or semifactual thoughts led to significantly increased participant ratings of the event’s perceived meaning when compared to participants who read only about the event as it had factually occurred.

<table>
<thead>
<tr>
<th>Study Variable</th>
<th>Sample</th>
<th>Counterfactual</th>
<th>Semifactual</th>
<th>Factual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Most meaningful</td>
<td>6.83</td>
<td>2.54</td>
<td>7.23$^a$</td>
<td>2.24</td>
</tr>
<tr>
<td>Most significant</td>
<td>6.77</td>
<td>2.64</td>
<td>7.18$^a$</td>
<td>2.27</td>
</tr>
<tr>
<td>Had an impact</td>
<td>7.48</td>
<td>2.28</td>
<td>7.82$^a$</td>
<td>2.08</td>
</tr>
<tr>
<td>Added meaning</td>
<td>7.66</td>
<td>2.32</td>
<td>7.99$^a$</td>
<td>2.14</td>
</tr>
<tr>
<td>Average rating</td>
<td>7.18</td>
<td>2.20</td>
<td>7.56$^a$</td>
<td>1.88</td>
</tr>
</tbody>
</table>

*Note.* Differing subscripts denote statistically significant differences as revealed by post hoc Tukey’s tests at the .05 level of significance.
DISCUSSION

Study 1 was conducted to test the effects of two types of counterfactual thinking on perceptions of meaning. Consistent with the findings of Kray et al. (2010), the results support the hypothesis that reading a scenario followed by counterfactual simulation would lead to significantly increased meaning ratings compared to only reading the factual scenario. However, meaning ratings did not significantly differ between those in the counterfactual and semifactual simulation conditions. Contrary to expectations, those in the semifactual condition also had significantly increased ratings of meaning when compared to the factual condition. In line with the Kray et al. (2010), and consistent with support theory (Tversky & Koehler, 1994), counterfactual thoughts were expected to increase the perceived likelihood of an alternative outcome and decrease the perceived likelihood of the actual outcome, leading to higher perceived meaning ratings. Semifactual thoughts were expected to lead to a reduction in the perceived likelihood of alternative outcomes, and an increase in the perceived likelihood of the actual outcome. Rather than making the event seem ordinary, semifactual thoughts lead to an increase in the subjective meaning that is equivalent to counterfactual thoughts.

One possibility to explain these findings is that semifactual thoughts are having unexpected effects. It may be that semifactual thoughts cause participants to automatically consider counterfactual thoughts, thereby generating all other subsequent effects of counterfactual thinking. A second explanation may be that both highly likely and highly unlikely events signal meaning. The belief that highly likely or highly unlikely events signal meaning may be an individual difference in meaning belief. Perhaps readings semifactual thoughts causes an event to appear more likely than we expected.
Rather than making the outcome seem commonplace, it could be that semifactual thinking causes the actual event outcome to be perceived as so likely that it is perceived as inevitable or fated.

**Study 2**

In Study 2, participants were presented with the same scenario from Study 1, followed by either counterfactual or semifactual thoughts. They also rated the level of meaning the friend perceives the event holds. Participants were then asked to rate the friend’s perception of the likelihood of the event’s actual outcome (i.e., the friend’s meeting) and of alternative outcomes (i.e., not meeting the friend). Finally, to understand the potential role of individual differences in belief, participants were asked to report the degree to which they believe highly unlikely events signify meaning and the degree to which they believe highly likely events signify meaning.

**Hypotheses**

It was expected that counterfactual thinking would increase the perceived likelihood of alternatives, decrease the perceived likelihood of the actual outcome, and therefore lead to higher meaning ratings. Semifactual thinking was expected to have the opposite effects. Although the previous expectations would result in a main effect of thought condition (counterfactual vs. semifactual) on meaning, this effect is expected to be moderated by participants’ beliefs about the degree to which likely and unlikely events signify meaning.

Specifically, it was hypothesized that participants’ meaning beliefs (i.e., that likely or unlikely events signal meaning) would interact with thought condition to alter how likely participants perceive the actual outcome and alternative outcomes to be.
Because humans are meaning makers (Heine, Proulx, & Vohs, 2006; Olivares, 2010), and due to the importance of social relationships as a source of meaning (Heintzelman & King, 2009), it was anticipated that participants, regardless of condition, would be motivated to find the event meaningful. Furthermore, it appears clear from the counterfactual potency research (see Study 4 of Petrocelli et al., 2011) that people are well aware of the implications that high and low perceived likelihoods have for their judgments and affective reactions. Thus, the motivation to find meaning may have a stronger effect than the manipulation on perceptions of probability.

Given the experimental design and the reality that people are likely to vary in their beliefs about the connection between probability and meaning, the typical effect of the thought condition and the participant’s meaning belief would be consistent for some participants and inconsistent for others. Specifically, for participants who consider counterfactual alternatives, the belief that unlikely events signify meaning would be consistent with the expected effect of the counterfactual simulation condition. That is, because counterfactual thinking is expected to enhance subjective meaning by making the actual event seem less likely to occur (and the alternatives to appear more likely to occur), participants who consider counterfactual alternatives and endorse the belief that unlikely events signal meaning would be expected to augment their sense of meaning – because the effect of their most recent mental activity is consistent with their belief about the connection between likelihood and meaning. On the other hand, participants who consider counterfactual alternatives and endorse the belief that likely events signal meaning would be expected to attenuate their sense of meaning – because the effect of
their most recent mental activity is inconsistent with their belief about the connection between likelihood and meaning.

However, for participants who consider semifactual alternatives, the belief that likely events signify meaning would be consistent with the expected effect of the semifactual simulation condition. That is, because semifactual thinking is expected to enhance subjective meaning by making the actual event seem more likely to occur (and the alternatives to appear less likely to occur), participants who consider semifactual alternatives and endorse the belief that likely events signal meaning would be expected to augment their sense of meaning – because the effect of their most recent mental activity is consistent with their belief about the connection between likelihood and meaning. On the other hand, participants who consider semifactual alternatives and endorse the belief that unlikely events signal meaning would be expected to attenuate their sense of meaning – because the effect of their most recent mental activity is inconsistent with their belief about the connection between likelihood and meaning.

As a consequence of the above predicted effects, a mediated moderation model is expected to emerge. It is hypothesized that the perceived likelihood of an alternative outcome and the actual outcome will mediate the interactive effect between thought condition (counterfactual thinking vs. semifactual) and meaning belief (likely vs. unlikely events signal meaning) on the subjective meaning associated with the event.
METHOD

Design
Study 2 included a single between-subjects variable, in which participants were randomly assigned to either the counterfactual or semifactual Simulation Condition. Responses to what extent participants believe probable and improbable events signal meaning (i.e., Meaning Belief), were computed as a single index and employed as a quasi-experimental variable. Dependent variables included ratings of Perceived Actual Outcome Probability, Perceived Alternative Outcome Probability, and a rating of the Perceived Meaning for the event and friendship.

Participants
Two hundred and fifty four undergraduate students enrolled in an introductory psychology course at Wake Forest University were recruited to participate in the study for partial course credit. After removing fifty one participants from analyses due to computer failure, the final sample consisted of two hundred and three students (110 female) ranging in age from 18 – 23 years old ($M = 18.7, SD = 1.54$).

Materials
All study materials were presented to participants using MediaLab v2012 software (Jarvis, 2012).

Simulation condition. Participants were presented with the same scenario employed in Study 1 explaining how two good friends met. Participants in the counterfactual simulation condition were again presented with thoughts about how the scenario could have gone differently and prevented the friends from meeting. Participants in the semifactual simulation condition were presented with thoughts about how the event
could have gone differently, but not prevented the friends from meeting (see Appendix A).

**Perceived meaning.** Participants rated how they believed Kathryn would respond to the same questions used in Study 1 (Kray, et al., 2010) about the meaning of the event and friendship on an 11-point response scale with *Not at all* (0) to *Entirely true* (10) as the anchor labels for the same statements employed in Study 1 (see Appendix B).

**Perceived actual and alternative outcome probability.** Participants responded to a question about how likely they felt Kathryn thought meeting Nicole was, and how likely she felt that not meeting Nicole was on an 11-point scale, with *Not at all likely* (0) to *Extremely likely* (10) as anchor labels. This came after the ratings of meanings, so that those in the semifactual condition did not consider alternate outcomes, or counterfactuals that could have influenced ratings of meaning.

**Meaning belief.** Participants rated the extent to which the likelihood of an event signifies meaning. They first read the following paragraph:

> “Some people appear to believe that highly unlikely events, whereas others appear to believe that highly likely events are most meaningful, and others are somewhere in between. We would like to ask you to report your belief with two separate questions.”

Participants then responded to two questions on a 5-point scale using *Not at all* (1) and *Entirely* (5) as the anchor labels:

> “To what degree do you believe that highly unlikely events are meaningful?”
> “To what degree do you believe that highly likely events are meaningful?”
**Demographic questionnaire.** Participants responded to demographic questions such as age, gender, and year in school.

**Procedure**

After arriving at the lab, participants signed an informed consent form and were then directed to individual private cubicles equipped with personal computers. All study materials were presented to participants using MediaLab v2012 software (Jarvis, 2012), which allowed participants to move through the study at their own pace. Participants were randomly assigned to the counterfactual or semifactual simulation condition. After completing all measures, they were informed about the “what happens in the lab stays in the lab rule” in order to prevent participant crosstalk, and asked if they will follow this rule (Edlund, Sagarin, Skowronski, Johnson, & Kutter, 2009). Finally, participants reviewed a debriefing statement and were dismissed from the lab.
RESULTS

Perceived Meaning

The average of the four meaning items were again used to create one meaning rating ($\alpha = .86$). To test the hypothesis that Simulation Condition would have a main effect on the event’s Perceived Meaning, an independent samples $t$-test was conducted to compare the average meaning rating from the counterfactual and semifactual simulation condition. As in Study 1, meaning ratings for participants in the counterfactual condition ($M = 6.09, SD = 1.86$) were not significantly greater than meaning ratings for the semifactual condition ($M = 6.03, SD = 2.42$), $t(201) = .20, p = .84$.

Perceived Actual Outcome Probability

The Perceived Actual Outcome Probability was not significantly correlated with Perceived Meaning across groups, $r(201) = .03, p = .68$. Though not significant, the Perceived Actual Outcome Probability was negatively correlated with meaning in the counterfactual condition, $r(99) = -.11, p = .30$, indicating that the less likely the actual outcome was perceived, the greater the meaning rating. As would be expected, the opposite was true for the semifactual condition. For those in the semifactual condition, higher Perceived Actual Outcome Likelihood was linked to higher Perceived Meaning ratings, and this correlation was marginally significant, $r(100) = .16, p = .10$. There was a significant negative correlation between Perceived Actual and Perceived Alternative Outcome Probability, $r(201) = -.80, p < .01$.

Consistent with support theory (Tversky & Koehler, 1994), an independent samples $t$-test revealed that participants in the counterfactual simulation condition reported the outcome (friends meeting) to be significantly less likely ($M = 3.7, SD =$
2.31) relative to those in the semifactual simulation condition ($M = 8.05, SD = 2.52$), $t(201) = 12.83, p < .001$.

**Perceived Alternative Outcome Probability**

The Perceived Alternative Outcome Probability was not significantly correlated with Perceived Meaning, $r(201) = .05, p = .44$. However, examining the groups separately, Perceived Alternative Outcome Likelihood was significantly correlated with Perceived Meaning in the counterfactual condition, $r(99) = .21, p = .03$. The correlation between Perceived Meaning and Alternative Outcome Likelihood for the semifactual condition was in the direction expected, but was not significant, $r(100) = -.06, p = .58$.

Also consistent with support theory (Tversky & Koehler, 1994), an independent samples $t$-test revealed that the perceived likelihood of an alternative outcome (friends not meeting) was significantly greater in the counterfactual simulation condition ($M = 6.58, SD = 2.52$) compared to the semifactual simulation condition ($M = 2.41, SD = 2.55$), $t(201) = 11.72, p < .001$.

**Meaning Belief**

Meaning Belief scores were first calculated by subtracting the rating for the belief that unlikely events signal meaning item ($M = 4.01, SD = .84$) from the rating for the belief that likely events signal meaning item ($M = 3.25, SD = .92$). Doing so provided a range of scores such that greater positive scores indicate a stronger belief that likely events are more indicative of meaning, and lower negative scores signifying a stronger belief that unlikely events signify meaning ($M = -.76, SD = 1.29$).

Because a range of responses were expected for the Meaning Belief questions, rather than completely polarized ratings, a Meaning Belief Ambivalence score was also...
calculated using methods recommended for measuring attitudinal ambivalence (Thompson, Zanna, & Griffin, 1995). The ambivalence score ($M = 2.53 \ SD = 1.36$) was included in the analysis as a covariate, thereby allowing for differentiation between participants who rate Meaning Belief high for both highly likely and highly unlikely events and those who rate both as being low. Extensive research on developing a scoring method to incorporate two separate unipolar scales into single index has been conducted in the area of attitudinal ambivalence (Kaplan, 1972; Thompson et al., 1995). The specific equation used for this index was $[(\text{highly likely belief} + \text{highly unlikely belief})/2] - \text{[absolute value (highly likely belief – highly unlikely belief)]}$ (see Thompson et al., 1995).

**Simulation Condition × Meaning Belief**

Though there was not a significant main effect of Meaning Belief, moderation analysis using hierarchical regression as suggested by Cohen and Cohen (1983) was used to test the hypothesis that effects of Meaning Belief and Simulation Condition on Subjective Meaning, Perceived Actual Outcome Probability, and Perceived Alternative Outcome Probability, would be qualified by a Simulation Condition × Meaning Belief interaction. Meaning Belief Ambivalence was controlled for by being in the first step of each model. Meaning Belief and Simulation Condition were centered and entered into the second model and their interaction term was added in the third step of three separate regression analyses. As displayed in Table 2, and consistent with results above, there was a significant main effect of Simulation Condition on Perceived Alternative Outcome Probability, such that counterfactual simulation led to increased ratings compared to semifactual simulation. However, there was not a significant main effect of Meaning
Belief on Perceived Alternative Outcome Probability, and the Simulation Condition × Meaning Belief interaction did not increase the model’s fit (see Table 2).

Similarly, as displayed in Table 3 and consistent with results above, there was a significant main effect of Simulation Condition on Perceived Actual Outcome Probability, such that counterfactual simulation led to decreased ratings compared to semifactual simulation. There was not a significant main effect of Meaning Belief on the Perceived Actual Outcome Probability and the Simulation Condition × Meaning Belief interaction did not improve the model’s significance (see Table 3).

The analysis showed no significant main effects when Subjective Meaning was regressed onto Simulation Condition, and the interaction term did little to improve the model’s significance (see Table 4). Despite the lack of significant interactions, to explore
how the data compared to what was predicted, the slopes for main effects were plotted
and found to have patterns consistent with expectations (see Figures 2, 3, and 4). It was
expected that Simulation Condition would have a stronger main effect than Meaning
Belief on probability and meaning ratings.

**Interaction and alternative outcome probability.** In the counterfactual
condition, for those who held the belief that unlikely events are most meaningful, belief
matched the effect of the counterfactual condition (making alternatives seem more likely)
and they rated the likelihood of an alternative outcome (friends not meeting) to be much
greater than those in the semifactual condition and slightly greater than those in the
counterfactual condition who believed that likely events signaled meaning. Similarly, for
those in the semifactual condition who believed that likely events are most meaningful,
belief and condition aligned and they rated alternative outcomes to be less likely than
those in the counterfactual condition and slightly less likely compared to those in
### Table IV

_Hierarchical Regression Analysis Predicting Perceived Meaning_

<table>
<thead>
<tr>
<th>Criterion/Step/Predictor</th>
<th>$R^2$</th>
<th>$\Delta R^2$</th>
<th>$B$</th>
<th>$SEB$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
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<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Meaning Belief Ambivalence</td>
<td>.01</td>
<td>.01</td>
<td>.20</td>
<td>.11</td>
<td>.11</td>
<td>1.60</td>
<td>.11</td>
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<tr>
<td><strong>Step 2</strong></td>
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<td></td>
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<td></td>
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<td></td>
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<tr>
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<td>.23</td>
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<td>.14</td>
<td>1.85</td>
<td>.07</td>
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<td>Meaning Belief</td>
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<td></td>
<td>-.11</td>
<td>.13</td>
<td>-.07</td>
<td>-.87</td>
<td>.39</td>
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<td>Simulation Condition</td>
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<td>.30</td>
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<td>.79</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Meaning Belief Ambivalence</td>
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<td>.01</td>
<td>.14</td>
<td>.14</td>
<td>.06</td>
<td>1.03</td>
<td>.31</td>
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<tr>
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<td>.10</td>
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<td>.91</td>
<td>.37</td>
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<tr>
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<td>.66</td>
<td>-12.67</td>
<td>.66</td>
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<tr>
<td>Meaning Belief × Condition</td>
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<td>.27</td>
<td>.03</td>
<td>.56</td>
<td>.56</td>
<td>.60</td>
<td></td>
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</tbody>
</table>

In the semifactual condition, for those who held the belief that likely events are most meaningful, belief matched the effect of the semifactual condition and they rated the likelihood of the actual outcome (friends meeting) to be much greater than those in the counterfactual condition and slightly greater than those in the semifactual condition who believed that unlikely events signaled meaning. Similarly, those in the counterfactual condition who believed that unlikely events are most meaningful, belief and condition aligned and they rated alternative outcomes to be less likely than those in the semifactual condition and less likely compared to those in counterfactual condition who held the opposite belief.
Figure 2

Perceived Alternative Outcome Probability by Simulation Condition and Meaning Belief

(see Figure 3). However, these results also warrant caution as the Simulation Condition × Meaning Belief interaction was also not statistically significant.

Interaction and Meaning Belief. As predicted, for participants in the counterfactual condition, holding the belief that unlikely events are most meaningful led to the highest Perceived Meaning ratings. Perceived Meaning from those in the semifactual condition, who believe that likely events signal meaning, gave the second highest ratings of Perceived meaning. The lowest Perceived Meaning ratings came from those in the counterfactual condition who believed likely events were most meaningful. The second lowest ratings were from those in the semifactual condition who believed that
unlikely events were most meaningful (see Figure 4). While these differences were not statistically significant, the slopes are very similar to the pattern of results that was predicted.

Mediation

Because there were no significant interactions, the indirect effect between Simulation Condition and Perceived Meaning was tested. A mediation analysis was computed using a bootstrap procedure to construct bias-corrected confidence intervals based on 5,000 random samples with replacement from the full sample (see Preacher &
Hayes, 2004, 2008) to examine the indirect effect of Simulation Condition on Perceived Meaning through Perceived Actual and Perceived Alternative Outcome Probabilities. The size of the indirect effect of Simulation Condition on Perceived Meaning through the Perceived Actual Outcome Likelihood was -.60 ($SE = .31$), and was significant with a 95% confidence interval which did not include zero, 95% CI [-1.24, -.03]. The size of the indirect effect of Simulation Condition on Perceived Meaning through the Perceived Alternative Outcome Likelihood was .56 ($SE = .31$), but was not significant with a 95% confidence interval which included zero, 95% CI [-.04, 1.18] (see Figure 5).
Figure 5

Mediation of the relationship between Simulation Condition and Meaning by Perceived Alternative Outcome Likelihood and Perceived Actual Outcome Likelihood (Study 2)

Note. The Simulation Conditions were dummy-coded using 1 for the counterfactual condition and 0 for the semifactual condition. The values displayed are standardized regression coefficients. †p < .10. *p < .001.
DISCUSSION

Study 2 was conducted to explore the role that mental simulation, meaning beliefs and perceptions of probability play in altering the perceived meaning that an event holds. Consistent with Study 1, a direct effect of mental simulation was not found for meaning. Again, in comparison to the Study 1 control (factual) condition, both counterfactual and semifactual mental simulations appeared to enhance subjective meaning.

Though it has been proposed that a perceived decrease in the probability of an event may play a role in the effect of counterfactual thinking on perceptions of meaning (Heintzelman et al., 2013; Kray et al., 2010), very little research has directly measured how counterfactual thinking alters perceptions of probability (see Buffone, Gabriel, & Poulin, 2016; Heintzelman et al., 2013).

Consistent with support theory (Tversky & Koehler, 1994), the results of Study 2 support the hypothesis that counterfactual thoughts about an event lead to the perception that an alternative outcome was likely and the actual outcome was unlikely. Counterfactual thinking, unpacking how seemingly small alterations in antecedents (e.g., “If Nicole had not been sitting next to me…”) could derail present life circumstances (“…then I never would have met her”) led participants to perceive the actual event outcome (e.g., meeting and befriending Nicole) as significantly less likely to occur and an alternative event outcome (e.g., not meeting and befriending Nicole) as significantly more likely to occur. Conversely, and also as expected, semifactual simulation led participants to perceive the alternative event outcome as significantly less likely to occur and the actual event outcome as significantly more likely to occur. Study 2 results supplement existing literature on counterfactual thinking and meaning by suggesting that
the changes in perception of the event’s actual outcome likelihood [alternative outcome
likelihood] mediates [partially mediates] the link between reimagining a past event and
the perceived meaning derived from the event.
GENERAL DISCUSSION

While previous findings have linked counterfactuals which alter an outcome to increased meaning (Ersner-Hershfield, Galinsky, Kray, & King, 2010; Kray et al., 2010), the effects of semifactual thinking on subjective meaning estimates had not been considered. Surprisingly, though perceptions of probability were influenced as expected in Study 2, the hypothesis that subjective meaning would be changed in opposite ways (depending on the nature of the mental simulation being counterfactual or semifactual) was not supported by data from Study 1 or Study 2. Essentially, the data suggest that events perceived as both more likely and unlikely increases subjective meaning.

Study 2 replicated the results of Study 1 with the finding that both counterfactual and semifactual mental simulation increase subjective meaning. One possibility is that instructions to engage in semifactual thinking prompts or spontaneously cues individuals to also generate counterfactual thoughts. Such mental activity would explain the comparable meaning ratings in counterfactual and semifactual conditions. However, because the results of Study 2 supported the hypothesis that the two simulation conditions would have opposite effects on perceptions of probability, this explanation seems less likely. If participants had generated counterfactuals on their own, it seems that actual and alternative outcome probability perceptions for those in the counterfactual and semifactual conditions would be similar; but they clearly were not. It appears to be more likely that counterfactual and semifactual thinking increase subjective meaning ratings via alternate routes.

As noted by Spellman (1997), research conducted by Mandel and Lehman (1996) seems to suggest that an inability (or difficulty) to mentally simulate an antecedent that
would undo an event’s outcome leads to the perception that the event was inevitable and the result of fate. Though it was expected that considering three antecedents that did not alter the outcome in the semifactual condition would make the event outcome seem like an everyday or common event, it is possible that unpacking antecedents that do not alter the outcome lead to stronger perceptions of subjective meaning because one comes to perceive that the event was unavoidable, or predestined.

However, contrary to the perspective of Kray and colleagues (2010), the increased ratings of the event’s outcome likelihood in the semifactual condition suggest that it is not necessary for counterfactual thoughts to make meeting a friend appear “…so improbable that it could not have possibly happened by chance alone” (p. 109) (i.e., the result of fate) in order to increase the event’s perceived meaning. Though counterfactual thinking appears to make the actual outcome seem improbable, it did not make alternative outcomes seem improbable; in fact, counterfactual thinking made alternative outcomes seem more probable than the actual outcome. If making events seem simultaneously improbable and inevitable is necessary to increase meaning, this was not reflected in participants’ probability estimates. Thus, in the way of enhancing one’s subjective meaning estimates, it may be sufficient for the event to appear either highly likely or highly unlikely.

A second potential effect of imagining how the past could have gone differently is inducing reflection on cause and effect relationships to increase meaning. People appear to have a natural desire to understand cause and effect relationships because it aids in maintaining a sense of meaning and making sense of life (Heine et al., 2006). Although Galinsky et al. (2005) contended that counterfactuals created meaning through mutability,
the results of Study 2 suggest that a perceived lack of mutability can have the same effect. In Study 1, participants in the factual condition were presented with the same scenario as the other conditions, and could have considered the causes and effects implicated by the scenario, yet they did not unpack the antecedent (cause) and outcome (effect) links by reading how things could have gone differently. Despite previous research suggesting that semifactuals diminish perceptions of causality between an antecedent and outcome (McCloy & Byrne, 2002), the mere process of focusing on antecedents and outcomes may have caused participants in both conditions to generate the necessary chain of events that led to the friends meeting, creating a framework that makes sense of the event, increasing meaning.

The hypothesis that participants beliefs about the extent to which highly likely and highly unlikely events indicate meaning would interact with condition to influence probability and meaning perceptions was not supported by the results of Study 2. There are several potential explanations for these findings. It is broadly accepted that humans are motivated to find meaning. For instance, Frankl (1963) believed that the desire to find meaning is our primary motivation for survival. Participants may have been motivated to find meaning regardless of their beliefs and may have been particularly motivated to perceive the friend event as meaningful, as social relationships have proved to be one of the primary sources for meaning making in life (Hicks & King, 2009). Furthermore, because belief was measured after likelihood and meaning ratings in Study 2, it could be that participants inferred their beliefs from their motivation to find the event meaningful. It is also important to note that 56.20% of meaning belief scores fell to the negative side of the distribution, meaning that most participants felt that highly unlikely events were at
least slightly more meaningful than highly likely events. However, though the difference was not significant, the mean belief score in the semifactual condition was greater than in the counterfactual condition.

**Theoretical Implications**

The findings of this research offer further insight into the psychological construct of meaning and how it is created in our lives. Specifically, these findings seem to align with the understanding of meaning as a framework, highlight the subjective nature of meaning and the readiness humans have to perceive it, and reaffirm its malleability.

While Kray et al. (2010) concluded that considering what might have been through downward counterfactuals (i.e., a comparison to a worse possible world) was important for meaning making, the results of the current studies suggest that meaning can be created just as easily by imagining an alternate world that is no better or worse than the present world. This research suggests that merely considering the connections between the events of life (attending a class and meeting a friend), even those that are not believed to be responsible for the event, is sufficient to glean an increased level of meaning.

As many of the early existential philosophical and psychological perspectives on meaning conclude, meaning certainly appears to be in the eye of the beholder. This research indicates that opposite perspectives on an event (that it was likely or unlikely) are equally effective in altering perceptions of meaning.

This findings also lend support to the view that humans are meaning-makers (Heine, 2006), as we seem primed create further meaning with very little effort. The limited effort with which we perceive meaning also emphasizes how easily it is
manipulated. By considering three events which would have precluded friends from meeting or not, taking no more than a matter of minutes, meaning was significantly increased for both conditions. It seems that humans are ready and eager to find meaning in life events with even very minimal encouragement.

A final important implication of these findings is that magical thinking may not be necessary in order to derive an increased degree of meaning from a life event. Fate has been implicated in previous research of counterfactuals, described as a sense that an event was so unlikely that it must have a predetermined (Galinsky et al., 2005; Kray et al., 2010). Similarly, Buffone et al. (2016) found that counterfactual thinking increased the sense that God had played a role in an event. However, the results of the present research suggest that an event need not be perceived as simultaneously unlikely and likely in order to increase its meaning. This finding leaves open the possibility that it is not necessary to implicate an unseen force as the cause of an event in order to increase the event’s meaning.

Limitations and Future Directions

The findings from two experimental studies add to previous research by furthering our understanding of the effect that counterfactual thinking has on perceptions of outcome probability and meaning. The results also suggest that mental simulations need not undo outcomes in order to increase subjective meaning. Although these findings offer new considerations for future research, there are several notable limitations that should be taken into account.

One limitation from Study 1 is that the factual condition did not further reflect on the friendship in the way that the counterfactual and semifactual condition did. In order to
be certain that the effect observed is not due to this further elaboration on the friendship in the experimental conditions, future research would do well to ensure that all conditions reflect equally on the friendship.

A second limitation comes from the absence of a control condition in Study 2. Outcome likelihood estimates were significantly different for semifactual and counterfactual conditions and mediated/partially mediated the link between condition and meaning in Study 2. However, without a control condition the possibility that probability estimates differ significantly between the mental simulation and factual conditions cannot be determined. Including a control condition in future studies would allow for a better understanding of the degree to which the effects that counterfactual and semifactual thinking have on probability perceptions is responsible for altering perceived meaning.

Another limitation comes from the controlled use of a scenario and list of counterfactuals for participants to consider. A critical step for subsequent research will be to replicate the findings of this research with participants reimagining their own autobiographical memories, rather than responding to a scenario. Nonetheless, the limited previous research on the topic has asked participants to generate their own scenarios and counterfactuals and to rate their personally perceived meaning, so there is reason to believe that the effects reported in the current investigation would remain consistent.

The current investigation examined alterations in probability estimates caused by two types of counterfactual thinking and found that perceived likelihood is important for increasing meaning, but there are many other features and effects of counterfactual simulation that may be important to this link. Future research should examine how the number and the availability of counterfactuals generated alters meaning. The perceived
potency of thoughts is another important feature of the counterfactual which should be explored. Petrocelli et al. (2011) found that the likelihood of different aspects in a counterfactual thought determine the impact of a counterfactual on cognitive and affective reactions. The greater the counterfactual potency, the stronger the influence of the counterfactual thought. Counterfactual potency is quantified by multiplying the perceived likelihood of a counterfactual antecedent occurring (i.e., “if-likelihood), by the likelihood that this antecedent would have indeed altered the outcome (i.e., then-likelihood; Petrocelli et al., 2011).

Attributions and perceptions of control may also contribute to counterfactual and semifactual thinking’s influence on meaning. Research conducted by Seto et al. (2015) found an effect of counterfactual thinking on meaning only in participants with high ratings of belief in free will. The current research found that semifactual thinking also increases subjective meaning, though it seems likely that it would decrease perceptions of control or free will by only considering antecedents which do not alter the outcome. Counterfactual thinking has been found to have varying effects on perceptions of control (Markman & Miller, 2006), and it is important for the effect of semifactual thinking on control perceptions and attributions be explored.

Finally, although the findings of two studies strongly suggest that both counterfactual and semifactual thinking increase subjective meaning, the current (and related) research does not speak to the durability of the effect, or its impact on overall perceptions of meaning in life. Future research would do well to explore whether the counterfactual reconstruction of a past memory leads to a lasting change in the meaning
associated with that memory, and whether meaning in life is altered by changing the meaning associated with one life event.

**Applied Implications**

The current research is further confirmation of the conclusions from previous research suggesting that counterfactual simulation significantly increases the degree of meaning perceived in an event above and beyond simply reflecting upon the event. It further suggests that the counterfactual considered need not undo the outcome or make the event appear rare in order to have this effect. Though subsequent research would do well to replicate the current findings and further our understanding of how event meaning develops, these findings appear to have some promise for applied psychology. Subjective well-being – or how well people think and feel they are doing – is a combination of the level of negative and positive affect experienced and perceived satisfaction with life (Deiner, Lucas, & Oishi, 2002). Because of meaning’s association with subjective well-being (Zika & Chamberlain, 1987), these findings have implications for interventions that aim to increase subjective well-being. This research also aligns with the findings of previous research that suggest meaning focused interventions (e.g., logotherapy, therapy designed by Frankl (1963) that focuses on finding meaning as a method of treating psychological illness) could be improved by having participants reimagine their past.

**Conclusion**

The findings of two studies supported the hypothesis that considering counterfactual and semifactual thoughts about an event alters subjective meaning ratings for an event, and have differing effects on the perceived likelihood of the actual and an alternative event outcome. Consistent with support theory, those exposed to
counterfactual thoughts rated the actual event outcome as less likely and an alternative outcome more likely. Conversely, those exposed to semifactual thoughts rated the actual event outcome as more likely and an alternative outcome as less likely. The results of Study 2 also confirmed that the effects of counterfactual and semifactual thinking on meaning is partially mediated by perceptions of actual outcome likelihood.

Interestingly, however, the present findings establish that counterfactual and semifactual thinking significantly alter perceptions of meaning relative to factual thinking. Semifactual thinking appears to enhance subjective meaning rather than diminish it. However, the malleability of this psychological construct is entirely consistent with Frankl’s (1963) assertion that meaning could be found under any circumstances.

It is clear from the scope of interest (Markman et al., 2013) that psychology is taking steps to better understand the important construct of meaning, but there is still more to discover. It may be common to find a reasonably high level of meaning in life (Heintzelman & King, 2014), but there are clear and wide-ranging benefits to understanding how meaning can be increased. The importance of meaning and the ease with which it can be altered make meaning an ideal goal for interventions. The results of two studies add the growing conceptualization of subjective meaning as a flexible psychological construct, and to the view that mental simulation could be used as an effective meaning and subjective well-being intervention.
REFERENCES


Kray, L. J., George, L. G., Liljenquist, K. A., Galinsky, A. D., Tetlock, P. E., & Roese, N. J. (2010). From what might have been to what must have been: Counterfactual thinking creates meaning. *Journal of Personality and Social Psychology, 98*, 106–118.


APPENDIX A

Simulation Condition

**Factual Condition**
Kathryn met her friend, Nicole, in an 8:00am biology class during her junior year in college. They had to choose partners for a class project and, since Nicole sat next her, Kathryn asked Nicole to be her partner.

**Counterfactual Condition**
Kathryn sometimes thinks of how things leading up to meeting Nicole could have gone differently. Considering how busy college students are with the many courses they take and extracurricular activities they become involved with, Kathryn has thought: “If I had not taken that biology class, then I never would have met Nicole,” “If I had not asked her to be my partner for the group project, then I never would have met Nicole,” and “If Nicole had not been sitting next to me, then I never would have met her.”

**Semifactual Condition**
Kathryn met her friend, Nicole, in an 8:00am class during her junior year in college. They had to choose partners for a class project and, since Nicole sat next her, Kathryn asked Nicole to be her partner. Kathryn sometimes thinks of how things leading up to meeting Nicole could have gone differently. Considering how busy college students are with the many courses they take and extracurricular activities they become involved with, Kathryn has thought: “Even if I had not taken that biology class, I still would have met Nicole,” “Even if I had not asked her to be my partner for the group project, I still would have met Nicole,” and “Even Nicole had not been sitting next to me, I still would have met her.”
APPENDIX B

Perceived Meaning

The next questions will ask you about the ACTUAL outcome. Please rate how true each statement is for Kathryn.

1. “Meeting Nicole was one of the most meaningful events of my life

Not at all true 0 2 3 4 5 6 7 8 9 10 11 Entirely true

2. “Befriending Nicole was one of the most significant choices of my life.”

Not at all true 0 2 3 4 5 6 7 8 9 10 11 Entirely true

3. “My friendship with Nicole has had an impact on who I am.”

Not at all true 0 2 3 4 5 6 7 8 9 10 11 Entirely true

4. “My friendship with Nicole has added meaning to my life.”

Not at all true 0 2 3 4 5 6 7 8 9 10 11 Entirely true
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