

PROCESS AND OUTCOME COUNTERFACTUAL THINKING

A Dissertation

by

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## ABSTRACT

The narratives we formulate about our lives are vital to our sense of well-being, meaning in life, and self-understanding. Counterfactual thinking (CFT), or mental simulations that imagine alternatives to past events, is a cognitive process often used to better understand specific past events in our lives. Extant literature has shown that CFTs can help us make sense or derive meaning from a past event. Importantly, related work on mental simulation and regret suggests that a thought's temporal focus (i.e., either imagining the process or antecedents leading up to an outcome versus imagining just the outcome itself or the consequence of the process) may have downstream effects. The present research applied this distinction to counterfactual thinking and examined how it influences our understanding of past events. In three studies, I examined two different contexts, trauma (Studies 1 and 2) and life turning points (Study 3), and measured the effect that process CFT versus outcome CFT has on well-being, meaning-making, and self-understanding. Organized as an exploratory investigation, the results of the studies endeavored to describe the types of thoughts participants were most likely to have along with correlates to some downstream effects. Basic interpretations of those exploratory results are also described.

## CONTRIBUTORS AND FUNDING SOURCES

### **Contributors**

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## 1. INTRODUCTION

Storytelling is a basic, universal human behavior that has survived the test of time, despite the uniqueness of individual identity and/or distinct cultural boundaries. Our brains are hardwired to process information and convey it to others in a narrative format; this process is constant and essential for understanding human cognition, perception, imagination, behavioral tendencies, and social patterns (Boyd, 2010; Crossley, 2000; Sarbin, 1986). This narrative approach to understanding life may be seen, functionally, as a motivation towards meaning-making. The stories we tell about the pivotal moments in our lives and the meaning we derive from those narratives are associated with a variety of adaptive outcomes, including ego development and resiliency (maturity), identity, optimism, and coping (McLean & Pratt, 2006; McLean & Thorne, 2003; Pals, 2006). Although there is little work comparing the effect of negative life events to positive life events, there is some evidence that a narrative that includes conflict is particularly useful in meaning-making and is beneficial to well-being. A redemptive narrative, for example, after a breakup was associated with reduced emotional distress (Slotter & Ward, 2015). Similarly, a particular type of turning point, a traumatic event, can elicit both growth (posttraumatic growth, PTG), as well as the well-documented distress (posttraumatic distress, PTD; Tedeschi & Calhoun, 1996).

Counterfactual thinking (CFT), or imagining alternatives to past events, features or states, is a common cognitive process used to help better understand past events (Roesse, 1997).

Counterfactual thoughts typically follow an “if...then” format and imagine alternative antecedents and consequences to what actually happened. While thinking counterfactually can be deleterious, affecting mental health and creating feelings of self-blame and regret (Davis, Lehman, Wortman, Silver, & Thompson, 1995), its’ inherent evaluative nature has important



consequences for meaning-making (Kray et al., 2010). Specifically, counterfactual thinking creates causal inferences between features of an event (antecedents) and outcomes (consequents), perhaps instilling a sense of order and purpose in one's life narrative (Roese & Olson, 1996).

Both the mental simulation (Pham & Taylor, 1999) and regret (Connolly & Reb, 2005) literatures show effects of temporally shifting thoughts about an event, such that they focus on the processes leading up to the event compared to the outcome of the event. That is, whereas process-focused mental simulations ask individuals to imagine the steps that would lead to a particular outcome, outcome-focused simulations imagine the outcome itself. The current research applies this distinction to counterfactual thinking and examines how this shift in counterfactual focus influences meaning-making in both positive and negative turning points. In this context, I contend that process CFT (which manipulate the "if" or antecedents leading up to the imagined alternative) and outcome CFT (which manipulate the "then" or consequent of the imagined alternative) may influence meaning-making and other relevant variables differently.

## 2. BACKGROUND AND LITERATURE REVIEW

### 2.1 Counterfactual Thinking

Counterfactual thinking refers to the cognitive process of undoing past events and imagining how things would have otherwise turned out differently (Roese, 1997). Thoughts of this nature typically follow an “if... then...” format. For example, “If I hadn’t failed that class, I would have never switched majors.” Typically, the “if...” portion (the antecedent) describes an alternative action or circumstance related to the event, whereas the “then...” portion (the consequent) describes an imagined better or worse alternative outcome. Individuals often engage in counterfactual thinking in order to explain or understand the past and prepare for or improve the future (Epstude & Roese, 2008).

Traditionally, counterfactual thoughts are categorized by direction (upward or downward), locus of control (self/internal or other/external), and controllability (controllable or uncontrollable). The direction of a counterfactual thought determines whether the alternative imagined is worse (downward; e.g., “If I had been inconsistent with my doctors’ appointments, they would have caught the cancer too late to treat”) or better (upward; e.g., “If I had known about my genetic predisposition for cancer, I would have gone to the doctor sooner”) than reality (Roese, 1997). The locus of control dimension (Roese & Olson, 1995) questions whether a counterfactual thought is internal or about the self (self; e.g., “If I had followed a budget, I would be financially stable”) or about external elements such as another person or the situation itself (other; e.g., “If my parents had taught me about budgeting, I would be financially stable.”) Furthermore, controllability (Mercier et al., 2016) refers to whether the counterfactual focuses on aspects that an individual has control over (controllable; e.g., “If I had engaged in an exercise regime, I would be healthy”) or aspects that are outside an individual’s control (uncontrollable;

e.g., “If I had different genes, I would be healthy”). Different combinations of these dimensions may beget different results in terms of the consequential affect, meaning, and functionality of one’s counterfactual thoughts.

Replaying one’s past was traditionally conceived of as a negative experience with emotional consequences ranging from regret to despair, sometimes culminating in a cycle of rumination and depression (Roese, 1994). For example, counterfactual thinking in depressed individuals tends to be more frequent, less controllable, and/or more self-deprecating in nature (Markman & Miller, 2006). Similarly, counterfactual thinking about a traumatic experience exacerbates negative affect, blame assignment, and other maladaptive outcomes (Branscombe, Wohl, Owen, Allison, & N’gbala, 2003). In accordance with posttraumatic growth theory (Tedeschi & Calhoun, 2004), I postulate that these results may reflect a temporal bias, or, the “struggle” before the “growth.”

Recently, counterfactual thinking has been reconceived as an asset within the functional theory of counterfactual thinking. This juxtaposes the earlier focus on counterfactual thinking’s negative consequences and proposes that counterfactual thinking can be useful in that it allows people to use their past failures to strategize about a better future (Epstude & Roese, 2008; Roese & Epstude, 2017). Similarly, the social comparison literature suggests that comparing oneself to a better off individual provides useful information for successful coping and self-betterment. This may be particularly true when coping with a stressful life event (Buunk, Collins, Van Yperen, Taylor, & Dakof, 1990; Taylor & Lobel, 1989). Roese (1994) logically conjectured that, “upward counterfactuals and upward social comparisons may serve the same preparative function” (pg. 806). Instead of comparing oneself to others, counterfactual thoughts allow individuals to compare their current reality with what “could have been” and how it could be

better in the future. In other words, when individuals reflect counterfactually on their past behaviors and the outcomes of those behaviors, they are able to strategize for future, similar tasks and thus, perform better on future attempts. Demonstrating this functionality, generating counterfactual thoughts in between trials on an anagram task improved participant's performance on a subsequent anagram task (Markman, McMullen, Elizaga, 2008; Reichert & Slate, 1999; Roese, 1994). Similarly, generating counterfactual thoughts about a recent exam performance increased feelings of personal control, which increased positive academic behaviors and resulted in higher scores on subsequent exams (Nasco & Marsh, 1999).

Beyond its ability to provide insight for improving future outcomes, counterfactual thinking has potential to enhance meaning-making. The causal inferences that counterfactual thinking relies on seems to influence the prosody of one's life-narrative, making events seem "fated" or "meant to be" and thus, more significant and meaningful (Byrne, 2002). Heintzelman, Christopher, Trent, and King (2013) found that having participants write counterfactually about their own birth led to a greater sense of meaning in life and better life satisfaction. These results mirror sentiments of the seminal classic, "It's a Wonderful Life," and, more relevantly, support the notion that thinking counterfactually can influence one's sense of well-being and meaning in life. Interestingly, Kray and colleagues (2010) likewise found that thinking counterfactually about pivotal events in one's life enhanced perceptions of meaning through two independent causal pathways, benefit finding (i.e., cognitively reappraising ostensibly negative events to acknowledge positive consequences) and fate-perceptions (i.e., perceiving pivotal moments as fated or "meant to be").

The interplay between the affective and cognitive components of counterfactual thinking demonstrates a complex and dynamic enmeshment of emotion and function. Upward

counterfactuals beget negative affect, making the individual susceptible to rumination and other negative outcomes; they also simulate a more effective strategy, which is necessary for improving future outcomes and learning from the past (Roese, 1994). Meanwhile, downward counterfactuals offer much-needed relief from the grief, despair, or self-blame one might feel after a traumatic event, but offer little insight to plan for the future (Mandel, 2003). Thus, the devil may be in the details; in that, the diversity in terms of a counterfactual's direction (upward/downward), locus of control (self/other), and controllability (controllable/uncontrollable) may be a better predictor of the type of consequences than the amount of CFT alone. Supporting this, a study on assault victims found that, although generating more counterfactual thoughts positively correlated with posttraumatic distress, individuals who generated a variety of counterfactual thoughts also enjoyed some counterfactual benefits, such as planning for future behaviors (El Leithy, Brown, & Robbins, 2006).

Building off of the Process-versus-Outcome distinction (Pham & Taylor, 1999), I propose that shifting the temporal focus of counterfactual thoughts is salient to their affective and cognitive consequences. A process-focused mental simulation requires an individual to imagine the process, or the steps they might take that leads to a particular outcome. Whereas, outcome-focused simulations imagine the particular preferred outcome (Pham & Taylor, 1999). Applied to counterfactual thinking, I conceptualize process-oriented counterfactuals as those that focus on manipulating the antecedents in an effort to undo the pivotal event. For example, "If only I had worn a condom, I wouldn't have contracted HIV" or "If I hadn't taken karate, my assailant would have killed me." In contrast, outcome-oriented counterfactuals focus on the outcome of the pivotal event, and imagine alternative consequences had the event not occurred. For

instance, “If I hadn’t contracted HIV, I wouldn’t have met my friends in my support group” or “If my parents hadn’t gotten divorced, I would still live next to my best friend.”

Although this has not been empirically tested in counterfactual thinking, some models of regret (an emotion commonly associated with CFT) have applied the Process-versus-Outcome distinction. For example, Connolly and Reb (2005) combined reference-point theory and decision-regret models to propose that cancer patients might experience either outcome regret (i.e., the regret is focused on the outcome of a decision; “I regret that chemotherapy is having terrible side-effects”) or process regret (i.e., the regret is focused on the decision process; “I regret not doing more research before making my treatment decision”). As mentioned previously, mentally undoing antecedents that led to the traumatic event (i.e., process-oriented counterfactuals), especially via upward counterfactuals about one’s own (in)actions, leads to greater posttraumatic distress (Davis et al., 1995). However, there is a dearth of work on outcome-oriented counterfactuals. This lacuna in the literature indicates a potential pathway towards posttraumatic growth via cognitive reappraisals.

## **2.2 Meaning-Making**

Meaning-making can refer to a multidimensional construct that includes the desire to make sense and understand the *how* of one’s life events or to the significance we place on those events and our vision of *why* life is the way it is (George & Park, 2017). By thinking counterfactually, we create causal links between situational factors (e.g., ours and other people’s actions, inactions, or environmental features) that potentially led to the specific outcomes. Counterfactuals tend to fixate on easily mutable features (like behaviors that are deviations from the norm; Kahneman & Miller, 1986), regardless of their causal accuracy. In this way, counterfactuals attempt to seek order in the chaos of seemingly arbitrary outcomes. Process

counterfactuals might be particularly useful in the *how* component of meaning-making as they endeavor to identify how an outcome came to be. If an individual does not consider the features leading up to an event, they will not be able to grasp the paths, or steps they (and others) took, that led them to a particular significant moment in time. The significance of an event, or the *why* component of meaning-making, may align more with outcome counterfactuals, as they guide in the interpretation of the outcome. An individual that does not consider how one's current life would be different if an event had not occurred at all might not experience the full weight of the influence that event actually did have. More broadly, outcome counterfactuals may help one's life narrative feel more cohesive. Instead of seeing life merely as a list of unconnected events, putting the outcome of a past event into the context of one's present creates a more seamless vision of the plot. In an effort to understand how process and outcome counterfactual thinking might influence meaning-making differently, Study 3 used counterfactual thinking in relation to meaning-making measures.

Another relevant set of questions was explored in Study 3: does counterfactual thinking influence perceptions of the self? For example, agency, as understood by Bandura (1989), affords individuals the ability to attribute causality to their narrative. Despite the constant "interference" of one's environment, by remaining grounded in one's own motivation, intentions, thoughts, behaviors, affect, and other personal factors, one creates an interactional causal structure between the self, the environment, and salient outcomes. Thus, counterfactual thoughts that enhance the meaning-making process, may also relate to a sense of agency. It similarly stands to reason that by exploring the significance of an event from all possible angles, one's sense of authenticity, or accordance with one's true-self (Vannini & Franzese, 2008) and self-actualization, or the growth of an organism to "become" what the organism is (Maslow, 1968),

becomes more developed. By identifying causal links, the individual may place their self more firmly, more colorfully, and more meaningfully within their own narrative, thereby not only enhancing the plot of that particular event, but also their own character.

If meaning making enhances our perception of our life narrative, it may also crystallize our vision of ourselves within that frame. Perhaps if events are interpreted as significant, the person to which they are occurring must also be significant. Reflecting this, Galinsky, Lilienquist, Kray, & Roese (2005) noted that a person who generates the counterfactual, “If this tragedy had not occurred, I would not be the person I am today”, is inferring that that an event is important because it shaped their current personage (who also must be important). Laying claim to meaning on a series of events creates a vision of a life and a person that is all the more meaningful and extraordinary.

Process counterfactuals identify the actions or circumstances that produced an outcome. Through the lens of the self, the process illustrates the journey one had to take in order to become who they are. For example, if a person currently sees themselves as being better after suffering a trauma, the process may indicate the ways they deserve this better outcome. Constructs like a sense of agency (Bandura, 1989) might be relevant to individuals who are able to identify the ways in which this journey was their own, that they created their own destiny. Outcome counterfactuals, on the other hand might speak more to the significance of the person they are. With less focus on the journey (or the how) to who they became, outcomes may shine a light on the why suffering through a particular journey ultimately occurred, for instance. Self-focused measures such as authenticity and self-actualization may be particularly relevant to those thinking counterfactually about an outcome. Thus, Study 3 also examined whether



counterfactual thinking can predict a variety of self-relevant variables, in addition to meaning-making.

### **2.3 Current research**

Extant literature associates counterfactual thinking with well-being and meaning-making (Epstude & Roese, 2008). Mental simulation and regret literature contend that process and outcome simulations have diverging effects. Applied to counterfactual thinking, the present research explored whether process counterfactuals (that manipulate the antecedent or “if” portion) influence meaning-making and well-being differently compared to outcome counterfactuals (that manipulate the consequent or “then” portion). Study 1 and 2 explored these effects in the context of traumatic events. The potentially pathogenic effects of traumatic events has been well-documented in literature on PTSD, depression, anxiety, physical pain, and alcohol/substance abuse symptoms (Breslau, Davis, Andreski, & Peterson, 1991; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Whitfield, 1998). The construct of posttraumatic growth, proposes that trauma can, in fact, also have a salutogenic effect (Tedeschi & Calhoun, 1996). Posttraumatic growth (PTG) describes an increase in personal strength, intimacy with others, spirituality, appreciation of life, hope, and meaning in life, all of which (can) occur in response to a trauma. PTG may peripherally assuage posttraumatic distress (PTD), but it primarily serves to positively transform an individual in ways that transcend pretrauma levels of psychological functioning (Calhoun & Tedeschi, 2014).

Individual differences related to positive coping skills, such as confidence in one’s abilities and early success in coping, may predispose individuals to be more or less likely to perpetuate a maladaptive (PTD) or adaptive (PTG) cognitive and affective style (Aldwin, Levenson, & Spiro, 1994; Cieslak, Benight, & Lehman, 2008; Tedeschi & Calhoun, 2004).

Thus, identifying individual differences that distinguish between coping abilities may also distinguish between CFT effects or interact with CFT content to predict outcome variables, including PTG and PTD. The Shift-and-Persist model of coping defines the “shift” portion as strategies that allow individuals to flexibly adjust cognitive appraisals, emotional reactions, and meaning derived from the external environment (Chen & Miller, 2012). Accordingly, Studies 1 and 2 also included measures of shift-and-persist coping and resilience (a multidimensional quality that features consistent coping, and even thriving, in response to stress via positive adaptations; Connor & Davidson, 2003).

While a traumatic experience is surely a pivotal moment to make sense of, the meaning-making must occur in relation to the individual’s consistent sense of self over time. The pervasiveness of the effects of our “narrative configurations” with regards to coherence and meaning, as well as identity formation, has been compellingly illustrated in the case of trauma victims (Crossley, 2000). While the disruption and fragmentation of one’s existential narrative can be a result of a trauma, narrative psychology can be used to reconstruct a consistent sense of the self and understanding of the self within the milieu. In other words, the story that one tells themselves (and others) about the trajectory of their own life, including negative or traumatic events (perhaps as “turning points”), is essential to psychological well-being. The present project is inspired by the narrative nature of one’s attempts at meaning-making and self-concept. Specifically, I used process versus outcome counterfactual thinking as a means by which to catalyze and measure individuals’ cognitive appraisals and/or reappraisals of life events (both traumatic events and other life turning points) and the consequences of those thought patterns.

Study 3 broadened the scope to life turning points (beyond trauma) and examined how the shift in the temporal focus of their counterfactual thoughts (process versus outcome)

influenced self-perception and meaning making measures. In Study 3, participants described an important life event/turning point and then generated process or outcome counterfactuals. Participants also focused on either a positive or negative important life event/turning point. Kray et al. (2010) found that undoing key life events via counterfactual thinking facilitated meaning making. I contend that this is important to understanding the function of counterfactual thinking after a negative or positive life-altering event. Although current research tends to focus on the negative outcomes associated with counterfactual thinking about a trauma (El Leithy et al., 2006) or the negative affect associated with counterfactual thinking about a negative event (Epstude & Roese, 2008), the meaning-making element speaks to the perhaps longer-term effect. In other words, given the benefits associated with enhanced meaning-in-life (Kray et al., 2010), perhaps the pain that may be begat from CFT is “worth it;” after all, humans persist in their tendency to think counterfactually about what might have been regardless. This may not be as dysfunctional as typically described and instead, be illustrative of a trade-off humans are willing to make in their development of meaning-in-life and self-development.

### 3. STUDY 1

The aims of the study are described in the below research questions and statistical plans. Firstly, I examined whether there are relationships between individual differences (i.e., shift and persist coping and resiliency), CFT content variables (i.e., direction, locus of control, controllability), and the main dependent measures (i.e., PTSD, PTG, and relevant single item measures). Using correlations, I hypothesized that shift-and-persist and resilience would be positively associated with PTG and negatively associated with PTSD. Secondly, I ascertained whether prompting individuals for process-oriented counterfactual thoughts, outcome-oriented counterfactual thoughts, or factual thoughts (control condition) promoted different levels of PTSD and PTG. Using one-way ANOVAs, I hypothesized that the CFT conditions (process and outcome) would produce higher levels of PTG than the control condition.

#### 3.1 Study 1 Method

**Participants.** Participants were recruited via the Texas A&M University online research subject pool (SONA). To be included in the study procedures and subsequent data analyses, participants had to be 18 years old or older and complete both Part 1 and Part 2 of the study. The final analyses included 403 participants ( $M = 18.84$  years,  $SD = 1.09$  years). Most participants were female (77%) and white (61.8%). All participants were randomly assigned to a process CFT, outcome CFT, or control condition.

#### **Measures and Materials.**

***Shift and Persist.*** The Shift-and-Persist Questionnaire (Chen, McLean, & Miller, 2015) is an eight-item scale (with 6 additional “distractor” items) that assesses for the psychosocial characteristics associated with positive coping and, consequently, mitigated risk for physical and mental illness ( $\alpha = .563$ ). Participants responded to each item on a four-point Likert scale

ranging from “not at all” (1) to “a lot” (4). Four items are summed and represent the shift score, which measures participants’ ability to adjust flexibly and appropriately to any given situation. The remaining four items are summed for the persist score, or, participants’ ability to persevere in the face of hardships. Since the shift-and-persist model posits that only simultaneous use of both shift strategies and persist strategies in tandem predict positive coping (Chen & Miller, 2012), these two raw scores are added together to represent a total shift-and-persist score (Chen et al., 2015). See Appendix A for the Shift-and-Persist Questionnaire.

***Resilience.*** The Connor-Davidson Resilience Scale (Connor & Davidson, 2003) is used to determine participants’ perceived amount of resilience ( $\alpha = .901$ ). The 25-item scale uses a 0 (Not True at All) to 4 (True Nearly All of the Time) Likert scale. Responses are averaged to produce an overall resilience score. See Appendix B for the Resilience Scale.

***Traumatic Life Events Scale.*** The Traumatic Life Events Questionnaire (TLEQ; Kubany et al., 2000) assesses participants’ traumatic experiences in general across the lifespan. The scale assesses traumatic experiences across 22 events that are either traumatic, according to DSM criteria, or extremely stressful in nature ( $\alpha = .797$ ). For each item, participants respond by indicating the number of times they experienced the trauma on a scale from “never” (0) to “more than five times” (6). Responders are also asked to report the number of times any other stressful or traumatic events that were not included on the list have occurred across their lifetime. The sum of all items represent a trauma across the lifespan score. These scores can be used in future analyses to control for any differences in posttraumatic growth or posttraumatic distress that may be relevant to trauma across one’s lifetime as opposed to differences that are the result of the specific trauma described in the traumatic event writing task. See Appendix C for the TLEQ.

***Traumatic Event Writing Task.*** All participants were asked to think of a specific example of the most (or one of the most) traumatic, upsetting experience(s) they have experienced; the event they choose must have occurred at least a year ago. I asked participants to choose an event from at least a year ago so that the outcome CFT group will have had time to reappraise the trauma and the consequences associated with it. After thinking of a specific event, they had three minutes to write about their experience. The writing prompt asked that they delve into their deepest emotions and thoughts and express that information in a few sentences. This writing prompt helped participants place themselves back into that moment and access salient emotions and cognitions about their trauma. Similar negative event prompts have been used in counterfactual thinking studies (McFarland & Alvaro, 2000; White & Lehman, 2005). Studies on writing about trauma have used similar prompts as interventions for or examinations of the effect of writing about trauma (Sloan & Marx, 2004). See Appendix D for the Traumatic Event Writing Prompt.

***Factual Thinking Task.*** After completing the traumatic writing task, participants in the factual thinking task condition (the control condition), were be told the following, “After traumatic, upsetting and/or negative experiences like the one you described on the previous page, people often think about the details of the situation. For example, when it happened, who was involved, and what happened right before or after the event occurred.” There were 10 blank boxes below the instructions and participants provided some examples of details from their traumatic event. They were asked to only list as many as they can naturally recall without repeating any. This procedure is derived from Kray and colleague’s (2010) control condition used in their study on counterfactual thinking and meaning in life. See Appendix E for the Factual Thinking Task.

***Process Counterfactual Thinking Task.*** After completing the traumatic writing task, participants in the process counterfactual condition completed the process counterfactual thinking task. These participants were told that, “After traumatic, upsetting, and/or negative experiences like the one you described on the previous page, people sometimes cannot help thinking “what if...” or “if only...” and imagining what it would be like, if only something prior to the event had been different. What if something were different, or if only something were changed? These thoughts often take an: “if \_\_\_\_\_, then \_\_\_\_\_” format.” Below the instructions, participants saw ten boxes that read “ if \_\_\_\_, then the outcome would have been different.” Individuals in this condition were asked to fill in the “if” portion by identifying things that, had it been different, would have changed the outcome of the traumatic experience. Participants filled in as many as they can naturally come up with without repeating any. See Appendix F for the Process Counterfactual Thinking Task.

***Outcome Counterfactual Thinking Task.*** After completing the traumatic writing task, participants in the outcome counterfactual condition completed the outcome counterfactual thinking task. These participants were told that, “After traumatic, upsetting, and/or negative experiences like the one you described on the previous page, people sometimes cannot help thinking “what if...” or “if only...” and imagining how things might be different if the event had not occurred. What if something were different, or if only something were changed? These thoughts often take an: “if \_\_\_\_\_, then \_\_\_\_\_” format.” Below the instructions, participants saw ten boxes that read, “If the event had not occurred, then \_\_\_\_.” Individuals in this condition were asked to fill in the “then” portion by identifying ways things could have turned out differently had the event not occurred at all. Participants were asked to fill in as many as they

can naturally come up with without repeating any. See Appendix G for the Outcome Counterfactual Thinking Task.

***Counterfactual Task Coding.*** At the end of the study, participants in the two experimental counterfactual thinking conditions (process and outcome) were asked to code each of the counterfactual thoughts that they reported for three content variables: direction (upward/downward), locus of control (self/other), and controllability (controllable/uncontrollable). See Appendix H for the Counterfactual Task Coding Questions.

***Posttraumatic Growth.*** The Posttraumatic Growth Inventory (PTGI), devised by Tedeschi and Calhoun (1996) is a 21-item measure of positive changes that participants may have experienced as a result of their trauma ( $\alpha = .932$ ). Participants are asked to “Indicate for each of the statements below the degree to which this change occurred in your life as a result of your crisis.” For each item, participants respond using a 6-point Likert scale ranging from “I did not experience this change as a result of my crisis” (0) to “I experienced this change to a very great degree as a result of my crisis” (5). An overall PTG score is calculated by averaging across all 21 items. See Appendix I for the Posttraumatic Growth Inventory.

***Gotten Better.*** In addition to the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), a single item question was asked inquiring whether participants felt that overall, things have gotten better since the traumatic event. Participants responded on a 10-point Likert scale ranging from strongly agree to strongly disagree.

***Posttraumatic Distress.*** The Impact of Event Scale-Revised (IES-R) is a 22-item scale ( $\alpha = .909$ ) that asks participants to rate subjective distress caused by a traumatic event and experienced in the last seven days (Weiss, 2007). Participants respond to each item using a five point Likert scale ranging from “not at all” (0) to “extremely” (4). The scale consists of three



subscales, intrusion, avoidance, and hyperarousal, which are relevant to the constellation of cognitive, affective, and physiological constructs associated with posttraumatic distress in general, as well as posttraumatic stress disorder, as defined by the DSM-V (American Psychiatric Association, 2013). For the present analyses, only the overall average score was used. See Appendix J for the Impact of Event Scale-Revised.

***Gotten Worse.*** In addition to the Impact of Event Scale-Revised (IES-R; Weiss, 2007) a single item question was asked inquiring whether participants felt that overall, things have gotten worse since the traumatic event. Participants responded on a 10-point Likert scale ranging from strongly agree to strongly disagree.

***Demographics.*** A basic demographics questionnaire collected data on participants' age, gender, and ethnicity. See Appendix K for the Demographics questionnaire.

***Procedure.*** This study was conducted in two parts, using the Qualtrics online survey program to collect and store data. Interested individuals signed up for both parts using the online subject pool, SONA. In Part 1, participants completed the Shift-and-Persist Scale, the Resilience Scale, the Life Stressor Checklist-Revised, and demographics.

In Part 2, participants were randomly assigned to one of three conditions: the factual condition (control condition), the process counterfactual thinking condition, or the outcome counterfactual thinking condition. Part 2 began with all participants completing the traumatic event writing task, followed by either the factual task (control), process counterfactual thinking task, or outcome counterfactual thinking task, depending on the condition. Next, all participants completed the posttraumatic growth inventory and the impact of event scale-revised (posttraumatic distress measure). These two measures were counterbalanced to control for any ordering effects. Following the PTD and PTG measures, all participants were asked how long

ago their counterfactual event occurred. Finally, participants in the two counterfactual thinking conditions responded to the self-coding questions for each of the counterfactual thoughts they reported. All participants finished the study by completing a debriefing task.

### **3.2 Study 1 Results and Discussion**

Correlations were used to analyze the relationship between the individual difference measures and dependent measures using all participants. Additional correlations, using only CFT participants, explored relationships between CFT content and DVs. Finally, ANOVAs investigated condition differences on dependent variables.

#### **Correlations**

Correlations between individual differences and outcome variables are in Table R.1. Notably, resilience correlated significantly with posttraumatic growth ( $r = .26, p < .001$ ) and negatively with posttraumatic distress ( $r = -.14, p = .006$ ). Shift and persist also correlated positively with PTG ( $r = .31, p < .001$ ) and negatively with PTD ( $r = -.15, p = .002$ ). A significant positive interaction was also found between PTG and PTD ( $r = .32, p < .001$ ). This supports the proposition that distress and growth work hand-in-hand instead of as opposing forces which is an interesting contribution to and replication of that literature.

Using only the participants in the counterfactual thinking conditions, correlations between individual differences, outcome variables, and counterfactual thinking content variables are in Table R.2. These results support the idea that some individual differences are related to some content variables. For example, downward CFTs were significantly and positively correlated with the shift portion of the shift-and-persist scale ( $r = .17, p = .007$ ). In addition, I found some support for CFT content variables relating to outcome variables. For instance, self-focused CFTs were positively and significantly correlated with PTD ( $r = .23, p < .001$ ).

The results from Study 1 demonstrated that correlations between variables behaved as I would expect. For example, individual differences of shift-and-persist coping and resilience generally positively correlated with posttraumatic growth and negatively correlated with posttraumatic distress. Also, downward CFT positively correlated with shift and posttraumatic growth and upward CFT positively correlated with posttraumatic distress. In addition, a positive correlation between posttraumatic growth and posttraumatic distress lends credence to the theoretical perspective that distress and growth, in response to trauma, go hand-in-hand.

### **ANOVAs Comparing Conditions**

Four one-way ANOVAs were run predicting each of the outcome variables. Process ( $M = 3.68$ ,  $SD = 1.14$ ), Outcome ( $M = 3.73$ ,  $SD = 1.15$ ), and control/factual ( $M = 3.78$ ,  $SD = 1.05$ ) conditions did not predict PTG ( $F(2, 400) = .282$ ,  $p = .755$ ,  $\eta^2 = .001$ ). Process ( $M = 2.70$ ,  $SD = .80$ ), Outcome ( $M = 2.53$ ,  $SD = .72$ ), and control/factual ( $M = 2.59$ ,  $SD = .72$ ) conditions did not predict PTD ( $F(2, 400) = 1.824$ ,  $p = .163$ ,  $\eta^2 = .009$ ). Process ( $M = 2.84$ ,  $SD = 2.16$ ), Outcome ( $M = 2.78$ ,  $SD = 2.38$ ), and control/factual ( $M = 2.74$ ,  $SD = 2.05$ ) conditions did not predict the single item “things have gotten worse” ( $F(2, 400) = .068$ ,  $p = .934$ ,  $\eta^2 = .000$ ). The only significant results was found in the ANOVA predicting to the single item “things have gotten better” outcome variable ( $F(2, 400) = 4.297$ ,  $p = .014$ ,  $\eta^2 = .02$ ). LSD post-hoc results identified a significant difference between the process ( $M = 8.59$ ,  $SD = 2.13$ ) and outcome ( $M = 8.02$ ,  $SD = 2.57$ ) conditions as well as the outcome and control/factual ( $M = 8.81$ ,  $SD = 2.1$ ) conditions. Outcome CFT predicted lower feelings that things had gotten better since the trauma compared to the other two groups. These results provide some support for the influence of manipulating CFT on perceptions of one’s traumatic experience and the consequences of said experience.

ANOVA results testing whether CFT condition predicts PTG/PTD, provided some conflicting evidence supporting the influence of my process versus outcome manipulation. The scale measures for PTG and PTD did not show any differences as a result of the CFT manipulation. However, the single item PTG measure showed that participants in the outcome condition were significantly less likely to report that things had gotten better since the trauma than those in the process or factual condition. It is possible that this result suggests that thinking counterfactually about the outcome of a traumatic event makes identifying the resulting growth more difficult, but not enough to show movement on a full PTG scale. That is, the difference might be more subtle and less clinical in this college-aged sample.

## 4. STUDY 2

Study 2 replicates the context of Study 1 by remaining in the realm of trauma but features one key difference in design: the only between-condition manipulation was CFT versus non-CFT. With respect to process versus outcome CFTs, participants in the CFT condition were educated on the two different types (see Methods) prior to the CFT task so that the option between generating process versus outcome focused thoughts was up to the participants. In addition, Studies 2 and 3 did not include individual difference measures. Using this methodology, I am able to determine whether a natural inclination towards a certain temporal focus of counterfactuals (i.e., process versus outcome) is associated with CFT content variables (direction, locus, and controllability) and outcome variables (posttraumatic distress and posttraumatic growth). This methodology also supports a different statistical plan. With a larger focus on natural inclination instead of manipulation, a key feature of the statistics for Studies 2 and 3 is a focus on descriptive statistics that were not featured in Study 1. Descriptive statistics and chi squares are used to illustrate the patterns of CFT content variables. Correlations were also used to explore the relationships between and amongst CFT content variables and posttraumatic growth and distress dependent measures.

### 4.1 Study 2 Methods

**Participants.** An a priori power analysis using G\*Power indicated that we would need at least 485 participants to detect a small effect size ( $F^2 = .02$ ). At least 223 participants would be needed to detect a small-to-medium effect size ( $F^2 = .05$ ). Participants were recruited from the SONA subject pool at Texas A&M University. 1/3 of participants were randomly assigned to the control condition with the remaining 2/3 participants assigned to complete the natural inclination CFT task and the process/outcome CFTs that corresponds with their choice. 374

participants were used in final analyses with a mean age of 18.62 years ( $SD = 1.09$ ). Most participants were female (75.9%) and white (75.1%).

### **Measures and Materials.**

***Traumatic Event Writing Task.*** The same traumatic writing task from Study 1 was used in Study 2.

***Factual Thinking Task.*** After completing the traumatic writing task, participants in the factual thinking task condition (the control condition), were told the following, “After traumatic, upsetting and/or negative experiences like the one you described on the previous page, people often think about the details of the situation. For example, when it happened, who was involved, and what happened right before or after the event occurred.” Participants were given one blank box below the instructions and asked to identify one detail to report.

***Process and Outcome Counterfactual Thinking Description.*** After completing the traumatic writing task, participants in the counterfactual condition saw both the process CFT description and the outcome CFT description (order was counterbalanced). Differences between the descriptions are italicized below.

The Process CFT description reads: “After traumatic, upsetting, and/or negative experiences like the one you described on the previous page, people sometimes cannot help thinking “what if...” or “if only...” and imagining *what it would be like, if only something prior to the event had been different.* What if something were different, or if only something were changed?”

The Outcome CFT description reads: “After traumatic, upsetting, and/or negative experiences like the one you described on the previous page, people sometimes cannot help

thinking "what if..." or "if only..." and imagining *how things might be different if the event had not occurred*. What if something were different, or if only something were changed?

***Process and Outcome Counterfactual Thinking Tasks.*** After seeing descriptions and examples of both process and outcome counterfactual thoughts (similar prompts were used as those in Study 1), participants in the CFT condition were asked to generate five “if only” (counterfactual) thoughts about the trauma they had written about. They were told: “Remember that these thoughts can focus on changing things that led up to the traumatic event that, had they been different, would have changed or prevented the event from happening. Or, they can focus on changing the outcome of the event and how things that happened as a result of the traumatic event would have been different had the traumatic event been different or not occurred at all.”

***Counterfactual Task Coding.*** At the end of the study, participants in the counterfactual thinking conditions were asked to code the counterfactual thought that they reported for five content variables. Just as in Study 1, they were asked about the direction (upward/downward), locus of control (self/other), and controllability (controllable/uncontrollable). In addition, participants were asked whether the thought focused primarily on “changing something prior to the traumatic event” (process) or “changing something that occurred as a result of (after) the traumatic event” (outcome). Finally, participants were asked whether each thought changes the event itself or undoes the event entirely.

***Posttraumatic Growth.*** As in Study 1, participants completed the Posttraumatic Growth Inventory ( $\alpha = .919$ ; PTGI; Tedeschi & Calhoun, 1996).

***Gotten Better.*** As in Study 1, participants completed the same single-item question about whether things had gotten better since the trauma, overall.

**Growth Item.** An additional single item question was added to Study 2 which simply asks participants to rate on a 1-10 (Strongly Disagree to Strongly Agree) Likert scale whether they feel they have grown as a result of their trauma.

**Posttraumatic Distress.** As in Study 1, participants completed the same Impact of Event Scale-Revised ( $\alpha = .910$ ; IES-R; Weiss, 2007).

**Gotten Worse.** As in Study 1, participants completed the same single-item question about whether things had gotten worse since the trauma, overall.

**Distress Item.** An additional single item question was added to Study 2 which simply asks participants to rate on a 1-10 (Strongly Disagree to Strongly Agree) Likert scale whether they feel they have suffered distress as a result of their trauma.

**Demographics.** Participants completed the same demographic questions as in Study 1.

**Procedure.** All participants first saw the traumatic event writing task. Next, participants in the control condition completed the factual writing task. Participants in the counterfactual thinking condition then saw the outcome and process descriptions and examples (counterbalanced). They were then asked to generate five counterfactual thoughts.

Next, all participants completed the posttraumatic growth inventory and the impact of event scale-revised (posttraumatic distress measure). These two measures were counterbalanced to control for any ordering effects. Following the PTD and PTG measures, all participants were asked how long ago their counterfactual event occurred. Finally, participants in the counterfactual thinking condition responded to the self-coding questions for the counterfactual thoughts they reported.



## 4.2 Study 2 Results and Discussion

Since the present study is meant to be exploratory in nature, specific hypotheses were not predetermined. I used chi-square statistics to examine what process versus outcome counterfactual thoughts look like (with respect to CFT content variables). In addition, to explore the causal nature of counterfactual thinking, I conducted ANOVAs to compare group-level differences between CFT and control conditions, as well as between participants who generated more process versus more outcome thoughts. Finally, correlations across the content variables and between the content variables and trauma-related dependent variables paint a more vivid picture of these relationships.

### Descriptive Statistics

The descriptive statistics and one-way chi-square comparisons between each pair of content variables can be found in Table R.3. 69% of counterfactual thoughts were process, which was significantly different from outcome oriented thoughts according to a chi-square test of independence,  $\chi^2(1, N = 940) = 151.2 (p < .001)$ .

To determine the relationship between process and outcome content variables, a series of chi-square tests of independence were performed (see Table R.3 for means). The relationship between type (process vs. outcome) and direction (up vs. down) was significant,  $\chi^2(2, N = 940) = 37.891 (p < .001)$ . Process counterfactuals were more likely to be upward (91.2%) compared to outcome counterfactuals that were upward (74.2%). Upward counterfactual thoughts are considered more functional (Epstude & Roese, 2008). This is due in part to their preparatory function as they allow for visualization towards a better future outcome. Process counterfactual thoughts might be in better service of this traditional vision of functional counterfactual thinking since the focus is on what led up to the traumatic event.

The relationship between type (process vs. outcome) and locus of control (self vs. other) was significant,  $\chi^2(2, N = 940) = 6.214$  ( $p = .015$ ). Outcome counterfactuals were more likely to be self-focused (55.2%) compared to process counterfactuals that were self-focused (46.1%). Whereas self-focused counterfactuals are considered more functional (Epstude & Roese, 2008), in a trauma setting, perhaps self-focused thoughts that also temporally fixated on events leading up to the trauma are too emotionally threatening. In other words, they might lend themselves to a “blame the victim” narrative, thus pushing some thoughts to focus on forces outside the individual who has suffered a trauma.

The relationship between type (process vs. outcome) and controllability (controllable vs. uncontrollable) was significant,  $\chi^2(2, N = 940) = 12.313$  ( $p = .001$ ). Process counterfactuals were more likely to be controllable (71.4%) compared to outcome counterfactuals that were controllable (60.2%). Since controllable counterfactuals are considered more functional (Epstude & Roese, 2008), it may be that the aforementioned utility of process counterfactuals with regards to theoretical functionality (i.e., serving a preparative purpose) also encourages those thoughts to have an air of agency as well.

Finally, a chi-square test of independence was performed to examine the relationship between type (process vs. outcome) and effect on the event (changed vs. undid the event) frequencies. The relationship was significant,  $\chi^2(2, N = 940) = 6.497$  ( $p = .011$ ). Outcome counterfactuals were more likely to change the event (66.7%) compared to process counterfactuals that changed the event (57.1%). This is a novel content coding variable that doesn't lend itself well to extant theoretical interpretation. It's possible that those who were generating outcome-oriented thoughts were motivated to imagine their life as “meant to be” and thus would not be interested in undoing the event entirely, although, this is pure speculation.

## ANOVA Comparing Conditions

A one-way ANOVA was run to determine whether there were condition effects between the counterfactual thinking condition and the control condition on each growth/distress dependent variable.

There were no significant effects of CFT ( $M = 6.35, SD = 2.50$ ) versus control condition ( $M = 6.31, SD = 2.42$ ) on single item “things have gotten better” [ $F(1, 371) = .020, p = .889, \eta^2 = .000$ ]. This diverges from results in study 1 which indicated that there were differences in how outcome CFTs versus process CFTs and the control condition influenced ratings on this item. Perhaps indicating that ratings of this perception are malleable but in a more nuanced way than simply generating CFTs or not generating CFTs.

There were no significant effects of CFT ( $M = 3.43, SD = 2.34$ ) versus control condition ( $M = 3.16, SD = 2.34$ ) on single item “things have gotten worse” [ $F(1, 371) = 1.206, p = .273, \eta^2 = .003$ ]. There were no significant effects of CFT ( $M = 6.63, SD = 1.95$ ) versus control condition ( $M = 6.90, SD = 2.31$ ) on single item “I have grown as a result of my trauma” [ $F(1, 371) = 1.510, p = .220, \eta^2 = .004$ ]. There were no significant effects of CFT ( $M = 3.88, SD = 1.038$ ) versus control condition ( $M = 3.81, SD = 1.05$ ) on posttraumatic growth [ $F(1, 371) = .578, p = .448, \eta^2 = .002$ ]. There were no significant effects of CFT ( $M = 2.72, SD = .79$ ) versus control condition ( $M = 2.68, SD = .78$ ) on posttraumatic distress scale [ $F(1, 371) = .272, p = .602, \eta^2 = .001$ ].

There was a significant effect between the counterfactual condition ( $M = 6.037, SD = 2.43$ ) and control condition ( $M = 5.467, SD = 2.67$ ) on the single item “I have experienced distress as a result of my trauma” [ $F(1, 371) = .4.641, p = .032, \eta^2 = .012$ ]. Perhaps thinking counterfactually about one’s trauma more attunes individuals to the distress they have experienced.

## Correlations

Correlations were run on participants in the counterfactual thinking condition to examine the relationship between and amongst the counterfactual thinking content variables and posttraumatic growth/distress dependent variables (see Table R.4).

**Dependent Variables.** Study 2 did not replicate the correlation between the posttraumatic growth scale and posttraumatic distress scale found in Study 1; no significant relationship was identified ( $r = .088, p = .229$ ). However, the single item question that inquired whether participants feel they have suffered distress as a result of their trauma was significantly and positively correlated with the single item growth item that questioned whether participants feel they have grown as a result of their trauma ( $r = .179, p = .014$ ). I speculate that this result might insinuate a relationship between growth and distress that is not consistently detectable on scales intended to measure entire constructs but is robust enough to be identified in more simple and direct inquiries, like our single items. It is also worth noting that the distress scale might be more appropriate for clinical samples, which may have influenced the results. Other correlations between the dependent variables were either not significant or predictably related. For instance, the single item measure of whether participants feel things have gotten worse was negatively related to the posttraumatic growth scale ( $r = -.282, p < .001$ ) and positively related to the posttraumatic distress scale ( $r = .418, p < .001$ ).

**CFT Content Variables.** Some correlations between the counterfactual thought content variables were significant. For example, process counterfactuals were positively correlated with upward counterfactuals ( $r = .179, p = .005$ ). This might justify our aforementioned association with process counterfactuals and functional CFT (Epstude & Roese, 2008). In addition, controllable CFTs were positively correlated with upward CFT ( $r = .146, p = .046$ ) and self-

focused CFT ( $r = .236, p = .001$ ). These variables are all considered more functional (Epstude & Roese, 2008), thus, their connection somewhat bolsters the supposition that certain constellations of CFTs tend to hang together. However, I propose that the relationship between these variables are better understood via the aforementioned descriptive and chi-square statistics.

**CFT Content Variables and Dependent Measures.** Finally, I was interested in the correlations between the counterfactual content variables and the dependent variables. There were only two significant relationships identified. Self-focused counterfactuals were negatively related to the single distress item ( $r = -.145, p = .048$ ). Counterfactuals that changed the event (as opposed to undoing it all together) were negatively associated with posttraumatic distress ( $r = -.178, p = .015$ ). Perhaps these counterfactuals seem more plausible in reality (i.e., if you had control over the event and could merely change it (assuming that avoiding it all together seems less likely)) add a sense of possibility or hope that deters the individual from associating CFTs with distress. Furthermore, since these are correlations and not predictions, it might be that less posttraumatic stress allows the individual some space to not want to undo the event all together, and instead, spend time thinking about it.

## 5. STUDY 3

Study 3 examined process versus outcome CFT in a new context, important turning points. Participants were asked to think about an important turning point in their life, as opposed to a traumatic event specifically. The dependent variables are focused on perceptions of the self and meaning in life. In addition, the new context provided the project with a new inquiry: does the valence of the event (i.e., was it a positive or negative turning point) influence CFT content variables and the aforementioned outcome variables. Research determined the influence of process and outcome CFT on perceptions of self and meaning in life. I investigated whether the type of turning point participants chose to focus on (positive versus negative), in addition to process vs. outcome influenced CFTs and perceptions of self and meaning.

### 5.1 Study 3 Method

**Participants.** An a priori power analysis using G\*Power indicated that we would need at least 485 participants to detect a small effect size ( $F^2 = .02$ ). At least 223 participants would be needed to detect a small-to-medium effect size ( $F^2 = .05$ ). Participants were recruited from the SONA subject pool at Texas A&M University. 1/3 of participants were randomly assigned to the control condition with the remaining 2/3 participants assigned to complete the natural inclination task and the process/outcome manipulation that corresponds with their choice. Final analyses included 395 undergraduate participants with a mean age of 18.7 years ( $SD = 2.5$ ). Most participants were female (71.4%) and white (79.2%).

#### **Measures and Materials.**

***Turning Point Event Writing Task.*** A similar prompt was used in Study 3 as was used in Studies 1 and 2 (Kray et al., 2010). Instead of a trauma, the participants were told to: “Please take a moment now to think of the turning point you will write about. The turning point should

be one of the best or worst things that has happened in your life. Some examples might include: getting accepted to college, meeting your boyfriend/girlfriend/best friend, a bad break up, an injury that influenced your athletic career.”

***Process versus Outcome Counterfactual Thinking.*** As in Study 2, participants first saw descriptions of each CFT type (process versus outcome; counterbalanced) and were then asked to provide five counterfactual thoughts of their choosing.

***Meaning in Life Questionnaire (MLQ).*** To determine participants’ current level of meaning in life ( $\alpha = .899$ ; subscale 1) and the degree to which they are searching for meaning in life ( $\alpha = .879$ ; subscale 2), the MLQ (Steger, Frazier, Oishi, & Kaler, 2006) uses 10 items rated on a 7-point Likert scale, from “absolutely untrue” (1) to “absolutely true” (7). See Appendix L for the MLQ.

***Authenticity.*** The Authenticity Scale (Wood, Linley, Maltby, Baliousis, & Joseph, 2008) is a 12-item measure that uses a 1 (does not describe me at all) to 7 (describes me very well) Likert scale. The subscales include: Authentic Living ( $\alpha = .741$ ), Capacity to Resist External Influence ( $\alpha = .869$ ), and Self-Alienation ( $\alpha = .869$ ). See Appendix M for the Authenticity Scale.

***Agency.*** An 11-item Sense of Agency scale (SOAS; Tapal, Oren, Dar, & Eitam, 2017) was used to investigate whether counterfactual thinking influences perceptions of personal control. Participants determined the degree to which they agree (1= strongly disagree; 7= strongly agree) with each item; for example, “I am in full control of what I do” and “The consequences of my actions feel like they don’t logically follow my actions.” The scale can be separated into two subscales, sense of positive agency ( $\alpha = .615$ ) and sense of negative agency ( $\alpha = .685$ ). See Appendix N for the Sense of Agency Scale.

***Self-Actualization.*** Jones and Crandall (1986) developed a short index of self-actualization. The scale is a 15-item index using a 4-point Likert scale (1: disagree, 2: somewhat disagree, 3: somewhat agree, 4: agree). See Appendix O for the Self-Actualization Scale ( $\alpha = .598$ ).

***Hope.*** The Hope Scale (Snyder, et al., 1991) is a 12-item measure using a 4-point Likert response scale. This scale in particular is relevant to my other self-variables as it measures the construct of hope as the reciprocal relationship between goal-directed determination (agency) and identifying pathways to meeting those goals. Hope can be, and thus was, analyzed by combining the 2 subscales, agency ( $\alpha = .669$ ) and pathway ( $\alpha = .646$ ) to measure the total hope ( $\alpha = .352$ ) construct. See Appendix P for the Hope Scale.

***Psychological Wellbeing.*** To measure how psychological wellbeing might be influenced by thinking counterfactually with a process or outcome focus, I used the 18-item short version of the Ryff Psychological Wellbeing scale (Ryff & Keyes, 1995). Participants responded using a 7-point Likert scale to determine their levels of perceived wellbeing and happiness. Subscale include: autonomy ( $\alpha = .600$ ), environmental mastery ( $\alpha = .478$ ), personal growth ( $\alpha = .568$ ), positive relations ( $\alpha = .537$ ), purpose ( $\alpha = .347$ ), and acceptance ( $\alpha = .693$ ). See Appendix Q for the Ryff Psychological Wellbeing scale ( $\alpha = .781$ ).

***Positive or Negative Event Measures.*** All participants were asked a series of questions to determine how they viewed the valence (positive vs negative) of the turning point they described. Participants were asked whether the turning point was objectively one of the best or objectively one of the worst things that has happened in their life (binary choice). They were also asked to rate on a 10 point Likert scale the degree to which they felt 1. The event had an



ultimately positive influence on their life and 2. The event had an ultimately negative influence on their life. The order of these questions were, of course, randomized.

**Contamination.** When determining the negative/positive objective and subjective influence of an event on a person's life holistically, some researchers (see McAdams, Reynolds, Lewis, Patten & Bowman, 2001) have questioned the importance of whether a "plot twist" is seen as a contamination (when a good event has negative consequences) or a redemption (when a bad event has positive consequences). This theory was explored by asking participants to choose which description best fits how they see the turning point event they described. The options were: A) It was an objectively positive event and I feel it ultimately had a positive influence on my life B) It was an objectively positive event but I feel it ultimately had a negative influence on my life C) It was an objectively negative event and I feel it ultimately had a negative influence on my life D) It was an objectively negative event but I feel it ultimately had a positive influence on my life. Option B represents a redemptive narrative while option D represents a contamination narrative.

**Procedure.** Participants began by describing a turning point in their life and then completed the CFT or control condition procedure. They then completed the outcome variables, followed by the CFT coding (for CFT condition participants), and the positive/negative event valence questions (all participants). The study concluded with a brief demographics survey.

## **5.2 Study 3 Results and Discussion**

The results for Study 3 are organized similarly to Study 2. Descriptive and chi-square statistics portray what content variables are most associated with process versus outcome counterfactual thoughts. ANOVAs were performed to compare group-level differences between

conditions. Finally, correlations across the content variable and between the content variables and the main dependent variables are reported.

The contamination item did not yield any significant results and thus will not be discussed. In addition, it is worth noting that some scales (hope, self-actualization, wellbeing subscales) yielded low alpha scores (below .70) and thereby, those analyses are best interpreted by the readers with pause.

### **Descriptive Statistics on CFT generation Frequency**

The descriptive statistics and one-way chi-square comparisons between each pair of content variables can be found in Table R.5. 70% of counterfactual thoughts were process, which was significantly different from outcome oriented thoughts (30%) according to a chi-square test of independence,  $\chi^2(1, N = 980) = 77.16 (p < .001)$ .

To determine the relationship between process and outcome content variables, a series of chi-square tests of independence were performed (see Table R.5 for means). Unlike Study 2 the relationship between type (process vs. outcome) and direction (up vs. down) was not significant,  $\chi^2(2, N = 980) = 1.066 (p = .302)$ .

The relationship between type (process vs. outcome) and locus of control (self vs. other) was significant,  $\chi^2(2, N = 980) = 5.853 (p = .016)$ . Outcome counterfactuals were more likely to be self-focused (69.03%) compared to process counterfactuals that were self-focused (61.31%). This result is similarly significant and in the same direction as Study 2.

The relationship between type (process vs. outcome) and controllability (controllable vs. uncontrollable) was significant,  $\chi^2(2, N = 980) = 12.967 (p < .001)$ . Process counterfactuals were more likely to be controllable (74.04%) compared to outcome counterfactuals that were controllable (63.07%). This result is similarly significant and in the same direction as Study 2.

Finally, a chi-square test of independence was performed to examine the relationship between type (process vs. outcome) and effect on the event (changed vs. undid the event) frequencies. The relationship was significant,  $\chi^2(2, N = 980) = 21.93$  ( $p < .001$ ). Outcome counterfactuals were more likely to change the event (69.89%) compared to process counterfactuals that changed the event (54.62%). This result is similarly significant and in the same direction as Study 2.

### **ANOVA Comparing Condition and Event Type Effects**

One way ANOVAs were run comparing the counterfactual thinking condition to the non-counterfactual thinking condition on all dependent variables and no significant results were uncovered.

A second set of ANOVAs were performed to determine whether the type of event (best versus worst) influenced dependent variables. Initially, 2X2 ANOVAs were run to determine whether any interactive effects existed between the condition and the type of event but no significant interactions were revealed. In addition, no significant effects due to the condition were uncovered. Thus, main effects of event type will be discussed.

### **Best Versus Worst Event Comparison**

**Meaning in Life.** There was a significant effect between those who chose “best event” ( $M = 5.11$ ) and “worst” ( $M = 4.8$ ) on the “current meaning” subscale of the meaning in life questionnaire [ $F(1, 392) = 4.568, p = .033, \eta^2 = .012$ ]. Although this is somewhat surprising and seems antithetical to the idea that “what doesn’t kill you makes you stronger,” it may be that “current meaning” is best supported by events that were easier to process (i.e., positive events). Perhaps more negative events are more useful when considering a person’s developing sense of a more future-oriented meaning.

**Wellbeing.** There was a significant effect between those who chose “best event” ( $M = 5.33$ ) and “worst” ( $M = 4.67$ ) on the “personal growth” subscale of the wellbeing questionnaire [ $F(1, 392) = 4.587, p = .033 \eta^2 = .012$ ]. Perhaps those who choose to think about positive events feel more comfortable and compelled towards a personal growth feeling of wellness.

There was a significant effect between those who chose “best event” ( $M = 6.67$ ) and “worst” ( $M = 7.0$ ) on the “self-acceptance” subscale of the wellbeing questionnaire [ $F(1, 392) = 10.235, p = .001 \eta^2 = .026$ ]. Ironically, it seems that writing about the worst event fostered a better sense of self-acceptance, perhaps due to an ability to appreciate oneself through the exploration of difficult moments.

### **CFT Condition Event Type Analyses**

Finally, one-way ANOVAs compared the influence of choosing “one of the best events” versus “one of the worst events” of one’s life on CFT content variables as well as the DVs, using only the counterfactual thinking condition participants. None of the analyses on the DVs were significant.

There was a significant effect between those who chose “best event” ( $M = .44$ ) and “worst” ( $M = .75$ ) on the proportion of upward CFTs produced [ $F(1,194) = 39.813, p < .001, \eta^2 = .170$ ]. Upward CFTs tend to leave people feeling worse, since it imagines a better alternative. Thus, there may be a relationship between people who wrote about the worst event (which should also negatively influence affect or imply an already existing negative affect) and the generation of upward CFTs. With respect to functional CFT thinking (upward CFTs are seen as more functional since they prepare for the future), it may also be that people who have written about a particularly negative event are more motivated to imagine a better alternative for the future.

There was a significant effect between those who chose “best event” ( $M = .68$ ) and “worst” ( $M = .59$ ) on the proportion of self CFTs produced [ $F(1,194) = 5.144, p = .024, \eta^2 = .026$ ].

While focusing on the “self” is often seen as a more functional type of CFT, and thus, is also associated with negative affect, it can also give way to a negative cycle of self-blame. Therefore, focusing on the best event of one’s life may create the space and comfort necessary to generating more self-focused CFTs. Although participants were asked to report whether they wrote about the best or worst event of their life after the CFT task, they wrote about said event beforehand. So, it may be more likely that the counterfactuals generated influenced the way participants saw the event. Perhaps being able to see yourself as having control over the event (i.e., self-focused CFTs), added an optimism for the future (via functional CFT, which insinuates that the future is malleable, if only one can do better), and made participants more likely to rate a previously somewhat neutral experience as one of the “best” things that have happened to them.

There was a significant effect between those who chose “best event” ( $M = .75$ ) and “worst” ( $M = .65$ ) on the proportion of controllable CFTs produced [ $F(1,194) = 6.684, p = .010, \eta^2 = .033$ ]. Similarly to the above finding regarding self CFTs, it may be that seeing the event as more controllable influenced participants interpretation of the turning point event they wrote about and were more likely to label it as the “best event” of their life. Or, it could be that those who wrote about the best event of their life were more likely to generate “functional” CFTs (controllable thoughts are also seen as more functional), in hopes of being able to positively impact the future, since the negative affect usually associated with functional CFTs was tempered by the comfort of writing about a positive event.

## Correlations

Next, using only the counterfactual thinking condition, correlations were run to examine the relationships between counterfactual thinking content variables and the dependent variables (see Table R.6). Included in this table are the proportion of counterfactuals that changed the event (as opposed to altering it). Since study 3 included a wide variety of variables, it is important to note that while some correlations did meet the  $p < .05$  threshold, the actual correlation coefficient is in some cases still rather small. Theoretical interpretations are still provided here to add some synergy to results and discussion of the data, however, they should be read with some caution.

**Relationship to CFT Content.** Agency (total) was positively correlated with proportion of change CFTs ( $r = .171, p = .017$ ). Perhaps an emphasis on change goes hand-in-hand with a sense of agency. Wellbeing (total) was positively correlated with proportion of upward CFTs ( $r = .182, p = .011$ ). Thus, imagining a better alternative for a past event was associated with a higher degree of feelings of wellness. Hope was positively correlated with proportion of process CFTs ( $r = .180, p = .011$ ). Wellbeing (personal growth) was negatively correlated with proportion of process CFTs ( $r = -.144, p = .044$ ). These correlations might indicate that a focus on the process is associated with a sense of assuredness in the past that allows for a more positive sense of one's future (i.e., hope). However, process CFTs don't seem to be enough to instill a sense of growth (that has already been achieved), in the context of wellbeing, perhaps because of other well-being factors such as exhaustion. Finally, wellbeing (self-acceptance) was positively correlated with proportion of upward CFTs ( $r = .188, p = .008$ ). Perhaps focusing on what could have been different about an event gives one the fodder needed to travel the road of self-acceptance.

**Relationship to Event Type.** To determine whether the continuous measures of the 1. Positive effect and 2. Negative effect the event had on the participants' lives, additional correlations were run across all DVs and CFT content variables (Table R.7). The current meaning scale demonstrated a positive correlation between the positive impact item ( $r=.143, p<.05$ ) and a negative correlation with the negative impact scale ( $r=.139, p<.05$ ). This indicates that individuals who felt that the event they wrote about had more of a positive impact were more likely to feel that their life was currently meaningful but individuals who felt like the event had more of a negative impact were more likely to rate their current meaning in life as lower. However, the acceptance subscale of the wellbeing inventory demonstrated a negative correlation between the positive impact item ( $r= -.132, p<.05$ ) and a positive correlation with the negative impact scale ( $r=.131, p<.05$ ). This seems to indicate that recalling a positive event is associated with less feelings of wellbeing whereas recalling a negative event is associated with greater feelings of wellbeing. Taken together, it might be wise to simply observe that perception of the event influences one's sense of meaning in life generally (past orientation) and assessment of current welfare.

## 6. GENERAL DISCUSSION

Humans seek to use their past to grow, or develop, a deeper sense of self and meaning in life. When thinking about the past, a common habit is to undo what really happened and imagine what may have happened via counterfactual thinking. Although the sentiment may be trite, I would like to acknowledge that life and our desire to understand it is a journey, one that, perhaps, never ends. Thus, the interpretation of the results of this dissertation was not intended to be that one type of counterfactual thought is “better” than any other. This is a fairly contemporary view of many psychological constructs, including counterfactual thinking (a niche that tends to place “functional” counterfactual thoughts on a bit of a pedestal). Instead, it is a humble attempt to “map” some cognitive twists and turns and their relationships to each other and other constructs, such as trauma sequelae and meaning in life. At its heart, the variety of variables (individual differences, type of event, manipulation of type of CFTs, natural inclinations towards type of CFTs, and content of CFT) is an homage to the need for an individual’s journey to be understood from as many angles and perspectives as possible. A true and complete picture of a person or even of one step in a person’s journey will never be able to be captured via a scientific study. The outcome variables (PTG/PTD, perceptions of self, meaning in life, wellbeing) speak to only some of the destinations that humans encounter on their ultimate quests and journey through life. Furthermore, it is quite possible that the most important variables that reciprocally influence all other constructs, for instance, love, are not measurable with the resources available in scientific exploration, but still exert influence.

### **6.1 Dynamic Interplay of Variables**

While we may think that it is only worthwhile to pursue thoughts that result in enhanced wellbeing or growth, we see in Study 1 that PTG and PTD are actually positively related to each



other. This supports a somewhat cliché belief that one needs the “good” as well as the “bad.” Thus, even the cognitions and/or individual differences that seem to promote deleterious results are still useful. It is a goal of this research and this researcher to not judge any component of a person, a person’s thoughts, or a person’s journey. It is important to concede that the results of this work can only be an incomplete and blurry (albeit, perhaps, valuable) picture of a much larger point of view.

It might be that humans are incredibly resourceful at making use of negative events, such as trauma, and one narrative schema that we rely on is by assuming that the negative is *necessary*. However, some results in study 3 suggest that positive events were associated with the most important ingredient in terms of the level of overall meaning in life. Thus, by holding on to the logical fallacy that assumes that if “what doesn’t kill you makes you stronger” is true, then we must need trauma in order to grow, humanity may be perpetuating a value system that glorifies suffering unnecessarily. It is quite remarkable and worth illuminating that trauma and growth can ostensibly go hand-in-hand and this researcher suspects that those who are able to grow from trauma should be able to, and, indeed, need to, honor that journey. Being able to make use of the experience of a trauma in the name of growth sounds like a positive constellation of responses to a series of questions. However, being decisively opposed and distressed by a world filled with trauma might be just as generous and valuable. Indeed, the PTG and PTD correlations interestingly only replicated theoretically but not methodologically, which is a compelling conundrum echoed in the replication crisis literature. That is, the scales correlated in study 1 but only the single-item measures correlated in study 2.

It is worth noting somewhere that the power of the individual and their journey can often get lost in the quantitative data. One way study 1 endeavored to honor this is by including

individual difference measures. These measures appeared to correlate in predictable ways. The shift and persist scale was positively associated with PTG. However, surely this does not demonstrate the journey someone with those individual skill sets would have to endure to achieve that growth. Thus, it would be too simple to theoretically interpret the negative correlation of shift and persist to PTD as, “those who don’t have this coping skill are less likely to report experiencing growth” because it ignores potential. Since shift requires cognitive flexibility, that insinuates that individuals who have this coping skill have experienced the “starting line” where they were suffering and needed to adapt. Correlation does not indicate causation, thus, those who report higher shift and persist scores might be in a mindset or sitting in a perspective more similar to PTG, at that moment in time. In other words, individual differences might exist on a temporal spectrum and need to be developed or ebb and flow with the vicissitudes of time as well. Studies 2 and 3 moved away from this individual difference element but highlighted the individual differences associated with the natural inclination towards a temporal focus of process or outcome CFTs. While process and outcome CFT did attempt to pinpoint some influence of temporal forces, this data also only represents a snapshot in time of incredibly complex subjects. That is, the individual who is able to genuinely describe their trauma as being amongst the most distressing one day, might also be the individual who is able to genuinely describe their trauma as being amongst the most salubrious another day. On yet another day, that individual might have high scores on both scales. Being able to see this journey, instead of the snapshots, requires yet another more abstracted vantage point and, likely, another page in the narration of that individual’s life. That would add an entirely different color to the quantitative representation of the sequelae of their life story. Thus, to say that these

variables likely interact with each other in complex ways that go beyond the present study, is an understatement.

## **6.2 Process and Outcome Counterfactual Thinking**

One of the novel explorations of this study was the inclusion of the process and outcome counterfactual thinking constructs. This adds an element of temporal depth when investigating how humans think about past events. Cognitions like CFT can be thought of, and respected, as a type of mental time travel. Highlighting that feature allows researchers to more seriously consider how thoughts can alter one's present and future. Considering the way self-beliefs can interact with how we see and treat others (and, how they, in turn, respond to us), this is no small revelation. In both study 2 and 3, participants were more naturally inclined towards the process portion of their counterfactual thinking. This insinuates that humans tend to spend time focusing on the lead-up to the outcome instead of the outcome itself. However, study 1 found some evidence to suggest that manipulating process versus outcome CFTs had some influence on, or was related to varying scores, on some dependent variables. Future studies with less of an exploratory focus might try manipulating process and outcome CFTs in different contexts or including it as a content coding variable.

Specifically, studies on constructs related to temporal foci of cognitions and emotions that interact with more abstracted constructs like "perspectives" and "intentions," might find this discrepancy between process and outcome thoughts useful. For instance, the college sample used in this dissertation might explain some of the natural inclination towards process counterfactual thoughts. Assuming that most youngsters enrolled in college are focused on how to influence their future, it makes sense that they would be more concerned with the process portion of CFT. Their perspectives on life are seemingly, likely still developing and the intent of

many of their thoughts might be towards self-development or simple system mastery (i.e., doing well in classes and socially). It may be the case that a consistent focus on the process is useful in that type of goal-pursuit, or it might simply be the influence of a culture that assumes humans are inevitably flawed and is thus focused on how one can do or be “better.” Thus, this project’s sample should be included as a limitation and future studies might inquire about the natural inclinations of younger and older populations. To summarize, it may be that humans are generally more inclined towards focusing on the process, as opposed to the outcome, or it may be a trend of a certain culture associated with college students.

### **6.3 Exploratory Results and Conclusions**

Another component of this project perhaps worthy of remark is the departing from some typical standards of hypothesis testing. While Study 1, follows traditional methods of hypothesis-testing and uses slightly more prediction-driven methodology via manipulation, Studies 2 and 3 remain steadfast in their non-predictive and more exploratory approach. In Study 1, which aimed to identify the effects of manipulating the ways individuals process their trauma, there was only one significant effect in the ANOVAs. Focusing on the outcome produced less feelings of “things are getting better” compared to process and the control conditions. Correlations yielded predictable results with the more negative constructs correlating with each other. As mentioned, posttraumatic distress and posttraumatic growth correlated positively with each other, insinuating common hope-filled wisdom along the lines of “the good and bad can go hand-in-hand.” However, that result was not consistently replicated per say, so should be taken in that context.

As a reminder, Studies 2 and 3 did not manipulate any independent variables and instead sought to merely report on natural inclination tendencies. A significant amount of individuals

were more likely to write process CFTs compared to outcome CFTs. This could be seen as an important contribution in terms of the functional CFT theory, which proposes that thoughts about one's past are most useful when trying to prepare to do better (focusing on a failed outcome in hopes of doing better in the future). By that logic, the thoughts humans naturally come up with are not typically functional. The context might be particularly salient here as in study 2, process and outcome was not associated with more or less upward versus downward CFTs. However, in the trauma context, process thoughts were more associated with upward CFT. However, results of Study 1 indicated that outcome CFTs are less likely to feel as though things are getting better. Albeit, this is in a trauma context which would likely be interpreted in a different light compared to most of the functional CFT literature.

Study 3 shifted our attention to another context: turning events in life with dependent measures focused on meaning in life and measures about the self. The natural inclination to focus on the process of the past instead of the outcome was replicated. Several ANOVAs were also run to determine whether processing "the best event" or "the worst event" of one's life statistically predicted the DVs differently. To reiterate, although it may be comforting to hope that "what doesn't kill you makes you stronger," it at least seems to be *not necessary* to suffer in order to develop a strong meaning in life, as current meaning was more significantly supported by those who spent time pondering a positive event in their life. However, those who wrote about the worst event of their life were more likely to report a higher degree of self-acceptance. Perhaps pain demands acceptance of some sort.

The limitations in this dissertation cannot be understated. As mentioned in reference to study 3, some alpha scores are below .7 and thus, interpretations including those scales should be taken lightly. Some might argue it's inappropriate to analyze those scales at all, which is for the

reader to decide. However, it is worth proposing that for some constructs as complex as “wellbeing” and “hope,” items being very highly correlated might insinuate a redundancy in item content in lieu of a more complete assessment of the construct. Readers might also take pause at some of the higher  $p$ -value scores. While  $p$ -values are typically used in academic publishing in a binary “below” or “above” .05 manner, others might argue that while .05 is certainly a standard to meet (as it simplifies verbally expressing whether the null hypothesis should be rejected or not), the actual  $p$ -value might be better understood using a continuum. With correlations for example, it’s important to consider the size of the correlation in tandem with the binary “below or above  $p=.05$ ” standard. In addition, studies 2 and 3 in particular are clearly purely exploratory as I did not make specific predictions before collecting the data. This type of work might be useful as an important starting-off point for future research. By mapping a lay-out of the types of counterfactual thoughts individuals naturally generate (in trauma and turning point contexts), more specific hypotheses can be devised that rest on the foundation of mere observation. For example, while counterfactuals can be focused on the outcome of the past, with an assumption being that a primary purpose of many counterfactual thoughts is to positively alter the outcome of future similar endeavors, it seems that individuals’ natural inclination is often to focus on the process itself. Perhaps that trend can be harnessed to reorient people’s focus to the outcome to create more functional thinking patterns. Alternatively, perhaps the mere observation that humans are inclined towards the journey, rather than a particular destination, is telling in its own right.

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## APPENDIX A

Shift-and-Persist Questionnaire (Chen et al., 2015).

- 1: not at all
- 2: a little
- 3: some
- 4: a lot

Using the above scale, Please rate how well the following statements describe you:

- 1. I feel my life has a sense of purpose
- 2. My life feels worthwhile
- 3. I believe that there is a larger reason or purpose for my life
- 4. I feel my life is going nowhere

Next you will see a list of things that people sometimes do, think, or feel when something stressful happens. Everybody deals with problems in their own way. Please rate how much you do each of the following things when something stressful happens in your life.

When something stressful happens in my life...

- 5. I think about what I can learn from the situation
- 6. I work to change or fix the problem
- 7. I try not to think about it, to forget about it
- 8. I think about the positive aspects, or the good that can come from the situation
- 9. I start to act without thinking

In life, things don't always go the way we want. Everyone has different preferences for how they deal with situations in which something doesn't turn out the way they want, and they are not able to change it. Please rate how much you do each of the following.

When something doesn't turn out the way I want...

- 10. Little things upset me easily
- 11. I think about what good things could come from the situation
- 12. I find it hard to stop thinking about what happened
- 13. I start working on other new goals
- 14. I think about what I can learn from the situation

*Items 6, 7, 9, 10, and 13 are distractors. Items 5,8,11, and 14 are summed for a shift score. Scores 1 to 4 are summed for a persist score, with 4 reverse scored.*

## APPENDIX B

The Connor-Davidson Resilience Scale (Connor & Davidson, 2003)

INSTRUCTIONS: Using the below scale, please rate how well each of the items describes how you have thought, how you have felt, and/or what you have believed in the last month.

(0) Not True at All

(1) Rarely True

(2) Sometimes True

(3) Often True

(4) True Nearly All of the Time

1. I am able to adapt to change
2. I have close and secure relationships
3. I believe that sometimes fate or God can help
4. I can deal with whatever comes
5. My past success gives me confidence for new challenges
6. I try to see the humorous side of things when I am faced with problems
7. I believe that coping with stress strengthens
8. I tend to bounce back after illness or hardship
9. I believe that things happen for a reason
10. I give my best effort no matter what
11. I believe I can achieve my goals
12. When things look hopeless, I don't give up
13. I know where to turn for help
14. Under pressure, I am able to focus and think clearly
15. I prefer to take the lead in problem solving
16. I am not easily discouraged by failure
17. I think of myself as a strong person
18. I am able to make unpopular or difficult decisions
19. I can handle unpleasant feelings
20. I have to acted on a hunch
21. I have a strong sense of purpose
22. I feel in control of my own life
23. I like challenges
24. I work to attain my goals
25. I take pride in my achievements

## APPENDIX C

Traumatic Life Events Questionnaire (TLEQ; Kubany et al., 2000).

Asked to report how many times an event occurred from “never” (0) to “more than 5 times” (6)

1. Natural disaster
2. Motor vehicle accident
3. Other kind of accident
4. Lived/worked/military service in a war zone and exposed to warfare/combat
5. Experienced sudden and unexpected death of a close friend/loved one
6. Loved one survived life-threatening accident/assault/illness
7. Had a life-threatening illness
8. Been robbed/present during robbery involving a weapon
9. Hit/beaten up and badly hurt by a stranger
10. Seen a stranger attack/beat up someone, leading to serious injury/death
11. Threats to kill/seriously harm you
12. Physical abuse whilst growing up
13. Witness to domestic violence whilst growing up
14. Subject to domestic violence
15. Sexual abuse from an adult when under 13
16. Sexual abuse from a peer when under 13
17. Sexual abuse when aged 13-18
18. Sexual assault when 18+
19. Other unwanted sexual attention
20. Victim of stalking
21. Miscarriage
22. Abortion
23. Any other events



## APPENDIX D

Traumatic Event Writing Prompt.

### ***Screen 1:***

On the next screen, you will be asked to recall and write about a specific example of the most (or one of the most) traumatic, upsetting experience(s) of your life. The event you choose to write about must have occurred **at least a year ago**. Try to place yourself back into that moment as if it had just occurred.

Whatever you choose to write, however, it is critical that you really delve into your deepest emotions and thoughts. You might write about significant experiences or conflicts that you have not discussed in great detail with others. Remember that whatever you write will remain completely confidential and that your identity will remain anonymous.

Please take a moment now to think of the traumatic experience you will write about. Some examples might include: a physical altercation, experiences of discrimination or bullying, a break-up or divorce (or parents' break-up or divorce), a potentially terminal illness (your own or a close family member or friend), death of a loved one, automobile accident, incarceration, etc. Once you have a traumatic experience in mind, please press continue. You will be given three minutes to write about that experience once you press continue.

### ***Screen 2:***

At this time, please think of a specific example of the most (or one of the most) traumatic, upsetting experience(s) of your life. The event you choose to write about must have occurred **at least a year ago**.

It is critical that you really delve into your deepest emotions and thoughts. Try to place yourself back into that moment as if it had just occurred. Remember that whatever you write will remain completely confidential and that your identity will remain anonymous.

You have three minutes to write your traumatic experience. After three minutes has passed, your screen will automatically continue to the next page. Please write a few sentences about the event below.

## APPENDIX E

### Factual Thinking Task.

After traumatic, upsetting and/or negative experiences like the one you described on the previous page, people often think about the details of the situation. For example, when it happened, who was involved, and what happened right before or after the event occurred.

In the space below please provide examples of some of these details. Please only list as many as you can naturally recall without repeating any. You can fill in all 10 spaces or just one. Please fill each box with only one thought.

## APPENDIX F

### Process Counterfactual Thinking Task.

After traumatic, upsetting, and/or negative experiences like the one you described on the previous page, people sometimes cannot help thinking "what if..." or "if only..." and imagining what it would be like, **if only something prior to the event had been different**. What if something were different, or if only something were changed?

These thoughts often take an: "if \_\_\_\_\_, then \_\_\_\_\_" format.

For example, after suffering from an injury due to a skiing accident, someone might think: "If I hadn't tried the advanced slope, I wouldn't have gotten injured at all."

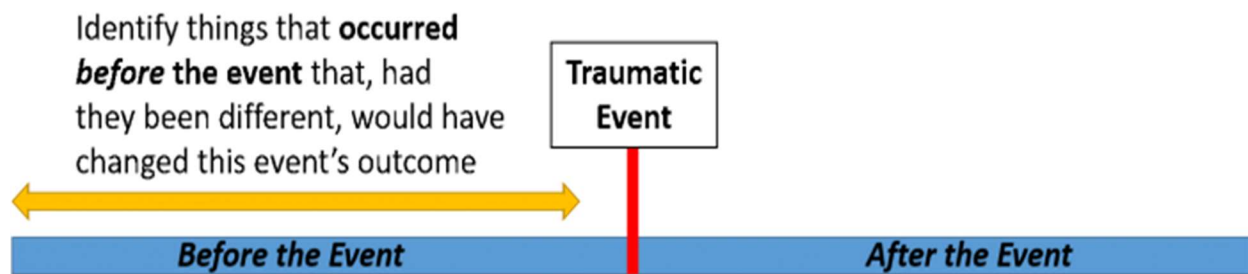
Or, they might think:

"If I hadn't taken those safety courses, I would have gotten really hurt badly."

For this part of the study, we are interested in things that **occurred before the event** that, had they been different, would have changed the outcome for better or worse.

In the boxes below you will see: If \_\_\_\_\_, then the outcome would have been different.

Please fill in the "if" portion by identifying a thing that, had it been different, would have changed the outcome of the traumatic experience you described earlier. See the image below for clarification.



Please only list as many of these thoughts as you can naturally come up with without repeating any.

You can fill in all 10 spaces or just one. Please fill each box with only one thought.

**Figure F.1.** Process CFT image.

## APPENDIX G

### Outcome Counterfactual Thinking Task.

After traumatic, upsetting, and/or negative experiences like the one you described on the previous page, people sometimes cannot help thinking "what if..." or "if only..." and imagining **how things might be different if the event had not occurred**. What if something were different, or if only something were changed?

These thoughts often take an: "if \_\_\_\_\_, then \_\_\_\_\_" format.

For example, after suffering from an injury due to a skiing accident, someone might think: "If I hadn't gotten into an accident, I could have won the competition."

Or, they might think:

"If I hadn't gotten into an accident, I wouldn't have met my best friend in physical therapy."

For this part of the study, we are interested in things that **happened after the event** that would have been different (for better or for worse), had the event not occurred.

In the boxes below, you will see: "If the traumatic event had not occurred, then \_\_\_\_\_".

Please fill in the "then" portion by identifying a thing that could have turned out differently, had the traumatic event not occurred at all. See the image below for clarification:



Please only list as many of these thoughts as you can naturally come up with without repeating any.

You can fill in all 10 spaces or just one. Please fill each box with only one thought.

**Figure G.1.** Outcome CFT image.

## APPENDIX H

Counterfactual Self-Coding questions.

Each Process CFT thought will be fed back to the participant in the Process CFT condition with the following questions.

### ***Upward vs. Downward***

1. Is the alternative described in this thought better or worse than reality?

- a. Better                      b. Worse

### ***Self vs. Other***

2. Does the “if” portion of the thought, which you wrote earlier in the study, focus on something within or about you (for example, your actions, abilities, skills, etc.) as opposed to another person or the environment/situation in general (i.e., “other”)?

- a. Self                              b. Other

### ***Controllable vs. Uncontrollable***

3. Does the “if” portion of the thought, which you wrote earlier in the study, focus on something that is changeable or controllable by a person (such as effort) or something no person could control (such as game rules or weather)?

- a. Controllable              b. Uncontrollable

**Self-Coding questions: Each Outcome CFT thought will be fed back to the participant in the Outcome CFT condition with the following questions:**

### ***Upward vs. Downward***

1. Is the alternative described in this thought better or worse than reality?

- a. Better                      b. Worse

### ***Self vs. Other***

2. Does the “then” portion of the thought, which you wrote earlier in the study, focus on something within or about you (for example, your actions, abilities, skills, etc.) as opposed to another person or the environment/situation in general (i.e., “other”)?

- a. Self                              b. Other

### ***Controllable vs. Uncontrollable***

3. Does the “then” portion of the thought, which you wrote earlier in the study, focus on something that is changeable or controllable by a person (such as effort) or something no person could control (such as game rules or weather)?

- a. Controllable              b. Uncontrollable

## APPENDIX I

Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996).

Indicate for each of the statements below the degree to which this change occurred in your life as a result of your crisis, the one you wrote about earlier in this study. Please use the below scale:

0: I did not experience this change as a result of my crisis

1: I experienced this change to a very small degree as a result of my crisis

2: I experienced this change to a small degree as a result of my crisis

3: I experienced this change to a moderate degree as a result of my crisis

4: I experienced this change to a great degree as a result of my crisis

5: I experienced this change to a very great degree as a result of my crisis

1. My priorities about what is important in life
2. An appreciation for the value of my own life
3. I developed new interests
4. A feeling of self-reliance
5. A better understanding of spiritual matters
6. Knowing that I can count on people in times of trouble
7. I established a new path for life
8. A sense of closeness with others
9. A willingness to express my emotions
10. Knowing I can handle difficulties
11. I'm able to do better things with my life
12. Being able to accept the way things work out
13. Appreciating each day
14. New opportunities are available which wouldn't have been otherwise
15. Having compassion for others
16. Putting effort into my relationships
17. I'm more likely to try to change things which need changing
18. I have a stronger religious faith
19. I discovered that I'm stronger than I thought I was
20. I learned a great deal about how wonderful people are
21. I accept needing others

## APPENDIX J

Impact of Event Scale-Revised (IES-R; Weiss, 2007).

INSTRUCTIONS: Below is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty has been for you DURING THE PAST SEVEN DAYS with respect to the traumatic event you wrote about earlier in this study. How much have you been distressed or bothered by these difficulties?

0: Not at all

1: A little bit

2: Moderately

3: Quite a bit

4: Extremely

1. Any reminder brought back feelings about it
2. I had trouble staying asleep
3. Other things kept making me think about it
4. I felt irritable and angry
5. I avoided letting myself get upset when I thought about it or was reminded of it
6. I thought about it when I didn't mean to
7. I felt as if it hadn't happened or wasn't real
8. I stayed away from reminders of it
9. Pictures about it pop into my mind
10. I was jumpy and easily startled
11. I tried not to think about it
12. I was aware that I still had a lot of feelings about it, but I didn't deal with them
13. My feelings about it were kind of numb
14. I found myself acting or feeling like I was back at that time
15. I had trouble falling asleep
16. I had waves of strong feelings about it
17. I tried to remove it from my memory
18. I had trouble concentrating
19. Reminders of it cause me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart
20. I had dreams about it
21. I felt watchful and on-guard
22. I tried not to talk about it

## APPENDIX K

### Demographics.

1. What is your age?
2. What is your gender
  - a. Male
  - b. Female
3. What is your ethnicity?
  - a. Hispanic
  - b. Not Hispanic
4. What is your race (check all that apply)
  - a. African American
  - b. American Indian or Alaska Native
  - c. Asian
  - d. Native Hawaiian or Other Pacific Islander
  - e. White
  - f. Other (please specify)
5. Your first language
  - a. English
  - b. Other (please specify)
6. (If “Other” chosen on response #5): Are you fluent in English?
  - a. Yes
  - b. No
  - c. Unsure



## APPENDIX L

Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006).

INSTRUCTIONS: Please take a moment to think about what makes your life feel important to you. Please respond to the following statements as truthfully and accurately as you can, and also please remember that these are very subjective questions and that there are no right or wrong answers. Please answer according the scale below:

- 1: Absolutely Untrue
- 2: Mostly Untrue
- 3: Somewhat Untrue
- 4: Can't Say True or False
- 5: Somewhat True
- 6: Mostly True
- 7: Absolutely True

- 1. I understand my life's meaning.
- 2. I am looking for something that makes my life feel meaningful.
- 3. I am always looking to find my life's purpose
- 4. My life has a clear sense of purpose.
- 5. I have a good sense of what makes my life meaningful.
- 6. I have discovered a satisfying life purpose.
- 7. I am always searching for something that makes my life feel significant.
- 8. I am seeking a purpose or mission for my life.
- 9. My life has no clear purpose
- 10. I am searching for meaning in my life.

## APPENDIX M

The Authenticity Scale (Wood, Linley, Maltby, Baliouisis, & Joseph, 2008).

INSTRUCTIONS: Choose the degree to which each item describes you using a 1 (Does not describe me at all) to 7 (Describes me very well) scale.

1. I think it is better to be yourself, than to be popular.
2. I don't know how I really feel inside.
3. I am strongly influenced by the opinions of others.
4. I usually do what other people tell me to do.
5. I always feel I need to do what others expect me to do.
6. Other people influence me greatly.
7. I feel as if I don't know myself very well.
8. I always stand by what I believe in.
9. I am true to myself in most situations.
10. I feel out of touch with the 'real me.'
11. I live in accordance with my values and beliefs.
12. I feel alienated from myself.

## APPENDIX N

Sense of Agency Scale (SOAS; Tapal, Oren, Dar, & Eitam, 2017).

INSTRUCTIONS: Respond to each item by selecting how much you agree or disagree with the statement. 1 (Strongly Disagree) to 7 (Strongly Agree).

1. I am in full control of what I do.
2. I am just an instrument in the hands of somebody or something else.
3. My actions just happen without my intention.
4. My movements are automatic—my body simply makes them.
5. The outcomes of my actions generally surprise me.
6. Things I do are subject only to my free will.
7. The decision whether and when to act is within my hands.
8. Nothing I do is actually voluntary.
9. While I am in action, I feel like I am a remote controlled robot.
10. My behavior is planned by me from the very beginning to the very end.
11. I am completely responsible for everything that results from my actions.

## APPENDIX O

Self-Actualization Scale (Jones and Crandall, 1986).

INSTRUCTIONS: For each item, choose the degree to which you agree or disagree with each statement.

- 1: Disagree
- 2: Somewhat Disagree
- 3: Somewhat Agree
- 4: Agree

1. I do not feel ashamed of any of my emotions.
2. I feel I must do what others expect me to do.
3. I believe that people are essentially good and can be trusted.
4. I feel free to be angry at those I love.
5. It is always necessary that others approve of what I do.
6. I don't accept my own weaknesses.
7. I can like people without having to approve of them.
8. I fear failure.
9. I avoid attempts to analyze and simplify complex domains.
10. It is better to be yourself than to be popular.
11. I have no mission in life to which I feel especially dedicated.
12. I can express my feelings even when they may result in undesirable consequences.
13. I do not feel responsible to help anybody.
14. I am bothered by fears of being inadequate.
15. I am loved because I give love.

## APPENDIX P

The Hope Scale (Snyder, et al., 1991).

INSTRUCTIONS: Read each item carefully. Using the below scale, please select the number that best describes YOU.

1: Definitely False

2: Mostly False

3: Mostly True

4: Definitely True

1. I can think of many ways to get out of a jam.
2. I energetically pursue my goals.
3. I feel tired most of the time.
4. There are lots of ways around any problem.
5. I am easily downed in an argument.
6. I can think of many ways to get the things in life that are most important to me.
7. I worry about my health.
8. Even when others get discouraged, I know I can find a way to solve the problem.
9. My past experiences have prepared me well for my future.
10. I've been pretty successful in life.
11. I usually find myself worrying about something.
12. I meet the goals that I set for myself.

## APPENDIX Q

Ryff Psychological Wellbeing scale (Ryff & Keyes, 1995).

INSTRUCTIONS: Using the below scale, choose the response that indicates the degree to which you agree with each statement.

- 1: Strongly Agree
- 2: Somewhat Agree
- 3: A Little Agree
- 4: Neither Agree nor Disagree
- 5: A Little Disagree
- 6: Somewhat Disagree
- 7: Strongly Disagree

1. I like most parts of my personality.
2. When I look at the story of my life, I am pleased with how things have turned out so far.
3. Some people wander aimlessly through life, but I am not one of them.
4. The demands of everyday life often get me down.
5. In many ways I feel disappointed about my achievements in life.
6. Maintaining close relationships has been difficult and frustrating for me.
7. I live life one day at a time and don't really think about the future.
8. In general, I feel I am in charge of the situation in which I live.
9. I am good at managing the responsibilities of daily life.
10. I sometimes feel as if I've done all there is to do in life.
11. For me, life has been a continuous process of learning, changing, and growth.
12. I think it is important to have new experiences that challenge how I think about myself and the world.
13. People would describe me as a giving person, willing to share my time with others.
14. I gave up trying to make big improvements or changes in my life a long time ago
15. I tend to be influenced by people with strong opinions
16. I have not experienced many warm and trusting relationships with others.
17. I have confidence in my own opinions, even if they are different from the way most other people think.
18. I judge myself by what I think is important, not by the values of what others think is important.

## APPENDIX R

Table R.1. Pearson Correlations: individual differences and outcome variables for Study 1.

	PTD	Gotten Worse	PTG	Gotten Better	Resilience	Shift	Persist	ShiftPlusPersist
1. PTD	-							
2. Gotten Worse	.36**	-						
3. PTG	.32**	-.074	-					
4. Gotten Better	-.004	-.46**	.35**	-				
5. Resilience	-.14**	-.23**	.26**	.22**	-			
6. Shift	-.06	-.18**	.29**	.23**	.57**	-		
7. Persist	-.21**	-.32**	.22**	.21**	.63**	.38**	-	
8. ShiftPlusPersist	-.15**	-.29**	.31**	.26**	.72**	.86**	.8**	-

\*\*Correlation is significant at the .01 level (2-tailed)

\* Correlation is significant at the .05 level (2-tailed)

Table R.2. Pearson Correlations: CFT Conditions only for Study 1.

	Shift	Persist	PTD	Gotten Worse	PTG	Gotten Better	Up	Down	Self	Uncon control
1. Shift	-									
2. Persist	.42**	-								
3. PTD	-.05	-.23**	-							
4. Gotten Worse	-.15*	-.34**	.36**	-						
5. PTG	.24**	.23**	.33**	-.08	-					
6. Gotten Better	.26**	.23**	-.01	-.46**	.34**	-				
7. Up	-.07	-.11	.14*	.25**	-.002	-.17**	-			
8. Down	.17**	.02	.1	-.08	.2**	.18**	-.24**	-		
9. Self	.04	-.16**	.23**	.19**	.09	-.01	.52**	.41**		
10. Uncontrol	.08	-.02	.17**	.13*	.1	-.1	.39**	.4**	.5**	-

\*\*Correlation is significant at the .01 level (2-tailed)

\* Correlation is significant at the .05 level (2-tailed)

Table R.3. Study 2 Means and one-way Chi-Square analyses for CFT content variables.



Means		$\chi^2$
Process	Outcome	
3.481 (1.45)	1.492 (1.43)	151.2**
Process Up	Process Down	
3.176 (1.53)	.363 (.72)	413.48**
Outcome Up	Outcome Down	
1.107 (1.31)	.385 (.81)	64.86**
Process Self	Process Other	
1.604 (1.43)	1.877 (1.53)	3.5
Outcome Self	Outcome Other	
.824 (1.15)	.668 (.96)	2.8
Process	Process	
Controllable	Uncontrollable	
2.487 (1.51)	.995 (1.20)	124.12**
Outcome	Outcome	
Controllable	Uncontrollable	
.898 (1.18)	.594 (.99)	11.16**
Process Changed	Process Undid	
Event	Event	
1.989 (1.55)	1.492 (1.36)	15.18**
Outcome	Outcome Undid	
Changed Event	Event	
.995 (1.23)	.497 (.94)	30.12**

\* Correlation significant at the .05 level.

\*\* Correlation significant at the .01 level.

Table R.4. Pearson Correlations: CFT content and outcome variables for Study 2.

	PTG	PTD	Growth	Distress	Gotten Worse	Gotten Better	Process	Up	Self	Control	Change
PTG											
PTD	.08										
Growth	.56**	.12									
Distress	.03	.51**	.18*								
Gotten Worse	-.28**	.49**	-.23**	.41**							
Gotten Better	.50**	-.14	.53**	-.18*	-.56**						
Process	-.04	.06	-.09	.04	.08	-.12					
Up	-.10	.09	-.14	.03	.12	-.14	.21*				
Self	.13	-.05	.12	-.15*	-.14	.09	-.14	-.10			
Control	-.01	.03	-.02	-.09	-.03	.05	.09	.15*	.24**		
Change	.08	-.18*	.04	.00	-.09	.0	.0	-.10	.15*	-.05	

Counterfactual thought content variables were calculated using a proportion score.

\* Correlation significant at the .05 level (2-tailed).

\*\* Correlation significant at the .01 level (2-tailed).

Table R.5. Study 3 Means and one-way Chi Square.

Means		$\chi^2$
Process	Outcome	
3.20 (1.46)	1.8 (1.46)	77.16**
Process Up	Process Down	
1.89 (1.63)	1.311 (1.53)	20.34**
Outcome Up	Outcome Down	
1.00 (1.22)	.80 (1.14)	4.32*
Process Self	Process Other	
1.96 (1.51)	1.24 (1.28)	31.66**
Outcome Self	Outcome Other	
1.24 (1.28)	.56 (.85)	50.26**
Process Controllable	Process Uncontrollable	
2.37 (1.56)	.83 (1.07)	144.26**
Outcome Controllable	Outcome Uncontrollable	
1.133 (1.3)	.66 (.92)	23.52**
Process Changed Event	Process Undid Event	
1.75 (1.57)	1.454 (1.33)	5.18*
Outcome Changed Event	Outcome Undid Event	
1.26 (1.29)	.54 (.96)	54.88**

\* Correlation significant at the .05 level.

\*\* Correlation significant at the .01 level.

Table R.6. Pearson Correlations: CFT content and outcome variables for Study 3.

	1.C urre nt Me anin g	2. Sear chin g Mea ning	3. Aut hent ic Livi ng	4. Aut hent ic Acc epti ng	5. Self Alie nati on	6.A gen cy Pos.	7. Ag enc y Ne g.	8.A gen cy Tot al	9. Self Actua lizati on	10. Ho pe	11. We llbe ing Tot al	12. Well bein g Auto nom y	13. Wellb eing Enviro nment al Master y	14. Well bein g Gro wth	15. Wellb eing Relati onshi ps	16. Well bein g Purp ose	17. Well bein g Acce ptanc e
Pro ces s Up	.07	.01	.11	.00	-.12	.09	- .08	.01	.08	.18 *	- .13	-.07	-.06	- .14*	-.05	-.10	-.11
Sel f	-.07	.06	-.06	.02	.14	.04	.03	.06	-.05	- .13 *	.18 *	.06	.12	.12	.13	.10	.19*
Co ntr ol Ch an ge	.04	.04	.12	-.05	-.01	.01	.02	.02	-.02	- .01	.00	-.03	.09	.02	.06	.03	-.10
	.11	.05	.03	.02	-.10	.00	- .10	-.08	.05	.01	- .05	-.02	-.06	-.04	-.04	.03	-.08
	-.09	.12	-.03	.06	.11	.07	.14	.17*	-.02	- .01	.06	.08	.05	.03	.09	-.03	.01

\* Correlation significant at the .05 level (2-tailed).

\*\* Correlation significant at the .01 level (2-tailed).

Table R.7. Pearson Correlations: Positive and negative impact in Study 3.

	1. Current Meaning	2. Searching Meaning	3. Authentic Living	4. Authentic Accepting	5. Self Alienation	6. Agency Pos.	7. Agency Neg.	8. Agency Total	9. Self Actualization	10. Hope	11. Wellbeing Total	12. Wellbeing Autonomy	13. Wellbeing Environmental Mastery	14. Wellbeing Growth	15. Wellbeing Relationships	16. Wellbeing Purpose	17. Wellbeing Acceptance
Positive Impact	.143**	-.012	.047	.021	-.118*	.031	-.043	-.012	.034	.184**	-.132**	.021	-.072	-.124*	-.126*	.008	-.215*
Negative Impact	-.139**	.060	-.081	-.023	.151*	.022	.070	.077	-.027	-.099*	.131**	-.015	.075	.091	.137**	-.045	.244*

\* Correlation significant at the .05 level (2-tailed).

\*\* Correlation significant at the .01 level (2-tailed).