



Essays in Organizational Behavior

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Essays on Organizational Behavior

A dissertation presented
by

Joo A Lee

to

The Department of Public Policy

in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy
in the subject of Public Policy

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Essays on Organizational Behavior:

Abstract

How do organizations create an environment to motivate their employees to be healthy, productive, and competent decision makers? My dissertation identifies the underlying factors that could prevent organizations from achieving their goals, and takes on three research projects to address such barriers to successful organizational functioning. To provide a theoretical foundation for my research, I bring together conceptual and methodological streams from various disciplines including organizational behavior, behavioral decision research, and cognitive and affective psychology. I then employ multiple methods, including laboratory experiments involving psychophysiology as well as field research.

Three essays compose this dissertation. My first essay examines the role of emotion-regulation processes in moral decision making. That is, emotion-regulation strategies (concealing and rethinking emotions) influence the decision maker's preference for utilitarian choice. Using a process-dissociation approach, I also show emotion regulation selectively reduces deontological inclinations, leading to greater preference for utilitarian decisions. My second essay utilizes data from a large-scale field data as well as data from laboratory and online labor market. This research shows how seemingly irrelevant, uncontrollable factors—such as rain—may influence employee productivity by eliminating potential cognitive distractions. My third essay focuses on an intervention designed to invoke individuals' psychosocial resources. Using a method called the Reflected Best-Self Exercise, I empirically test a set of hypotheses at the individual and team level. This research demonstrates that this intervention not only has positive health and stress-buffering effects, but also has implications for individual-level creativity, team-level functioning and performance.

Across three essays, I argue that organizational performance should be understood in terms of the functioning of individual employees and teams. Thus, my work lays groundwork for organizational leaders to counteract the three barriers to organizational functioning.

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*Cambridge, Massachusetts
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For my loving family

Chapter 1

Microfoundations of Organizational Functioning

How do organizations create an environment to motivate their employees to be *healthy*, *productive*, and *competent* decision makers? The basic premise of my research is that organizational performance should not only be understood in terms of pure productivity measured by tangible input and output, but should also capture (i) managerial decision making, (ii) employee engagement, and (iii) employee health and motivation. Our understanding of performance should account for critical underlying psychological factors that often cripple organizations.

My dissertation identifies the underlying factors that could prevent organizations from achieving their goals, and takes on three research projects to address such barriers to successful organizational functioning. To provide a theoretical foundation for my research, I bring together conceptual and methodological streams from various disciplines including organizational behavior, behavioral decision research, and cognitive and affective psychology. I then employ multiple methods, including laboratory experiments involving psy-

chophysiology and neuroendocrinology as well as field research.

1.1 Barriers to Managerial Decision Making

An organization may suffer the long-term consequences of biased decision making if a decision maker is unaware of the potential influence of emotions on the decision task at hand. Organizational leaders often encounter moral dilemmas in which making a choice based on principles of right and wrong (i.e., a deontological approach) conflicts with making a choice based on creating the greatest good (i.e., a utilitarian approach). Emotions that arise from moral dilemmas, in particular, can cloud the decision maker's judgment and may lead to suboptimal outcomes for the organization. Consider a manager who must fire employees to save the company, or a regulator who approves new drugs that may have dangerous side effects. Often, decision makers facing moral dilemmas are not aware of the role that their own emotions and their efforts to regulate such emotions play in their decision making.

In my second chapter, I focused on the emotion-regulation processes that precede moral decision making to understand the mechanism by which suppressing emotional expressions leads to more utilitarian decision making. Using both correlational and causal designs in five studies, I examine how different emotion-regulation strategies (i.e., concealing and rethinking emotions) influence the decision maker's preference for utilitarian choice. I use a process-dissociation approach to understand why regulation of emotions increases utilitarian decision making, and show that it is because emotion regulation selectively reduces deontological inclinations, leading to greater preference for utilitarian decisions. This research not only contributes to the theory of emotions and moral decision making, but also provides insights for organizational leaders into how emotion regulation can facilitate conflict resolution between our intuitive impulses and utilitarian goals.

1.2 Barriers to Employee Engagement

When organizations estimate their future revenue stream, they tend to consider only the factors that are directly under their control or the risk-related factors that influence the macroeconomic environment. However, I argue that organizational performance can be influenced by costly incidental factors such as workplace distractions that are rarely accounted for in the organizational leaders' minds.

My third chapter identified a limited attention span as an obstacle to sustaining employee productivity in the online labor market, in the laboratory, and in the field. Exogenous weather was studied as one of the many factors that may lead employees to engage in distracting thoughts. Using a large-scale field data that included individual productivity of Japanese bankers, my colleagues (Brad Staats and Francesca Gino) and I found that, contradictory to conventional wisdom, an increase in precipitation is associated with an increase in worker productivity. Good weather was associated with a 1.3% decrease in worker productivity, which could be translated as a significant loss in revenue for the bank, estimated at approximately a million dollars a year. Further, we showed in the laboratory that when the weather is bad, individuals tend to focus more on their work than on alternate outdoor activities. This research reveals how seemingly irrelevant, uncontrollable factors—such as rain—may influence employee productivity by eliminating potential cognitive distractions. Thus, our work suggests that organizations should factor such incidental factors into their staffing model and allow flexible working hours to minimize productivity loss.

1.3 Barriers to Employee Health and Motivation

An organization may suffer low productivity, high rates of absenteeism, and rising health care costs if it fails to ensure that its employees cope with job-related stressors, and if it fails to motivate them to excel. Yet, organizations often fail to predict how their employees will respond to processes that were created to maximize productivity. Performance evaluation that is focused on identifying the employee's weaknesses, for example, may fail to motivate employees, or might even backfire.

My fourth chapter addresses this problem of organizations impeding the human potential, by invoking individuals' psychosocial resources. I adopt a method called the Reflected Best-Self Exercise, in which employees identify their own narrative providers, then receive and reflect on stories of when they were at their best, and finally revise their own strength narratives. I theorize how this experience, which I term a *positive interpersonal jolt*, can trigger a change in self-knowledge structures, and I empirically test a set of hypotheses at the individual and team level. First, experiencing jolts in the laboratory setting increased positive affect and vagal tone—a physiological marker for positive emotions and social engagement. Second, beyond the immediate affective and physiological responses, it also strengthened one's immune system (measured by an increase of secretory immunoglobulin A) and reduced aversive physiological arousal associated with stress. Third, individuals who experienced jolts outperformed controls in creative problem-solving tasks.

The first study in this chapter provides empirical evidence for the role of social affirmation in promoting resilience, physiological function, and productivity. Building on this research, the second study was conducted with the Senior Executive Fellows program at the Harvard Kennedy School as an in-class experiment. Using this unique opportunity to work with real-world leaders, I show that the same intervention can enhance team functioning

(team satisfaction, learning, voice behavior, and perspective-taking) and team performance even though team functioning and performance were measured 10 days after the initial intervention. This research thus identified a low-cost intervention that enables organizations to trigger high-impact changes in employees' psychological resilience, physical health, productivity, and organizational functioning.

1.4 Concluding Remarks

My work to date is intended to promote the use of scientific evidence to diagnose and address critical problems in social and behavioral science. Through a series of empirical studies, I intend to deepen our understanding of psychological antecedents and behavioral consequences of individual and organizational functioning. This dissertation demonstrates that organizational performance should be understood, at least in part, in terms of the functioning of individual employees and teams. This work provides managerial insights for organizational leaders and managers, by informing them of affective, cognitive, and motivational influences that they may not have predicted to affect the behavioral outcomes of themselves and their employees. Thus, my work lays groundwork for organizational leaders to counteract the three barriers to organizational functioning, by creating systems that promote employee behaviors that are emotionally competent, engaged, and motivated.

Chapter 2

Poker-faced Morality: Concealing Emotions Lead to Utilitarian Decision Making

Abstract

This paper examines how making deliberate efforts to regulate aversive affective responses influences people's decisions in moral dilemmas. I hypothesize that emotion regulation – mainly suppression and reappraisal – will encourage utilitarian choices in emotionally charged contexts and that this effect will be mediated by the decision maker's decreased deontological inclinations. Study 1 finds that individuals who endorsed the utilitarian option (vs. the deontological option) were more likely to suppress their emotional expressions. In Studies 2a, 2b, and 3, participants are instructed to either regulate their emotions, using one of two different strategies (reappraisal vs. suppression), or not to regulate, and data is

collected through the concurrent monitoring of psycho-physiological measures. It is found that participants are more likely to make utilitarian decisions when asked to suppress their emotions rather than when they do not regulate their affect. Study 4 shows that one's reduced deontological inclinations mediate the relationship between emotion regulation and utilitarian decision making.

2.1 Introduction

In the 2009 film *Up in the Air* (2009), the character Natalie Keener, played by Anna Kendrick, takes a job with Career Transition Corporation, a company that institutes layoffs on behalf of other companies. Kendrick proposes a plan to cut costs by conducting layoffs via videoconferencing. Piloting the virtual-firing program online, with no trace of emotion on her face, Natalie matter-of-factly informs Mr. Samuels, a 57-year-old employee, that he has been let go. Even as Mr. Samuels becomes upset and starts to cry, Natalie continues to suppress her emotional expressions, mechanically telling him to pack his belongings.

In both our professional and personal lives, we often face moral dilemmas in which making a choice based on our principles of right and wrong (i.e., a deontological approach) conflicts with making a choice based on creating the greatest good (i.e., a utilitarian approach). More specifically, decision makers in various professional settings regularly engage in harmful actions toward others in pursuit of greater overall goals. Managers sometimes must fire employees to save their company, judges sometimes hand down capital punishment to uphold legal principles, and regulators often approve new drugs that can have dangerous side effects.

Like Natalie, people often appeal to utilitarian logic to justify their decisions to harm others. [Molinsky and Margolis \(2005\)](#) coined the term "necessary evils" to refer to tasks

in which a person must knowingly and intentionally cause harm to another human being in the service of achieving some perceived greater good or purpose. Interviews conducted to determine how professionals who carry out necessary evils experience such incidents (e.g., surgeons operating on infants) found that 46% reported staying psychologically disengaged (Molinsky and Margolis 2005). As a result, they denied experiencing prosocial emotions toward those (if only temporarily) harmed and reported trying to dissociate from the harmed target's experience. This research highlights that once a utilitarian decision has been made and is about to harm someone, people often try to detach themselves emotionally from the event and show behavior lacking in interpersonal sensitivity.

Whereas this line of research treats emotional expressions as a consequence of justifying utilitarian decision-making, this research asks if regulating emotional expression can lead to more utilitarian decision making when people face moral dilemmas. Given the pervasiveness of such choices in our daily lives, in this paper I aim to investigate the emotion-regulation processes that precede moral decision making and to understand the mechanism by which suppressing emotional expressions may lead to more utilitarian decision making.

2.1.1 Utilitarian vs. Deontological Decision making in Moral Psychology

Given the importance of moral decision making in dilemmas, moral psychology research has begun to identify the psychological processes by which people evaluate moral dilemmas. Cognitive and emotional processes are often in conflict when a moral decision needs to be made (Bartels 2008; Greene 2001; Greene et al. 2008). One early manifestation was found in neuroimaging studies conducted to distinguish how individuals respond to personal, impersonal, and non-moral dilemmas (Greene 2001). Personal dilemmas, in par-

ticular, trigger processing in brain regions closely associated with emotions, and this affective processing interferes with the utilitarian choice to avoid doing harm to others. Such emotions have also been identified in the form of a host of discrete intrapersonal emotions (such as victim distress and empathy; Blair 1995), as well as visceral, physiological reactions associated with engaging in harmful actions (Cushman et al. 2012). When such strong aversive emotions are tied to a moral dilemma, people no longer prefer the utilitarian option ("Doing harm is morally acceptable in circumstances that improve well-being") and instead tend to choose the more morally intuitive, deontological one ("Doing harm is morally unacceptable"). As this research from the dual-process model of moral judgment suggests, when people face difficult, personal moral dilemmas, both cognitive and emotional considerations can influence their decisions.

Researchers have since proposed several ways in which one can elect the more utilitarian choice even in the presence of strong emotions. For example, when people engage in deliberative thinking (Greene 2001; Greene et al. 2004) or have a higher working memory capacity (Bartels 2008; Feltz and Cokely 2008; Moore et al. 2008), they tend to make more utilitarian judgments. Whereas this research has recognized the important role of cognitive styles and executive functions in driving moral judgments and decisions, recent evidence suggests that there is an alternate, affective route to influence our utilitarian vs. deontological decisions. For example, individuals who suffer damage to brain areas associated with emotions make more utilitarian decisions (Ciaromelli et al. 2007; Koenigs et al. 2007), and visualizing or imagining a harm vividly (Amit and Greene 2012; Bartels 2008; Petrinovich et al. 1993) also increases the tendency to make deontological judgments.

2.1.2 Role of Emotion-Regulatory Efforts in Moral Decision Making

Less scholarly attention has been paid to the ways in which people regulate the emotions that arise from moral dilemmas themselves. If emotions are indeed critical in deterring people from making utilitarian decisions, then one's decision to regulate one's emotional reactions in the face of a moral dilemma is likely to be crucial in determining whether one chooses options that are more or less utilitarian. This research considers distinct psychological routes to more utilitarian decisions by focusing on the role of regulating affective responses that arise from moral dilemmas.

Research has identified two types of emotion-regulation strategies, expressive suppression and cognitive reappraisal, and examined their differential consequences on behavior (Ochsner and Gross 2005, 2008). Suppression involves concealing our emotions after the initial emotional response has occurred. It is unlikely to help one feel less negative, and it impairs the efficiency of cognitive processing, such as memory and problem solving (Richards 2004; Richards and Gross 2000). In contrast, cognitive reappraisal alters one's thoughts about a target event to control the initial emotional response. Individuals who chronically engage in reappraisal have been shown to have a more adaptive profile of physiological responses (Gross and Levenson 1997) and are psychologically healthier in the long term than those who do not (Gross 2002; Gross and John 2003). As compared to controls, individuals who were instructed to use reappraisal felt less negative after experiencing a negative event and had less sympathetic nervous system arousal (Gross 1998, 2002). Taken together, the empirical evidence to date suggests that the use of reappraisal reduces one's subjective and physiological experience of emotions.

Although such adaptive profile of reappraisal and maladaptive profile of suppression are well-documented, few studies to date have examined the role of emotion-regulation

strategies in moral decision making. Feinberg and colleagues (2012) demonstrated the relevance and efficacy of the reappraisal strategy in reducing moral intuitions (e.g., disgust that arises from reading a scenario describing a family eating a deceased pet dog). In their research, individuals who employed the reappraisal strategy, as compared to those who did not, judged the family's action to be less morally wrong. Although most people experienced disgust initially, the use of reappraisal helped them to reconstrue the situation such that they felt less negative (e.g., "The dog has already been killed in an accident, so no real harm was done to the dog, and therefore I cannot judge this family's action to be morally wrong"). Importantly, Feinberg and colleagues (2012) found that habitual suppression is not significantly associated with reducing moral intuitions, which led them to focus on reappraisal only. This research pioneered the study of emotion regulation and moral decision-making using scenarios that induce moral emotions such as disgust and contempt. However, it has a limitation: the types of scenarios used do not capture the wide variety of moral dilemmas present in the world.

There are several key differences between the moral scenarios used in Feinberg et al. (2012) and the moral dilemmas I discuss and use here. First, my research focuses on moral dilemmas that involve a conflict between two moral principles: utilitarian and deontological. The moral dilemma scenarios used in this study highlight a tension between two conflicting goals that can be justified using two distinct moral principles. When people feel torn between the options, they experience strong aversive emotions (Luce et al. 1997; Tetlock et al. 2000). Second, these moral dilemmas involve inevitable harm. No matter what decision the agent makes, some level of individual sacrifice in the form of physical harm or suffering is unavoidable (Moore et al. 2008). Third, instead of reacting to what has already been done from a third-person perspective, participants are asked to make moral

judgment about the agent's potential utilitarian actions or to make an active decision from a first-person perspective.

2.1.3 Deontological Inclinations as an Underlying Mechanism for the Relationship between Emotion Regulation and Utilitarian Decisions

Due to such differences, I argue that the moral dilemmas used in this research are more conflicting and emotionally charged by nature than those used in [Feinberg et al. \(2012\)](#). As such, predictions regarding the relationship between emotion regulation and moral decision making should be made with caution. A primary criticism of the previous research on moral decision making is that utilitarianism and deontology are measured on one scale, on the assumption that these two moral principles are perfectly inversely related (i.e., a stronger preference for utilitarian judgment means a weaker preference for deontological judgment). However, given that these moral principles stem from two independent psychological systems ([Greene 2007](#)), [Conway and Gawronski \(2013\)](#) used Jacoby's (1991) process-dissociation approach to quantify the relative strength of deontological and utilitarian inclinations within individuals. This technique allowed them to determine whether an increase in utilitarian choice or judgment is driven by a heightened utilitarian inclination or by a decreased deontological inclination. I thus adopted this methodology to understand the mechanisms by which specific emotion-regulation strategies influence moral decision-making.

Given the previous research on how suppression leads to more negative physiological arousal associated with emotional stimuli ([Gross 1998](#)), suppressing negative affect arising from moral dilemmas may not help individuals feel less negative. Similar to the

finding that habitual suppression is not significantly correlated with moral judgment (Feinberg et al. 2012), one could hypothesize that suppression will not be effective in increasing one's preference for a utilitarian choice or may even decrease one's utilitarian inclinations if aversive arousal is heightened and consciously felt as a moral "gut feeling." However, reappraisal would be more effective in leading individuals to make a utilitarian choice, as it reduces physiological arousal (Gross 1998). These predictions are based on the assumption that such physiological arousal can influence our conscious decision-making by modulating the experience of empathic concerns for potential victims. If this is true, suppression would increase deontological inclinations, and reappraisal would decrease deontological inclinations.

However, a different prediction could be made if suppression actually helps reduce one's tendency to make a more emotionally driven decision. It is possible that the suppression of emotion-related facial expressions may function as feedback, providing information that in turn influences one's moral judgment. Drawing from the Facial Feedback Hypothesis (Tomkins 1963), past research has found that facial feedback influences social-cognitive processes, such as emotional experience (Davis et al. 2010) and empathic accuracy (Neal and Chartrand 2011). As a result of facial feedback, individuals who express emotions may become more sensitive toward a victim's suffering associated with the utilitarian choice. If suppression of facial feedback (either by instruction to suppress muscle movement or by the injection of botulinum toxin to paralyze the facial muscles) were to reduce people's experience and appraisal of emotions, it might reduce one's empathic distress associated with the victims harmed and sacrificed as a result of the moral decision. If a decision maker expects to experience negative feelings and knows it would be difficult to avoid such an aversive psychological state, suppression may successfully tamper with emotional in-

fluence, thereby helping to generate a disconnect between one's emotional reactions and the decision at hand. Conway and Gawronski (2013) have demonstrated that showing a photograph of the victim enhanced empathic concerns and emotional distress, thus selectively increasing one's deontological inclinations. Thus, I theorize that suppressing facial expressions of aversive emotions will reduce one's deontological inclinations and therefore facilitate a utilitarian choice.

Hypothesis 1a: The use of suppression strategy will be associated with more utilitarian decision-making.

Hypothesis 1b: The relationship between suppressing emotional reactions and making utilitarian decisions will be explained by reduced deontological inclinations.

Based on prior research on the efficacy of reappraisal in down-regulating negative affect, I expect to replicate the finding from Feinberg et al. (2012) but further probe the mechanisms by which reappraisal leads to a more utilitarian choice. Cameron and Payne (2011) proposed a motivational account of emotion regulation to explain the "collapse of compassion," or the tendency for people to reduce their compassion as the number of people in need of help increases. Individuals who had been instructed to down-regulate (reappraise) emotions as they learn about one or eight victims expecting help were more likely to experience the "collapse of compassion" as compared to those who were told to experience their emotions. Cameron and Payne (2011) demonstrated that people tend to predict that the needs of large groups will be more overwhelming to them than the needs of one person; therefore, people are motivated to engage in emotion regulation to prevent themselves from experiencing such an aversive psychological state. This explains why people tend to be insensitive to mass suffering. Along the same lines, I expect that reappraisal would

reduce empathic concerns for the possible victims of the utilitarian choice. Taken together, I predict that reappraising aversive emotions will reduce one's deontological inclinations, thereby facilitating a utilitarian choice.

Hypothesis 2a: The use of reappraisal strategy will be associated with more utilitarian decision-making.

Hypothesis 2b: The relationship between reappraising emotional experience and making utilitarian decisions will be explained by reduced deontological inclinations.

2.1.4 Overview of the Present Research

The main goal of this research is to contribute to the intersection between emotion regulation and utilitarian decision-making, and to clarify the underlying mechanisms by which emotion regulation affects morality. Using both correlational and causal designs, I examine how different emotion-regulation strategies influence moral decisions when people are faced with a difficult moral dilemma. My goals are (1) to first show that concealing and rethinking emotions increases one's preference for utilitarian choice and (2) to test my hypothesis regarding why regulation emotions has this specific effect on utilitarian decision making using a process-dissociation approach.

Across five studies, I test the main predictions and find that regulating emotions increases people's likelihood of making utilitarian decisions. I use a variety of emotionally charged moral dilemmas and vary the dependent measures to include either making a moral judgment (i.e., Is it morally appropriate?) or making a moral decision (i.e., Which decision will you make if you were the agent?).

In Study 1, I examine whether individuals who choose a utilitarian option are more likely to suppress emotions than those who make a deontological choice. Given the cor-

relational nature of Study 1, in Study 2-4, I manipulate participants' emotion-regulation strategies and examine the effects of such strategies on their moral decisions in a dilemma situation. Here I test Hypothesis 1a and 2a, which suggests that individuals who are instructed to regulate their emotions are more likely to make utilitarian decisions as compared to those who are not instructed to do so. Importantly, to closely track the effect of each emotion-regulation strategy on participants' physiological arousal, I use data from concurrent monitoring of psycho-physiological indices of emotion in Study 2b and 3. I test the alternative hypothesis that suppression decreases preference for utilitarianism through heightened physiological arousal, while reappraisal increases preference for utilitarianism through reduced physiological arousal. Finally, in Study 4, I test Hypothesis 1b and 2b on the mechanisms using the process-dissociation approach, which suggests that both strategies selectively reduce deontological inclinations, thus leading to greater preference for utilitarian decisions.

2.2 Study 1

In Study 1, I use a hypothetical scenario to test whether individuals who make utilitarian decisions predict that they will experience more negative, high-arousal emotions, and will thus be willing to use more emotion-regulation strategies, as compared to those who make deontological decisions. To ensure that participants are given at least two emotion-regulation strategies, I asked them to first make a moral decision and then indicate their willingness to use suppression and reappraisal strategies.

2.2.1 Method

Participants

I recruited 186 workers ($M_{age} = 37.21$, $SD = 12.98$; 38% male) from an online labor market (Amazon Mechanical Turk) to participate in a 10-minute survey for \$0.40.

Procedure

The study's instructions informed participants that they would read a hypothetical scenario (adapted from [Uhlmann et al. 2013](#)). In this scenario, an agent is about to decide whether to approve the use of \$2 million to save one child's life (deontological choice) or to use it for other hospital needs that could save 200 future patients' lives (utilitarian choice) ([Tetlock et al. 2000](#), See Appendix A.1 for the scenario). After reading the scenario, participants were presented with two choices: a deontological or a utilitarian choice.

In addition, participants answered two questions assessing how they felt as they made the decision and some demographic questions. To better understand the emotions people expect to experience as they considered making moral choices, two questions predicting their emotional valence and arousal were asked. The first measured valence by asking participants to indicate how positively or negatively they felt (with 0 = extremely unhappy/unpleasant, 5 = neutral, and 10 = extremely happy/pleasant). The second measured arousal by asking participants to indicate how aroused they would feel (with 0 = low level of arousal, 5 = a moderate (everyday) level of arousal, and 10 = a high level of arousal).

Participants were then asked to decide how they would display their emotions. Then I presented two ways to display emotions and asked how willing they would be to use such strategies (1 = not at all, 7 = extremely willing): suppression ("I will try not to show any emotional expressions on my face."), reappraisal ("I will try to change the way I think

about the situation so I feel less negative."). Participants were also asked to rate how much emotion they would actually express as they informed the transplant department of their decision (1 = none, 5 = all) and to write a few sentences to describe what facial expression they would have. Participants' responses to this open-ended question were coded by two research assistants who were blind to the study's hypotheses. The two coders scored the responses based on the extent to which the participants suppressed their emotional reactions (1 = no attempt to suppress emotion, 7 = complete suppression of emotion).

Finally, participants completed a demographics questionnaire. Although testing the gender effects is outside the scope of this research, I included gender in all analyses, as participants' gender may influence both one's tendency to make a utilitarian vs. deontological choice and one's emotion-regulation strategy.¹

2.2.2 Results

Table 2.1 reports the descriptive statistics of the main variables and their zero-order correlations. Of the participants, 65.6% chose to make a utilitarian decision by denying the transplant request, and 34.4% made a deontological decision by approving the transplant request. There was a significant gender difference: males (53 out of 66) were more likely to make a utilitarian choice than were females (62 out of 110), $\chi^2(1, N = 176) = 10.44$, $p = 0.001$, $V = 0.02$.

Individuals who made the utilitarian decision ($M = 3.41$, $SD = 2.67$) predicted feeling

¹Gender was included in my analyses for two main reasons. First, the gender effect on moral decision making is still debated by many scholars; it has been theorized that females are more likely to be driven by emotion, empathy, and care for others than males (Gilligan 1982). While some researchers found a small effect or no effect of gender (Brabeck and Shore 2003; Jaffee and Hyde 2000), others found that females are more likely to have deontological inclinations (Aldrich and Kage 2003; Indick et al. 2000). Second, the gender effect on the type of emotion-regulation strategy that individuals choose is well-documented; males use suppression strategy more frequently than females (Tamres et al. 2002).

Table 2.1: Zero-order correlations among utilitarian decision making, self-reported emotions, and emotion-regulation decision, Study 1.

	Mean (SD)	1	2	3	4	5	6
1. Utilitarian Decision	0.65 (0.48)						
2. Suppress	3.57 (2.06)	0.15*					
3. Reappraise	3.99 (1.96)	0.04	0.38***				
4. Emotions Displayed	2.72 (0.94)	-0.26***	-0.54***	-0.28***			
5. Predicted Valence	4.36 (2.89)	-0.45***	0.08	0.03	0.17*		
6. Predicted Arousal	4.29 (2.84)	-0.15*	0.03	-0.01	0.10	0.30***	
7. Sex (1=male, 2=female)	1.62 (0.48)	-0.24**	-0.25***	-0.19*	0.07	-0.05	-0.05

Note. $\hat{p} < 0.10$, $*p < 0.05$, $**p < 0.01$, $***p < 0.001$; likelihood of utilitarian decision was 1 if utilitarian option was chosen, 0 if not; likelihood of suppression decision was 1 if suppress, 0 if not; the higher the score of emotional valence, the more negative participants felt (5=neutral).

more negative emotions than those who made the deontological decision ($M = 6.15, SD = 2.40$), $t(176) = 6.92, p < 0.001, d = 1.07$. Similarly, utilitarian decision makers ($M = 3.97, SD = 2.75$) predicted experiencing more arousal than deontological decision makers ($M = 4.90, SD = 2.94$), $t(176) = 2.03, p = 0.04, d = 0.33$.

I used a mixed ANOVA in which the participants' willingness to use emotion-regulation strategy served as a dependent variable, emotion-regulation type (suppression vs. reappraisal) served as a within-subject factor, and moral decision (utilitarian vs. deontological) served as a between-subject factor. Participants reported that they were more likely to use reappraisal ($M = 3.99, SD = 1.96$) than suppression ($M = 3.57, SD = 2.06$) when facing the moral dilemma, $F(1, 175) = 7.83, p = 0.006, \eta_p^2 = 0.04$. More importantly, this difference was driven by the significant difference in willingness to use suppression when making a utilitarian choice ($M = 3.80, SD = 2.15$) as compared to when making a deontological choice ($M = 3.13, SD = 0.23$), $t(177) = 2.18, p = 0.03, d = 0.15$. However, I did not find a significant difference on the willingness to reappraise emotions across utilitarian and deontological decision making, $t(177) = -0.60, p = 0.55, d = 0.09$. Figure 2.1 summarizes this relationship. Lastly, participants who made a utilitarian choice reported that they were less likely to display emotional expressions when notifying others of their decision ($M = 2.55, SD = 0.91$) as compared to those who made a deontological choice ($M = 3.06, SD = 0.91$), $t(175) = 3.56, p < 0.001$.

A content analysis also confirms that participants who made the utilitarian choice were more likely to engage in suppression. The intercoder reliability kappa was 0.74, $p < 0.001$, so I created a composite score using an average. Utilitarian decision makers ($M = 4.17, SD = 2.22$) suppressed emotional reactions more than deontological decision makers ($M = 3.19, SD = 2.01$), $t(174) = 2.92, p = 0.004, d = 0.46$. Examples of a suppression

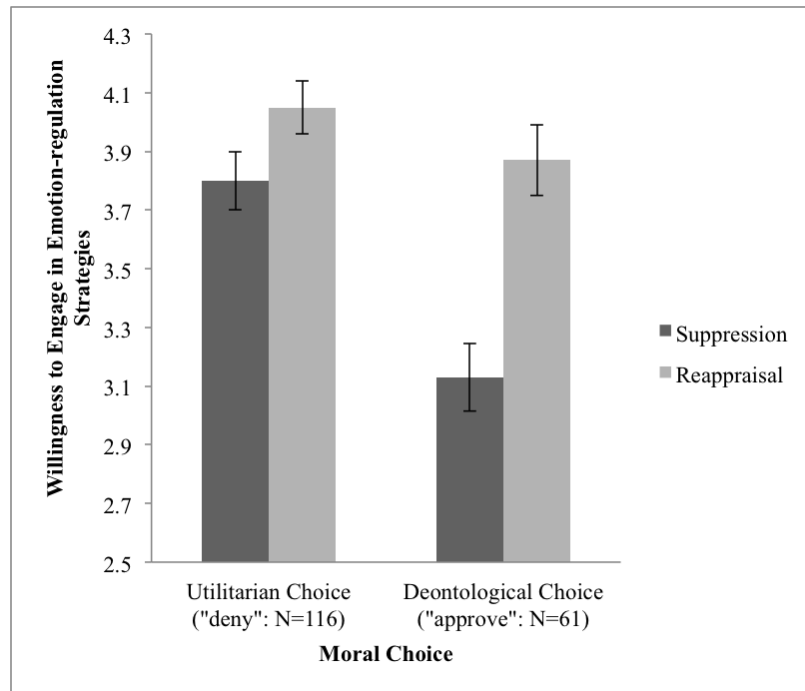


Figure 2.1: Results for the willingness to engage in emotion-regulation strategies as a function of the moral choice made. Error bars represent standard errors (Study 1).

response followed by a utilitarian decision include the following: "I would have to keep my mouth shut very tight to keep my emotions from getting out of control," "I would try to be as calm and stoic as possible," and "I would try to stonewall it." Examples of a no-suppression response followed by a deontological decision included: "I would show the pain and struggle of this decision in my expression" and "I would be sad and wouldn't be afraid of showing it. I don't think there is much point in hiding the fact that my decision causes someone to suffer."

Controlling for gender did not change the direction or significance of the results, although being female was positively associated with expressing emotions but negatively associated with suppressing and reappraising emotions. Similarly, controlling for predicted emotions (both valence and arousal) did not change the direction or significance of the results.

2.2.3 Discussion

In this study, participants' emotional displays served as a primary measure of interest as a function of the choice they made (whether utilitarian or deontological). These findings demonstrated that utilitarian decision making, as compared to deontological decision making, involved predicting the experience of more negative and high-arousal emotions. This suggests that sacrificing one person to save 200 lives in the near future still generates more aversive emotional reactions, despite the positive emotions that arise from saving 200 lives in the distant future. Individuals who decided to make the utilitarian choice were also more willing and likely to suppress emotional expressions, while those who made the deontological choice were less likely to do so. However, participants' willingness to use reappraisal did not differ based on the moral decision made. It should be noted that this result is driven

by lower levels of suppression when a deontological decision is made; people tended to express emotions when making a deontological choice. Thus, this study demonstrated that both suppression and reappraisal are relevant emotion-regulation strategies when dealing with emotionally charged moral dilemmas.

2.3 Study 2

Study 1 showed that when individuals can rate each of the emotion-regulation strategies that are likely to use, utilitarian decision makers are more willing to use suppression than deontological decision makers. no significant difference in the use of reappraisal was found. Based on the promising correlations linking utilitarian decision making with emotion-regulation strategies (suppression, in particular), in Study 2 I examined the causal relationship between regulatory strategies (by randomly assigning participants to one of the three conditions – control, reappraisal, and suppression) and moral decisions. Specifically, I investigated whether an emotion-regulation strategy employed at the moment of decision affects one's moral decisions.

In Study 2a, I first instructed participants to use a specific emotion-regulation strategy and then presented them with five moral dilemma scenarios. In each, participants judged whether the agent's utilitarian action is morally appropriate or not. In Study 2b, I asked participants to watch a video clip depicting a moral dilemma and then asked them to make a high-conflict moral decision by taking the perspective of the main character in the clip. In Study 2b, I included skin conductance as a measure of emotional involvement in moral dilemmas as well as a manipulation check of the emotion-regulation strategies. Skin conductance levels, which reflect individuals' tonic electrodermal activity, have been associated with indices of arousal, attention, fear, and anxiety ([Mendes 2009](#)). A key benefit

of using skin conductance is that it cannot be voluntarily controlled or consciously processed. Scholars have thus used skin conductance to reduce self-report biases and to detect emotional engagement in judgment and decision making (Figner and Murphy 2011).

2.3.1 Study 2a Method

Participants and procedure

One hundred sixty-three individuals ($M_{age} = 35.75$ years, $SD = 11.70$; 38% male) from Amazon Mechanical Turk participated in a 10-minute long study for \$0.50. Participants were randomly assigned to one of three conditions, in which they were asked to employ different emotion-regulation strategies (adapted from Shiota and Levenson 2009): suppression, reappraisal, or no strategy at all (control). In the suppression condition, the instructions read:

As you listen to the audio clips, if you have any feelings, please try your best not to let those feelings show. Please listen carefully, and try to behave so that someone watching you would not know that you are feeling anything at all.

In the reappraisal condition, the instructions read:

As you listen to the audio clips, please think about what you are seeing objectively. Please listen carefully, and try to think about what you are seeing in such a way that you feel less negative emotion.

Finally, in the control condition, participants were asked to "Please listen carefully."

Then participants listened to five moral dilemmas in the same order (See Appendix A.2 for the transcribed materials) and were asked to rate whether the utilitarian action of the

agent is morally appropriate (1 = very inappropriate to 6 = very appropriate).

2.3.2 Study 2a Results

Using a multiple regression analysis, I tested the hypothesis that regulating one's emotions would be associated with an increased likelihood of making a utilitarian decision, as compared to controls. I included gender as a covariate; being a male was associated with rating the agent's utilitarian action to be more morally appropriate, $B = 0.46$, $SE = 0.17$, $p = 0.006$. The suppression dummy variable had significant regression weights, $B = 0.51$, $SE = 0.21$, $p = 0.01$, as did the reappraisal dummy variable, $B = 0.50$, $SE = 0.20$, $p = 0.01$.

2.3.3 Study 2b Method

Participants and procedure

One hundred ten individuals ($M_{age} = 30.51$ years, $SD = 12.85$; 46% male) from the Boston/Cambridge area participated in the study for \$15. They completed the study at individual computer terminals. I used the same instructions for each of the conditions (Shiota and Levenson 2009).

At the beginning of the experiment, I applied physiological sensors to participants to measure their physiological responses from electrodermal activities throughout the entire study. I first asked them to self-report their current emotions. After reading the emotion-regulation instructions to suppress or reappraise their emotions (no specific instructions were given to controls), participants watched a four-minute video clip from the movie *Vertical Limit* (2000). The video clip presents a moral dilemma that triggers strong emotional reactions. Specifically, it shows a rock-climbing accident that endangers a father, his daugh-

ter, and his son. The father presents his son with a difficult choice: 1) cut the rope, an action that would save the son and daughter but kill the father; or 2) not cut the rope, which would cause all three people to die. Thus, in this scenario, the utilitarian choice is to cut the rope (i.e., save two people rather than none). After watching the video clip, participants indicated the decision they would make if they faced the same choice as the son depicted in the movie.

Next, they completed a questionnaire that measured their state emotions and were asked demographic questions.

Measures

Autonomic responses. All physiological data were scored manually using Mindware software modules (Mindware Technologies, Gahanna, OH) by research assistants who were blind to both the study hypotheses and conditions. In addition, a subsample was rescored to ensure reliability. *Skin-conductance level* was assessed by two Ag/AgCL electrodes attached to the palm of the non-dominant hand. Skin conductance was recorded continuously throughout the study, and the skin-conductance levels were retained for analysis.

State emotions. I assessed participants' preexisting state emotions and their post-manipulation state emotions (after watching the video and making their moral decision) using the 20-item Positive and Negative Affect Scale (PANAS; [Watson et al. 1988](#)). I then created four composite variables: pre-task positive affect ($\alpha = 0.76$), pre-task negative affect ($\alpha = 0.82$), post-task positive affect ($\alpha = 0.88$), and post-task negative affect ($\alpha = 0.93$).

2.3.4 Study 2b Results

Table 2.2 reports the descriptive statistics of the main variables I assessed in the study and their zero-order correlations. Table 2.3 reports the mean and standard deviation of the main variables by condition.

Manipulation checks. As a manipulation check, I tested whether different emotion-regulation conditions led to different emotional and physiological consequences. The *Vertical Limit* video clip begins with two minutes of relatively relaxing scenes and ends with two minutes of anxiety-inducing scenes that depict the son's moral dilemma. I asked participants to report their subjective positive and negative emotions before they watched the video and after they made the moral decisions. I also measured the participants' physiological responses by capturing skin-conductance levels at the baseline period and at the post-decision period (during the moral decision making immediately after the movie). I failed to collect skin conductance data for 18 participants due to measurement issues, and they were thus treated as missing variables in the analysis on manipulation checks.

For subjective feelings, I conducted two mixed ANOVAs in which participants' self-reported positive and negative affect served as dependent variables, time (baseline vs. post-decision period) served as a within-subjects factor, and condition (emotion-regulation strategies) as a between-subjects factor. The ANOVA using positive affect as the dependent variable revealed that positive affect decreased significantly from the baseline to the post-decision period, $F(1, 107) = 91.21, p < 0.001, \eta_p^2 = 0.46$. The main effect for condition was not significant, $F(2, 107) = 2.47, p = 0.09$, nor was the Condition \times Time interaction, $F(2, 107) = 1.11, p = 0.33$. Mirroring these results, the ANOVA using negative affect as the dependent variable revealed that negative affect increased significantly over

Table 2.2: Zero-order correlations among utilitarian decisions, emotion-regulation conditions, self-reported emotions, and skin-conductance levels, Study 2b.

Variables	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Utilitarian Decision	0.62 (0.49)									
2. Suppression Dummy	0.34 (0.47)	0.16 [^]								
3. Reappraisal Dummy	0.34 (0.48)	-0.03	-0.51***							
4. Positive Affect T1	3.24 (1.93)	-0.14	-0.10	0.19 [^]						
5. Positive Affect T2	1.41 (0.87)	0.09	-0.13	0.10	0.12					
6. Negative Affect T1	2.02 (1.28)	-0.04	0.03	0.05	0.61***	0.04				
7. Negative Affect T2	4.61 (2.20)	-0.05	0.08	0.01	-0.05	-0.42***	0.20*			
8. Skin Conductance T1	11.11 (10.82)	0.05	-0.14	0.24*	0.11	0.04	0.20*	0.08		
9. Skin Conductance T2	12.81 (12.16)	0.09	-0.00	0.10	0.08	-0.02	0.21 [^]	0.11	0.89***	
10. Sex (1=male, 2=female)	1.55 (0.49)	-0.36***	-0.02	0.06	-0.10	-0.21*	-0.08	0.04	-0.00	-0.01

Note. [^] $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.3: Means and standard deviations by condition, Study 2b.

Conditions	Likelihood of Utilitarian Decision	Positive Affect at T1	Positive Affect at T2	Negative Affect at T1	Negative Affect at T2	SCL at T1	SCL at T2
Control	0.53 (0.51)	3.00 (0.86)	1.44 (0.96)	1.88 (0.93)	4.33 (2.25)	9.56 (5.13)	10.95 (4.82)
Suppression	0.73 (0.45)	2.97 (0.58)	1.25 (0.77)	2.07 (1.03)	4.85 (2.42)	8.89 (8.53)	12.77 (10.32)
Reappraisal	0.59 (0.50)	3.76 (3.13)	1.53 (0.86)	2.11 (1.74)	4.65 (1.94)	14.54 (15.09)	14.43 (17.14)

Note. Likelihood of utilitarian decision was 1 if utilitarian option was chosen, 0 if not.

time, $F(1, 107) = 135.80$, $p < 0.001$, $\eta_p^2 = 0.56$. The main effect of condition was again not significant, $F(2, 107) = 0.66$, $p = 0.52$, nor was the Condition \times Time interaction, $F(2, 107) = 0.19$, $p = 0.83$. Together, these results indicate that the emotion-regulation strategies that participants were asked to use while watching the video did not differentially influence participants' emotional state based on participants' self-reported emotions.

For physiological arousal, I conducted a mixed ANOVA in which participants' physiological arousal served as a dependent variable, time (baseline vs. arousal period) served as a within-subjects factor, and condition (emotion-regulation strategies) as a between-subjects factor. There was a significant increase in skin-conductance levels over time, $F(1, 90) = 8.95$, $p = 0.004$, $\eta_p^2 = 0.09$. There was no significant difference across conditions, $F(2, 90) = 1.37$, $p = 0.26$, but was there a significant interaction between the conditions and change over time, $F(2, 90) = 4.38$, $p = 0.01$, $\eta_p^2 = 0.09$. Increase in skin conductance was more pronounced among individuals who suppressed ($B = 3.88$, $SE = 0.98$, $p < 0.001$), as compared to those who reappraised ($B = -0.11$, $SE = 0.94$, $p = 0.91$) and controls ($B = 1.31$, $SD = 1.01$, $p = 0.20$). It should be noted that the skin-conductance levels were not similar across the three conditions at the baseline, $F(2, 90) = 2.70$, $p = 0.07$; they were slightly higher for reappraisal than suppression, $p = 0.11$. In order to capture the relative skin-conductance levels of the individual at different times, I thus created standardized (ipsatized) scores for skin conductance for each individual and subtracted the scores at the baseline from those at the arousal period. Replicating the same effect, there was a significant difference across conditions, $F(1, 91) = 6.04$, $p = 0.003$, $\eta_p^2 = 0.12$. In the post-hoc analysis, the difference score for suppression ($M = 0.42$, $SD = 0.74$) was higher than that for reappraisal ($M = -0.42$, $SD = 1.08$), $p = 0.004$. However, the difference scores for suppression and reappraisal were not significantly different from controls

($M = 0.30$, $SD = 0.98$), $p_s > 0.18$.

Emotion regulation and utilitarian decisions. Using a binary logistic regression analysis, I tested my hypothesis that regulating one's emotions would be associated with an increased likelihood of making a utilitarian decision as compared to the control condition, controlling for gender. Being male was associated with the higher likelihood of making utilitarian decision, $B = 1.73$, $SE = 0.46$, $p < 0.001$. The suppression dummy variable had significant regression weights, $B = 1.05$, $SE = 0.53$, $p = 0.05$, whereas the reappraisal dummy variable did not, $B = 0.45$, $SE = 0.52$, $p = 0.39$.

Mediation analysis. Additionally, I ran mediation analyses to test whether physiological arousal mediates the relationship between emotion regulation and utilitarian decision making. First, I entered the suppression indicator as an independent variable, utilitarian decision making as a binary dependent variable, and changes in physiological arousal (difference between arousal period and baseline) as a mediating variable, while controlling for the reappraisal indicator and gender as covariates. A bootstrap analysis confirmed that the 95% bias-corrected confidence interval for the size of the indirect effect did not exclude zero (-0.03, 0.13). Second, I repeated the same analysis but using the reappraisal indicator as an independent variable, while controlling for the suppression indicator and gender. A bootstrap analysis similarly confirmed that the confidence interval did not exclude zero (-0.03, 0.11).

2.3.5 Discussion

Together, the results from Study 2a and Study 2b show that making an explicit effort to suppress one's emotional expressions increases utilitarian decisions in personal, emotion-

ally rich moral dilemmas. However, the effect of reappraising emotions was not as robust as that of suppression; reappraisal did not have the same effect in Study 2a as in Study 2b, but did have a similar effect as suppression in Study 2a as in Study 2b.

Previous research (Gross 1998) found that reappraisal is effective in making people feel less negative, while suppression increases sympathetic activation. Although my findings seem inconsistent with previous work on emotion regulation, the absence of a statistically significant effect of reappraisal on self-reported emotions might be attributed to the fact that I asked participants to rate their emotions after they made the moral decision. It is possible that making a difficult decision may have led to negative emotions regardless of the emotion-regulation strategy previously employed.

However, using different emotion-regulation strategies led to differential changes in physiological arousal over time. Consistent with what previous research has found (Gross and Levenson 1993), suppressors experienced the most sympathetic activation over time, while reappraisers and controls did not have similar sympathetic activation. Although my results show that physiological arousal tracked one's emotional state during the video more closely than self-reported ratings of emotions, it is important to note that the skin-conductance levels at baseline for those who reappraised were already higher than for those who suppressed or for controls. It is possible that those who were instructed to reappraise their emotions predict the emotion-inducing stimuli to be more difficult to regulate, and these expected emotions may have been sufficient to increase their skin-conductance levels.

It should also be noted that sympathetic activation did not mediate the relationship between the use of emotion-regulation strategies and utilitarian decision-making. This excludes the possibility that physiological arousal is consciously entered into the way people

make moral decisions and increases their preference for deontological decision making.

2.4 Study 3

In Study 3 I conduct a conservative test of how regulating unrelated emotions influence subsequent moral decision-making. This study also addresses the concern that people's lay belief that the utilitarian choice is less emotionally driven than the deontological choice may play a role when they are told to regulate emotions while making a moral decision. Using a separate-tasks paradigm (Keltner et al. 1993), I vary the emotion-regulation strategy participants employ while viewing a series of aversive images as the first task, and then present them with a decision task with moral dilemmas as the second task. Thus, participants are not explicitly told to regulate their emotions while reading moral dilemmas. I predict that this incidental regulation of aversive emotions will carry over to influence decisions even in the unrelated moral domain. I use the same measure of sympathetic activation as in Study 2b as a manipulation check and as a potential mediator.

2.4.1 Method

Participants and procedure

One hundred seventeen individuals ($M_{age} = 28.36$ years, $SD = 8.65$; 41% male) from a city in the Northeastern United States participated in a half-hour study and received \$10 for their participation. The study instructions informed participants that they would complete two unrelated surveys; they would first answer some questions about their emotions and view some images, and then they would make choices in a moral decision-making task.

At the beginning of the experiment, I applied physiological sensors to participants to

measure their physiological responses from electrodermal activities throughout the entire study. After I applied sensors to measure skin-conductance levels, I first asked participants to indicate their current emotions. I then showed them 15 neutral images to measure their physiological responses at baseline (T1). Next, I randomly assigned participants to one of three conditions, in which they were asked to employ different emotion-regulation strategies: suppression, reappraisal, or no strategy at all.

Across conditions, participants saw 12 aversive images after viewing the neutral images. Before viewing the images, they received instructions similar to those used in Study 2a and 2b. The images involved graphic scenes of burn, mutilation, and threats, and were designed to induce negative, high-arousal emotions (T2). Both neutral and aversive images have been used in studies of emotion regulation in the past ("picture reappraisal task"; Jackson et al. 2000; Ochsner et al. 2002), and were originally developed by the International Affective Picture System (IAPS; Lang et al. 1999). All images appeared for 10 seconds, followed by a three-second resting period. During the resting period, I presented a simple prompt to remind participants to follow instructions. For all neutral images, participants saw a cue screen "LOOK". Negative images were followed by either "REAPPRAISE," or "SUPPRESS," or "LOOK," depending on the randomized condition in which participants belonged. All images were presented in a fixed, randomized order.

In an ostensibly separate survey, I asked participants to read four high-conflict, personal moral dilemmas (Greene 2001; Koenigs et al. 2007). All of the dilemmas had a similar structure, such that one person would have to personally harm another person to save several others (see Appendix A.2 for details). I intentionally selected dilemmas that are usually contested and for which people feel divided. In previous studies, on average, about 55% of people chose the utilitarian judgment over the non-utilitarian, emotional judgment

(Greene et al. 2008). All scenarios were presented in the same order. I asked participants two questions: 1) what decision they would make (utilitarian or non-utilitarian), and 2) how they felt, in order to test whether the images influenced their self-reported negative feelings, including fear and disgust. Then I asked a series of follow-up questions about their emotion-regulation task, followed by demographic questions.

Measures

Autonomic responses. As in Study 2b, I collected skin-conductance levels to measure participants' negative arousal and anxiety induced by the images they viewed.

State emotions. I used the 20-item PANAS (Watson et al. 1988) before the participants' viewing of the images and also after they had made the moral decision. To correctly measure how participants felt during the image-viewing task, I asked them to recall this particular task and to report their emotions. I then created four composite variables: pre-task positive affect ($\alpha = 0.86$), pre-task negative affect ($\alpha = 0.91$), pre-task positive affect ($\alpha = 0.87$), and post-task negative affect ($\alpha = 0.93$).

Post-task questionnaire. As a manipulation check, participants indicated the extent to which they regulated their emotions while viewing the pictures (on a seven-point scale anchored by 1 = not at all and 7 = very much).

2.4.2 Results

Among 117 participants, nine participants did not want to view images, so the experimenters allowed them to skip this portion of the experiment. Two participants did not follow instructions. These participants were excluded from further analyses, as they did

not receive the same stimuli as other participants. In addition, I failed to collect skin-conductance data for nine participants due to measurement issues and treated them as missing in the analysis of the effect of emotion regulation on sympathetic activation.

Table 2.4 reports the descriptive statistics of the main variables I measured and their zero-order correlations. Table 2.5 reports the mean and standard deviation of these variables by condition.

Manipulation checks. The extent to which participants regulated their emotions differed across emotion-regulation strategies, $F(2, 103) = 3.35, p = 0.04, \eta^2 = 0.06$. A planned contrast revealed that participants in the control condition reported significantly less emotion regulation ($M = 4.08, SD = 1.40$) than did those in the suppression condition ($M = 5.06, SD = 1.47; p = 0.04$), whereas those in the reappraisal condition ($M = 4.43, SD = 1.82$) did not differ significantly from either those in the control condition or those in the suppression condition, $ps > 0.25$. This suggests that suppressors, but not reappraisers, regulated emotions to a larger extent than controls.

As an additional manipulation check, I asked participants to report their subjective feelings before and after the negative stimuli being presented. I also captured the average skin-conductance levels during the baseline period (during the viewing of 15 neutral images) and during the arousal period (during the viewing of 12 aversive images).

First, I conducted mixed ANOVAs in which participants' self-reported positive and negative affect served as dependent variables, time (baseline vs. post-decision period) served as a within-subjects factor, and condition (emotion-regulation strategies) served as a between-subjects factor. Positive affect significantly decreased over time, $F(1, 103) = 84.08, p < 0.001, \eta_p^2 = 0.45$, but did not differ across conditions, $F(2, 103) = 1.02, p = 0.36$. I found no significant interaction between time and condition, $F(2, 103) = 2.43, p = 0.09$. Neg-

Table 2.4: Zero-order correlations among utilitarian decisions, emotion-regulation conditions, self-reported emotions, and skin-conductance levels, Study 3.

Variables	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Utilitarian Decision	1.78 (1.19)									
2. Suppression Dummy	0.32 (0.47)	0.14								
3. Reappraisal Dummy	0.35 (0.48)	0.05	-0.50***							
4. Positive Affect T1	4.61 (1.08)	-0.19*	0.13	-0.10						
5. Positive Affect T2	3.88 (1.25)	-0.12	0.12	0.03	0.75***					
6. Negative Affect T1	2.03 (1.07)	-0.06	0.17 [^]	-0.07	-0.24*	-0.05				
7. Negative Affect T2	2.70 (1.35)	-0.10	0.16	-0.14	0.08	-0.24*	-0.57***			
8. Skin Conductance T1	8.31 (6.08)	-0.02	-0.05	0.01	0.16	0.20*	-0.04	-0.18 [^]		
9. Skin Conductance T2	9.19 (6.56)	0.01	-0.06	-0.01	0.13	0.17 [^]	-0.01	-0.13	0.96***	
10. Sex (1=male, 2=female)	1.58 (0.49)	-0.15	0	0.01	0.01	-0.15	-0.12	0.14	-0.24*	-0.24*

Note. [^] $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; number of utilitarian choices was between 0 and 4.

Table 2.5: Means and standard deviations by condition, Study 3.

Conditions	Frequency of Utilitarian Decision	Positive Affect at T1	Positive Affect at T2	Negative Affect at T1	Negative Affect at T2	SCL at T1	SCL at T2
Control	1.46 (1.09)	4.57 (1.07)	3.61 (1.20)	1.89 (0.86)	2.67 (1.32)	8.67 (5.34)	9.79 (5.61)
Suppression	2.03 (1.34)	4.82 (1.02)	4.10 (1.19)	2.29 (1.11)	3.01 (1.34)	7.88 (6.19)	8.66 (7.28)
Reappraisal	1.86 (1.08)	4.47 (1.15)	3.93 (1.34)	1.93 (1.18)	2.45 (1.36)	8.37 (6.82)	9.08 (6.89)

Note. Number of utilitarian choices was between 0 and 4.

ative affect increased significantly over time, $F(2, 102) = 35.69, p < 0.001, \eta_p^2 = 0.26$. Again, the main effect of condition was not significant, $F(2, 102) = 1.84, p = 0.16$, nor was the condition \times time interaction, $F(2, 102) = 0.49, p = 0.62$.

For physiological arousal, I conducted a mixed ANOVA in which participants' physiological arousal served as the dependent variable, time (baseline vs. arousal period) served as a within-subjects factor, and condition (emotion-regulation strategies) served as a between-subjects factor. This analysis revealed a significant increase of skin-conductance levels over time, $F(1, 95) = 23.42, p < 0.001, \eta_p^2 = 0.20$, but no significant difference across conditions, $F(2, 95) = 0.19, p = 0.83$, nor an interaction between time and condition, $F(2, 95) = 0.52, p = 0.60$. This confirms that the aversive images successfully induced both self-reported negative affect and physiological arousal.

Emotion regulation and utilitarian decisions. I predicted that an individual's attempt to conceal emotional expressions carries over to unrelated moral decision-making and thus increases the frequency of making utilitarian decisions. I used a Poisson regression to model for count data. Incidental suppression increased the number of utilitarian choices, $B = 0.33, SE = 0.17, p = 0.04$, whereas incidental reappraisal did not, $B = 0.25, SE = 0.16, p = 0.11$. The effect of being female on the frequency of making utilitarian decisions was negative but not statistically significant ($B = -0.21, SE = 0.12, p = 0.09$).² This result suggests that regulating emotional reactions unrelated to moral decision-making increases the frequency with which participants make utilitarian choices.

²The same analysis was repeated using the OLS regression, and the direction and significance of the relationships did not change ($B = 0.58, p = 0.04$ for suppression, $B = 0.42, p = 0.12$ for reappraisal, $B = -0.38, p = 0.09$).

Mediation analysis. I also ran mediation analyses to test whether physiological arousal mediates the relationship between emotion regulation and utilitarian decision-making. First, I entered the suppression indicator as an independent variable, utilitarian decision making as a dependent variable, and changes in physiological arousal (difference between arousal period and baseline) as a mediating variable, while controlling for the reappraisal indicator and gender as covariates. Similar to Study 2b, the 95% bias-corrected confidence interval for the indirect effect did not exclude zero (-0.25, 0.02). Second, I repeated the same mediation analysis for reappraisal as an independent variable, but the confidence interval did not exclude zero (-0.29, 0.03). As before, changes in physiological arousal did not significantly predict utilitarian decision-making, $B = 0.07$, $SE = 0.07$, $p = 0.28$.

2.4.3 Discussion

Both self-reported negative affect and physiological arousal increased as a result of viewing the aversive images, but I could not confirm that the emotion-regulation strategies influenced emotions differently. As in Study 2b, it is possible that making decisions in the moral dilemmas may have wiped out the differential effect, if it existed, of emotion-regulation strategies. Unlike Study 2b, however, the use of emotion-regulation strategies did not differentiate the effect of aversive images on physiological arousal. There are a few possible explanations. One is that the images may have not been aversive and emotionally engaging enough to influence the physiological component of one's response to disgust, as compared to the video clip from *Vertical Limit*. Also, given that nine participants opted out of watching all images, it is also possible that more physiologically reactive participants chose not to participate, leaving less reactive participants in the study.

Replicating the findings of Study 2, the results of Study 3 indicate that even when

the target of one's suppression strategy consists of unrelated negative stimuli and not the emotions that arise from the moral dilemma one is facing, the mere effort to suppress emotions carries over to the subsequent moral domain and increases the likelihood of utilitarian choices. Similar to Study 2b, however, the effect of reappraisal on utilitarian decision making was not as robust as that of suppression.

2.5 Study 4

In Study 2 and 3, I found that regulation of emotional reactions in moral dilemmas leads to more utilitarian decision-making. Because participants were asked to endorse either a utilitarian decision or a deontological decision, their preference for the utilitarian decision can be interpreted as either an increase in utilitarian inclinations or a decrease in deontological inclinations. To reduce this uncertainty in interpreting the effect of emotion-regulation strategies on moral decision making, in Study 4, I used a process-dissociation approach (Jacoby 1991) to independently quantify and delineate the contributions of utilitarian and deontological inclinations to moral judgments (Conway and Gawronski 2013). I randomly assigned participants to one of three conditions, in which I asked them first to employ different emotion-regulation strategies, similar to Studies 2 and 3 (Shiota and Levenson 2009): suppression, reappraisal, or no strategy at all (control), and then to judge the appropriateness of the utilitarian actions described in the moral dilemmas.

2.5.1 Method

Participants and design

One hundred twenty-eight individuals recruited through Amazon Mechanical Turk ($M_{age} = 34.18$ years, $SD = 11.97$; 44% male) participated in an online study for \$0.50. After reading the emotion-regulation instructions, participants read six pairs of moral dilemma scenarios that included both congruent and incongruent dilemmas (See Appendix A.4 for all scenarios; Conway and Gawronski 2013), and judged whether the agent's action would be morally appropriate or not. Incongruent dilemmas pit deontological inclinations against utilitarian inclinations; that is, benefits associated with the utilitarian action outweigh the harms, but it violates deontological moral principles. For example, in the medical director scenario I used in Study 1, it is acceptable to save 200 patients' lives in the future over one patient's life according to the utilitarian principle, but it is not acceptable to let Ravi die according to the deontological principle. However, pairs of congruent dilemmas describe almost identical actions, except that the benefits from the utilitarian action do not outweigh the harms, thus aligning utilitarian inclinations with deontological ones. For example, if the medical director is facing a choice between spending funds to either save Ravi's life or to improve the hospital's landscaping, then the decision not to save Ravi's life violates both deontological and utilitarian inclinations. I followed the same method (Conway and Gawronski 2013) to calculate the process-dissociation scores (PD scores) of utilitarian and deontological inclinations; I calculated the probability of rejecting harm in congruent and incongruent dilemmas, and then derived the utilitarian (U) and deontological (D) parameters.³

³U and D were calculated as follows.

$$U = p(\text{unacceptable}|\text{congruent}) - p(\text{unacceptable}|\text{incongruent})$$

$$D = p(\text{unacceptable}|\text{incongruent})/(1 - U)$$

2.5.2 Results

Among incongruent dilemmas across three experimental conditions, harmful action was judged as acceptable 66% of the time ($SD = 30\%$). It was judged as acceptable 27% of the time ($SD = 24\%$) for the congruent dilemmas. Incongruent dilemmas ($M = 4.41$, $SD = 1.44$) were deemed more acceptable than congruent dilemmas ($M = 2.44$, $SD = 1.59$), $t(121) = 12.40$, $p < 0.001$, $d = 1.13$, consistent with previous findings (Conway and Gawronski 2013).

Moral decision-making analysis. I first calculated the proportion of appropriate responses on incongruent moral dilemmas. Controlling for the gender effect (being female was associated with finding the utilitarian action more inappropriate; $B = 0.55$, $SE = 0.26$, $p = 0.035$), the suppression indicator predicted the greater likelihood of judging the utilitarian action to be more acceptable as compared to the controls, $B = 0.70$, $SE = 0.32$, $p = 0.03$. Similarly, the reappraisal indicator was associated with more utilitarian judgment than controls, $B = 0.76$, $SE = 0.31$, $p = 0.015$ (See Figure 2.2).

Process-dissociation analysis. I first calculated the probability of rejecting harm in both the congruent and incongruent dilemmas, and then calculated the process-dissociation (PD) parameters based on the procedures in Conway and Gawronski (2013). PD utilitarianism and deontology thus indicate the strength of inclinations for each principle within an individual, and were standardized. I ran a mixed-model ANOVA with PD parameters as a within-subject factor and emotion-regulation strategy as a between-subjects factor (see Figure 2.3). A marginally significant interaction between PD parameters and emotion-

Please see the technical description of this method in Conway and Gawronski (2013) for more detailed information.

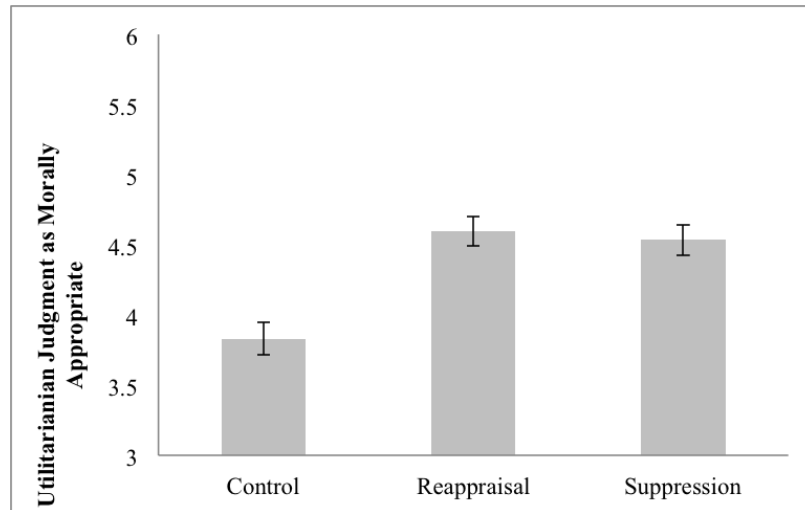


Figure 2.2: Results for the traditional utilitarian judgment as a function of the emotion-regulation strategies. Error bars represent standard errors (Study 4).

regulation strategy was found, $F(2, 116) = 2.68$, $p = 0.07$, $\eta_p^2 = 0.04$. Post-hoc comparisons suggested that deontological inclinations were significantly higher in the control condition ($M = 0.45$, $SD = 1.08$) than in the reappraisal ($M = -0.13$, $SD = 0.96$) and suppression ($M = -0.16$, $SD = 0.83$) conditions, $ps < 0.02$. There was no difference between the suppression and reappraisal conditions, $p = 0.99$. On the other hand, utilitarian inclinations did not differ significantly across different conditions, $ps > 0.49$. Lastly, gender did not have a significant effect in this model, $p = 0.57$.

2.5.3 Discussion

My findings suggest that both emotion-regulation strategies selectively decreased deontological inclinations while leaving utilitarian inclinations relatively unaffected. This result is consistent with Conway and Gawronski's (2013) finding that increased empathy toward the victims selectively increased deontological inclinations. While the data from Study 2b and 3 suggest that one's emotional reactions to the moral dilemma, in terms of physiological

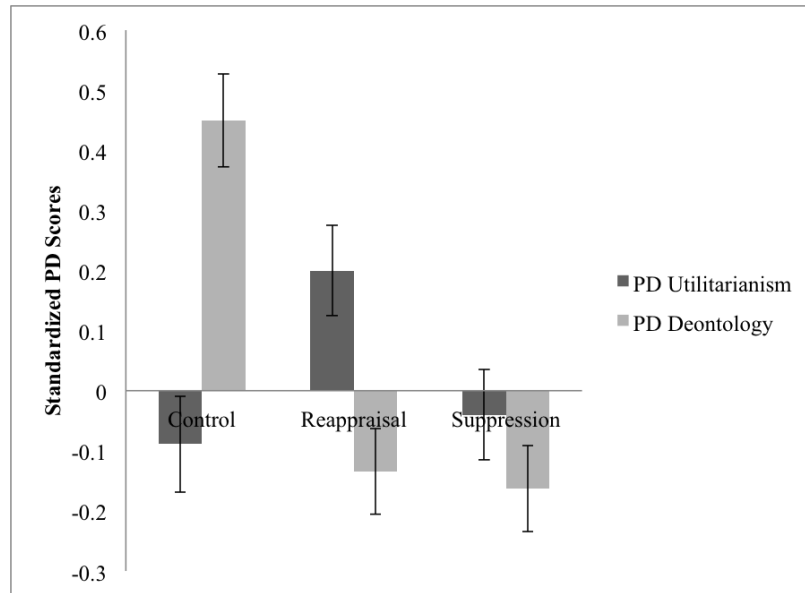


Figure 2.3: Results for the process dissociation deontology and utilitarian scores as a function of the emotion-regulation strategies. Error bars represent standard errors (Study 4).

arousal, did not mediate the relationship between employing emotion-regulation strategies and utilitarian decision making, this study demonstrates that these strategies still reduce one's deontological inclinations related to causing harm.

2.6 General Discussion

In five studies, I examined the relationship between regulating emotions and utilitarian decisions in moral dilemmas. I also investigated the psychological mechanism explaining why the use of emotion-regulation strategies leads to greater utilitarian preferences and found that decreased deontological inclinations explained this relationship. Across all studies, I found support for both my hypotheses using multiple methods to manipulate emotion-regulation strategies and test its effects on moral decision making. Not only did integral emotion regulation on emotions rooted in moral dilemmas have a carryover effect on one's

utilitarian preference (Study 2 and Study 4), but incidental emotion regulation did as well (Study 3). To ensure the generalizability of the findings, I used different types of moral dilemmas in different studies. In addition to studying responses to written scenarios resembling the well-known ethical dilemma known as the trolley problem, I used a video in Study 2b that portrays a similar moral dilemma visually, a format that may have produced stronger emotional reactions.

Thus, I argue that because emotion plays a critical role in determining whether or not people make a moral choice, regulation of such emotion is predictive of choices when facing moral dilemmas.

2.6.1 Theoretical Contributions

This paper contributes to the literature in several ways. First, by clearly delineating the contributions of utilitarian versus deontological inclinations to moral decision-making, my research provides empirical evidence that emotion-regulation strategies selectively reduce the decision maker's deontological inclinations, thus allowing them to choose a more utilitarian option. This suggests that our deontological inclinations are not only rooted in our judgments of right vs. wrong, but also are grounded in our emotional reactions related to conducting harmful actions. The current study thus supports the previous work that has demonstrated the role of "gut feelings" in thwarting utilitarian decisions ([Greene 2001](#)), and shows that such aversive responses can be regulated by employing emotion-regulation strategies.

Second, this work extends previous research ([Feinberg et al. 2012](#); [Margolis and Molinsky 2008](#); [Molinsky and Margolis 2005](#)) by focusing on moral dilemmas that have conflicting moral principles. I theorized that the nature of our moral dilemmas would be more

emotionally charged and conflicting due to the inevitability of harm, and therefore induce more strong aversive emotional reactions than those used in the previous study (Feinberg et al. 2012). My work is the first to empirically show how individuals make moral decisions when facing strong aversive emotions from endorsing harmful actions; not only do individuals who engage in the necessary evil of doing harm detach themselves emotionally from the event (Molinsky and Margolis 2005; Margolis and Molinsky 2008), but those who regulate their emotions also tend to prefer harmful actions that maximizes overall well-being.

Third, while (Feinberg et al. 2012) demonstrate the relevance and efficacy of the reappraisal strategy in reducing moral intuitions, this research brings back the relevance of suppression in moral decision making. I showed in Study 1 that participants who made the utilitarian decision predicted experiencing more negative emotions than did those who made the deontological decision, and they also were more likely to suppress their facial expressions. Supporting the facial feedback hypothesis (Tomkins 1963), reducing emotional expressions during the highly conflicting moral dilemma led to a preference for utilitarian choice. This work also builds on the emotion-regulation choice literature (Sheppes et al. 2011, 2014), as Study 1 allowed the decision makers to report on their willingness to engage in reappraisal and suppression strategies instead of imposing only one strategy to be used.

2.6.2 Limitations and Venues for Future Research

I see several directions for future research that build on the limitations of the current work. First, although the effect of suppression on moral decision making was consistent across all studies, the effect of reappraisal was less evident, a result that seems inconsistent with prior research findings (Feinberg et al. 2012). I conjecture that the lack of a statistically

significant effect of reappraisal might be explained by the intensity of emotions and the extent to which the self is involved. Previous research suggested that high-intensity emotional situations render the reappraisal strategy ineffective and costly (Sheppes and Meiran 2007, 2008; Sheppes et al. 2009). Our moral dilemmas involve inevitable harms, which might have made it difficult to reappraise the situation to feel less negative, while the idea of suppressing such emotions might have been easier to implement. Also, reappraisal was not as effective as suppression (although the result was not statistically different) when individuals were asked to make a hypothetical decision for themselves, as in Studies 2b and 3, instead of judging an agent's actions, as in Studies 2a and 4. These results provide an alternative explanation that reappraisal is more effective when one is judging another agent's *fait accompli*, but not as effective when one is making a difficult decision for oneself. Building on previous work suggesting the dissociation between moral judgment and choice of action (Tassy et al. 2013), future research could investigate whether individuals choose different emotion-regulation strategies when they are told to make moral judgments versus when they are told to make a choice of action for themselves.

Second, I examined a specific context in which the decision maker needs to closely attend to the dilemma at hand and process aversive emotions attached to doing harm. Thus, my theory was focused on reappraisal and suppression as key emotion-regulation strategies. Future studies could investigate the role of different types of emotion-regulation strategies. For example, previous research identified disengaging through distraction to be more effective than reappraisal (Sheppes et al. 2011, 2014).

Third, my findings support the view that the ways in which people make moral decisions are not driven simply by one particular emotion (i.e., fear of doing harm). In the medical director scenario I used in Study 1, for example, the utilitarian decision maker may

experience sadness, sympathy, and compassion toward the patient who is being sacrificed as a result of a utilitarian decision. Similarly, the deontological decision maker may experience the same negative feelings for the 200 patients who may be sacrificed to save one patient, but to a lesser degree due to temporal distance. In addition, although the current research is focused on a particular case of moral decision making that involves a conflict between utilitarian and emotional options, both of which result in some form of losses, not all moral decisions are made in the loss domain. That is, I have not studied different types of moral dilemmas in which doing the right thing involves regulating positive emotions associated with rewards (e.g., engaging in unethical behavior for financial gain). Thus, future work could identify the role of different emotions involved in a variety of moral dilemmas (right vs. right and right vs. wrong) and examine how regulating more specific emotion has similar consequences.

Fourth, this research found that physiological arousal did not explain the relationship between emotion-regulation strategies and utilitarian decision making, although skin-conductance levels accurately reflected the increase of aversive arousal associated with emotional stimuli (i.e., the video depicting a moral dilemma as well as graphic images). This suggests that the regulation of deontological inclinations associated with harmful actions may still be at the conscious level. Thus, future studies could use methods that could capture moment-to-moment changes in emotion and emotion regulation, such as online emotion ratings (Cameron and Payne 2011; Larsen and Fredrickson 1999).

Finally, I note that suppression is known to have negative cognitive, emotional, physiological, and interpersonal consequences (Butler et al. 2003; Gross 2002; Gross and John 2003; Richards and Gross 1999; Srivastava et al. 2009). This raises the possibility that making utilitarian choices when people suppress their emotions could be harmful to their

psychological and physiological health in the long run. However, research has demonstrated that when dealing with extremely adverse situations, such as conjugal bereavement, suppressing the facial expressions of negative affect (e.g., anger) has been found to be beneficial for longer-term recovery of normal functioning (Bonanno and Keltner 1997). Further research found that individuals' ability to both enhance and suppress emotional expression flexibly based on situational demands predicted successful long-term adaptation and adjustment (e.g., less distress) in the aftermath of the September 11th terrorist attacks (Bonanno et al. 2004). This line of research thus suggests that suppression can aid one's coping with aversive events in spite of its lingering emotional costs. It is not my goal to make normative judgments about whether one should always make reason-based utilitarian decisions and avoid intuitive, emotion-based decisions in the moral domain. Rather, my results indicate the plasticity of how we decide when faced with moral dilemmas, as suppression of emotions predicted utilitarian decision-making.

2.6.3 Conclusion

Across five studies, I demonstrate that regulating emotions has moral consequences in situations in which one needs to intentionally cause harm to another person to achieve a greater good. The moral dilemmas I employed in my studies mirror a common struggle people experience in a wide range of contexts between their deliberative and intuitive decision-making processes. This work shows that emotion regulation offers some benefits in our moral lives by helping us resolve the conflicts between our intuitive impulses and utilitarian preferences.

Chapter 3

Rainmakers: Why Bad Weather Means Good Productivity

Abstract

People believe that weather conditions influence their everyday work life, but to date, little is known about how weather affects individual productivity. Contrary to conventional wisdom, we predict and find that bad weather increases individual productivity and that it does so by eliminating potential cognitive distractions resulting from good weather. When the weather is bad, individuals appear to focus more on their work than on alternate outdoor activities. We investigate the proposed relationship between worse weather and higher productivity through four studies: (1) field data on employees' productivity from a bank in Japan; (2) two studies from an online labor market in the United States; (3) a laboratory experiment. Our findings suggest that worker productivity is higher on bad rather than good weather days and that cognitive distractions associated with good weather may explain the relationship. We discuss the theoretical and practical implications of our research.

3.1 Introduction

In this paper, we seek to understand the impact of weather on worker productivity. Although researchers have investigated the effect of weather on everyday phenomena, such as stock market returns (Saunders 1993; Hirshleifer and Shumway 2003), tipping (Rind 1996), consumer spending (Murray et al. 2010), aggression in sports (Larrick et al. 2011), and willingness to help (Cunningham 1979), few studies have directly investigated the effect of weather on work productivity. Moreover, to date, no studies have examined psychological mechanisms through which weather affects individual worker productivity, the focus of our current investigation.

We theorize that thoughts related to salient outdoor options come to mind more easily on good weather days than on bad weather days. Consistent with our theorizing, Simonsohn (2010) found that cloud cover during visits to a college known for its academic rigor by prospective students predicted whether they enrolled in the visited school. Prospective students who visited on a cloudier day were more likely to enroll than were those who visited on a sunnier day. Cloudy weather reduced the opportunity costs of outdoor activities such as sports or hiking and thus increased the attractiveness of academic activities.

To gain insight into how people intuitively think about this relationship, we asked 198 adults ($M_{age} = 38$, $SD = 14.19$; 42% male) to predict the impact of weather on individuals' work productivity. Among our respondents, about 82% stated that good weather conditions would *increase* productivity, and about 83% responded that bad weather conditions would *decrease* productivity. These survey results indicate that people indeed believe that weather will impact their productivity and that bad weather conditions in particular will be detrimental to it.

This conventional wisdom may be based on the view that bad weather induces a nega-

tive mood and therefore impairs executive functions (Keller et al. 2005). In contrast to this view, we propose that bad weather actually *increases* productivity through an alternative psychological route. We theorize that the positive effects of bad weather on worker productivity stem from the likelihood that people may be cognitively distracted by the attractive outdoor options available to them on good weather days. Consequently, workers will be less distracted and more focused on bad weather days, when such outdoor options do not exist, and therefore will perform their tasks more effectively.

3.1.1 Psychological Mechanisms of the "Weather Effect" on Productivity

When working on a given task, people generally tend to think, at least to some extent, about personal priorities unrelated to that task (Giambra 1995; Killingsworth and Gilbert 2010). Task-unrelated thoughts are similar to other goal-related processes in that they can be engaged in without explicit awareness, though they are not directed toward the given task (Smallwood and Schooler 2006). Thus, when the mind wanders, attention shifts away from the given task and may lead to failures in task performance (Robertson et al. 1997; Manly et al. 1999). Prior work notes that general cognitive interference can have costly effects on worker productivity (for a review, see Jett and George 2003). Workers who experience cognitive interference are distracted, showing an inability to focus on a task (Fisher 1998) and a greater likelihood of committing errors while completing the task (Flynn et al. 1999).

Thinking about salient and attractive outdoor options is a form of task-unrelated thinking that serves as a cognitive distraction that shifts workers' attention away from the task at hand. Accordingly, we expect it will be harder for workers to maintain their task-related thoughts on good weather days than on bad weather days. As a result, we also predict that

workers will be less productive on good weather days than on bad weather days. More specifically, we argue that on a bad weather day, individuals will have a higher ability to focus on a given work task not because of the negative mood induced by the weather but because fewer distracting thoughts related to outdoor options will be readily available in their minds. Consequently, they will be able to better concentrate on their tasks and work more productively on bad weather days. In our research, we consider tasks where productivity requires high levels of attention and focus, which allow workers to complete their work faster. Thus, we expect fewer cognitive distractions to be associated with higher levels of work productivity. Taken together, these arguments lead to the following hypotheses:

Hypothesis 1: Good weather conditions, such as lack of rain, will decrease worker productivity on tasks that require sustained attention and focus, as compared to bad weather conditions.

Hypothesis 2: Good weather conditions will increase the salience and attractiveness of outdoor options, as compared to bad weather conditions.

Hypothesis 3: The relationship between good weather conditions and worker productivity will be mediated by greater cognitive distractions (i.e., salience of one's outdoor options).

To test our predictions, we used empirical data on worker productivity, measured by individual performance on tasks conducted in a Japanese bank (Study 1), an online marketplace (i.e., Amazon Mechanical Turk, Studies 2 and 3), and the laboratory (Study 4). We focused on precipitation as the key measure of bad weather given the previous finding that precipitation is the most critical barrier to outdoor physical activities ([Chen et al. 2006](#); [Togo et al. 2005](#)).

3.2 Study 1: Field Evidence from a Japanese Bank

3.2.1 Method

In Study 1, we examined the proposed link between weather conditions and productivity by matching data on employee productivity from a mid-size bank in Japan with daily weather data.¹ In particular, we assessed worker productivity using archival data from a Japanese bank's home-loan mortgage-processing line. For the sake of brevity, we discuss the overall structure of the operations here; more detailed information can be found in Staats and Gino (2012). Our data includes information on the line from the rollout date, June 1, 2007 until December 30, 2009, a two-and-a-half year time period. We examined all transactions completed by the permanent workforce, 111 workers who completed 598,393 transactions. Workers at the bank conducted the 17 data-entry tasks required to move from a paper loan application to a loan decision. The tasks included steps such as entering a customer's personal data (such as name, address, phone number, etc.) and entering information from a real estate appraisal. Workers completed one task at a time (i.e., one of 17 steps for one loan); when a task was completed, the system assigned the worker a new task. The building in which the work took place had windows through which workers could observe the weather. Workers were paid a flat fee for their work; there was no piece-rate incentive to encourage faster completion of work.

In addition to the information on worker productivity, we also assembled data on weather conditions in Tokyo, the city where the individuals worked. The National Climactic Data Center of the U.S. Department of Commerce collects meteorological data from stations

¹The data reported in Study 1 have been collected as part of a larger data collection. Findings from the data have been reported in separate manuscripts; Staats and Gino (2012), and Derler, R., Moore, C., & Staats, B. (2013). Enhancing ethical behavior through sequential task variety, *Working Paper*.

around the world. Information for a location, such as Tokyo, was calculated as a daily average and includes summaries for temperature, precipitation amount, and visibility.

Measures

Completion time. To calculate *completion time*, we took the natural log of the number of minutes a worker spent to complete the task ($\mu = 0.39$, $\sigma = 1.15$). As we detail below, we conducted our analyses using a log-linear learning curve model.

Weather conditions. Since our main variable of interest is precipitation, we included a variable equal to the amount of precipitation each day in inches, down to the hundredth of an inch ($\mu = 0.18$, $\sigma = 0.53$). To control for effects from other weather-related factors, we also included temperature ($\mu = 62.1$, $\sigma = 14.6$) and visibility ($\mu = 10.3$, $\sigma = 5.1$). With respect to the former, it may be that productivity is higher with either low or high temperatures. Therefore, we entered both a linear and quadratic term for temperature (in degrees Fahrenheit). Finally, because worse visibility could be related to lower productivity, we included the average daily visibility in miles (to the tenth of a mile).

Control variables. We controlled for variables that have been shown to affect worker productivity. These included: same-day, cumulative volume (count of the prior number of transactions handled by a worker on that day); all prior days' cumulative volume (count of transactions from prior days); load (percentage of individuals completing work during the hour that the focal task occurred; see [KC and Terwiesch 2009](#)); overwork (a comparison of current load to the average, see [KC and Terwiesch 2009](#)); defect; day-of-week, month, year, stage (an indicator for each of the 17 different steps); and individual indicators.

3.2.2 Results and Discussion

We used a log-linear learning curve model because individuals' performance improves over time with experience. Using this approach, we conducted our analyses at the transaction level. Therefore, in our models, we controlled for the effects of the worker, task, and time, and then examined the effect of weather on worker productivity. For our primary model, we used a fixed effects linear regression model with standard errors clustered by individual.

Column 1 in Table 3.1 shows our main model, which we used to test Hypothesis 1. Examining rain, we found that the coefficient is negative and significant (coefficient = -0.01363). In terms of the effect size, we found that a one-inch increase in rain is related to a 1.3% decrease in worker completion time for each transaction. Given that there are approximately 100 workers in the operation, a 1.3% productivity loss is approximately equivalent to losing one worker for the organization on a given day. Based on the average yearly salary of the associate-level employees at this bank and the average frequency of precipitation, this loss could cost approximately \$18,750 for this particular operation a year. When accumulated over time for the entire bank of nearly 5,000 employees, a 1.3% productivity loss could be interpreted as a significant loss in revenue for the bank: at least \$937,500 a year. Further, in a city the size of Tokyo (approximately 9 million people) our identified effect could translate into hundreds of millions of dollars in annual lost productivity.

Next, it is important to properly account for the standard errors in our model as we have many observations nested within a small number of individual workers. Therefore, in Column 2, we clustered the standard errors by day, not by worker. In Column 3, we used Prais-Winsten regression with panel-corrected standard errors adjusted for heteroskedasticity and panel-wide, first-order autocorrelation. Then, in Column 4, we used the fixed

Table 3.1: Summary regression results on completion time ($n = 598, 393$) for Study 1.

Model:	(1) Main Model	(2) Cluster by Day	(3) Prais-Winsten	(4) Block Bootstrap	(5) Indvl × Month Fixed Effects	(6) Indvl × Stage Fixed Effects
Rain (inches)	-0.01363* (0.006068)	-0.01363* (0.006869)	-0.01284*** (0.002788)	-0.01363* (0.005686)	-0.01167* (0.004827)	-0.01336* (0.006055)
Temperature (degrees)	0.006964	0.006964*	0.006789***	0.006964	0.004519	0.006863
Temperature	(0.004340)	(0.003341)	(0.001773)	(0.004364)	(0.003473)	(0.004438)
Temperature	-6.425e-05	-6.425e-05*	-6.323e-05***	-6.425e-05	-4.588e-05	-6.449e-05
Temperature	(3.710e-05)	(2.680e-05)	(1.382e-05)	(3.819e-05)	(2.946e-05)	(3.756e-05)
Visibility (miles)	9.799e-04	9.799e-04	8.483e-04*	9.799e-04	8.176e-04	7.808e-04
Visibility (miles)	(7.311e-04)	(6.991e-04)	(3.443e-04)	(7.040e-04)	(5.755e-04)	(7.102e-04)
Same-day, cumulative volume	-1.696e-04*	-1.696e-04***	-1.040e-04***	-1.696e-04**	-1.274e-04***	-1.661e-04**
All prior days' cumulative volume	(6.511e-05)	(2.259e-05)	(9.373e-06)	(6.031e-05)	(2.909e-05)	(5.830e-05)
All prior days' cumulative volume	-4.507e-05*	-4.507e-05***	-4.581e-05***	-4.507e-05*	-1.809e-05	-3.477e-05*
All prior days' cumulative volume	(1.801e-05)	(3.674e-06)	(1.672e-06)	(1.823e-05)	(2.380e-05)	(1.661e-05)
All prior days' cumulative volume	1.524e-09*	1.524e-09***	1.508e-09***	1.524e-09*	1.380e-09	1.323e-09*
Load	(6.132e-10)	(1.461e-10)	(6.198e-11)	(7.360e-10)	(1.205e-09)	(5.905e-10)
Load	-0.4181***	-0.4181***	-0.4014***	-0.4181***	-0.3283***	-0.3651***
Load	(0.05738)	(0.02195)	(0.01030)	(0.05965)	(0.05141)	(0.04788)
Overwork	0.2603***	0.2603***	0.2468***	0.2603***	0.1898***	0.2166***
Overwork	(0.04925)	(0.02583)	(0.009857)	(0.05339)	(0.04601)	(0.04108)
Overwork	0.2206***	0.2206***	0.3108***	0.2206***	0.2398***	0.2487***
Overwork	(0.03507)	(0.01661)	(0.006690)	(0.03900)	(0.03609)	(0.03500)
Constant	-0.3350	-2.1010***	-2.4212***	-0.3350	0.1733	1.0083***
Constant	(0.2192)	(0.1693)	(0.08566)	(0.2394)	(0.2160)	(0.2154)
Individual x month fixed effect	-	-	-	-	Yes	-
Individual x stage fixed effect	-	-	-	-	-	Yes
Observations	598,393	598,393	598,393	598,393	598,393	598,393
R-Squared	0.3563	0.4591	0.3374	0.3563	0.08806	0.04908

Note. All models include indicators for the individual, stage, month, year, and day of week. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

effects regression model from Columns 1-3, but used block-bootstrapped standard errors. In each model, the coefficient on rain is negative and statistically significant. Finally, in Columns 5 and 6 we added additional controls with first individual fixed effects interacted with monthly fixed effects and then individual fixed effects interacted with stage fixed effects. In conclusion, using a within-subject design, this study showed that greater rain is related to better worker productivity.

3.3 Study 2: Online Study of Weather and Productivity

Although Study 1 offers valuable information on employees' actual work productivity, only the time taken to complete a task was used as an outcome variable, as error rates were low (less than 3%) and showed little variation across employees. In Study 2, we sought a conceptual replication of the effect of weather on completion time while also using a task that would permit us to measure error rates. We could thus investigate productivity not only in terms of quantity (speed at which workers completed their given task) but also in terms of quality (accuracy of detecting errors and correcting them). To account for the potential influence of weather-driven moods, in addition to new productivity measures, we collected data on whether workers felt positive or negative affect while completing the task.

3.3.1 Method

Participants and Procedure

We recruited U.S. residents to participate in an online survey in early March, when weather conditions vary significantly depending on where workers are located. Three hundred and twenty-nine online workers ($M_{age} = 36.52$, $SD = 12.79$; 48% male) participated in a 30-

minute study and received a flat fee of \$1. We first gave all workers a three-paragraph essay that included 26 spelling errors; we asked them to find as many errors as they could and correct the errors they found.²

Once all the workers had completed the task, they completed a questionnaire that included measures of state emotions to control for potential effects of affect. Finally, we asked workers to complete a demographics questionnaire that also included questions about the day's weather and their zip code.

Measures

Productivity. We computed the time (in seconds) workers spent on the task of correcting spelling errors (i.e., speed). Given that each worker spent a different amount of time on the task, we calculated speed by dividing the number of typos detected by the total time taken in seconds. We then log-transformed the variable to reduce skewness. In addition, we computed how many spelling errors were *correctly* identified and fixed as a measure of accuracy.

State emotions. We used the 20-item form of the Positive and Negative Affect Scale (PANAS; Watson et al. 1988). Participants indicated how much they felt each emotion "right now" using a seven-point scale. We calculated two summary variables for each participant: positive ($\alpha = 0.90$) and negative affect ($\alpha = 0.91$).

Weather questionnaire. Workers were asked to report their zip code, which enabled us to find the daily weather data of the specific area on a specific day (www.wunderground.com). To ensure that workers' perceived weather matched actual weather conditions, we

²More detailed instructions and materials are available online as supplemental materials (Appendix B.1).

also asked them to think about the weather conditions of the day, relative to their city's average weather conditions, using a five-point scale (1="One of the best" to 5="One of the worst").

3.3.2 Results and Discussion

We first tested whether actual weather matched workers' perceptions of the day's weather. Indeed, subjective perceptions of bad weather were associated with lower temperature ($r = -0.24, p < 0.001$), higher humidity ($r = 0.21, p < 0.001$), more precipitation ($r = 0.23, p < 0.001$), more wind ($r = 0.31, p < 0.001$), and lower visibility ($r = -0.26, p < 0.001$).

Table 3.2 reports summary statistics. Table 3.3 summarizes a series of regression analyses. Consistent with Hypothesis 1, more rain was associated with higher productivity, measured in terms of both speed and accuracy (Model 1). This relationship holds even after controlling for key demographic variables and state emotions (Model 2). These findings suggest that bad weather is associated with both indicators of productivity, increased speed, and accuracy.

3.4 Study 3: Online Study of Weather and Salience of Outdoor Options

We conducted a third study to test Hypothesis 2, which suggests that good weather conditions raise the attractiveness of outdoor options as compared to bad weather conditions.

Table 3.2: Summary statistics for Study 2.

Variable	Mean	σ	1	2	3	4	5	6	7	8	9
1. Speed	2.84	0.64									
2. Accuracy	17.87	4.82	0.82								
3. Precipitation	0.28	0.93	0.12	0.11							
4. Perceived Bad Weather	3.01	0.82	0.01	0.01	0.24						
5. Positive Affect	4.00	1.14	-0.04	-0.04	0.02	-0.09					
6. Negative Affect	1.53	0.83	-0.03	-0.05	-0.02	0.01	-0.06				
7. Female	1.52	0.50	0.02	0.05	-0.10	0.06	0.08	-0.09			
8. Age	37.23	12.88	-0.08	0.05	0.00	0.06	0.10	-0.15	0.13		
9. Education	4.19	1.49	0.13	0.18	0.05	0.02	0.06	-0.05	0.05	0.11	
10. Income	3.84	2.68	0.13	0.13	-0.01	-0.06	0.01	0.03	0.04	-0.02	0.25

Note. Bold denotes significance of less than 5%.

Table 3.3: Summary regression results in Study 2.

A. Speed			B. Accuracy		
	Model 1	Model 2		Model 1	Model 2
Precipitation	0.07** (0.02)	0.07** (0.02)	Precipitation	0.54** (0.15)	0.52** (0.15)
Female		0.04 (0.07)	Female		0.30 (0.54)
Age		-0.00 (0.00)	Age		0.01 (0.02)
Education		0.05* (0.02)	Education		0.47* (0.01)
Income		0.02 (0.01)	Income		0.18 (0.09)
Positive Affect		-0.02 (0.04)	Positive Affect		-0.23 (0.28)
Negative Affect		-0.03 (0.04)	Negative Affect		-0.39 (0.36)
Constant	2.81*** (0.04)	2.72*** (0.24)	Constant	17.62*** (0.28)	15.45*** (1.72)
Observations	321	321	Observations	321	321
R-squared	0.01	0.05	R-squared	0.01	0.06
Root MSE	0.62	0.62	Root MSE	4.79	4.71

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

3.4.1 Method

Participants and Procedure

We recruited 77 online workers ($M_{age} = 33.02$, $SD = 11.99$; 53% male) on MTurk to participate in a five-minute study for a flat fee of \$0.20. We randomly assigned participants to one of two weather conditions (good vs. bad). Participants were primed on the weather; half of them read, "Please imagine that it is a beautiful, sunny day outside for the next 10 seconds" and the rest read, "Please imagine that it is raining outside for the next 10 seconds." We then asked all workers to write down as many non-work-related activities that they would like to engage in as possible (up to 10). Workers were also asked to rate the attractiveness of these activities using a five-point scale (from 1="the least attractive" to 5="the most attractive"). Among all activities listed, we counted the number of outdoor and indoor activities separately.

3.4.2 Results and Discussion

Workers who were told to imagine good weather conditions listed significantly more outdoor activities they would like to engage in ($M = 4.47$, $SD = 2.91$) than did workers who imagined bad weather conditions, ($M = 1.31$, $SD = 2.10$), $t(75) = -5.48$, $p < 0.001$, although the total number of non-work-related activities (which include both indoor and outdoor activities) did not differ across weather conditions, $t(75) = 1.48$, $p = 0.14$. Similarly, attractiveness ratings for these outdoor activities were higher for those who imagined good weather ($M = 3.77$, $SD = 0.14$) as compared to bad weather ($M = 1.38$, $SD = 0.29$), $t(75) = -7.32$, $p < 0.001$. This finding suggests that outdoor activities were indeed more salient and attractive when workers perceived weather to be good than bad.

3.5 Study 4: Laboratory Study of Outdoor Options and Productivity

In Study 4, we carefully chose the days on which we conducted our study sessions to take advantage of natural variation, then we experimentally manipulated subjects' exposure to outdoor options. Through moderation, we seek to provide evidence in support of our mediation hypothesis that the salience of attractive outdoor options is directly linked to cognitive distractions. To test for the mediating role of outdoor options and cognitive distractions through a moderation approach (Spencer et al. 2005), we chose weather conditions and manipulated the mediating factor (in our case, exposure to outdoor options).³ Using a 2×2 design, we expect to find an interaction between weather conditions and exposure to outdoor options in predicting work productivity (consistent with Hypothesis 3). Further, we predict that productivity will be lower on good weather days as compared to bad weather days, regardless of the outdoor-options manipulation, as these options are already salient and attractive without our prompt. Thus, we expect to see our predicted effect (better performance on bad weather days) in the condition in which we do not introduce outdoor options as distractions.

3.5.1 Method

For our first manipulation, we varied whether the task was undertaken on days with poor weather (rainy) or good weather (sunny). For our second manipulation, the participants

³We selected this method of manipulating the availability of outdoor options instead of relying on self-reports, which are less reliable and more likely to be biased (i.e., asking participants how distracted they felt or how frequently they thought about outdoor options). This approach is considered a stronger test of the mediation hypothesis than measuring the mediating factor through the use of self-reported measures (Rucker et al. 2011; Spencer et al. 2005).

either were primed by exposure to a variety of outdoor options prior to the task or were not primed by exposure to outdoor options. We used this second manipulation to vary the level of cognitive distraction created by thinking about outdoor activities one may engage in, a manipulation based on prior research (e.g., [Simonsohn 2010](#)). During the entire experiment, the laboratory's lighting and temperature levels were fixed at the same level, and participants were able to see the outside weather through the lab's window. There was no significant difference in show-up rates between bad versus good weather days.

Participants and Procedure

We recruited 136 students ($M_{age} = 21.82$, $SD = 3.51$; 48.89% male) through the study pool at the Harvard Decision Science Laboratory. Students signed up online in advance to participate in an hour-long study and were paid a \$10 participation fee. They were also told that, depending on the completion time of their data entry, they could receive an additional \$10 bonus.

Participants in the exposure-to-outdoor-options condition viewed photos of outdoor activities taking place in good weather conditions and were asked to evaluate the attractiveness of each activity. Participants were then asked to pick their favorite depicted activity or the activity in which they engaged most frequently and to discuss as vividly as possible what they would do in the depicted scene. By contrast, participants in the control group were asked to describe their typical daily routine.

Next, all participants completed the data-entry task, which involved entering five sets of questionnaire responses written in Italian from printed copies into a spreadsheet.⁴ All participants finished entering five surveys and received additional \$10. After all participants

⁴Further details of the instructions and materials used in this study are available online as supplemental materials (Appendix B.2).

completed their data-entry task, they answered a questionnaire that included state emotions, subjective weather perceptions, and demographic questions.

Measures

Productivity. We assessed speed and accuracy as measures of productivity. For speed, we first calculated the number of words entered, then divided this number by the amount of time spent completing the task, given that each survey data consisted of a different number of words. We assessed accuracy by counting the number of *correct* words entered for each person.

State emotions. Similar to Study 2, we controlled for the potential influence of affect by measuring both positive ($\alpha = 0.93$) and negative affect ($\alpha = 0.89$) using PANAS.

Subjective weather perceptions. As a manipulation check for our weather manipulation, we asked participants whether they thought the weather on the day of their participation was "good" or "bad."

3.5.2 Results and Discussion

We excluded 10 participants who failed to follow our instructions, as their completion time was not recorded correctly. Table 3.4 reports the descriptive statistics and correlations among the key variables used in our analyses.

Manipulation check. Almost 90% of the participants who participated on a good weather day (60 out of 67) felt that the weather was good; almost 93% of participants who participated on a rainy day (64 out of 69) felt that the weather was bad, $\chi^2(1, N = 136) = 92.29$,

Table 3.4: Summary statistics for Study 4.

Variable	Mean	σ	1	2	3	4	5	6	7	8	9
Variable	Mean	σ	1	2	3	4	5	6	7	8	9
1. Speed	30.03	3.55									
2. Accuracy	190.49	31.81	0.90								
3. Good Weather Indicator	0.48	0.50	-0.02	-0.01							
4. Outside Option Indicator	0.52	0.50	-0.14	-0.20	-0.04						
5. Age	21.94	3.57	-0.20	-0.16	0.05	-0.06					
6. Female	1.52	0.50	0.18	0.10	0.01	-0.07	-0.07				
7. Income	4.90	3.40	0.13	0.09	0.00	0.06	-0.19	0.06			
8. Education	3.42	1.03	-0.11	-0.04	0.09	0.00	0.71	-0.07	-0.26		
9. Positive Affect	35.93	12.16	0.03	0.07	0.09	-0.07	0.11	-0.09	0.06	-0.00	
10. Negative Affect	19.59	9.67	0.00	-0.01	0.04	0.13	-0.15	0.10	-0.05	0.01	-0.13

Note. Bold denotes significance of less than 5%.

$p < 0.001$. These weather variables were not significantly correlated with our manipulation of exposure to outdoor options, which we randomized.

Main analyses. Hypothesis 3 predicted that bad weather conditions increase productivity by decreasing thoughts about outdoor options, which should reduce cognitive distractions. Given the design of Study 4, this hypothesis would be supported by a significant interaction between weather conditions and exposure to outdoor options in predicting productivity. To test this hypothesis, we conducted a series of regression analyses (Table 5). As shown in Model 1, exposure to outdoor options decreased data-entry speed and accuracy. We did not find a statistically significant effect of bad weather on productivity (for speed, $\beta = 1.60$, $p = 0.10$; for accuracy, $\beta = 13.33$, $p = 0.10$). As predicted, the effect of weather on speed was qualified by a significant interaction between exposure to outdoor options and weather conditions, while the interaction effect on accuracy did not reach significance criteria. We conducted similar analyses while controlling for demographics and state emotions (Model 2). After holding these variables constant, the interaction effect on speed remained robust, and the interaction effect on accuracy became statistically significant.

A simple slope analysis supports Hypothesis 3 (see Figure 3.1). When no outdoor options were made salient to participants, bad weather significantly increased data-entry speed, $\beta = 3.04$, $p = 0.04$. When participants were exposed to outdoor options, however, weather conditions no longer predicted speed significantly, $\beta = 0.19$, $p = 0.76$. Similarly, when there were no outdoor options, bad weather significantly increased data-entry accuracy, $\beta = 24.90$, $p = 0.05$, a relationship that no longer held for those distracted by outdoor options, $\beta = 1.87$, $p = 0.74$.

To summarize, we found that having attractive outdoor options decreased productivity through increased cognitive distractions. In line with previous work (Bailey and Konstan

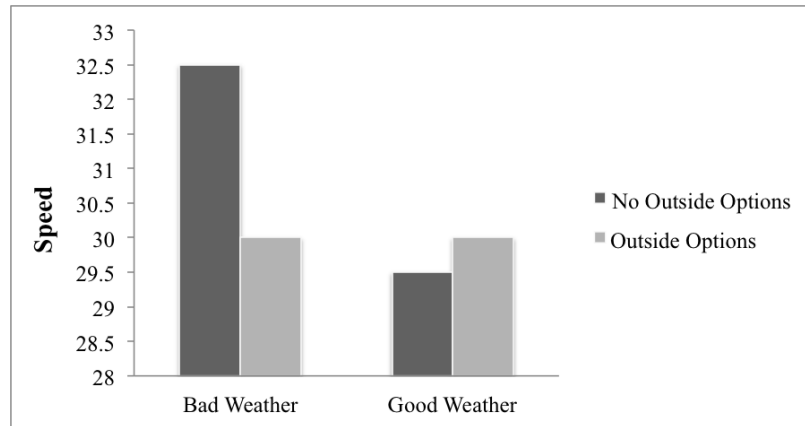


Figure 3.1: Exposure to outdoor options moderates the relationship between weather conditions and productivity.

2006; Speier et al. 1999), we demonstrate that making outdoor options salient in people's minds alone could impair their ability to concentrate. Good weather conditions were harmful for productivity, an effect that seemed to disappear when outdoor options were made salient. This interaction effect between weather conditions and exposure to outdoor options suggests that people can be relatively more productive at work on rainy days, unless they are actively distracted. On sunny days, participants were likely to already be distracted, as outdoor options were salient in their minds. Together, consistent with Hypothesis 3, these findings show that cognitive distractions created by the salience of outdoor options may serve as a mechanism through which bad weather conditions increase productivity.

3.6 General Discussion and Conclusion

Our main goal in this paper was to provide an alternative psychological route of limited attention through which bad weather conditions influence productivity, even when we hold affective influences constant. Our evidence from both the field and the lab was consistent

Table 3.5: Summary regression results in Study 4 (Speed as a dependent variable).

	Model 1	Model 2
Exposure to Outdoor Options	-2.20*	-2.26*
	(0.87)	(0.87)
Good Weather Indicator	-1.49	-1.58
	(0.91)	(0.92)
Interaction (Outdoor Options x Weather)	2.51*	2.60*
	(1.27)	(1.27)
Age		-0.27
		(0.13)
Female		1.14
		(0.63)
Income		0.14
		(0.63)
Education		0.46
		(0.44)
Positive Affect		0.02
		(0.03)
Negative Affect		-0.01
		(0.03)
Constant	31.28***	32.70***
	(0.64)	(2.69)
Observations	123	122
R-squared	0.05	0.14
Adjusted R-squared	0.03	0.07
Root MSE	3.50	3.43

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 3.6: Summary regression results in Study 4 (Accuracy as a dependent variable).

	Model 1	Model 2
Exposure to Outdoor Options	-22.82** (7.68)	-23.90** (7.75)
Good Weather Indicator	-12.02 (8.09)	-13.61 (8.26)
Interaction (Outdoor Options x Weather)	20.61 (11.16)	21.88* (11.34)
Age		-2.62* (1.14)
Female		5.42 (5.65)
Income		1.10 (0.87)
Education		6.50 (3.97)
Positive Affect		0.26 (0.24)
Negative Affect		-0.14 (0.03)
Constant	203.27*** (5.67)	219.07 (24.22)
Observations	125	124
R-squared	0.07	0.13
Adjusted R-squared	0.04	0.07
Root MSE	31.08	30.82

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

with the predictions of our theoretical model.

Although numerous previous studies used weather to induce either positive or negative moods (Cunningham 1979; Parrott and Sabini 1990; Schwarz and Clore 1983; Goldstein 1972; Keller et al. 2005) to study the effect of moods, our result does not support this weather-mood hypothesis. Using a meta-analysis, Shockley et al. (2012) found that positive affect is associated with enhanced overall job performance. In Studies 2 and 4, however, weather conditions did not induce positive nor negative affect, and affect did not predict productivity. Yet it is not our goal to suggest that the weather-mood hypothesis is unwarranted or that affect plays no role in cognition. Although these influences were not realized in our study, they may still be in place, even if to a lesser extent than previous research posited.

One potential moderator that could address these seemingly contradictory results is workers' exposure to outside weather, either by spending time and working outside or by looking outside through windows. In fact, Keller et al. (2005) found that the amount of time spent outdoors moderated the effects of weather on mood and cognition. Both of our studies were conducted in a climate-controlled environment where individuals were asked to complete a series of tasks requiring attention and focus, such as a workplace (Study 1), an online labor market (Study 2-3), and the laboratory (Study 4). Thus, this may explain why outside weather conditions played a lesser role in influencing workers' affective state but created a more significant variation in the level of cognitive distraction. In such contexts, weather may primarily act on people's cognition rather than on their affective states, as weather influences their level of distraction when they think about attractive outdoor options, as we have shown. Future research examining the role of weather across these different contexts (i.e., workers who typically work outside the office, or workers who work

in an office without windows) would further our understanding of the relationship between weather, affect, and cognition.

It should also be noted that our measure of job performance was limited to the data entry task, which requires attention, and thus more likely to be affected by cognitive distractions, rather than affective influences. Positive affect tends to encourage less constrained, less effortful, and more creative problem solving (Schwarz and Clore 1983). In fact, positive moods induced by good weather conditions may broaden workers' cognition, thus increasing the flexibility of their thoughts (Keller et al. 2005). Consequently, future research should include different types of tasks that could measure other aspects of job performance. For example, weather-induced positive moods may improve workers' productivity on tasks that require creativity, as well as affective interpersonal skills such as empathy and emotional intelligence.

Research also shows that bad weather conditions may lead people to prefer spending time at work because attractive outdoor options are not available to them (e.g., Connolly 2008; Zivin and Neidell 2010). Although our studies did not allow for testing this possibility, future studies should investigate the potential role of differing incentives. If workers have incentives to finish their work early on sunny days, rather than having fixed work hours per day, their motivation to leave early might offset productivity loss due to cognitive distractions.

In addition, there might be individual differences in people's responses to weather conditions (See Klimstra et al. 2011 for "weather reactivity") and their preference for outdoor activities. Such dispositions may contribute to the variance in how outside weather conditions are perceived and may also explain the lack of significant correlations between weather and moods. Future studies should further examine the role of such individual

differences in modulating the role of outside weather in influencing worker productivity.

3.6.1 Theoretical and Practical Implications

Our research extends previous work on the influence of weather conditions on behavior. Prior work has focused on the effects of weather on behavior through people's affective reactions to weather conditions (e.g., [Larrick et al. 2011](#)). Our work demonstrates that weather conditions also influence individuals' cognition. By reducing the potential for cognitive distractions, bad weather was actually better than good weather at sustaining individuals' attention and focus, and, as a result, increasing their productivity.

Our results also deepen understanding of the factors that contribute to work productivity. Prior research has focused primarily on factors that are directly under one's control or the control of the organization (e.g., [Staats and Gino 2012](#)). We document the influence of weather conditions, incidental factors that affect work productivity. Distractions that arise at work have been studied under the assumption that they can be avoided. In fact, engaging in distractions, such as Internet surfing, may have positive effects on productivity (due to increased stimulation, [Jett and George 2003](#)). Similarly, perceived autonomy over lunch breaks reduced fatigue at the end of the day ([Troughakos et al. 2014](#)). Thus, a concerted effort to take advantage of good weather for break purposes could offset potential negative effects on productivity. Future studies may explore the consequences of different types of distractions at work, including how to structure break programs to restore the workers' cognitive resources.

Weather is one of the many factors that may lead workers to engage in non-work-related thoughts. Bad weather eliminates only one type of distracting thoughts; other factors may influence worker productivity to a larger degree (i.e., explicit incentives and implicit goal-

oriented motives). Despite our small effect size in Study 1, our findings shed light on how seemingly irrelevant, uncontrollable factors may influence workers' productivity and also learning over time. In fact, operational improvement efforts often focus on issues that have effect sizes less than 1%. Companies realize that even small efficiency improvements can translate to cost advantages. This finding calls for further investigation of the factors that can increase task-unrelated thoughts that may adversely affect productivity. Research could also examine how expectations of certain conditions (e.g., rain when sunshine was expected) might moderate the effect of task-unrelated thoughts.

Our research also has practical implications. Although weather conditions are exogenous and uncontrollable, to tap into the effects of bad weather on productivity, organizations could assign more clerical work of the type that requires sustained attention on rainy days than sunny days. Since we found that cognitive distractions led to higher error rates, individuals may wish to avoid working on a task in which errors would be costly when they have task-unrelated priorities. In addition, organizations may give productivity feedback to each employee and allow flexible working hours that could maximize productivity. We also note that if an organization wishes to maintain a consistent work output, then the weather forecast might be a valuable input to a staffing model. Finally, as [Cachon et al. \(2011\)](#) note, weather is an important variable for facility location. Our results suggest that, holding all other factors constant, locating operations in places with worse weather may be preferable.

Chapter 4

The Power of Social Affirmation: Effects of Positive Interpersonal Jolts on Health and Performance

Abstract

In this paper I argue that the reflective process of positive reinforcement and redefinition of one's self-concept—what I term positive interpersonal jolts—can have a lasting influence on performance and health. I draw on past research in narrative psychology and positive psychology to test empirically how a positive interpersonal jolt intervention influences health and performance at both the individual and group levels. First, experiencing jolts in the laboratory setting increased positive affect and vagal tone—a physiological marker for positive emotions and social engagement. Second, beyond the immediate affective and physiological responses, it also strengthened one's immune system (measured by an increase of

secretory immunoglobulin A) and reduced aversive physiological arousal associated with stress. Third, individuals who experienced jolts outperformed controls in creative problem-solving tasks. The first study provides empirical evidence for the role of social affirmation in promoting resilience, physiological function, and productivity. Building on this research, the second study was conducted with the Senior Executive Fellows program at the Harvard Kennedy School as an in-class experiment. Using this unique opportunity to work with real-world leaders, I show that the same intervention can enhance team functioning (team satisfaction, learning, voice behavior, and perspective-taking) and team performance even though these measures were taken 10 days after the initial intervention. My research suggests that this intervention may lead to an upward spiral, in which the jolt increases teams' relational coordination and performance. This low-cost intervention enables organizations to institute high-impact changes that improve employees' psychological resilience, physical health, productivity, and organizational performance.

4.1 Introduction

Can introducing positive psychology into organizational life deliver positive outcomes for organizations and their employees, or does it simply engender complacency? Moreover, if positive feedback may be less effective than negative feedback at altering behavior, why engage in it at all, given the potential downsides? Despite our limited understanding of answers to these questions, a wave of positive psychology interventions has entered management practices in recent years. The clearest example of such change is the emergence of the Chief Happiness Officer—a new executive position first championed by Google's Chade-Meng Tan and Zappos's Jenn Lim. One of the more prevalent management practices that has leveraged past work on positive psychology is the "strength-based" employee

development program. In 2000, Standard Chartered Bank asked employees to identify their core strengths and develop action plans to improve their effectiveness (Dempsey, 2007). Similarly, Southwest Air and Zappos.com hire new employees based on their unique strengths (Freiberg and Freiberg 1998; Hsieh 2010). By moving away from a traditional competency-based model to a strengths-based model in developing employees, these programs improved employee engagement and organizational outcomes. The trend of adopting positive psychology in management has naturally been met with both optimism and skepticism. Some welcome company efforts to create a work environment that helps employees' emotional well-being and productivity, while others express suspicion that this is yet another intrusion into employees' private emotional lives for the sake of maximizing profits (Asgar 2014; Kovensky 2014).

Research confirmed that identifying and using one's personal strengths—particularly one's "signature strengths"—increases life satisfaction and reduces depressive symptoms. Similarly, visualizing one's best possible self proved to help boost immediate positive affect and to sustain the effect in the long term (Sheldon and Lyubomirsky 2006). The benefits of this approach extend beyond subjective well-being: Employee engagement (defined at least in part as employees having the opportunity to do what they do best every day) was associated with better business-unit outcomes, such as higher profit levels (Harter et al. 2002). Applying one's own strengths was found to increase positive job-related experiences (i.e., job satisfaction, engagement, pleasure, and meaning) and perceptions of one's job as a calling (Harzer and Ruch 2012, 2013). A similar self-affirmation approach at the time of employee orientation also increased customer satisfaction and decreased turnover (Cable et al. 2013).

However, a strengths-based approach may backfire if it leads to complacency and lack

of engagement and motivation in the workplace. Moreover, a large body of research shows that negative information on self is generally stronger than positive information, as individuals are more motivated to avoid their bad self-concept than to pursue their good self-concept (Baumeister et al. 2001). Such research suggests that negative feedback might be more powerful in motivating people to move away from the status quo. Often, performance evaluations with constructive criticism are believed to function as a "jolt" to employees—a quick but effective reshaping of the self-narrative such that employees accurately understand their progress at work as measured against their own performance goals and then exert more effort in their work. In the absence of threats to self, employees may lower their defenses, and may not feel stimulated enough to pursue their goals. Strengths-based approaches may thus give employees a false sense of success, leading them to believe that they no longer need to increase their effort, and resulting in "complacent self-assurance" (Vancouver and Thompson 2002).

Research also has shown that self-affirmation, coupled with initial failure to meet a goal, can lead to goal disengagement (Vohs et al. 2013). Because self-affirmation helps individuals view a situation more realistically, facing setbacks may lead them to doubt their goal-attainment abilities, thus reducing their sense of self-efficacy. Indeed, experiencing initial failure on a task was found to reduce subsequent motivation and performance on a new but related task. As members of a work group, employees may experience complacency and lack of engagement that leads them to stop searching for useful information from other team members, which may in turn impede their learning and innovative thinking, and negatively affect the behavior of other group members.

This leads to two competing hypotheses on the role of self-affirmation in the workplace. On one hand, strengths-based management practices may promote and develop employee

potential based on what employees are already quite confident doing. On the other hand, the possibility of employees becoming complacent and lethargic is deeply concerning to many organizations. This puzzle leads to key questions. What happens to our stress levels and health when our self-concept is affirmed? Would self-affirmation lead to better or worse problem-solving? Would self-affirmed individuals make better team members?

The goal of this research is to build upon the narrative psychology literature by linking it with the literature on self-affirmation, and to broaden the conceptual range of the "positive interpersonal jolt" beyond individual-level motivation and performance to include team functioning and team performance. In this paper I first consider the benefits and challenges of traditional self-affirmation interventions and then identify an alternative method that allows avoiding the potentially harmful effect of self-affirmation. I then develop the logic of why this method may bring about an experience of the positive interpersonal jolt, and why it might lead to better individual and group outcomes. Last, I empirically demonstrate the effect of jolts in laboratory and classroom settings with a sample of employees and managers.

4.1.1 Self-Affirmation and Problem-Solving Performance

Our work lives can at times be threatening to our self-concept. Modern workplaces are replete with performance evaluations, which invariably focus on identifying weaknesses (Buckingham and Clifton 2001). People can receive negative performance evaluations from their coworkers or clients (Ilgen and Davis 2000). Some events at work may even become traumatic. People can be demoted or fired (Folger and Skarlicki 1998) or may fall victim to workplace harassment, violence, or bullying (Berdahl 2007; Bond et al. 2010). Such turns of events can leave us feeling that our value to the organization is nothing more

than a tiny mechanical part—the proverbial cog in a wheel that can easily be diminished or replaced by others. As a result, threats to self-concept can derail us from maintaining a positive view of self (Taylor and Brown 1988) and can lead to spiraling drops in performance, thus preventing us from performing at our best (Steele 1997). As conceptualized by Petriglieri (2011), identity threat is an experience appraised as indicating potential harm to the value, meanings, or enactment of an identity. Not only do employees whose identity is threatened have less motivation to take on leadership positions and leave their jobs voluntarily (Davies et al. 2005; Trevor and Nyberg 2008), but they also act out in ways that can thwart organizational goals (Elsbach 2003; Nag et al. 2007). Research on self-affirmation shows that people can restore their positive self-concept in such threatening situations by affirming personal attributes and values (Sherman and Cohen 2002, 2006; Steele 1988).

One of the main criticisms of self-affirmation is that it is unclear whether it can lead to clear behavioral changes evident in performance. For example, the effects of self-affirmation on attitude and motivation were found to persist over a month-long period (Harris and Napper 2005; Harris et al. 2007), and its effects on health-related behavioral change were found to be mixed (Harris and Epton 2010). In addition, given that changes in attitude and motivation are rarely sufficient to make a long-term behavioral change (Ross and Nisbett 2011), it is unclear whether the stress-buffering effect of self-affirmation can increase problem-solving performance in individuals and teams. Finally, the positive relationship between self-efficacy and motivation can easily be disturbed when goals are perceived as difficult to achieve (Wright and Dismukes 1995).

A second criticism is that the personal attributes and values that self-affirmation generates can be biased toward promoting a self-concept that is neither accurate nor realistic. This becomes particularly problematic for individuals with low self-esteem, because self-

verification motives (i.e., wanting to be viewed as they view themselves) can prevail. For example, repeating a positive but ambiguous self-statement such as "I am a lovable person" was found to backfire for those with low self-esteem (Wood et al. 2009).

In sum, in order for self-affirmation to help trigger a critical and sustainable change in self-concept to promote performance, it first needs to ensure that the changes in one's attitude and motivation lead to changes in performance. I argue that the intervention should be sufficiently powerful that it aligns one's self-concept with one's behavior, by making the self-concept more accessible to the individual. Second, timing is important in that an experience of failure followed immediately by self-affirmation can lead to negative self-evaluations and a decrease in self-efficacy and motivation. Third, it is important to ensure that people's self-verification motives to see themselves accurately does not conflict with self-affirmation motives by providing accurate and concrete descriptions of their behaviors rather than ambiguous descriptions of their traits. The integration of benefits and potential pitfalls of self-affirmation thus calls for an alternative form of intervention.

4.1.2 Social-Affirmation as an Alternative Self-Affirmation Intervention

To maximize the impact of self-affirmation, I identified the Reflected Best Self Exercise as a particularly useful method. This method was developed by Quinn et al. (2003), and theorized by Roberts et al. (2005) to help individuals reach their full potential at work. This exercise is "reflected" because it involves a process of integrating positive feedback from close social relationships into the creation of a self-portrait. It taps into one's best self in that it relies on the individual's cognitive representation of the qualities and characteristics he or she displays when at his or her best (Roberts et al. 2005). I argue that

this social-affirmation method involves three strategies to strengthen the positive effect of self-affirmation, which can be distinguished from the method that is most often used in positive psychology and self-affirmation literature (i.e., counting one's blessings, recalling one's strengths, and writing down one's core values).

First, this intervention gives individuals an opportunity to change the stories they tell themselves. Rather than simply reflecting on their values and personal attributes, they are given specific stories of themselves and asked to create a new one. Although self-narratives are often generated from our own autobiographical memories, not all autobiographical memories become one's self-narrative. Instead, it has been theorized that it is the self-defining memories that make an individual unique and different from others (Singer and Salovey 2010). These self-defining memories are often affectively charged and vivid, often formed from repeated episodes in the past, and may reinforce an individual's enduring concerns and goals (2010). It is these memories that build one's life stories as an internalized and evolving narrative about the narrator (Bruner 1990; Ibarra and Barbulescu 2010; Josselson 2004; Lave and Wenger 1991; Linde 1993; McAdams 1988b; Pentland 1999). According to McAdam's theory of life stories (1988a), the telling of stories is the fundamental principle of a theory of identity and self-knowledge, as such self-narratives ground one's memories in a meaningful context of personal history. My research intends to capitalize on the process of creating and revising a personal history with a core theme of one's unique strengths and contributions, by drawing from a collection of vivid, personal, concrete narratives.

Second, this intervention facilitates the process of discovering one's core strengths by involving narratives from one's social ties. People often choose to affirm themselves in the domain of social relationships (Creswell et al. 2007). A pioneering work on the topic

of revising narratives was Singer's (1997) study of men with substance abuse problems. Singer investigated the role of self-defining memories in the life stories of such individuals, and found that their recovery involved redrafting a life story to include self-defining memories that affirmed their personal agency and interpersonal connections. Similarly, it has been argued that subjective feelings of connectedness may provide protective effects of self-affirmation (Cacioppo and Patrick 2009). This research thus capitalizes on the psychosocial resources that significant others can provide to individuals. The narratives are written by members of the focal individual's own network, which often consists of people who have a meaningful relationship with him or her, such as family, friends, and coworkers. The focal individual is asked to actively identify narrative providers who can recall memories of the focal individual and construct stories of the focal individual at his or her best. This process generates an opportunity to place oneself as a social being, as one realizes how he or she is connected to these other individuals. Prior research found that individuals change their self-concepts to align more closely with the appraisals of significant others (Drigotas et al. 1999; Malloy et al. 1997). As such, the current research operationalizes these externalized narratives as an alternative intervention that can help individuals revise a life story around their unique strengths and contributions.

Third, this intervention equips individuals with specific strategies to reach their goals and potential. Most past self-affirmation interventions asked individuals to list a few values that are important to them and to write about why they are important. The contents were mainly self-generated and tailored to one's particular valued identity (Sherman 2013), with the exception of a few studies that treated positive feedback as a form of self-affirmation (Cohen et al. 2000). Less attention was paid to how one can achieve the goal of becoming congruent with one's valued identity. Based on Gollwitzer and Sheeran (2006), who sug-

gested that achieving behavioral outcomes requires realistic and concrete plan-making, this intervention instead asks individuals to make a deliberate effort to synthesize a collection of narratives, to articulate the newly developed self-narratives, and to write about how they can apply their strengths to their work. Having a vivid picture of self is associated with specific action tendencies that support the application of one's strengths at work (Roberts et al. 2005). This process of reflection and articulation can help individuals behave in ways that are congruent with their newly revised personal history of strengths.

In sum, this research uses the Reflected Best Self Exercise as an effective tool to affirm one's personal agency and interpersonal connections.

4.1.3 Positive Interpersonal Jolts and Problem-Solving Performance

I propose that narratives that affirm one's personal agency and interpersonal connections can enhance the problem-solving performance of individuals and work groups, when an individual is told and reminded of their relationships with others.

I first consider why social-affirmation intervention might lead to such positive outcomes. In this intervention, the focal individual's experience of receiving significant others' narratives can create a point of reflection. Roberts and colleagues (2005) termed this a "jolt," a discrepant or surprising event that causes individuals to pause and reflect on their experience (Louis 1980). Although it has been theorized that a jolt can occur with a new piece of information that serves as a tipping point (Ibarra 2013), regardless of its intensity or valence ("challenge vs. affirmation") (Roberts et al. 2005), this research focuses on the positive jolt created by significant others. That is, individuals learn about strengths they may not have identified previously by themselves, and such moments are likely to produce strong emotional responses that could also induce changes in "self-knowledge structures"

(Poole et al. 1989; Roberts et al. 2005). Then individuals have an opportunity to reflect on this experience of "jolt," synthesize the narratives, find a recurring theme of strengths, and write a paragraph that articulates and abstracts what they have learned from this experience. It is this process of reflection that sparks the change in the stories that individuals tell themselves.

Effects of Positive Interpersonal Jolts on Human Emotions and Physiology

I first hypothesize that a personal interpersonal jolt will have immediate benefits in terms of increased positive affect and improved physiology, enhanced immune system, and reduced stress. Roberts and colleagues (2005) further theorized that three psychological resources could enable jolt-driven responses, such as positive affect, a sense of relational connection, and personal agency. One of the ways that one's experience of self-affirmation is differentiated from experiencing jolt is that the latter generates strong emotional responses that can trigger changes in self-knowledge structures (Roberts et al. 2005). This is in line with research showing that positive feedback can increase one's positive affect (Cooper and Duncan 1971; Nummenmaa and Niemi 2004) whereas self-affirmation typically does not influence affect (McQueen and Klein 2006; Schmeichel and Martens 2005). Thus, I predict that the experience of jolt will have even more powerful effects in terms of elevating one's emotional state than will self-affirmation manipulations. Specifically, I hypothesize that the jolt experience increases one's feelings not only of subjective well-being (happiness) but also of specific positive social emotions such as astonishment, awe, compassion, elevation, and inspiration. These emotions represent feelings of self-transcendence. In addition, I hypothesize that positive interpersonal jolts not only will increase positive state emotions but also will manifest in physiological functioning, namely the tonic influence of the vagus

nerve on heart rate, measured by respiratory sinus arrhythmia (RSA).¹ Given that a jolt may tap into both positive affective and social-relational resources (Roberts et al. 2005), greater increases in RSA are predicted to be observed in those who experience jolt than in those who do not.

Hypothesis 1a: Individuals who experience positive interpersonal jolts have greater self-reported positive affect, and more heightened vagal tone, a biological measure of positive emotionality and social engagement, than do controls.

Effects of Positive Interpersonal Jolts on Enhancing Immune System and Buffering Stress

Self-affirmation is known to buffer stress and promote health (Creswell et al. 2005; Keough and Markus 1998; Sherman et al. 2009). The two key features discussed above—positive emotions and social engagement—are also useful psychosocial resources that could help individuals cope with potentially threatening situations. I identified secretory immunoglobulin A (sIgA) as a salivary measure that may capture the positive emotional and social aspects of positive interpersonal jolts. SIgA is a type of antibody that defends against infections (i.e., common cold) by interfering with bacterial and viral adherence to mucosal surfaces.² Compared with lonely individuals, socially connected individuals were found to have higher levels of Epstein-Barr virus (EBV) antibody titers (Glaser et al. 1985), less

¹The vagus nerve is responsible for regulating heart rate and maintaining homeostatic functions. The change in vagal tone, most accurately indexed by respiratory sinus arrhythmia (RSA), is linked to self-regulatory efforts and mood (Beauchaine 2001; Butler et al. 2006; DiPietro et al. 1992; Porges 1995). An increase in RSA is associated with heart-rate deceleration and is often used as a proxy for positive, relaxing mood states and social engagement (Bazhenova et al. 2001; Beauchaine 2001; Ingjaldsson et al. 2003; Kok et al. 2013; Wilhelm et al. 2001). For example, social touching by friends and strangers was found to increase vagal tone (Wilhelm et al. 2001).

²SIgA has been linked to positive affect in many studies (Pressman and Cohen 2005 for reviews connecting affect and immune system; Salovey et al. 2000) as well as to social support (Kiecolt-Glaser et al. 2002; Uchino et al. 1996 for a review of the relationship between social support and immune systems).

natural-killer-cell activity (Kiecolt-Glaser et al. 1984), a better immune-system response to an influenza vaccine (Pressman et al. 2005), and less stress-related inflammation (Jaremka et al. 2013). Thus, the positive emotions and social engagement resulting from the jolt experience are predicted to strengthen one's immune system.

In addition to the direct emotional and health benefits associated with positive interpersonal jolts, the effect may carry over to a subsequent stress task. That is, jolts could help individuals cope with stress more effectively by buffering its negative influence and by reducing the aversive physiological arousal associated with stress at hand (Roberts et al. 2005).³ Based on the broaden-and-build theory of positive emotions (Fredrickson 2000), I hypothesize that a jolt will increase one's ability to cope with an aversive psychological state after a cognitive and social stress task. Taken together, this intervention is predicted to have an enduring effect on subsequent stress tasks and to reduce the aversive physiological arousal associated with negative emotions.

Hypothesis 1b: Individuals who experience positive interpersonal jolts develop a stronger immune response (as measured by secretory immunoglobulin A) and experience reduced physiological arousal associated with stress, compared with controls.

Effects of Positive Interpersonal Jolts on Problem-Solving Performance

In addition to the affective and physiological benefits, cognitive benefits such as problem-solving performance may arise from three jolt-related psychosocial resources theorized by Roberts and colleagues (2005), such as positive affect and personal agency.

³Positive affect was shown to increase one's tolerance for physical discomfort (Cogan et al. 1987) and trait resilience in the aftermath of the September 11 terrorist attacks (Fredrickson et al. 2003). Importantly, positive affect is known to have the effect of "undoing" negative emotions, and therefore the cardiovascular responses associated with negativity quickly return to baseline levels of arousal (Fredrickson et al. 2000).

A large body of research has focused on the role of positive affect in increasing intrinsic motivation (Isen and Reeve 2005) as well as in cognitive functioning, such as creative problem-solving (Ashby et al. 1999; De Dreu et al. 2008; Estrada et al. 1994; Isen et al. 1987). In the workplace, positive emotions are also associated with greater innovation and job-related performance (Amabile et al. 2005; Côté 1999; "Employee Positive Emotion and Favorable Outcomes at the Workplace," Stalikas and Fitzpatrick 2008; Judge et al. 1998). Research in education settings has demonstrated that self-affirmation can boost test scores by reducing the negative effect of stereotype threat (e.g., related to gender and racial minorities) that could hinder performance on intelligence tests (Cohen et al. 2006, 2009; Martens et al. 2006; Miyake et al. 2010). Given that stress impairs cognitive functioning (Liston et al. 2009), it is possible that a jolt may enhance problem-solving performance by reducing the negative influence of stress. One study found that self-affirmation improved problem-solving performance among chronically stressed individuals (Creswell et al. 2013).

Similarly, a jolt may increase creative performance through an increased sense of self-efficacy. Numerous studies on self-affirmation found that it enhances scholarly performance under evaluative threat (Cohen et al. 2006, 2009; Martens et al. 2006; Miyake et al. 2010). Here I draw on the biopsychological model of stress as threat versus challenge (Blascovich and Tomaka 1996). The evaluative nature of the workplace can be seen as either challenging or threatening. Challenge is a state in which individuals perceive that they have sufficient resources to cope with a task's demands, whereas threat is a state in which they perceive that they lack sufficient resources. Individuals whose values are affirmed may not view the evaluative situation in the workplace as threatening. This heightened sense of self-efficacy can in turn motivate individuals to exert more effort toward a given

task (Vancouver et al. 2008), which may lead them to work more creatively and effectively as individuals and as group members. Similarly, positive self-evaluations and self-efficacy have been associated with greater job performance (Judge et al. 1998, 2004). I hypothesize that, taken together, positive emotions and a greater sense of self-efficacy from jolt will provide sufficient resources to tackle problems at hand.

Hypothesis 2: Individuals who experience jolt outperform controls on tasks that involve creative problem-solving and performance under stress, due to increased positive affect and sense of self-efficacy.

Effects of Positive Interpersonal Jolts on Team Functioning and Performance

Although it is plausible that the effects of a jolt would extend far beyond intrapsychic benefits, little has been theorized on the role of jolts in team functioning and performance. Individuals whose self-concept is triggered such that they view themselves as being appreciated by others and connected to others may behave in ways that match their authentic self-concept. I consider two potential channels that might explain why jolt can facilitate interpersonal relationship among group members: self-transcendence and social sensitivity.

First, as proposed in Hypothesis 1a, jolt can enhance feelings of self-transcendence, which reaches beyond caring about oneself. Self-affirmation is known to reduce one's defensiveness in response to self-threatening information (Harris et al. 2007; Sherman and Cohen 2002). Importantly, this effect on defensiveness was found to be mediated by positive other-directed feelings such as love and connection (Crocker et al. 2008). This finding suggests that self-affirmation reduces one's defensiveness via self-transcendence rather than self-enhancement. Similarly, Roberts and colleagues (2005) theorized that as individuals learn about their strengths and gain clarity about their unique contribution to their

social context through jolt, they may develop a strong sense of identification with others (Stets and Burke 2003; Stryker 1980). Thus, I expect other-directed emotions generated by jolt to facilitate effective voice behavior, perspective-taking, and learning among group members, which can lead to better team performance.

Second, a jolt may increase an individual's sensitivity to others, thereby preventing potential conflicts with his or her team members. Research on collective intelligence found that members' social sensitivity and the ways in which group members interact predict group performance (Woolley et al. 2010). The literature on intergroup conflict has shown that teams with affective relationship-based conflict tend not to perform well (Jehn and Mannix 2001; Jehn et al. 1999), because relationship conflicts decrease goodwill and mutual understanding (Deutsch 1969). Reducing relationship conflicts would therefore be positively associated with better team functioning and performance. In fact, self-affirmation was found to reduce interpersonal resistance and intransigence in the context of negotiation (Cohen et al. 2007). For example, self-affirmation increased a negotiator's openness to compromise, thereby increasing concession-making. In addition, self-affirmation reduced the tendency to derogate a concession, which often is a psychological barrier to resolving conflicts (Ward et al. 2011). This was because self-affirmation reduced individuals' feeling that they were passive and uninfluential recipients of an inferior concession. Thus, I hypothesize that a heightened sense of sensitivity to others will enable individuals to enhance the quality of group interaction and reduce intergroup conflict, which can lead to better team performance.

In sum, I predict that work groups that experienced jolts will have a better relationship, evidenced by team functioning, and that this will mediate the relationship between the jolt and team performance.

Hypothesis 3a: Work groups that experience jolts will function better as a team than work groups that do not experience jolts.

Hypothesis 3b: Work groups that experience jolts will outperform work groups that do not experience jolts.

Hypothesis 3c: The relationship between experiencing jolts and team performance is explained by team functioning.

4.1.4 Overview of the Present Research

The current work focuses on the more specialized concept of the positive interpersonal jolt, and provides a direct test of the effects of positive interpersonal jolts on emotion, health, stress, problem-solving performance, team functioning, and team performance. In Study 1, in a laboratory experiment, individuals who were randomly assigned to the jolt condition engaged in the Reflected Best Self Exercise, and those who were assigned to the control group did not. Here I first demonstrate affective and physiological manifestations of a positive interpersonal jolt. Then I test the main hypotheses that a jolt reduces cognitive and social stress, and enhances one's problem-solving performance. In Study 2, using a unique sample of senior leaders in the crisis simulation, I test the hypothesis that the jolt effect extends to enhance team performance, mediated by enhanced team functioning.

4.2 Study 1

4.2.1 Method

Procedure and Participants A large sample of participants from the Boston/Cambridge area were invited to fill out an online survey to determine their eligibility for this study. This prescreening procedure included questions about their employment status, seniority at work, health conditions (related to cardiovascular or neuroendocrinological disorders) and demographics. Seventy-five individuals ($M_{age} = 38.72$, $SD = 14.92$; 45% male) who were currently employed full-time with at least 3 years of work experience were invited to participate in the 90-minute laboratory study. They were paid \$30 at the end of the laboratory study.

Before their participation in the laboratory study, participants were randomly assigned to one of the two conditions. Individuals assigned to the treatment condition were asked to send emails to their friends, family, and coworkers requesting three stories about when the participant was at his or her personal best. This email included a link to an online survey, so that all stories about each participant could be compiled by the researchers but not be available to the participants themselves. Individuals who were assigned to the control condition were not asked to do anything prior to their participation. An average treated participant had 1.78 narrative providers ($SD = 2.43$), and the average number of narratives was 4.05 ($SD = 5.60$). After receiving the stories from the treatment group, I scheduled laboratory sessions for all participants between 2 PM and 6 PM to minimize diurnal variability, and sent out a reminder a day before they were to appear in the laboratory.⁴

⁴Because of potential effects on endocrine levels, we asked participants to refrain from engaging in strenuous exercise, drinking alcohol/caffeine, eating dairy products, smoking, or taking nonprescription medication on the morning of the appointment, or brushing their teeth at least 1 hour before the experiment.

After participants signed the consent forms, they were asked to rinse their mouth to prepare for the saliva sample collection. Then they were escorted to the changing rooms, where the research personnel attached electrodes and sensors to each participant's body. Participants were then escorted to the computer room and seated in their own cubicle, where they remained for the duration of the study. Throughout the study, skin conductance and heart rate were continuously measured. In addition, two saliva samples were collected to measure secretory immunoglobulin A (sIgA) at the baseline and after engaging in the Reflected Best Self Exercise.

Once participants were seated, they watched a 5-minute video showing a relaxing ocean scene, after which they answered questions about their current emotions for measuring baseline physiological measures during the resting period. Participants also completed a series of questionnaires that measured their current emotions and attitudes toward work.

For the key manipulation, experimenters delivered an envelope to each participant. Participants in the treatment group received a booklet along with the compiled stories about themselves that had been provided by their narrative providers (see Appendix C.1). The treatment booklet was designed to help participants engage in deeper personal reflection about times when they believed they demonstrated their unique strengths. They were asked to write three stories about themselves when they were at their best, and then to read the stories submitted by the narrative providers. Finally, they incorporated these stories into their final strengths narrative. The control booklet included a writing task that described participants' day-to-day organizational routines (see Appendix C.2). Participants spent 15 to 20 minutes on this task, then answered questions about their current emotions. Figure 4.1 illustrates the experimental design of this study.

For dependent measures, first, cognitive problem-solving tasks were introduced as a

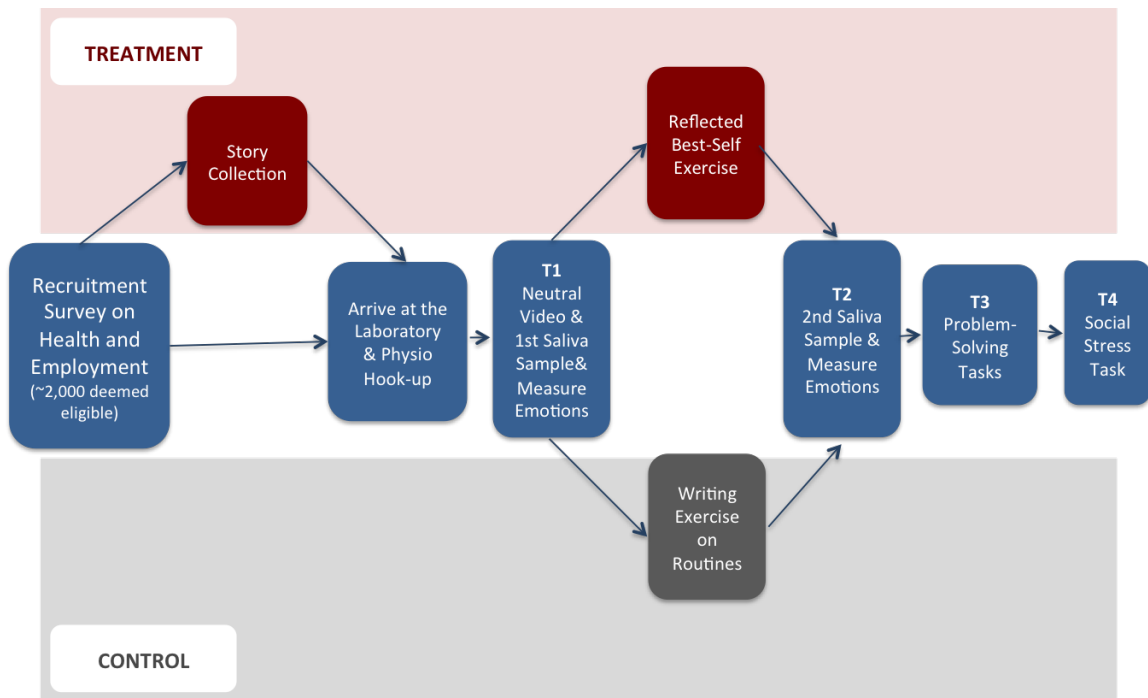


Figure 4.1: Experimental procedure for Study 1.

measure of individual creative performance. Second, a computer-based social-exclusion task (Williams and Jarvis 2006), which has been shown to make individuals feel ostracized, was used as a manipulation of social stress (Zadro et al. 2004). This task is expected to increase a person's perceived sense of threat, thus increasing physiological arousal. Last, participants completed health and demographics questionnaire.

Measures

Self-reported emotions. The adapted version of the Positive and Negative Affect Scale (PANAS; Watson et al. 1988) was used to measure the level of discrete emotions at baseline and immediately after the writing task. Participants indicated how much they felt each emotion "right now" using a 7-point scale (from 1 = "clearly does not describe my feel-

ings" to 7 = "clearly describes my feelings"). In addition to seven items of the positive emotions from the original PANAS (determined, happy, amused, strong, enthusiastic, excited, proud), five items were added to capture specific emotions that were hypothesized to be related to an experience of a jolt, such as feeling awe, inspired, elevated, astonished, or compassionate. For further analyses, two summary variables were calculated for each participant for both pre- and post- positive affect ($\alpha = 0.92; 0.96$). In addition, two summary variables consisting of only the new positive-emotion items ($\alpha = 0.88; 0.94$) were created.

Autonomic nervous system (ANS) measures. Throughout the experiment, skin conductance responses and heart rate were measured using the Biopac system (Biopac, Inc., Santa Barbara, CA). Skin conductance levels have been associated with indices of arousal, attention, fear, and anxiety (Mendes 2009). To measure skin conductance (activity of the sweat glands), experimenters placed two disposable pre-gelled adhesive electrodes on the middle volar surfaces of the first and second fingers of a participant's nondominant hand. Through the use of a BioNex amplifier system (Mindware Technologies, Gahanna, OH), raw skin conductance measures were amplified with a gain of 25 micro-mho/V, a low-pass filter set to 5Hz, and a sampling rate of 1000Hz. To measure heart rate and heart-rate variability through electrocardiogram recordings, experimenters placed three disposable adhesive electrodes on each participant's torso. In particular, this measured vagal tone using RSA (Porges 1995) to capture the vagal influences on the heart. RSA was calculated as heart-rate variability in the high-frequency (respiratory) band of the R-wave to R-wave sequence (0.14~0.40 Hz). All the physiological data were ipsatized to control for physiological variability across participants (see Bush et al. 1993). Four participants were excluded because they exhibited no variation in skin conductance over time.

Immune-reactivity hormone. After watching the baseline video, participants were given instructions for using the Salimetrics Oral Swab (SOS) kit. Each participant held an oral swab under his or her tongue and, once the swab was fully saturated, placed the swab in an individually labeled tube. Participants repeated the same procedure for the second swab, which was requested 25 to 30 minutes after both treatment and control groups completed their respective writing tasks. All samples were stored at ~20 degrees Fahrenheit until shipment on dry ice to Salimetrics for biochemical analysis of the concentration of salivary sIgA. After these salivary responses were assayed, they were log-transformed to approximate normal distribution and ipsatized. Last, two participants' data were excluded because there was not enough saliva to be assayed.

Creative problem-solving. Two problem-solving tasks were presented in random order. First, participants were presented with the Duncker candle problem (Duncker 1945; Glucksberg and Weisberg 1966) with a time constraint of 3 minutes. It measured the ability to see objects as performing atypical functions (Maddux and Galinsky 2009) and thus was coded as a binary variable (1 = "solved," 0 = "did not solve"). Second, participants were asked to generate as many uses of a newspaper as possible in 3 minutes (Guilford 1950). The uses for a newspaper were coded according to their fluency, flexibility, and novelty (Guilford 1950; Tadmor et al. 2012). First, the total number of distinct uses of newspapers was generated as a measure of fluency. Second, the number of different categories generated was used as a measure of flexibility. Last, the mean score of the two coders' subjective ratings of the overall creativity of the items generated was used as a measure of novelty on a scale from 1 ("not creative at all") to 7 ("very creative") ($r = 0.86$; $ICC(2) = 0.92$). After confirming that all three methods yield similar outcomes, I created a composite variable.

Social exclusion. Participants' physiological responses to social exclusion using the "CyberBall" game (Williams and Jarvis 2006) were measured. In this game, subjects play a ball-throwing game on their computer screen with other players. All participants were assigned to an "ostracism" condition in which they were thrown the ball several times at the beginning of the game and then not again for the duration of the game (35 throws total).

4.2.2 Results and Discussion

Table 4.1 reports means and standard deviations for the key variables in this study, as well as their zero-order correlations. I compared the two groups' self-reported emotions to ensure that there was no significant difference between the treatment and control groups. For baseline affect, there was no difference across different groups: positive affect, $t(71) = 0.76$, $p = 0.45$, $d = 0.19$. This result suggests that the individuals who were assigned to the treatment and the control groups did not differ significantly from each other at the baseline.

Consequences of a jolt on self-reported emotions and vagal tone. To test Hypothesis 1a, I used random-effects regression models to control for the lack of independence of two emotion measurements within the same participants. A summary variable for positive emotions from PANAS was entered as a dependent variable. Time (baseline vs. after manipulation) and condition (treatment vs. control) were entered as predictors. There was a marginally significant main effect of time, $B = -0.16$, $SE = 0.09$, $p = 0.08$, but no main effect of condition was found, $B = 0.15$, $SE = 0.20$, $p = 0.45$. Importantly, however, a significant interaction between treatment and time was found, $B = 1.07$, $SE = 0.13$, $p < 0.001$, which suggests that the changes in positive emotions over time depended on the condition to which individuals were assigned. Although positive affect for controls actually decreased significantly from pretest ($M = 2.83$, $SD = 0.89$) to posttest ($M = 2.59$,

Table 4.1: Means, standard deviations, and zero-order correlations for key variables, Study 1.

Variables	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11
1. Treatment (vs. Control)	0.48 (0.50)											
2. Positive Emotions at T1	2.69 (0.79)	0.10										
3. Positive Emotions at T2	3.12 (1.02)	0.60***	0.69***									
4. RSA at T1	6.57 (20.1)	0.23	0.05	0.01								
5. RSA at T2	6.78 (2.18)	0.35**	0.03	0.07	0.58***							
6. SIgA at T1	194.29 (157.68)	-0.36**	-0.00	-0.18	-0.21	-0.18						
7. SIgA at T2	271.54 (196.97)	-0.26	0.00	-0.17	-0.10	-0.07	0.65***					
8. Skin Conductance at T1	7.89 (4.84)	-0.02	0.12	-0.01	0.09	0.07	0.11	-0.10				
9. Skin Conductance at T3	9.82 (4.45)	-0.14	0.15	-0.08	0.07	0.05	0.14	-0.09	0.80***			
10. Skin Conductance at T4	9.43 (4.17)	-0.11	0.14	-0.06	0.03	0.03	0.21	-0.03	0.81***	0.93***		
11. Performance (Candle)	0.35 (0.48)	0.34**	-0.14	0.23	0.04	0.08	-0.14	-0.06	-0.08	-0.11	-0.07	
12. Performance (Newspaper)	5.27 (1.91)	0.29*	-0.13	-0.04	0.07	0.10	-0.17	-0.10	-0.08	-0.00	-0.05	0.23*

Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, $\hat{p} < 0.10$. All physiological measures are raw scores before transformation and standardization. T1 refers to baseline, T2 refers to the time period when participants were treated, T3 refers to the cognitive task period, and T4 refers to social stress task period.

$SD = 1.00$), $p = 0.02$, $d = 0.34$, it increased significantly for the treatment group from pretest ($M = 3.03$, $SD = 0.72$) to posttest ($M = 3.78$, $SD = 0.73$), $p < 0.001$, $d = 1.40$.

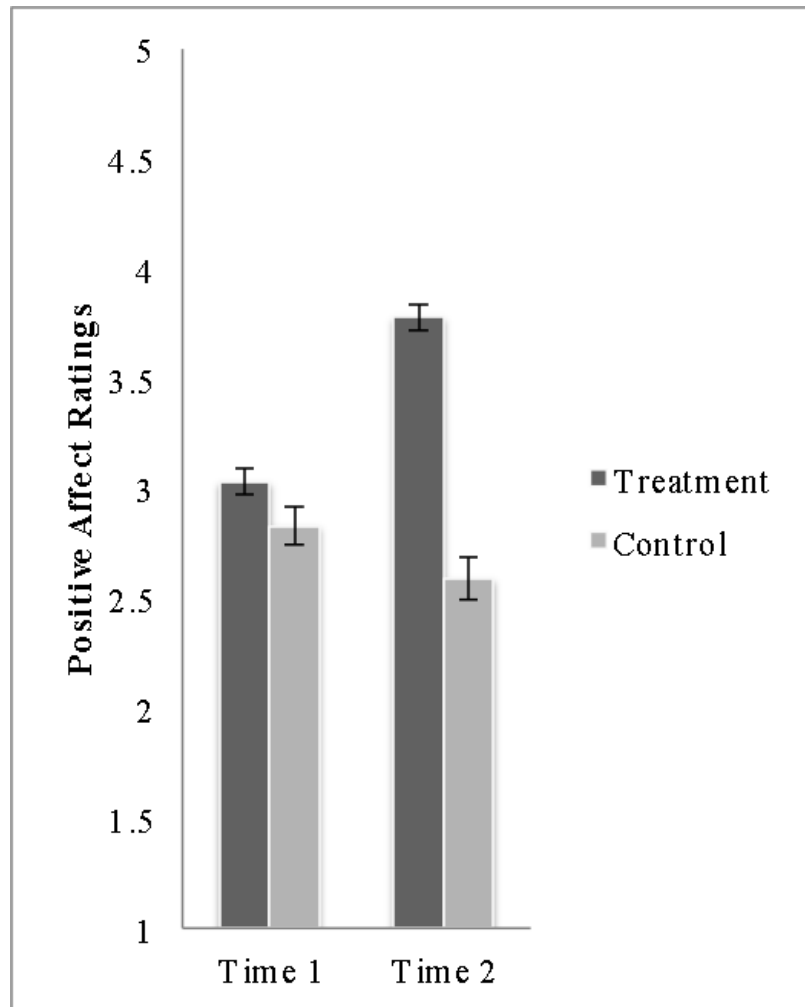


Figure 4.2: Mean positive and transcendence emotions as a function of time and treatment in Study 1. Error bars represent standard errors.

The same analysis was conducted for the self-transcendence (other-directed) emotion items (e.g., compassionate). A similar pattern was found; neither main effect of time, $B = -0.21$, $SE = 0.13$, $p = 0.11$, nor main effect of treatment, $B = 0.15$, $SE = 0.23$, $p = 0.51$, was found, but there was a significant interaction effect, $B = 1.37$, $SE = 0.17$,

$p < 0.001$. Figure 4.2 reports the average positive emotions that include both PANAS items and self-transcendence items as a function of treatment and time.

The same analyses were repeated for the levels of RSA as a dependent variable. Neither a main effect of time, $B = -0.18$, $SE = 0.20$, $p = 0.36$, nor of treatment, $B = 0.00$, $SE = 0.21$, $p = 0.99$, was found, but there was a significant interaction between the two, $B = 0.62$, $SE = 0.29$, $p = 0.03$. Mirroring the results in positive emotions above, RSA for controls did not increase from pretest ($M = 0.05$, $SD = 0.84$) to posttest ($M = -0.13$, $SD = 0.96$), $p = 0.38$, $d = 0.21$. For the treatment group, RSA increased significantly from pretest ($M = 0.05$, $SD = 0.78$) to posttest ($M = 0.48$, $SD = 0.86$), $p = 0.03$, $d = 0.53$. Figure 4.3 depicts the average RSA as a function of treatment and time.

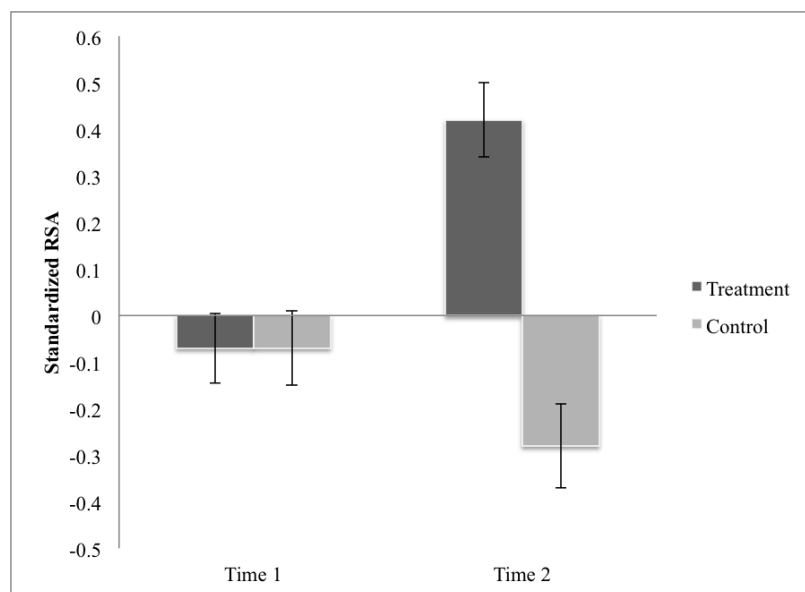


Figure 4.3: Mean RSA as a function of time and treatment in Study 1. Error bars represent standard errors.

Consequences of jolt on immune response and physiological arousal under stress.

I next tested Hypothesis 1b, that the jolt will strengthen a participant's immune system.

Again, random-effects regression models were used to control for the lack of independence of two salivary samples within the same participant. Here, sIgA level is a dependent variable, and time (at baseline vs. after manipulation) and condition (treatment vs. control) are independent variables. For sIgA, there exists a main effect of time, $B = 0.24$, $SE = 0.07$, $p = 0.001$, and of treatment, $B = -0.47$, $SE = 0.14$, $p = 0.001$. A significant interaction between treatment and time was found, $B = 0.28$, $SE = 0.10$, $p = 0.008$. Interestingly, sIgA increased marginally for the control group from pretest ($M = 5.28$, $SD = 0.65$) to posttest ($M = 5.52$, $SD = 0.63$), $p = 0.10$, $d = 0.39$. This change over time was more pronounced, however, for the treatment group; it increased from pretest ($M = 4.81$, $SD = 0.53$) to posttest ($M = 5.35$, $SD = 0.58$), $p < 0.001$, $d = 0.99$. Controlling for the weight of the saliva samples provided did not change the significance and direction of the results. Figure 4.4 illustrates the average sIgA as a function of treatment and time.

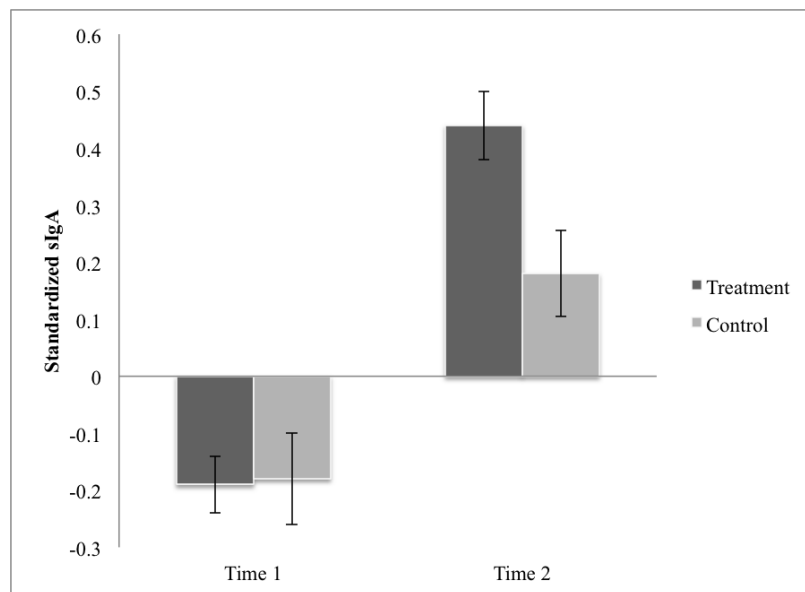


Figure 4.4: Mean sIgA as a function of time and treatment in Study 1. Error bars represent standard errors.

Using the potentially stress-inducing periods in the problem-solving task and Cyber-

ball, I tested whether individuals in the treatment condition experienced less negative physiological arousal than those in the control condition. A repeated-measures mixed model was used to test the effect of treatment across three time points (baseline, cognitive task, and social stress task). There was no main effect of treatment, $B = 0.15$, $SE = 1.07$, $p = 0.88$, but there was a significant main effect of time (for baseline vs. cognitive task, $B = 2.84$, $SE = 0.42$, $p < 0.001$; for baseline vs. social stress task, $B = 2.23$, $SE = 0.42$, $p < 0.001$). More important, there was a significant interaction between treatment and time during the cognitive task, $B = -1.59$, $SE = 0.60$, $p = 0.008$, and a significant interaction between treatment and time during the social stress task, $B = -1.17$, $SE = 0.60$, $p = 0.049$. This finding indicates that individuals who experienced jolt felt less physiological arousal during the cognitive and social stress tasks than those in the control condition. Figure 4.5 illustrates the levels of skin conductance as a function of treatment and time.

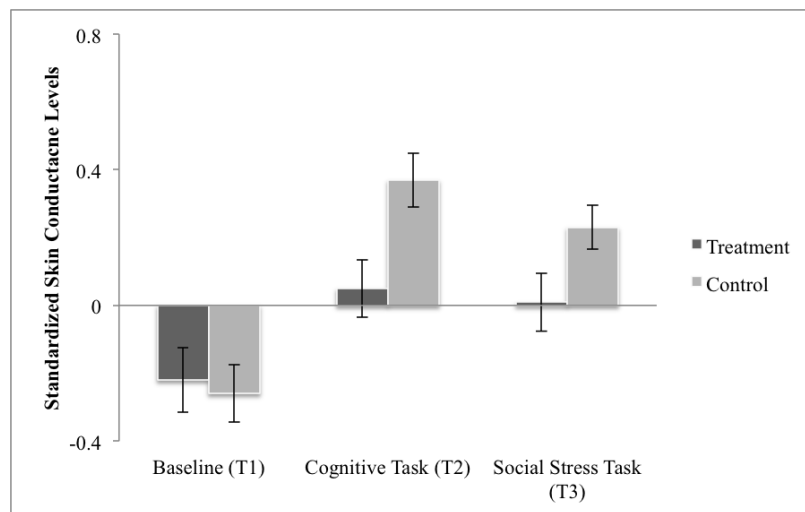


Figure 4.5: Mean skin conductance as a function of time and treatment in Study 1. Error bars represent standard errors.

Consequences of jolt for problem-solving performance. Last, I tested Hypothesis 2a, that a jolt will enhance individual ability to solve problems creatively. For the candle task, individuals in the treatment condition were more likely to solve it (51%, 18/35) than those in the control condition (19%, 7/37), $\chi^2 = (1, N = 72) = 9.39, p = 0.004$. Although education level was not different across different conditions ($M_{treatment} = 3.83, SD = 1.25$; $M_{control} = 4.08, SD = 1.10, t(71) = 0.91, p = 0.36, d = 0.22$), it was controlled for in further analysis. A logit regression analysis found that this effect is robust after controlling for the level of education, $B = 1.61, SE = 0.55, p = 0.004$ (for education; $B = 0.29, SE = 1.12, p = 0.02$). Similarly for the newspaper task, individuals in the treatment condition ($M = 5.79, SD = 0.31$) did better at generating different uses of a newspaper than did controls ($M = 4.67, SD = 0.30$), $t(71) = -2.61, p = 0.01, d = -0.62$. A regression analysis found that controlling for education does not change the significance and direction of the treatment effect, $B = 1.23, SE = 0.42, p = 0.004$ (for education; $B = 0.45, SE = 0.18, p = 0.01$). Figure 4.6 illustrates the summary performance outcomes as a function of treatment and time. Table 4.2 summarizes separate analyses on fluency, flexibility, and novelty for the newspaper task.

I examined the combined affective, physiological, and cognitive effects of engaging in the social-affirmation intervention in the laboratory setting. First, in support of Hypothesis 1a, a jolt increased positive affect and vagal tone. Second, in support of Hypothesis 1b, a jolt significantly strengthened the immune system of those in the treatment group compared with those in the control group and buffered negative physiological arousal associated with stress-inducing tasks. Third, in support of Hypothesis 2a, a jolt increased problem-solving performance. Thus, Study 1 provides evidence for the role of a jolt in building psychosocial resources that have critical organizational implications such as for employee health and

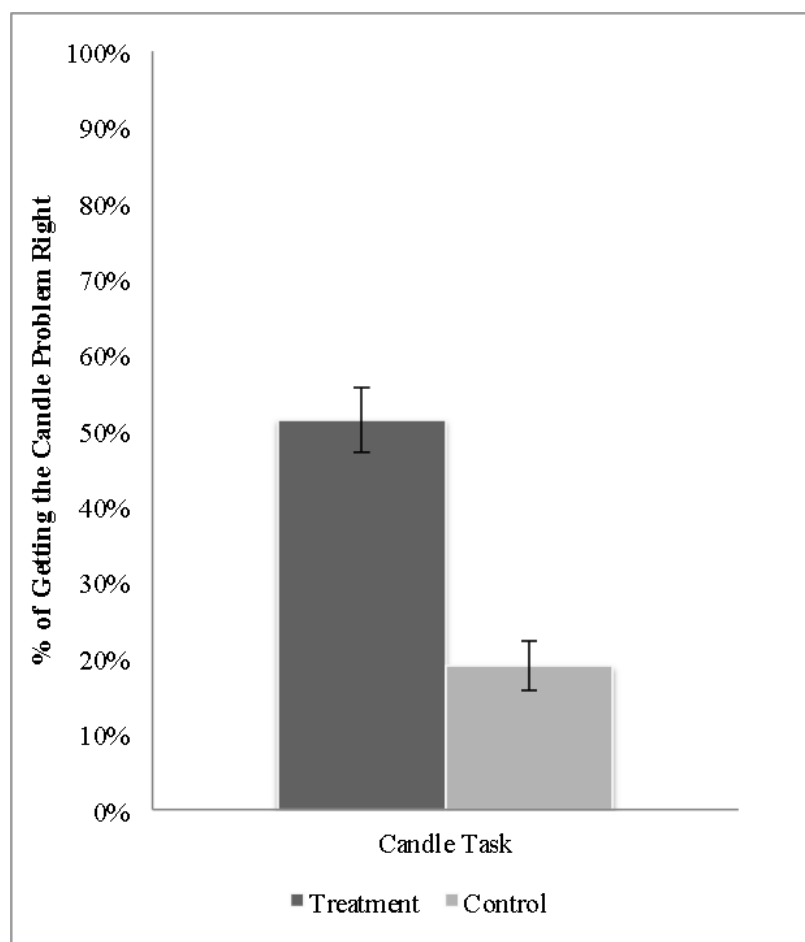


Figure 4.6: Mean problem-solving performance as a function of treatment in Study 1. Error bars represent standard errors.

productivity.

4.3 Study 2

Although Study 1 provided causal evidence that jolt can bring affective, physiological, and cognitive benefits immediately, it is difficult to conclude that a jolt can bring about a change in behavior in the long term in the interpersonal setting. In Study 2, a group of

Table 4.2: Multiple regressions results for fluency, flexibility, and novelty, controlling for the level of education, Study 1.

Predictor Variables	Creative Performance					
	Fluency		Flexibility		Novelty	
	β	SE	β	SE	β	SE
Treatment (vs. Control)	0.50*	0.22	0.51*	0.22	0.64**	0.22
Level of Education	0.24*	0.09	0.23*	0.09	0.21*	0.09
N	73		73		73	
Overall R-squared	0.13		0.13		0.15	
Overall F	5.08**		5.22**		6.15**	

Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, $\hat{p} < 0.10$.

senior leaders, after experiencing a jolt, participated in a crisis simulation related to public health. At the end of the simulation, they were asked to give a presentation, which was evaluated by expert panels. Here I intended to observe a change in interpersonal judgment and behavior in a controlled setting that minimized demand characteristics. That is, the role of the Reflected Best Self Exercise and its relationship with the crisis simulation were not revealed to participants, and there was a 10-day gap between intervention and measurement of outcomes.

In addition, Study 2 triangulates the effect of positive interpersonal jolts by holding all other factors constant. The treatment condition in Study 1 asked participants to identify narrative providers, reach out to them, and write an integrated narrative from both self-identified and other-reflected stories. However, individuals who were assigned to the control condition did not perform any such activities, which makes it difficult to attribute the difference between the treatment and control condition to the effect of positive interpersonal jolt. In Study 2, however, all other factors (such as recalling one's social network,

soliciting stories from the narrative providers, and writing one's own best-self stories) are held constant. Instead, the only difference between treatment and control groups is whether the narrative providers' stories are delivered to the individuals early on (10 days before the performance task) or after the performance task. This design enables isolating the effect of experiencing positive interpersonal jolt.

4.3.1 Method

Participants

In this study, I worked with a unique sample of leaders from the Senior Executive Fellows (SEF) program at Harvard Kennedy School. The SEF program is a 4-week leadership development program offered three times a year, in February, April, and October. A total of 246 participants participated in this program ($M = 48.47$, $SD = 7.13$, 73% male). Approximately 60 to 80 fellows are admitted to each program, and most are career civil servants (a majority work for the U.S. government) or current or former military officers. Many of the participants are candidates for promotion to senior executive or general officer ranks. I collected data from four sessions: October–November 2013 ($N = 31$), February–March 2014 ($N = 70$), April–May 2014 ($N = 80$), and October–November 2014 ($N = 65$).

Procedure

Pre-arrival assignment. Once the list of SEF program participants was confirmed, the SEF program staff emailed all participants, asking them to complete a pre-arrival assignment (see Appendix C.3 for a sample email). First, all participants were asked to submit their own self-assessment describing a past event when they were at their best. Second, participants were asked to identify a minimum of five to 10 contacts who had witnessed

them in situations in which they were at their best. They were encouraged to include a mix of contacts who knew them well, including friends, mentors, family members, customers, and colleagues. Third, after all contact information was provided, an invitation was sent to these potential narrative providers to write up to three detailed stories describing their interactions with the participant and to identify the occasions when the participant added value and made important contributions. In particular, the narrative providers were asked to describe the participant's behaviors and specific characteristics in the situation. A third-party website then compiled the stories received and created a report for each participant to include all stories from self and others (see Appendix C.4 for a sample report).

Group assignment and experimental manipulation. The program director randomly assigned participants to work groups consisting of five or six fellows. There were a few rules that the program followed. First, each group had a similar gender and nationality composition, and second, in cases where there were more than two fellows from the same organization, or the same office, they were assigned to different groups. After being assigned on the first day of the program, these work groups were told to meet each morning to discuss the cases given to them, or to work together on group projects, including the crisis-simulation exercise, throughout the program.

In each program, the program director randomly assigned the work groups to one of the two conditions: treatment and control. A total of 24 groups were assigned to the treatment condition, and 22 groups were assigned to the control condition. All participants were asked to sit together as a group on Wednesday of Week 1, at which time they received the individual packages. The work groups assigned to the treatment condition received a package that included the narrative providers' stories as well as worksheets to facilitate their reflection on the strength narratives. On this worksheet, they were asked to first identify the

commonalities across the stories and to write down the key themes, and then to integrate the evidence to create a written portrait of themselves based on the strengths identified (see Appendix C.5 for a treatment worksheet).

The work groups in the control condition did not receive the stories from the feedback providers but instead received a worksheet to prepare for the group discussion that took place later in one of the classes. In this assignment, the fellows were asked to reflect on a previous experience in which they had observed a leader's impressive communication success or failure in detail, to identify common patterns of communication behavior, and to write how these insights can be tied to the communication structure of their own organization (see Appendix C.6 for a control worksheet).

All groups were given an hour to complete their respective tasks. Although each group's members sat around the table together, participants were told not to discuss with others what they'd received (either within the group or outside the group), in order to give the treatment groups the opportunity to privately reflect on what they received, and to minimize the suspicion of the work groups that were not treated.

Team-functioning survey. On Thursday and Friday of Week 2 (9 to 10 days after the manipulation, depending on the class schedule), all participants were asked to complete a 15-minute survey that measured their individual experience with their work group and collected demographic information to be included as covariates.

The Middle East Respiratory Syndrome (MERS) crisis simulation. The SEF program launched a crisis-simulation exercise on the third day of Week 1 (10 days after the manipulation). In this exercise, all work groups played the role of the Emergency Watch Team working in the Massachusetts state government to monitor developments following the re-

port of a dangerous coronavirus, Middle East Respiratory Syndrome (MERS-CoV), being detected in Massachusetts (see Appendix C.7 for more detailed assignment). All participants were also asked to follow a Twitter account (#GameSEFHKS) to receive the latest information. In addition, more background information on MERS from state, local, and international public health organizations, and fictional news articles confirming the spread of the virus across Massachusetts, with increasing numbers of deaths, was provided (all informational materials given to participants for 7 days leading up to the briefing day are available upon request). Each work group was asked to prepare a brief presentation for the Massachusetts governor's top staff the following Friday, in Week 2, which allowed about 10 days of preparation.

The briefing-day performance evaluation. Each work group presented to a group of "top state officials and experts" consisting of faculty members at the Harvard Kennedy School with various expertise, as well as external experts from the U.S. government, such as the current Director of Massachusetts Emergency Management Agency / Undersecretary for Homeland Security and Emergency Management in Executive Office of Public Safety, a former Commissioner of U.S. Customs and Border Protection, and the Director of the Bureau of Infectious Disease at the Massachusetts Department of Public Health. Each group had 20 minutes to recommend a course of action for the governor. The expert panels, which were blind to the experimental conditions, spent 5 minutes giving each group feedback on its performance and completed an evaluation form (see Appendix C.8 for a sample evaluation sheet).

In order to ensure that all participants benefited from the intervention, after all data collection was concluded I distributed the same materials to those in the treatment condition that were distributed to those in the control condition. I then debriefed all participants on

the experimental procedure in the class that followed.

Measures

Member-rated team functioning. A three-item scale measured the extent to which each individual was satisfied working with the group (Van Der Vegt and Emans 2000). Participants indicated whether they agreed or disagreed with three statements ("I am satisfied with the members of my group," "I am pleased with the way the members of my group and I work together," and "I am very satisfied with working in my group") using a 7-point scale (from 1 = "strongly disagree" to 7 = "strongly agree"; $\alpha = 0.95$). In addition, participants rated the frequency with which they felt their opinions were heard by other group members on a 5-point scale (from 1 = "never" to 5 = "always") and how much they learned from other members of their group on a 4-point scale (from 1 = "none" to 4 = "a lot"). Last, participants rated both the frequency with which they took the perspectives of other group members and the frequency with which other members took their perspectives on a 5-point scale (from 1 = "never" to 5 = "always").

All four measures loaded well onto a single factor (eigenvalue = 2.40, explaining 60% of the variance), and a summary variable for team functioning was created ($\alpha = 0.77$).

Member-rated and expert-rated team performance. All participants reported their team's performance in preparing the MERS exercise according to five dimensions, efficiency, quality of innovation, adherence to schedule, ability to resolve conflict, and overall excellence, on a 5-point scale (from 1 = "very poor" to 5 = "very good"; $\alpha = 0.88$). In addition, each team of three to four expert panels evaluated up to six work groups' presentations based on six criteria: *effectiveness* (whether the group provided convincing support for the recommendations), *clarity* (whether the recommendations were clear and concrete), *fea-*

sibility (whether the policy recommendations were realistic and feasible), *innovativeness* (whether the team showed creative and innovative thinking), *team cohesiveness* (whether the team members showed an ability to relate to each other), and *overall value* of the contents for the decision maker. Out of four programs, the first two used a 5-point scale (from 1 = "needs improvement" to 5 = "excellent"), and the last two used a 7-point scale (from 1 = "needs improvement" to 5 = "excellent"). Thus, we standardized the scales within programs using z scores and combined them into one performance scale ($\alpha = 0.95$).⁵

Because all 11 items loaded well onto a single factor (eigenvalue = 3.85, explaining 35% of the variance), I combined them to create a summary variable that captures both member-rated and expert-rated team performance ($\alpha = 0.87$).

4.3.2 Results and Discussion

Data Analysis Strategy

I first tested whether the average outcome for the treatment groups differs from that for the control group, by collapsing the data to the group level, and regressed the outcome variable onto a dummy variable indicating assignment to the treatment group. Second, I tested whether the average outcome for individuals in treatment groups differed from that for individuals in control groups, by conducting a multivariate regression analysis at the individual level, clustering standard errors by group. Third, I also controlled for theoretically relevant covariates that may have influenced team functioning or team performance.

I controlled for other group-specific characteristics such as group size, mean age, and gen-

⁵Because the limited number of available experts and limited class hours meant that different teams of expert panels evaluated different groups, overall interrater reliability could not be obtained. However, there were four judges, who rated 12 groups together. ICC(1) ranged from 0.13 to 0.51, ICC(2) ranged from 0.37 to 0.81.

der composition (ratio of females to males) based on the literature on team diversity and collective intelligence (Polzer et al. 2002; Woolley et al. 2010). In addition, I controlled for the cohort (by entering four different cohort indicators) in order to control for potential factors that changed over time (such as course schedule and curriculum). For example, the fellows in the October–November 2014 program had more experience working as a group as the result of a curriculum change, and this may have increased their overall team performance compared with previous programs. Next, I controlled for the group of expert panels who evaluated each of the groups, as a total of nine groups of nonoverlapping expert panels evaluated the groups and different groups of experts may have scored the work groups differently.

Consequences of a Jolt for Team Function 10 Days After the Intervention

The work groups assigned to the treatment condition ($M = 0.13$, $SD = 0.35$) rated their average team functioning higher than did the groups assigned to the control condition ($M = -0.15$, $SD = 0.32$), $t(42) = 2.70$, $p = 0.01$, $d = 0.85$. Similarly, the individuals assigned to the treatment condition rated their team functioning to be higher than the individuals assigned to the control condition, $\beta = 0.38$, $SE = 0.13$, $p = 0.008$ in the regression analysis with group-clustered standard errors. Last, controlling for the effect of group size, mean age, gender composition, and cohort/expert panels did not change the direction or significance of the treatment effect, $\beta = 0.39$, $SE = 0.13$, $p = 0.004$ (see Table 4.3 for the hierarchical regression results for the summary variable; individual measures are also reported in Table 4.4).

Table 4.3: Hierarchical multiple regression analyses for member-reported team functioning, Study 2.

Predictor Variables	Team Functioning			
	Step 1		Step 2	
	β	SE	β	SE
Treatment (vs. Control)	0.38**	0.12	0.39**	0.13
Group Size			0.04	0.14
Mean Age			0.01	0.02
Gender Composition			0.6	0.91
Panel #2			-0.16	0.25
Panel #3			-0.36	0.25
Panel #4			-0.04	0.28
Panel #5			-0.14	0.28
Panel #6			0.15	0.29
Panel #7			-0.57*	0.29
Panel #8			0.28	0.27
Panel #9			0.60 [^]	0.31
N	246		246	
Overall R-squared	0.04		0.12	
Overall F	9.23**		2.51**	
Change in R-squared			0.08	
Change in F			1.88*	

Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, [^] $p < 0.10$. β refers to a standardized regression coefficient, and panel refers to group of experts who evaluated work groups.

Consequences of a Jolt for Team Performance 10 Days After the Intervention

In support of Hypothesis 3a, the work groups that were assigned to the treatment condition ($M = 0.18$, $SD = 0.48$) outperformed the groups in the control condition ($M = -0.25$,

Table 4.4: Hierarchical multiple regression analyses for member-reported team functioning by categories, Study 2.

Predictor Variables	Satisfaction with Group Work				Frequency of Voice				Frequency of Learning				Frequency of Perspective-taking			
	Step 1		Step 2		Step 1		Step 2		Step 1		Step 2		Step 1		Step 2	
	β	SE	β	SE	β	SE	β	SE	β	SE	β	SE	β	SE	β	SE
Treatment (vs. Control)	0.29*	0.13	0.24 [^]	0.13	0.28*	0.13	0.35*	0.14	0.34**	0.12	0.30*	0.14	0.19	0.13	0.25 [^]	0.14
Group Size			0.09	0.14			0.09	0.14			0.01	0.14			-0.06	0.14
Mean Age			0.02	0.02			-0.03	0.02			0.03 [^]	0.02			0.02	0.02
Gender Composition			0.35	0.9			1.61 [^]	0.93			-0.90	0.92			0.68	0.91
Panel #2			0.09	0.25			-0.30	0.25			0.2	0.25			-0.45 [^]	0.25
Panel #3			-0.17	0.25			-0.40	0.25			-0.11	0.25			-0.36	0.25
Panel #4			0.27	0.28			-0.43	0.29			0.02	0.29			0.01	0.29
Panel #5			0.00	0.28			-0.40	0.29			0.33	0.28			-0.34	0.28
Panel #6			0.13	0.29			-0.08	0.3			0.24	0.29			0.13	0.29
Panel #7			-0.47	0.28			-0.69*	0.29			0.11	0.29			-0.62*	0.29
Panel #8			0.62*	0.27			-0.02	0.28			0.41	0.28			-0.18	0.28
Panel #9			0.63*	0.31			0.22	0.32			0.38	0.31			0.51	0.31
N		246		246		246		246		246		246		246		246
Overall R-squared		0.02		0.11		0.02		0.09		0.03		0.08		0.01		0.1
Overall F		5.20*		2.34**		5.08*		1.93*		7.55***		1.52		2.15		1.96*
Change in R-squared				0.09		0.07		0.05				0.05				0.09
Change in F				2.06*		1.65 [^]		0.97				0.97				1.94*

Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, $\hat{p} < 0.10$. β refers to a standardized regression coefficient, and panel refers to group of experts who evaluated work groups.

$SD = 0.44$), $t(42) = 3.04$, $p = 0.004$, $d = 0.96$. Similarly, the individuals assigned to the treatment condition outperformed those assigned to the control condition, $\beta = 0.70$, $SE = 0.12$, $p < 0.001$. Controlling for the effect of group size, mean age, gender composition, and cohort/expert panels did not change the direction or significance of the treatment effect, $\beta = 0.77$, $SE = 0.12$, $p < 0.001$ (see Table 4.5 for the hierarchical regression results for the summary variable; member-rated vs. expert-rated performance ratings are reported in Table 4.6).

Mediation Analysis

To test the mediation hypothesis that enhanced team functioning explains the relationship between the experience of jolt and team performance (Hypothesis 3b), I first regressed team performance on the treatment indicator, and entered team functioning as the proposed mediator at the group level. A bootstrap analysis of the indirect effect using 1,000 repetitions showed that the 95% confidence interval (CI) for the indirect effect excluded 0, suggesting that team functioning partially mediated the relationship between positive interpersonal jolts and team performance (estimate = 0.12, base-corrected 95% CI = [0.02, 0.30]). This result is reported in Figure 4.7.

I repeated the same analysis using the individual-level variables, controlling for group size, mean age, gender composition, and cohort/expert groups. A bootstrap analysis of the indirect effect using 1,000 repetitions confirmed that the 95% CI of the indirect effect excluded zero, suggesting that team functioning partially mediated the relationship between jolts and team performance (estimate = 0.14, base-corrected 95% CI = [0.04, 0.26]).

Table 4.5: Hierarchical multiple regression analyses for overall team performance, Study 2.

Predictor Variables	Team Performance			
	Step 1		Step 2	
	β	SE	β	SE
Treatment (vs. Control)	0.70***	0.12	0.77***	0.12
Group Size			0.17	0.12
Mean Age			0.04*	0.02
Gender Composition			2.00*	0.8
Panel #2			0.07	0.22
Panel #3			-0.37 [^]	0.22
Panel #4			-0.01	0.25
Panel #5			0.37	0.25
Panel #6			-0.04	0.26
Panel #7			-0.66**	0.25
Panel #8			0.75**	0.24
Panel #9			0.19	0.27
N		246		246
Overall R-squared		0.12		0.32
Overall F		34.51***		8.50***
Change in R-squared				0.19
Change in F				5.52***

Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, [^] $p < 0.10$. β refers to a standardized regression coefficient, and panel refers to group of experts who evaluated work groups.

4.4 General Discussion

The goal of this paper is to broaden the conceptual width of the positive interpersonal jolt, by scaling it down in the domain of individual health and creativity in the short term, and

Table 4.6: Multiple regression analyses for member-rated and expert-rated team performance, Study 2.

Predictor Variables	Member-Rated Team Performance		Expert-Rated Team Performance	
	Step 1	Step 2	Step 1	Step 2
	β	SE	β	SE
Treatment (vs. Control)	0.26*	0.13	0.28*	0.13
Group Size		0.05	0.14	0.14
Mean Age		0.01	0.02	0.02
Gender Composition		0.95	0.9	0.9
Panel #2		-0.22	0.25	0.25
Panel #3		-0.12	0.25	0.25
Panel #4		0.33	0.28	0.28
Panel #5		0.01	0.28	0.28
Panel #6		-0.03	0.29	0.29
Panel #7		-0.47 [^]	0.28	0.28
Panel #8		0.74**	0.27	0.27
Panel #9		0.86**	0.31	0.31
N	246	246	246	246
Overall R-squared	0.02	0.14	0.11	0.32
Overall F	4.32*	2.95**	31.43***	8.75***
Change in R-squared		0.12		0.21
Change in F		2.80**		6.01***

Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, $\hat{p} < 0.10$. β refers to a standardized regression coefficient, and panel refers to group of experts who evaluated work groups.

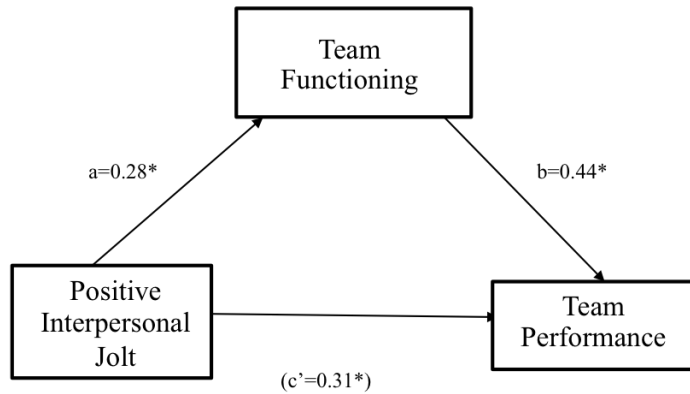


Figure 4.7: Team satisfaction and functioning mediates the relationship between the experience of jolt and team performance. c denotes beta coefficient for total effect, and c' beta coefficient for direct effect. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, $\hat{p} < 0.10$.

by scaling it up in the domain of team functioning and team performance in the long run. Study 1 demonstrated that jolt increased positive social emotions in both self-reports and physiological responses, buffered stress, and improved individual immune response in a laboratory study. Study 2 demonstrated that jolt carried over to individual group members' behavior over a period of 10 days, facilitating intragroup interactions. Importantly, both studies showed that positive interpersonal jolts lead to better performance, in terms of creative problem-solving (in Study 1) and team performance in a crisis simulation (in Study 2). The two studies demonstrate the presence of benefits in experiencing positive interpersonal jolts for both employees from various organizations (Study 1) and work groups consisting of senior leaders (Study 2).

4.4.1 Theoretical and Practical Contributions

This research advances positive organizational scholarship, narrative psychology, and self-affirmation literature in four ways.

First, it adds to the body of research that connects positive social interactions to physiological functioning (Dutton and Heaphy 2003; Heaphy and Dutton 2008). By tapping into one's close social relationships, positive interpersonal jolts may bring greater salience and meaning to past interactions with the narrative providers. This indicates that past social interactions can be capitalized to build necessary psychosocial resources to stay psychologically and physiologically resilient in threatening situations. One important methodological extension of this research is to examine the physiological consequences of jolt, which are less likely to be biased than self-reports. This research used new tools of investigation to accurately measure the impact of positive interpersonal jolt, by including measurements of physiological signals (skin conductance and vagal tone) and collection of saliva samples (immune-reactivity levels). Psychological stress is associated with susceptibility to the common cold (Cohen et al. 1991), and job strain is associated with high rates of absenteeism (Darr and Johns 2008). The findings of increased antibody and reduced physiological arousal under stress suggest that psychological interventions can reduce physical illness and absenteeism, which are costly for organizations.

Second, this research highlights the importance of stories that individuals tell themselves. The intervention I used consisted of a series of deliberate and reflective actions taken to solicit self-knowledge from others who have vivid memories from the past in narrative form, and the incorporation of such stories to redefine and articulate an individual's self-concept. Scholars of narrative psychology called the organization of human experience into self-narratives that consist of plots, characters, settings, and conflicts a "root metaphor for psychology" (Sarbin 1986). Self-narratives create, develop, and maintain the self-concept, which is a collection of self-representations (Ashforth 2000; Bruner 1990; Ibarra and Barbulescu 2010; McAdams 1996, 1999; Singer and Salovey 2010). The study

of self-narratives was proposed as an alternative to psychometric tests that often fail to capture subtle and complex human experiences (Singer and Salovey 2010), but empirical tests of the efficacy of self-narrative construction have been rare. Instead of relegating self-narratives to mere anecdotes, my work resuscitates this scholarship by actively using them as an intervention in a randomized trial. Not only does this research provide direct empirical evidence that constructing self-narratives with positive interpersonal jolts helps individuals' health and performance, but it also suggests that the very reflective process of jolt that involves a revision of one's self-narratives is critical.

Third, this research broadens the scope of self-affirmation. Past research mainly focused on curbing aversive responses in the context of imminent identity threat; often the effect of self-affirmation was present only when individuals felt threatened (Sherman and Cohen 2006). Self-affirmation seemed to have little impact on behavior in the absence of a threat to self-concept. In one study that directly tested the effect of self-affirmation on improving problem-solving performance, the effect existed only in chronically stressed individuals (Creswell et al. 2013). However, the present research shows that social affirmation can increase performance outcomes at individual and group levels, even under situations where threat to self is not clearly imposed, although it is possible that the perceptions of threat prior to the problem-solving task and crisis-simulation briefings may have moderated the relationship between jolt and performance.

Fourth, this research deepens our understanding of how creating a point of reflection for employees can benefit their relationships with others in the workplace. Because the narratives that describe the focal individual come from various sources, they allow him or her to draw from narratives that are not necessarily restricted to work-related strengths and contributions. Rather, these narratives broaden the range of self-defining moments such

that the focal individual can construct multiple identities beyond the professional (e.g., "I am not only an employee of the corporation; I am also a daughter, mother, and a friend"). In line with the research on positive identity construction (Dutton et al. 2010), positive interpersonal jolts can spark changes in self-concept, thus creating an opportunity to reconstruct a work-related identity that is aligned with one's personal strengths and purpose. Although performance evaluations could function as a negative, threatening jolt that produces a negative self-concept, managers could consider different forms of performance review that help employees reflect on their positive relationships and contributions. Thus, this research has implications for how organizations communicate with their employees to foster motivation and engagement and to give them an opportunity to learn and grow from these relationships.

4.4.2 Limitations and Venues for Future Research

First, although current employees who have at least 3 years of work experience were recruited, it is possible that only those who had positive and meaningful social relationships participated, since this study required participants to identify and reach out to potential narrative providers. Individuals who did not want to participate in this exercise may have different characteristics from those who did. Study 2 did not have the same problem because senior executives had already confirmed their participation with the executive education program and then were asked to identify their narrative providers. However, holding a leadership position in their respective organizations may also be associated with having more contacts who may be willing to write best-self stories. Future studies can address this problem by asking participants who opted out to participate in the study as an additional control group (intent-to-treat).

Second, this research may not be generalizable to the different organizational settings,

as the two studies were conducted either in the laboratory or in the classroom. In the organizational setting, specific organizational norms or contexts may play a significant role in modulating the role of positive interpersonal jolts in enhancing employees' health and performance. Some work by design may not allow employees sufficient autonomy to use their strengths even if these strengths have been identified. In addition, the work groups in existing organizations may have fixed hierarchical structures and be assigned particular roles, which may leave little room for each individual to contribute beyond his or her assignment. The ad hoc work groups in Study 2 were rather flat in terms of hierarchy, and have much more flexibility in assigning roles. Thus, future research could be conducted in the organizational setting to explore the far-reaching interpersonal and intergroup benefits as well as the impact on organizational outcomes (e.g., employee absenteeism, attrition, customer satisfaction, and business profits). Furthermore, future work could identify the boundary conditions under which the effect of positive interpersonal jolts is reduced, or may even backfire.

Third, the two studies compared positive interpersonal jolts with a control condition. In Study 1, individuals who were assigned to the treatment condition identified and contacted their narrative providers prior to the laboratory study and engaged in the writing exercise based on the stories they received. Control participants, however, did not interact with their social network, nor did they have a chance to reflect on their strengths, but instead wrote about their daily routines. Similarly, in Study 2, individuals who were assigned to the control groups engaged in a writing exercise about leadership communications. It is possible that these control conditions induced an aversive psychological state, which could have biased the results. Future studies can delineate the effect of positive interpersonal jolts by comparing a condition in which participants identify their own strengths and write about

them and a condition that simply focuses on positive autobiographical memories. This will clearly delineate whether this jolt effect can be driven by ordinary positive memories or by self-defining memories that involve abstract and higher-level construal.

Fourth, future research should address the potential negative outcomes of social-affirmation interventions. For example, it is possible that this intervention may lead individuals to engage in self-enhancing thoughts and positive illusions, leaving them vulnerable to self-serving biases such as overconfidence (Taylor and Brown 1988). Future studies should explore the potential danger of social affirmation in decision-making tasks, in which self-serving biases can lead to suboptimal outcomes. At the group level, a heightened sense of group cohesion may also lead to an escalation of commitment to a losing course of action (Thompson et al. 1998). Given that affirming on decision-relevant traits (vs. traits that were of low relevance) was shown to increase escalation of commitment to a losing course of action (Sivanathan et al. 2008), future studies could examine the effect of specific domains of traits and values that are being affirmed. Thus, future work could identify the boundary conditions under which the effect of positive interpersonal jolts is reduced, or may even backfire.

4.4.3 Conclusion

Organizational scholars have become increasingly aware of the importance of human physiological processes in the workplace. Much of this work has focused on how workplace stressors (such as high job demands, burnout, and interpersonal/relational stresses) reduce productivity through higher rates of absenteeism among employees and rising health-care costs incurred by employers (Ganster 2005; Greenberg 2010; Halpern 2005; Zellars et al. 2009). There is, however, a relative dearth of research on how positive workplace in-

terventions could lead to better physiological function and improved overall health and productivity.

I argue that rigorous empirical tests of such interventions can significantly improve the way organizations recruit, hire, and develop their employees. This research identified a low-cost intervention that enables organizations to institute high-impact changes that improve employees' psychological resilience, physical health, productivity, and organizational performance. This intervention would allow employers and employees to capitalize on their psychosocial resources and align their strengths closely with the work they do. This research suggests that positive interpersonal jolts may lead to an upward spiral, in which the jolt increases teams' relational coordination and performance. Such positive team dynamics reaffirm the employee's core strength.

Appendix A

A.1 Moral Dilemma Scenario (Study 1)

You are the Chief Medical Director at a charity hospital in Deeg, a poor slum community in the Rajasthan region of India. You are confronted with an important decision regarding how to allocate hospital funds. One of the patients at the hospital is a five year-old little boy named Ravi, who needs a rare and extremely expensive (\$2 million) transplant operation to save his life. The only available funds are the \$2 million that has already been set aside to purchase better equipment over the next five years for the transplant department. In the long run, these purchases will save the lives of 200 future patients from the Rajasthan region.

Presented with the choice, you have to decide whether to use \$2 million to save Ravi's life, or to use it for other hospital needs. The transplant department is knocking your door right now and you need to notify your decision whether or not to approve the transplant request. What is your decision?

- 1) Approve the transplant request.
- 2) Deny the transplant request.

A.2 High-conflict, Personal Moral Dilemmas (Study 2a)

Euthanasia

You are the leader of a small group of soldiers. You are on your way back from a completed mission deep in enemy territory when one of your men has stepped in a trap that has been set by the enemy and he is badly injured. The trap is connected to a radio device that by now has alerted the enemy to your presence. They will soon be on their way. If the enemy finds your injured man they will torture him and kill him. He begs you not to leave him behind, but if you try to take him with you your entire group will be captured. The only way to prevent this injured soldier from being tortured is to shoot him yourself. Is it appropriate for you to shoot this soldier in order to prevent him from being tortured by the enemy?

Vaccine Test

A viral epidemic has spread across the globe killing millions of people. You have developed two substances in your home laboratory. You know that one of them is a vaccine, but you don't know which one. You also know that the other one is deadly. Once you figure out which substance is the vaccine you can use it to save millions of lives. You have with you two people who are under your care, and the only way to identify the vaccine is to inject each of these people with one of the two substances. One person will live, the other will die, and you will be able to start saving lives with your vaccine. Is it appropriate for you to kill one of these people with a deadly injection in order to identify a vaccine that will save millions of lives?

Vitamins

You are the leader of a mountaineering expedition that is stranded in the wilderness. Your expedition includes a family of six that has a genetically caused vitamin deficiency. A few people's kidneys contain large amounts of this vitamin. There is one such person in your party. The only way to save the lives of the six members of this family is to remove one of this man's kidneys so that the necessary vitamins may be extracted from it. The man will not die if you do this, but his health will be compromised. The man is opposed to this plan, but you have the power to do as you see fit. Is it appropriate for you to forcibly remove this man's kidney in order to save the lives of the six vitamin-deficient people?

Sacrifice

You, your husband, and your four children are crossing a mountain range on your return journey to your homeland. You have inadvertently set up camp on a local clan's sacred burial ground. The leader of the clan says that according to the local laws, you and your family must be put to death. However, he will let yourself, your husband, and your three other children live if you yourself will kill your oldest son. Is it appropriate for you to kill your oldest son in order to save your husband and your other three children?

Sophie's Choice

You, your husband, and your four children are crossing a mountain range on your return journey to your homeland. You have inadvertently set up camp on a local clan's sacred burial ground. The leader of the clan says that according to the local laws, you and your family must be put to death. However, he will let yourself, your husband, and your three

other children live if you yourself will kill your oldest son. Is it appropriate for you to kill your oldest son in order to save your husband and your other three children?

A.3 High-conflict, Personal Moral Dilemmas (Study 3)

Crying Baby

Enemy soldiers have taken over your village. They have orders to kill all remaining civilians. You and some of your townspeople have sought refuge in the cellar of a large house. Outside you hear the voices of soldiers who have come to search the house for valuables. Your baby begins to cry loudly. You cover his mouth to block the sound. If you remove your hand from his mouth his crying will summon the attention of the soldiers who will kill you, your child, and the others hiding out in the cellar. To save yourself and the others you must smother your child to death.

Which option would you choose?

- 1) I do not smother my child to death.
- 2) I smother my child to death.

Sophie's Choice [same as in Study 2]

Which option would you choose?

- 1) I refuse to bring one of my children.
- 2) I bring one of my children to his laboratory.

Euthanasia [same as in Study 2]

Which option would you choose?

- 1) I do not shoot him myself.
- 2) I shoot him myself.

Vitamins [same as in Study 2]

Which option would you choose?

- 1) I do not remove this man's kidney.
- 2) I remove the man's kidney.

A.4 Congruent vs. Incongruent Moral Dilemmas (Study 4; Conway & Gawronsky, 2013)

Car Accident	incongruent	You are driving through a busy city street when all of a sudden a young mother carrying a child trips and falls into the path of your vehicle. You are going too fast to break in time; your only hope is to swerve out of the way. Unfortunately, the only place you can swerve is currently occupied by a little old lady. If you swerve to avoid the young mother and baby, you will seriously injure or kill the old lady.	Is it appropriate to swerve and hit the old lady in order to avoid the young mother and child?
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Appendix A

Car Accident	congruent	<p>You are driving through a busy city street when all of a sudden a young mother carrying a child trips and falls into the path of your vehicle. You are going too fast to break in time; your only hope is to swerve out of the way. Unfortunately, the only place you can swerve is currently occupied by a group of children on their way to elementary school. If you swerve to avoid the young mother and baby, you will seriously injure or kill several of them.</p>	<p>Is it appropriate to swerve and hit the schoolchildren in order to avoid the young mother and child?</p>
Crying Baby	incongruent	<p>It is war time. Enemy soldiers have taken over your village. They have orders to kill all remaining civilians. You and some of your townspeople have sought refuge in the cellar of a large house. Outside you hear the voices of soldiers who have come to search the house for valuables. A baby with no parents begins to cry loudly. You cover her mouth to block the sound. If you remove your hand from the baby's mouth her crying will summon the attention of the soldiers who will kill you and the others hiding out in the cellar. To save yourself and the others you must smother the child to death.</p>	<p>Is it appropriate for you to smother the child in order to save yourself and the other townspeople from being killed?</p>

Appendix A

<p>Crying Baby</p>	<p>con- gruent</p>	<p>It is war time. Enemy soldiers have taken over your village. They have orders to capture all remaining civilians to make them work quarrying stone in a mine. You and some of your townspeople have sought refuge in the cellar of a large house. Outside you hear the voices of soldiers who have come to search the house for valuables. A baby with no parents begins to cry loudly. You cover her mouth to block the sound. If you remove your hand from her mouth the crying will summon the attention of the soldiers who will capture you and the others hiding out in the cellar. To save yourself and the others from laboring in the mine you must smother the child to death.</p>	<p>Is it appropriate for you to smother the child in order to save yourself and the other townspeople from being captured?</p>
<p>Abortion</p>	<p>incon- gruent</p>	<p>You are a surgeon. A young woman you know becomes pregnant, but her body reacts in an unusual fashion. She develops a severe case of preeclampsia, a dangerous syndrome that leads to rapid increases in blood pressure. The only treatment is to deliver the baby. Unless the baby is delivered soon, the mother will die. However, the baby is too young to survive on its own. If it is delivered, it will die. So, although it is very difficult for her, the mother asks you to abort the baby.</p>	<p>Is it appropriate for you to perform an abortion in order to save the mother's life?</p>

Appendix A

Abortion	con- gruent	<p>You are a surgeon. A young woman you know becomes pregnant, but she is not yet ready for children. She has not finished high school, has no income, and was abandoned by the father. If she has the baby now, she will be stuck as a single mother on welfare for the rest of her life. This will make things very hard on her and the baby. She thinks that it would be smarter to wait and have children later. So, although it is very difficult for her, she asks you to abort the baby.</p>	<p>Is it appropriate for you to perform an abortion in order to let the mother live a better life?</p>
Torture	incon- gruent	<p>You are a police officer, and have recently caught a criminal you have been hunting for some time. He is allegedly responsible for rigging a series of explosive devices: some that have already gone off and some that have yet to detonate. He places explosives outside city cafes and sets them to go off at a time when people are drinking coffee on the patios. In this manner, he has injured many people and might injure many more. Now that the criminal is in custody, you want to know where the unexploded bombs are so you can defuse them. He refuses to talk, so you decide to use “aggressive interrogation techniques” like holding his head under water and beating him.</p>	<p>Is it appropriate for you to use “aggressive interrogation techniques” in order to find and defuse the unexploded bombs?</p>

Appendix A

Torture	con- gruent	<p>You are a police officer, and have recently caught a criminal you have been hunting for some time. He is allegedly responsible for rigging a series of explosive devices: some that have already gone off and some that have yet to detonate. He places explosives outside city cafes and sets them to go off at a time when no one is around. His explosives are inside paint cans so that they spray nearby objects with paint. In this manner, he has sprayed many cafes with paint and might spray many more. Now that the criminal is in custody, you want to know where the unexploded bombs are so you can defuse them. He refuses to talk, so you decide to use “aggressive interrogation techniques” like holding his head under water and beating him.</p>	<p>Is it appropriate for you to use “aggressive interrogation techniques” in order to find and defuse the unexploded bombs?</p>
Vaccine Policy	incon- gruent	<p>You are a doctor in a health clinic overrun by patients with a serious disease. You just received a shipment of drugs that can cure the disease but the drugs have their own severe side effects. If you administer the drugs to your patients, a small number will die from the side effects but most will live. If you do not, most will die from the disease.</p>	<p>Is it appropriate for you to administer the drug to your patients?</p>

Appendix A

Vaccine Policy	con-gruent	You are a doctor in a health clinic overrun by patients with the latest flu virus. You just received a shipment of drugs that can cure the flu but the drugs have their own severe side effects. If you administer the drugs to your patients, a small number will die from the side effects but most will live. If you do not, most will continue to suffer from the effects of the flu virus for some time.	Is it appropriate for you to administer the drug to your patients?
Animal Research	incon-gruent	You have been hired by a pharmaceutical company to conduct research on their products. Since products must be fit for human use, they are first tried out on animals. Your job is to find out the effects various chemicals have on rats, pigeons, rabbits, and monkeys. Most chemicals have only minor effects on the animals, but some cause them discomfort or even permanent damage. The chemicals you are researching are slated to form part of a new AIDS drug cocktail that will give new hope to millions of AIDS victims around the world. You anticipate saving many lives with the chemicals.	Is it appropriate to test these chemicals on animals?

Appendix A

Animal Research	con- gruent	<p>You have been hired by a pharmaceutical company to conduct research on their products. Since products must be fit for human use, they are first tried out on animals. Your job is to find out the effects various chemicals have on rats, pigeons, rabbits, and monkeys. Most chemicals have only minor effects on the animals, but some cause them discomfort or even permanent damage. The chemicals you are researching are slated to form part of a new acne facial cleanser that will give new hope to people with pimples and greasy skin. You anticipate making many people feel better about their appearance with the chemicals.</p>	<p>Is it appropriate to test these chemicals on animals?</p>
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Appendix B

B.1 Instructions and Materials for the Online Task (Study 2)

“Please read the short essay with three paragraphs that contain spelling errors. Note that some lines may have a word with an error, but some may not. Please find as many errors as you can on each line, and write it down in each corresponding box. For example, if you saw an error on the 3rd line, you can write down what the incorrect word is, and how it needs to be changed. For example, [Febraury→February].”

Many academics have writtten about professional ethics; however, there has been relatively little study on the question of how and to what degree ethics in one profession clash with the ethics of another, or with the generally accepted social ethics. For many lines of work, there is little variance between the accepted moral standrads of the profession and the surrounding culture and in-stiutions. Typically the variance is a subtle matter of degree or a difference in the priorites assigned to particular duties or funtions. It is a difference of emphasis, not substance.

Consider the example of medical ethics. Hippocrates cultvated a requisite code for the medical profession requiring confidentiality in the doctor-patient

relationship. A refusal to divulge another person's most private matters is a moral standard to which all citizens are considered to be bound, but physicians are expected to follow this standard more stringently to ensure the trust of their patients who must divulge all matter of secrets to allow a proper diagnosis. A doctor's code of ethics also requires using medical expertise only for the good of patients. This is expected of everybody, but is especially true of a doctor who has an unusual capacity to do harm. Likewise, while all of us are expected to be truthful, a college professor must take special care in delivering information to students.

Do the same circumstances apply to the pursuit of profit? Since the beginning of the world trade route, writers have asserted the benefits of commerce in their zeal to promote the role of the middle class in a benevolent society. Trade encouraged the exchange of ideas and culture among disparate people, fostering understanding and tolerance. Trade made different societies aware of their interdependence. Although principles of generosity and sharing are not generally advanced by trade, justice and equality are. Still, while many were quick to laud the advantages of commerce, many eighteenth century moralists pointed out contradictions between the teachings of the dominant world religions and the rules of trade. Today, there are many practices often admissible in the pursuit of monetary gain that would meet with stern disapproval in society at large. The unspoken rules of particular professions are pitted against wider cultural mores. Durkheim points to a conflict between a soldier who must be obedient to a hierarchical command structure and a scientist whose moral duty is to question entrenched authority.

B.2 Instructions for the Data Entry Task (Study 4)

“You are about to start the data-entry task. You will be given 5 survey responses from a study conducted in Italy. If you have entered all five documents (10 pages total), you will receive an extra \$10 at the end of the experiment. Please read the following instructions carefully. If you fail to follow the instructions, you will not be given the additional \$10. If you wish to stop entering the data, or fail to finish entering the data (by 40 minutes after the start of the experiment), we will pay \$2 per survey entered. You will receive 10 pages of data that include 5 participants’ survey responses. You are asked to enter the responses (not the questions) into the Excel spreadsheet. Below is an example of the spreadsheet that you will be working from.”

	Sample Answers	Survey 1	Survey 2	Survey 3	Survey 4	Survey 5
Please type your participant ID below						
	224010					
Nome e Cognome del bambino	Giovanni Ferraro					
Sesso	maschio					
Luogo di nascita	Castelfranco					
Data di nascita	9/9/12					
Nome della Scuola	Prim. Treville					
Classe	3B					
Numero di fratelli o sorelle	1					

In the top column, **you will be asked your participant ID first**. As shown in the example, please enter the numbers in the yellow cell. In the same column, you will see a total of 24 questions written in Italian. You do not need to know what the questions mean. The second column gives sample responses. Please follow the same format as the sample.

Your job is to enter five people’s responses in the 3rd to 8th columns.

- You can leave an answer empty if you cannot recognize any of the characters (due to poor handwriting, or printing problems).
- You can leave an answer empty if there is no response.

Appendix C

C.1 Treatment Booklet



Reflected Best Self Exercise

In this exercise, you will be asked to write your best-self stories. All responses will remain strictly confidential. Only you will have access to your own stories.

Step I. Write Your Own Best-Self Stories

While you're waiting for your stories from respondents, please engage in deeper personal reflection about times when you believe you were at your best. You will analyze your own best-self stories, and the analysis will be part of your final reflected best-self portrait.

Think about three times in your life when you were at your best. Allow yourself to think of stories from all contexts and time periods. For three of these memories, write a story about what happened. In the story you may choose to describe the context, the role you played, the actions you took, the characteristics you displayed, the results, and the reasons behind your actions. The examples and explanation in the sample can be helpful.

Sample Story

I feel I was at my best helping my organization create and pursue a new vision. We had been in existence for ten years and had tried and learned so many things along the way. I believed in the organization's mission but wanted to move us in a new direction to expand our impact. I reflected on what was possible and crafted a vision of our team at our best. I presented the vision to my team and was delighted to incorporate their ideas into mine, thus creating something entirely new in a way that united the team.

Your turn: Pretend you received the story request you sent a while ago. Reflect about times when you were, and normally are, at your best and capture the stories that exemplify that time in the same space, document, or file that will eventually house the stories you receive from respondents.

Story I.



Story II.



Story III.



Now, please go back to the computer screen, press CONTINUE, and follow the instructions.

Step II. Read Your Best-Self Stories

Please first read each of your stories from respondents carefully. These are the stories that have been compiled for you.

WARNING: Reading these stories can stir up a great deal of emotions for you. It is normal to find yourself surprised by how people saw you positively.

When you have thought deeply about each of the stories, look for patterns and themes that emerge from considering the stories and analysis together. When you are ready, please turn to the next page.

Step III. Compose the Reflected Best-Self Portrait

Create a portrait of your best-self that captures the wisdom in your personal and reflected best-self analysis. The portrait is meant to be an aggregated articulation of your personal and reflected best-self which you can refer to and revise well in to the future.

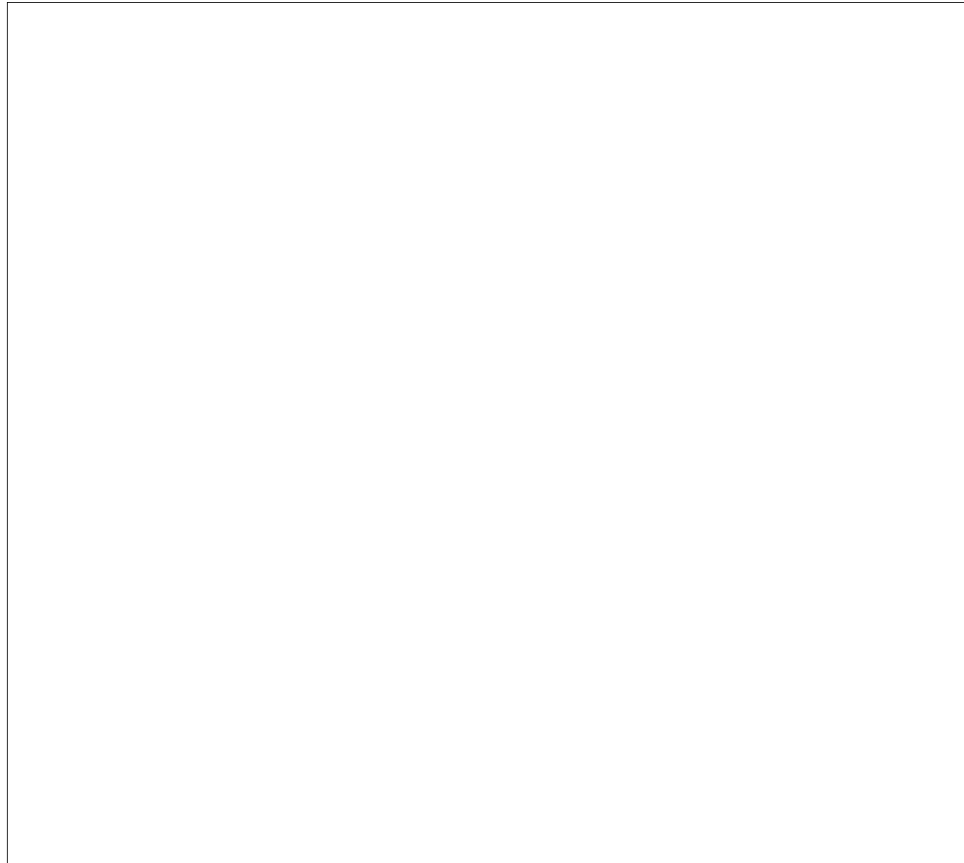
Sample Reflected Best-Self Portrait

When I am at my best, I tend to be creative. I am enthusiastic about ideas and I craft bold visions. I am an innovative builder who perseveres in the pursuit of the new. I do not waste energy thinking about missed opportunities or past failures nor do I take on the negative energy of the insecure or worry about critics. I stay centered and focused on what is possible and important.

I use frameworks to help me make sense of complex issues. I can see disparate ideas and integrate them. So I make points others do not readily see. In doing so, I frame experiences in compelling and engaging ways. I paint visions and provide new ways for people to see. I use metaphors and stories to do this. I find the stories in everyday experiences, and people find it easy to understand them. The new images that follow help people to take action.

In helping others, I try to empathize with them and understand their needs. I give them my attention and energy but I allow them to be in charge. In exercising influence, I try to enroll people, not force them, in new directions. I invite people to work with me. I use dialog to help people surface their ideas, and then I weave them together with others until we create knowledge in real time. I ignore symptoms and focus on deep causes. I help people and groups surface the darkest realities and the most painful conflicts. From these emergent tensions comes the energy for transformation, I liberate people from their fears and help them embrace new paths. In all of this, I try to model the message of integrity, growth, and transformation.

Reflected
Best-Self Portrait



Please feel free to take this booklet as well as the respondents' stories with you. Now, please go back to the computer screen, press CONTINUE, and follow the instructions.

C.2 Control Booklet



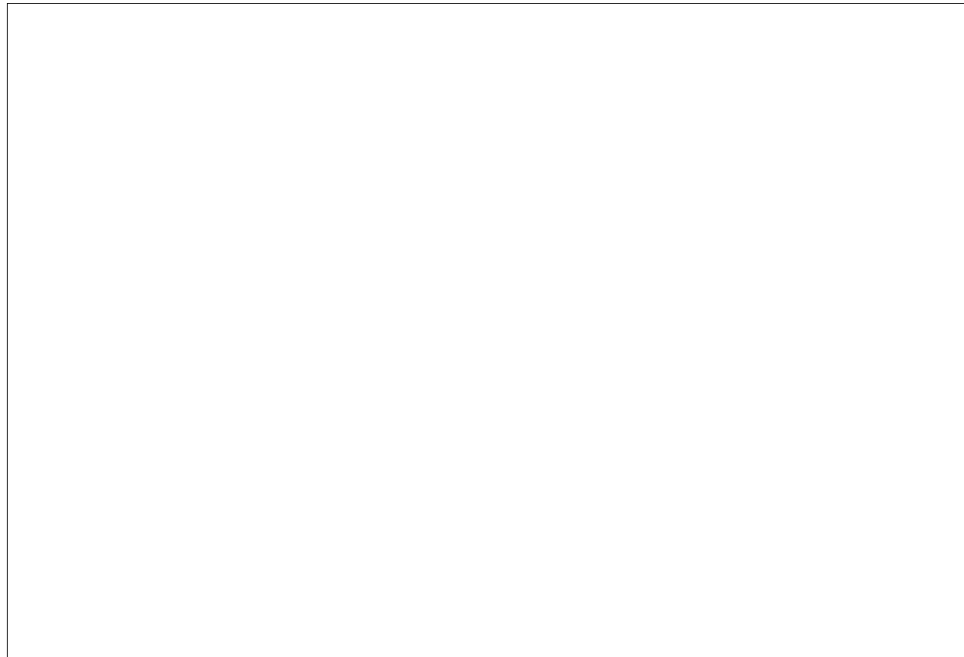
Writing Exercise

In this exercise, you will be asked to write about your daily activities. All responses will remain strictly confidential. Only you will have access to your own stories.

Writing Exercise: Your Daily Routines at Work

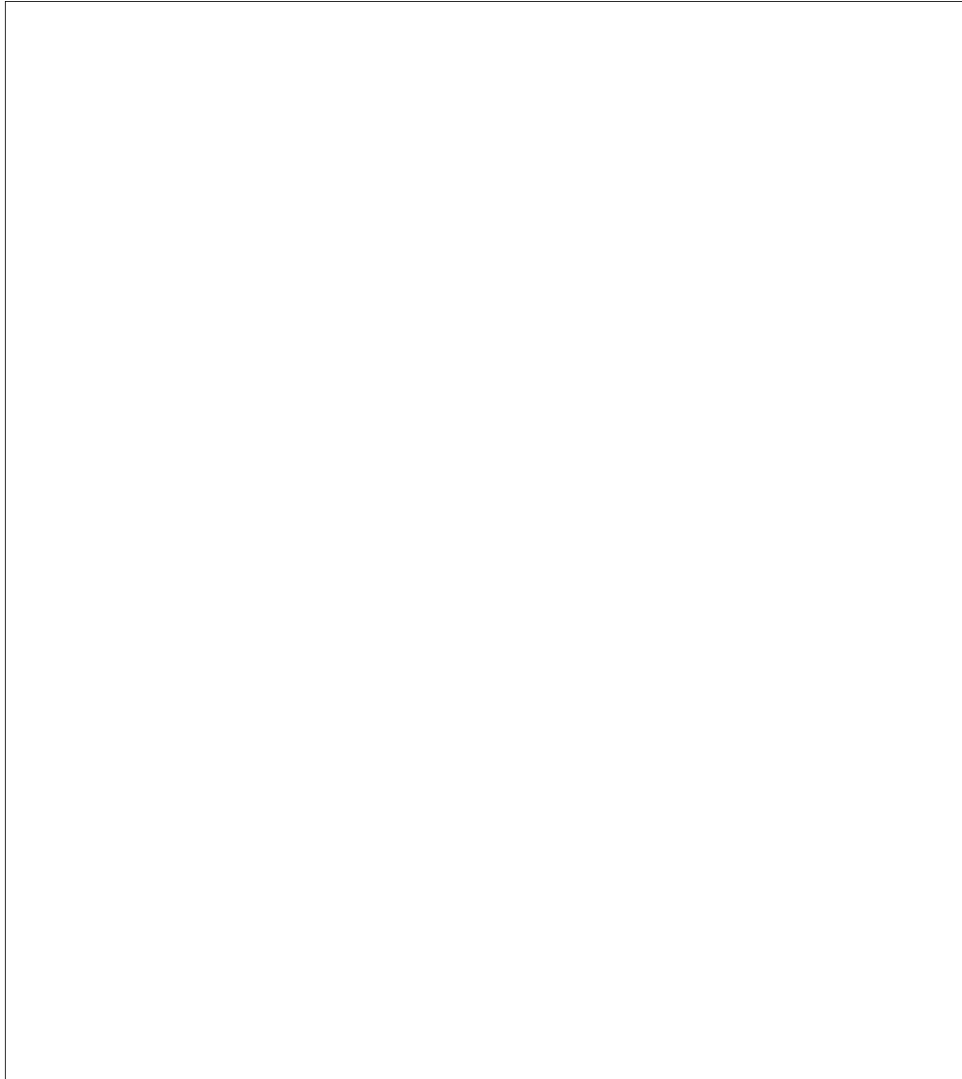
Please recall your daily routines as vividly as possible. We would like to understand the types of activities that you regularly engage in at your workplace.

First, please recall what you do when you get up in the morning, how you get to work, and how you start your day at work. Please provide as many details as possible.

A large, empty rectangular box with a thin black border, intended for the user to write their response to the writing exercise.

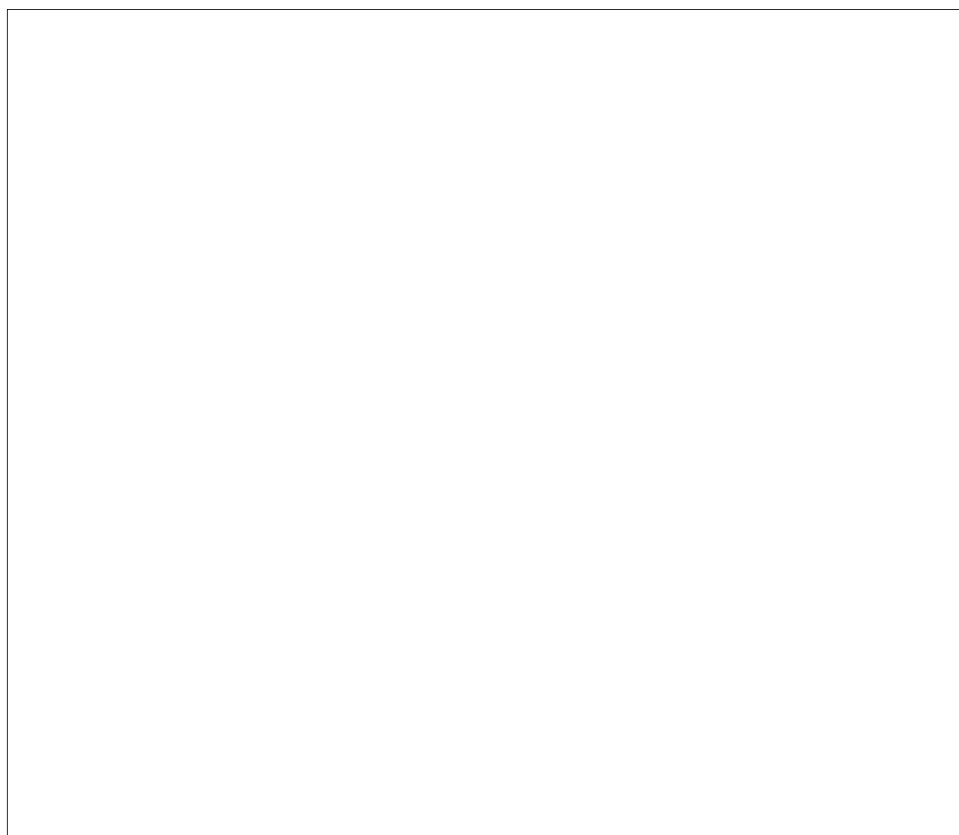
Appendix C

Second, please recall what you do during your normal work hours. What are the responsibilities you have at work? Please provide as many details as possible.



Appendix C

Third, please recall what you do after you are done with work. What do you normally do when you return home until you go to bed? Please provide as many details as possible.

A large, empty rectangular box with a thin black border, intended for the respondent to write their answer to the question above.

Please feel free to take this booklet with you. Now, please go back to the computer screen, press CONTINUE, and follow the instructions.

C.3 Sample Email from the Senior Executive Fellows Program

Dear Participant,

As a participant in the Senior Executive Fellows (SEF) program at Harvard Kennedy School, we ask that you participate in a 360 degree assessment prior to your arrival in Cambridge. The instrument we employ is the 1Self Assessment. The assessment is distributed by *Essentic*, a small UK-based firm. The 1Self assessment focuses in particular on how you can foster excellence by identifying and harnessing your unique strengths.

For the External Assessment, you will be asked to nominate a minimum of 5-10 individuals to provide feedback in the form of brief stories - accounts of times when you were at your very best, when you made a positive and lasting impact on people and situations. This will be of greatest value to you if at least five stories come from those in your professional life- professional colleagues, mentors, superiors and subordinates. We encourage you to ask friends or family members, who know you in a different context and whose stories can supplement feedback from the professional world. The goal is to focus on your strengths and unique contribution. These stories should be brief accounts (approximately 250 words or less). For the Self Assessment, you will be asked for your own account of when you are at your personal best.

Your External Assessment and Self Assessment will be combined into a report which you alone will receive. Neither Harvard nor Essentic retains any of your information. It is collected, collated and provided only to you. During the program, we will discuss the theory and research underlying this approach and how to interpret the results.

You will be contacted separately by Essentic, the provider of the 1Self Assessment by Thursday, March 27. They will send detailed instructions for accessing and completing the 1Self. Please add 1Self@essentic.com to your email contacts/address book to ensure the mail reaches your inbox. More information on 1Self is available through the Essentic website: www.essentic.com

We look forward to seeing you in Cambridge!

Senior Executive Fellows Program Team
Harvard Kennedy School


C.4 Sample Best-Self Report



1 Self Signature
Strengths Assessment
for Sample Report

A new lens into who you are when you're at your best

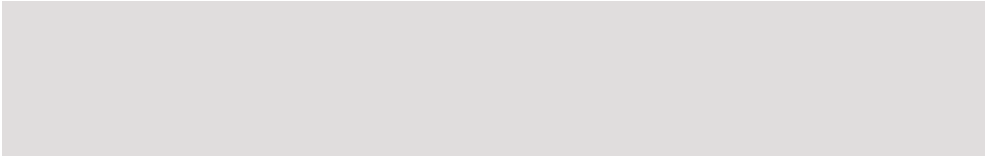
Essentic



The intent of this report is to remind you of the person you have been when you are at your best – from other people’s perspectives and your own.

We recommend that you find a private place to digest the stories and information in your 1Self Assessment. Reading your 1Self stories can be an emotional experience.

Please read through your entire 1Self Assessment once to get a sense of what others noticed about you, then proceed with the worksheet instructions.



Feedbacker

Feedbacker 1

Story 1

Feedback will appear below each story heading.

Story 2

Story 3

Feedbacker

Feedbacker 2

Story 1

Feedback will appear below head story heading.

Story 2

Story 3

Feedbacker

Feedbacker 3

Story 1

Feedback will appear below each story heading

Story 2

Story 3

Self Assessment: You at Your Best

Story 1

Participants Self Assessment text will appear below each story heading.

Story 2

Story 3

C.5 Treatment Worksheet

STRENGTH-BASED LEADERSHIP ASSIGNMENT

You do not have to turn in your iSelf report, or this booklet. However, please keep in mind that this booklet is to help you refresh your memories for future discussions. We ask you to spend 30 minutes filling it out. Please do not discuss any details about this assignment.

Reflecting Upon Your Core Strength

Now, please read through your iSelf report a second time. In particular, think about the signature strengths and themes which emerge from each story. Please search for patterns across your report. You may be surprised by signature strengths and events which did not seem so important to you, but touched others consistently.

Patterns Across Your Feedback

Read all of your feedback and take notes on the key insights. Look for commonalities across the responses. Create themes where you find a commonality and link any relevant examples to it. The themes can include: strengths you displayed during these episodes, emotions you experienced during these episodes, and how others experienced you at your best.

You may find it useful to fill in the table below.

Commonality/Theme	Examples Given	My Interpretation
<i>Creative</i>	<ol style="list-style-type: none"> 1. Innovative builder of new projects for education. 2. Find new solutions for old problems in department relationships with my boss. 3. Guided company in transforming itself. 	<i>My ideas tend to be bold and creative. I am an innovative builder of the new. I tend to bring a new vision to the old.</i>

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Characteristics of Your Core Strength

Your goal now is to integrate the evidence across your sources and develop a statement of the person you are when you are at your best. This is your 1Self Statement, and you may find you come back to it when you need to ignite energy, unleash innovation or need courage to use your signature strengths and be your best more often.



C.6 Control Worksheet

LEADERSHIP OBSERVATION ASSIGNMENT

You do not have to turn in this assignment. However, please keep in mind that this booklet is to help you refresh your memories for future discussions. We ask you to spend 30 minutes filling it out. Please do not discuss any details about this assignment.

Reflecting Upon Communication Experience

Effective communication is essential to the success of any organization. Good communication can lead to extraordinary performance even for small or poorly equipped organizations, and poor communication can be devastating even for the most well established organizations.

Think about three times in your career when you observed a leader's impressive communication success, or a leader's communication failure. For each episode, write the story of what happened, including how the episode got started, what kept it going, and how it came to an end.

Episode 1:

Episode 2:

Episode 3:

Characteristics of Communication

Review the three episodes you just described and search for patterns of behavior and experience that emerged in the episodes.

What strengths did a leader display during these episodes?

What weaknesses did a leader display during these episodes?

What emotions did you experience during these episodes?

Communication in your Organization

Combine your observations about the three episodes into a written summary that captures what you think are the most important aspects of communication. Read all of your observations and take notes on the key insights. Look for commonalities across the episodes. Create themes where you find a commonality and link any relevant examples to it. Then, explain how these insights can be tied to the communication structure of your current organization.

Write your summary here:

Commonality/Theme	Examples Given	My Interpretation

C.7 MERS Assignment



Senior Executive Fellows Program
October 2014

You are a member of a small interagency team (composed of members of your SEF discussion group) working in Massachusetts state government. With the discovery of a dangerous coronavirus here in the Commonwealth, the Governor's chief of staff has contacted your team leader and tasked the group to monitor progress of the virus, assess the threat to public health and safety, identify options for action by public health and emergency management authorities, and recommend a preferred course of action. You should complete your assessment prior to Friday, October 24.

The chief of staff explains that the Bay State Medical Center in Springfield, MA admitted two patients Saturday evening with intense flu like symptoms. Both were in respiratory distress. As it happened there was a young Saudi medical doctor working in the Bay State Emergency Room as part of his medical residency. He suggested that the patients might be suffering from the Middle East Respiratory Syndrome (MERS-CoV), a rare, recently discovered coronavirus, heretofore only seen in the Middle East, with a few cases in Europe.

Massachusetts Public Health Commissioner Cheryl Bartlett spoke this morning with Dr Tom Frieden, Director of the US Center for Disease Control (CDC), the nation's leading public health agency. Dr Frieden shared with Commissioner Bartlett what is known about MERS-CoV and confirmed that the two cases in Springfield are MERS CoV or a closely allied strain. They agreed that they would collaborate on public statements concerning MERS, particularly important in light of the many misleading, alarming and misinformed reports in today's media concerning Ebola and Enterovirus-68.

On Friday morning, October 24, you will conduct a formal oral briefing of the Governor's top executives and staff (the Commissioner of the Department of Public Health, the Director of the Massachusetts Emergency Management Agency, and the Governor's director of communications and political advisor) on your assessment and recommendations for state action. The chief of staff asks that you highlight any specific actions involving the Governor, and that with all recommendations, you should be as specific as possible about timing, sequence, and future contingencies.

Between now and the day of the briefing, SEF participants will receive periodic news briefs and announcements from public health agencies about events in the developing epidemic. This material and other information that discussion group members may gather should be incorporated in your group's work on this assignment.

Appendix C

On Friday, the 24th, each SEF discussion group team will conduct its briefing before a panel of Harvard faculty and actual senior state officials from the relevant departments. Review panel members will rate and critique each discussion group's briefing individually following each presentation. They will also provide substantive comments on the potential epidemic and their overall impressions of the simulated briefings in full SEF sessions in the late morning and after lunch.

C.8 Sample Evaluation Sheet for Expert Panel

Team Name/Number: _____

Evaluation of Team Presentation

The purpose of evaluating the presentation is to recognize strengths and identify areas of needed improvement. Please evaluate the presentation using the items listed below and circling the appropriate rating level. You are also encouraged to use the space provided to include comments that support your ratings.

	1 Needs Improve ment	2	3	4	5	6	7 Excellent
Effectiveness of overall presentation <ul style="list-style-type: none"> Did the presentation have a logical structure appropriate for the topic? Did the presenter(s) provide convincing support for his/her recommendations? 	1	2	3	4	5	6	7
Overall team cohesiveness <ul style="list-style-type: none"> Were other team members attentive while presenter(s) spoke? Did the team show an ability to relate to each other? 	1	2	3	4	5	6	7
Contents (1) -- Creativity <ul style="list-style-type: none"> Did the team show creative and innovative thinking in the policy recommendations? 	1	2	3	4	5	6	7
Contents (2) – Clarity <ul style="list-style-type: none"> Did the presenter(s) give clear and concrete recommendations? 	1	2	3	4	5	6	7
Contents (3) – Feasibility <ul style="list-style-type: none"> Were the policy recommendations realistic and feasible in terms of execution? 	1	2	3	4	5	6	7
Overall value to the decision-maker	1	2	3	4	5	6	7

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