Examining the effect of emotions on forecasting extensiveness during idea

evaluation

By

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ABSTRACT

Previous research has shown emotion to be an antecedent to creativity. Research has also illustrated that emotion affects non-creative decision making. The focus of this study was an examination of the relationship between emotion and performance in forecasting during idea evaluation, which is a decision about the viability of creative ideas. Incidental emotions were induced for social service workers, then they were presented with a social innovation problem along with three previously generated ideas for solutions. Participants were then asked to forecast the positive and negative consequences along with obstacles that may arise during the implementation of each solution. The results indicate that emotion does not impact forecasting performance during idea evaluation. However, individual difference measures included in this study, namely creative fluency and domain expertise were found to be significant contributors to performance in forecasting. While future research is needed to confirm these findings, these results reveal that organizations may be best served to increase accuracy in decisions regarding the viability of creative ideas through increasing the creative fluency or expertise of their employees rather than attending to the emotional influences of the decision maker.

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CHAPTER I: INTRODUCTION

Throughout recent history, there have been instances when reputable companies have deemed ideas as destined for failure, only for another company to turn the same idea into a monumental success story. For instance, J. K. Rowling's idea for the Harry Potter series was rejected by many publishing houses before becoming the overwhelming sensation it is today (Flood, 2015). More recently, Dr. Koriko and Dr. Weissman's idea to use mRNA technology to create therapeutics for untreatable diseases, was rejected for funding by numerous pharmaceutical companies and venture capitalists before Moderna and Pfizer along with BioNTech took notice (Kolata, 2021). The mRNA technology created by Drs. Koriko and Weissman was eventually used in the creation of the COVID-19 vaccines (Kolata, 2021).

One possible reason companies falsely regard ideas as unviable could be differences in the creative decision-making process. For example, in 2018, when Pfizer shifted its strategy to focus on breakthrough drugs and vaccines, the organization made several key changes to the decision-making process. Through the creation of cross-functional teams, Pfizer brought together individuals with expertise in different critical areas of the problem which has been shown to facilitate creative performance (Baer, 2015). Alternatively, Harald Friis, a leader at Bell Labs sought to improve the viability of ideas generated by his team members by challenging the team members to focus on the constraints that may prohibit ideas from coming to fruition, which placed emphasis on the revision of ideas (Gertner, 2014, p.209). The revision process, then entails another round of creative ideas, bolstering the initial creative value as well as the effectiveness of the

final solution (Lonergan et. al, 2004). What is clear from these examples is that creative decision making in organizations is deliberate and intentional. However, what remains unclear are the factors that contribute to the *evaluation* of the viability of a creative idea. One possible factor is the role of emotions in the creative decision-making process.

Previous research has shown that emotions can and do influence non-creative decision making (Lerner et al., 2015; Lerner & Keltner, 2001; McKenzie, 2005; Smith & Ellsworth, 1985; Tiedens & Linton, 2001). When situations are complex and ambiguous, inferential processing is often required to make sense of limited information. This inferential processing is particularly susceptible to the influence of emotion (Forgas & George, 2001). The most common definition of creativity holds that it is a process that begins with a complex, novel, and ill-defined problem, and ends in the production of high-quality solutions (Mumford & Gustafson, 1988). Therefore, emotions likely also play a role in the creative decision-making process. This research will investigate the effects of emotion during the evaluation of creative ideas.

Creative Problem Solving

According to Mumford et al.'s, (1991) model of creativity, creativity is an iterative process containing eight, distinct, serially occurring, cognitive sub-processes. These processes are depicted in Figure 1 below.

Figure 1.

Mumford and Colleagues' (2001) Creative Process Model
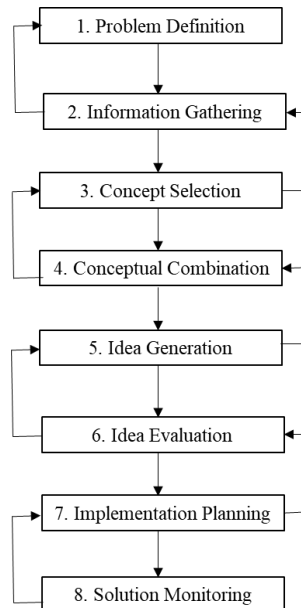
The process begins with problem definition. In this stage, a problem is identified and understood (Mumford et al., 1991). For example, according to the United States census (U.S. Census Bureau, 2022), there are approximately half a million homeless people in the country, and that number has been increasing since 2016. Once the problem is understood, a search for unknown information pertaining to the problem is conducted (Mumford et al., 2018; Mumford et al., 1991). To continue with the previous example (as will be the case throughout the model), a search may be conducted for information regarding why there has been an uptick in homelessness in the United States since 2016. For example, a google search might reveal that the CEO of the National Alliance to End Homelessness, reported a shortage of around 7 million affordable housing units for low-income households (Woodruff & Cuevas, 2021).

In concept selection, this newly found information would then be mentally compared to previously existing knowledge of problems and solutions (Mumford et al., 2018; Mumford et al., 1991). For instance, when examining the homelessness and affordable housing issue, one might recall that Millard and Linda Fuller developed the concept of "partnership housing," as the foundation of the non-profit organization, Habitat for Humanity (Habitat for Humanity, 2021). People in need of housing help build their own home which come with affordable mortgages. The funds from those mortgages are then used to continue the cycle, providing sustainable resources to build additional homes for others in need. Additionally, one might recall that the Family Options Study (Gubits et al., 2015), a three-year study on the effectiveness of homelessness interventions, found a voucher program that provides subsidies for permanent housing was more effective than temporary rental assistance, time-limited housing coupled with counseling and medical services, and emergency shelters (Gubits et al., 2015). While the more permanent solution provided by the voucher system was found to be more effective than other government funded programs, the study also found that families receiving vouchers also became less likely to have a job (Gubits et al., 2015).

Once existing knowledge and experience relevant to the current problem has been identified, conceptual combination commences. In this stage, the newly acquired knowledge is integrated with existing knowledge structures to form the foundation of ideas for solutions to the new problem (Mumford et al., 2018; Mumford et al., 1991). For example, Pastor Jeff Obafemi in Nashville provided another solution, the construction of a tiny house village at the cost of around $7,000 for each house (Semuels, 2015). The sustainability of the Habitat for Humanity model may be combined with the resource

minimization and increased speed of production provided by the tiny house village model.

After a pool of ideas has been generated, they are each evaluated within the parameters of the situation. For instance, federal, state, and local laws as well as the legislators in those areas may impose different rules, regulations, and norms that could influence the likelihood of successful implementation of a particular idea. During idea evaluation, revisions may be made to minimize the constraints of viability. Once the revisions have been completed, a decision to implement a particular solution is made (Mumford et al., 2018; Mumford et al., 1991). For example, the proposed solution to implement a partnership housing model utilizing tiny homes may be revised to include a community wellness center in which social service professionals are available to provide support services for the newly homed individuals such as counselling, job coaching, and financial management training. Next, plans for the implementation of the selected idea are made (Mumford et al., 2018; Mumford et al., 1991). These plans may include obtaining the necessary funding and other resources, assigning responsible parties, and determining a method of evaluating the success of an idea. For instance, the required personnel may be projected, the process for securing grants and fundraising efforts may commence and future available funds may be forecasted, and bids for building the village may be obtained. Success might be evaluated by the percent increase in new homes provided over prior year or by creating behavioral metrics to systematically evaluate improvements in the people the program is designed to help. And, finally, once the solution has been implemented, it is then monitored for success or failure (Mumford et al., 2018), according to evaluative benchmarks identified in the implementation planning

stage. For instance, quarterly, the number of houses provided can be assessed and/or the behavioral appraisals can be compared against the predetermined standards.

As inadequacies carry through to subsequent stages within the creative process model, feedback loops allow for corrections or improvements to be made to previous stages which, in turn, incrementally improves performance in subsequent stages. The result of this iterative process is a creative idea for solving a novel and complex problem. The creativity of an idea is judged based on the quality and originality of the idea (Mumford et al., 2002; Dailey & Mumford, 2006). Quality is defined as the completeness, coherence, and usefulness of the idea (Mumford et al., 2002; Dailey & Mumford, 2006). For instance, in an attempt to solve the traffic congestion problem in downtown Nashville, TN due to the stark increase in tourists and new residents in recent years, a high-quality idea might be to implement a mass-transit system. A low-quality idea might be to place more scooters and pedal taverns downtown for people to ride. Originality is defined as the novelty and unexpectedness of the idea (Mumford et al., 2002; Dailey & Mumford, 2006). A high-originality idea for a solution to the traffic in Nashville problem might be to create and implement a flock of drones strong enough to carry people so that ground traffic would be minimized. A low-originality idea may be to implement more ride-sharing services.

Several studies provide evidence for this model (Mumford, 2003). The first set of studies show that each of the subprocesses are related to the quality and originality of the solution (Mumford, 2003). The second set shows the power of each of the sub-processes to predict the quality and originality of the solution (Mumford, 2003). Finally, a third set of studies show that the sub-processes within Mumford et al.'s (2001) model of creativity

are causally linked (Mumford, 2003). The disruption of one sub-process execution

negatively affects process execution in subsequent stages (Mumford et al., 2001).

Most attempts to identify the factors contributing to creativity in problem solving

have focused on the earlier stages of the process, leading up to the generation of creative

ideas (Mumford, 2003; Watts et al., 2017). One reason for this is the historic usage of

divergent thinking tests in the exploration of the antecedents to creativity (Reiter-Palmon

et al., 2019). Divergent thinking serves idea generation in providing multiple ways to

view the problem at hand. Naturally, the wider variety of ways in which one views a

problem aid in the generation of ideas, but fluency, a particular facet of divergent,

thinking has been found to be associated with performance in idea evaluation (Byrne et

al., 2010). Fluency is defined as the number of ideas a person generates within a given

period of time (Reiter-Palmon et al., 2019). Additionally, divergent thinking is of

particular interest in the present study as a realistic problem will be used in this study to

examine the effects of emotion in the evaluation of ideas for solutions to the problem, and

divergent thinking has been found to predict creativity in such problems (Reiter-Palmon

& Arreola, 2015).

In addition to the number of ideas produced, the quality of the ideas produced in

idea generation is also critical to the production of high-quality solutions to the problem

at hand (Mumford et al., 2018). To support this notion, Basadur et al. (2000) uncovered a

strong positive relationship between skill in producing ideas and skill in evaluating ideas

through structural equation modelling, and further research revealed a strong positive

relationship between idea evaluation and creative solutions (Dailey & Mumford, 2006).

The present study focuses on the cognitive process of idea evaluation as this is the point

where a decision is made regarding the viability of ideas within the situation (Mumford et al., 2002; Mumford et al., 2018; Scott et al., 2004).

Idea Evaluation

Idea evaluation involves three mental sub-operations (forecasting, idea appraisal, and idea revision) during which a list of generated ideas is narrowed down according to the likelihood of viability (Lonergan et al., 2002). In forecasting, the potential downstream consequences of implementing the proposed solutions are identified (Dailey & Mumford, 2006; Lonergan et al., 2002; Lonergan et al., 2004). During idea appraisal, the solution is analyzed according to a set of standards or goals (Dailey & Mumford, 2006; Lonergan et al., 2002; Lonergan et al., 2004). Idea revision entails refinements made to ideas before selecting a solution for implementation (Dailey & Mumford, 2006; Lonergan et al., 2002; Lonergan et al., 2004). Since mistakes in forecasting are likely to carry through to the subsequent mental sub-operations, the present research will focus specifically on this initial cognitive sub-operation.

Forecasting

Forecasting entails the mental simulation of the future consequences or outcomes that may occur as a result of the implementation of a particular solution (Lonergan et al., 2004; Mumford et. al, 2002). Mumford (2002) suggested that extensiveness of these forecasts provides a wider range of consequences to be considered and, as a result, an opportunity to formulate contingency plans. In another study conducted by Byrne et al. (2010), participants were asked to forecast the outcomes of a list of ideas for marketing a new product for a beverage company. The extensiveness of the forecasts was strongly positively related to the creativity of the final marketing plan. Wider and deeper pools of

forecasted consequences resulted in more creative final solutions. In other words, if the sample of forecasted consequences is representative of the complete spectrum of potential consequences, there is a better chance for selecting a viable creative solution. Since previous research has demonstrated the criticality of forecasted consequences in the selection of a viable creative solution, the identification of factors that may contribute to performance in forecasting would provide insight into how forecasting might be improved. The current study will investigate the effects of emotion on forecasting the consequences for implementing a creative idea.

Emotion and Idea Evaluation

Emotion as an Antecedent to Creativity

A great deal of research has examined emotion as an antecedent to creativity, and for a time, the primary focus was on valence, whereby emotions were categorized as positive or negative without any further differentiation (Baas et al., 2008). Throughout the literature, when the effects of positive emotion on performance have been compared directly to the effects of negative emotion on performance, the findings have been mixed (Baas et al., 2008). Some studies found that positive emotions yielded better creative performance (Grawitch et al., 2003; Baas et al., 2008) while others found that negative emotions yielded better creative performance (Gasper, 2003; Baas, 2008). These inconsistent findings prompted researchers to explore additional dimensions of emotion that may further explain its relationship with creative performance.

As one alternative, the dual pathway was proposed, which introduces the dimension of arousal in addition to the valence of an emotion (De Dreu et al., 2008). In the dual pathway theory, the researchers explained that high arousal would facilitate

creativity in different ways depending on the valence of the emotion. High-arousal positive emotions were thought to contribute to creativity through enhanced cognitive flexibility, and high arousal negative emotions were thought to contribute to creative performance through enhanced cognitive persistence (De Dreu et al., 2008). For example, according to the dual pathway theory, happiness, as a high-arousal positive emotion, would prompt a wide variety of categories of information to be considered, which would then positively contribute to creativity. And, as a high-arousal negative emotion, anger would facilitate greater depth of information in specific categories to be considered, which would then positively contribute to creativity.

Another alternative, dual tuning theory (George & Zhou, 2007), drew on mood-as-information theory (Schwartz & Clore, 2003) to incorporate cognitive processing with the valence of the emotion. Unpleasant moods were said to trigger the need for slow, systematic, or deliberative processing, whereas pleasant moods were said to trigger the need for fast, heuristic, or broad processing (George & Zhou, 2007). For example, according to dual tuning theory, negative emotions such as anger or sadness would evoke a careful and thorough analysis of the situation. Alternatively, positive emotions such as happiness or relaxation would evoke a quick analysis of the situation which would facilitate the connection of broad and loosely related information.

In a three-part study, Watts et al. (2020) drew upon both dual tuning theory and dual pathway theory in conjunction to explore the effects of affective shifts in each of three adjacent stages of the creative process model posed by Mumford et al. (1991): idea generation, idea evaluation, and implementation planning. In each part of the study, participants were asked to read two emotion inducing stories that differed on the

dimensions of valence and arousal (sad, angry, relaxed, happy). They were then asked to act as a business consultant contracted to assist a failing furniture company in generating ideas to "help turn the company around and increase profitability p. 7 (Watts et al., 2020)," then evaluate the ideas for viability, and ultimately, devise a plan for implementing the idea for the company. Watts et al. (2020) found that while shifts in both tone and arousal were shown to be predictive of performance in idea generation and implementation planning, no effects were observed on performance in the idea evaluation stage.

As noted in the research conducted by Watts et al. (2020), the systematic or deliberate analysis of the situational parameters of the problem at hand is critical to the idea evaluation process (Mumford et al., 2002). However, in exploring the effects of two high-arousal emotions on decision-making (fear and anger), utilizing the Appraisal Tendency Framework (ATF), found that anger prompted fast, heuristic processing rather than slow, systematic processing (Lerner & Tiedens, 2006; Tiedens & Linton, 2001). Therefore, it may be beneficial to use the tenets of the ATF to explore specific emotions that have been shown to induce the systematic processing necessary for creative performance in idea evaluation.

Emotions In Decision Making: The Appraisal Tendency Framework (ATF)

The Appraisal Tendency Framework (ATF) is a more recent theory developed by Lerner and Keltner (2000) to further our understanding of the effects of emotion on judgement. In the ATF, Lerner and Keltner introduced emotion-centric core appraisal themes which provide additional clarity on how Smith and Ellsworth's (1985) cognitive appraisal dimensions play a role in decision-making. To begin, Lerner and Keltner (2000)

distinguish integral emotions from incidental emotion in their effects on subsequent decisions. The authors explain that integral emotions are those that are directly related to decision at hand. For example, making a large financial decision such as buying a home, often elicits an emotion. A common emotion experienced across many people when making a large financial decision such as buying a home is anxiety. Anxiety, then, is integral, or directly related to the decision to buy a home. Lerner and Keltner (2001) go on to explain that incidental emotions are those that are *not* related the situation, but the subjective experience still influences the decision at hand. For example, a professor might receive a phone call that they are expecting twins causing them to experience happiness. The happiness the professor experienced may lead to more lenient grading of the students' papers even though the happiness has nothing to do with the quality of the paper. Since incidental emotions can be separated from the decision, they are ideal in assessing the impact of emotions on subsequent decisions in research (Lerner et al., 2007) as will be the case in the current study.

Appraisal themes can be described as patterns in the appraisal of situations that are formed from an individual's collection of experiences over time. The felt emotions during these experiences are said to be connected to the appraisal themes. According to Lerner and Keltner (2000), these emotion-centric appraisal themes act in concert with cognitive appraisal dimensions described by Smith and Ellsworth (1985) to form a person's tendencies in the appraisal of future situations. In other words, when a person experiences a particular emotion, the following choices and decisions will be influenced by the person's tendencies in the appraisal of situations on congruent cognitive dimensions. For instance, when happiness is experienced, a tendency to appraise the

situation as pleasant and in the control of the individual themselves will influence the following decision. Following from the previous example, when the professor experiences happiness about having twins, the cognitive dimensions of pleasantness and control in the hands of the professor influences the decision about the grade to be assigned to the paper.

Smith and Ellsworth (1985) identified six cognitive appraisal dimensions associated with emotional states (pleasantness, level of anticipated effort, perceptions of control in the hands of the self or other, perceptions of situational control, certainty predictions, and level of attention required). These researchers found that when positive and negative emotions were examined independently, agency or control arose as the cognitive factor that distinguishes positive from negative emotions. For instance, when unpleasantness is experienced, the degree of control something other than the individual has over the situation influences the felt emotion. Conversely, when pleasantness is experienced, the degree of control that the individual has in the situation influences the felt emotion.

The Appraisal Tendency Framework (ATF): Emotions and Forecasting

Tiedens and Linton (2001) found that anger prompted heuristic processing while fear prompted systematic processing, and these findings were mediated by judgements of certainty. When anger is experienced, people describe the situation as unpleasant, but they are certain that the cause of the displeasure is the fault of another person (Lazarus, 1991). Since the person experiencing anger is certain of the root of displeasure, there is no perceived need to exert cognitive effort in further exploration as to other possible causes (Lazarus, 1991). Conversely, when fear is experienced, people also report

displeasure with the situation, but they are not certain of the cause or what may happen next (Lazarus, 1991; Slovic, 1987). This uncertainty triggers the need for slow and deliberate, systematic processing of the situation to identify potential causes and outcomes. When neither the idea nor the resulting consequences are static within a given situation, forecasting requires constant monitoring of the changes in the environment. Therefore, in the face of a novel and complex problem, forecasting is expected to be best served by the deliberate and systematic processing of the situation, causes, and consequences.

Purpose of the Current Study

There have been numerous historical accounts of instances when reputable companies have deemed high quality creative ideas as unviable. An attempt to understand the contributing factors to these decisions begins with the definition of creativity as a process that begins with a complex, novel, and ill-defined problem, and ends in the production of high quality-solutions (Mumford & Gustafson, 1988). The creative process model proposed by Mumford et al. (2001) brings further clarity as it delineates eight, serially occurring, cognitive sub-processes within the over-arching process of creativity. According to Mumford's model, once ideas for solutions to the problem have been generated, the evaluation of the ideas commences. Since idea evaluation is the stage in which a decision is made regarding the viability of ideas, it will be the focus of this study. During idea evaluation, the downstream consequences of implementing an idea are forecasted, the ideas are appraised against the standards within the situation, then revisions are made to correct characteristics of the idea seen as inviable (Scott et al., 2004). Rather than taking a holistic view of idea evaluation, this research will specifically

address forecasting. Examining forecasting is the logical first step as inadequacies in this stage will carry through to the next stage.

Emotion is a heavily researched antecedent to creativity, but no research was found using the ATF to do so. The ATF (Lerner & Keltner, 2001) is a theory that has been used to explain the role of emotion in non-creative decision making, which makes it particularly suitable for this study. Within the ATF it is explained that emotions affect decision-making through the engagement of cognitive dimensions and core-emotion centric appraisal themes congruent with the specific emotion. Since previous research in the ATF literature has shown that fear prompts systematic processing while anger prompt heuristic processing, it is expected that when fear is experienced, more extensive forecasts will be produced than when anger is experienced. The purpose of this study is to investigate whether the induction of fear or anger will have differential effects on the extensiveness of forecasts for implementing a creative solution to a novel and complex problem.

Hypothesis 1a

Fear will produce significantly more extensive forecasts than a neutral emotion.

Hypothesis 1b

A neutral emotion will produce significantly more extensive forecasts than anger.

Hypothesis 1c

Fear will produce significantly more extensive forecasts than anger.

CHAPTER II: METHODS

Participants

The participants in this study consisted of 120 professionals employed in the field of social work, with at least a bachelor's degree. Participants were recruited via Prolific Academic which previous research has shown to produce more diverse participants and higher quality data than comparable service providers (Peer et al., 2017). To recruit participants meeting the professional and educational requirements, a series of screening questions provided by the researchers were administered by Prolific Academic. Once the participants elected to participate in the study and met the screening requirements, they were provided with a link to the study's survey.

Following a data cleaning process, 112 participants were included in the final analyses. Of the final sample included in the analyses, 71 reported a bachelor's degree as the highest level of education obtained, 31 reported a master's degree as the highest level obtained, and 10 reported a doctoral degree as the highest level obtained. The ages of participants ranged from 22-76, with a median age of 36. The data of 8 participants was excluded from analysis due to failure to meet the screening criteria for this study.

At the onset of the study, all participants were informed of their right to withdraw from the study at any time. They were also informed of the general purpose of the study. No risks were anticipated beyond that which may be expected in one's daily life. Upon completion of the study, each of the participants were credited the cash equivalent of $7.88 to their Prolific Academic account.

Procedures

This study was approved by the Institutional Review Board at Middle Tennessee State University under protocol 22-1155 29. The approval letter can be found in Appendix A. The survey was administered online via Qualtrics. Once the participant provided consent, two individual difference measures were presented. Participants were first asked to complete the Trait Positive Affectivity and Negative Affectivity Schedule (Watson & Clark, 1994), then they were asked to complete the Consequences *A-1* test (Christensen et al., 1953). Participants were then randomly assigned to one of three emotion conditions (anger, fear, or neutral-control). Next, an emotion manipulation was administered according to the group to which the participants were randomly assigned. During the emotion manipulation, participants were asked to view a short video designed to induce the desired affective response (Bagneux, 2012; Hewig et al., 2005; Schaefer et al., 2010). After viewing the video, an emotion manipulation reinforcer was administered. Participants were asked to write a short auto-biographical story describing a time when they experienced the target emotion (Kausel, 2016; Tucker, 2021). To ensure the emotional manipulation was effective, participants were asked to complete a modified version of Izard's (1974) Differential Emotions Scale as a manipulation check.

Next, participants completed an experimental task in which they were asked to assume the role of a board member who has been tasked with recommending a solution to a social innovation problem for funding. The participants were then presented with a short description of a social innovation problem produced in a previous study (Swetz, 2021) followed by three previously generated ideas for solutions to the problem (French, 2021). The participants were then asked to provide a list of the positive outcomes that

may occur as a result of implementing each solution, the negative outcomes that may

occur as a result of implementing each solution, and the obstacles that may arise during

the implementation of each solution. The solutions were presented in random order to

avoid differential fatigue effects during the forecasting portion of task for any particular

solution. After providing the lists of forecasted consequences and obstacles, as an

exploratory measure to be used in future studies, the participants were asked to rank their

the solutions according to the likelihood that they would recommend each solution to

receive funding.

Upon completion of the experimental tasks, participants were given the

opportunity to provide their own additional idea for a solution to the problem.

Participants were also asked to provide a list of positive consequences that may occur as

a result of implementing the solution, a list of negative consequences that may occur as a

result of implementing the solution, and a list of the potential obstacles that may arise

during the implementation of the solution. The additional solutions provided by the

participants were not entered into the analysis in this study. These solutions may be used

to further investigate the findings of this research in a future study.

Once the participants had been given the opportunity to provide their idea for a

solution to the problem presented in the study, they were asked to provide demographic

information including gender identity, age, ethnicity, educational level, and employment

status. Participants were then be asked to indicate whether they watched the entire video

included in the study and whether there was sound during the video. Additionally, the

participants were asked whether they had experience working with individuals in the

incarcerated or mental health communities. As a final step, participants were asked to

provide a short explanation of what they thought the study was about. To complete the study, participants were debriefed and thanked for their participation.

Design

This study used an experimental design with two individual difference measures to control for potential confounds. Trait-level anger and fear were measured at the start of the study to establish baseline measures of each of these variables of interest. Fluency, a facet of divergent thinking that has been shown to influence creativity in previous studies (Runco & Basadur, 1993), was also entered into the analysis. Four one-way ANOVAs were conducted in which three emotion conditions (fear, anger, neutral emotion) served as the independent variable, and three facets of forecasting extensiveness (forecasting positive consequences, forecasting negative consequences, and forecasting implementation obstacles) as well as total forecasting extensiveness each served as dependent variables.

Materials

Individual Differences

Trait Positive and Negative Affectivity. Trait level affect was measured using a modified version of Watson and Clark's (1994) trait level Positive Affectivity and Negative Affectivity Schedule (PANAS-X), utilizing items from the fear, anger (hostility), and joviality subscales. Participants were asked to use a 5-point Likert scale to indicate the degree to which they experience each of a list of 12 emotions in their lives on average. (1 = *Very little or not at all*, 5 = *Extremely*). Previous studies by Watson and Clark (1994) indicated internal consistency reliability for each of the subscales to be the following: $\alpha = .83$ for fear, $\alpha = .83$ for hostility, and $\alpha = .93$ for joviality. The internal

consistency reliability for the subscales in the current study were as follows: α = .92 for

fear, α = .86 for hostility, and α = .83 for joviality. Evidence for validity can be found in

prior work by Watson and Clark (1994). The full measure can be found in Appendix B.

Fluency. Fluency is a facet of divergent thinking which can be defined as the

number of ideas a person generates within a given period of time (Reiter-Palmon et al.,

2019). Fluency was assessed using the Consequences *A-1* test (Christensen et al., 1953)

in which participants were presented five unusual events. For each event, they were asked

to produce as many potential outcomes as possible in two minutes. Fluency was scored

according to the number of responses provided that were different than the examples

given across the five scenarios. More responses received higher fluency score. The

internal consistency reliability for fluency was α = .91. Evidence for validity has been

demonstrated in previous studies by Merrifield et al. (1962) and Vincent et al. (2002).

The full measure can be found in Appendix C.

Emotion Manipulation

Emotion Manipulation Conditions**. Participants were randomly assigned to either

the anger condition, fear condition, or neutral-control condition. The participants were

then asked to watch a video clip designed to elicit the targeted affective state congruent

with their assigned condition (Bagneux, 2012; Gino & Schweitzer, 2008; Hewig et al.,

2005; Schaefer et al., 2010). For the anger condition, participants were asked to watch a

clip from the movie *My Bodyguard* (Gino & Schweitzer, 2008) in which a teenager is

bullied and assaulted by another teenager. Participants in the fear condition were asked to

watch a clip from the movie *The Blair Witch Project* (Bagneux, 2012; Schaefer et al.,

2010) in which the characters encounter a super-natural being in the final scene.

Participants in the neutral-control condition were asked to watch a clip from the movie *All the President's Men* (Hewig et al., 2005) in which two men are conversing in a courtroom. Links to the video clips can be found in Appendix D.

Emotion Manipulation Reinforcer. The emotional manipulations were reinforced by having the participants complete a writing task in which they will be asked to describe a time in their life when they experienced the emotion congruent with their assigned condition (Kausel et al., 2016, Siedlecka & Denson, 2019; St. Jacques & Levine, 2007; Tucker, 2021). For example, if they are assigned to the anger condition, they were asked to describe a time when they experienced anger. A copy of the writing prompts can be found in Appendix E.

Manipulation Check

To ensure the emotional manipulations were effective, participants were asked to complete a modified version of the Differential Emotions Scale (Izard, 1974) before completing the experimental task. Three anger-related items (i.e., Angry, Mad, and Irritated) were used to assess anger, three fear-related items (i.e., Scared, Afraid, and Fearful) were used to assess fear, and three enjoyment-related items (i.e., Happy, Amused, and Joyful) were included in the scale. During this assessment, participants will be asked to use a 5-point Likert scale to indicate the degree to which they are experiencing each of a list of 9 emotions at the present moment (1 = *Not at all like me*, 5 = *Very much like me*). The internal consistency reliability for the subscales in this study were as follows: $\alpha = .97$ for fear, $\alpha = .96$ for anger, and $\alpha = .89$ for enjoyment. The full measure can be found in Appendix F.

Forecasting Extensiveness

Forecasting extensiveness was operationalized as the number of positive consequences forecasted, the number of negative consequences forecasted, and the number of potential implementation obstacles forecasted. This is an adaption of the factors revealed by Byrne et al. (2010) to encompass forecasting extensiveness. The participant was instructed to enter the positive consequences, negative consequences, and potential implementation obstacles in a text box labeled as such. Forecasting extensiveness was measured by calculating the total number of responses provided across categories. The internal consistency reliability for forecasting extensiveness was α = .79, and the internal consistency for each of the subscales were as follows: α = .66 for forecasting positive consequences, α = .70 for forecasting negative consequences, and α = .69 for forecasting implementation obstacles. The problem can be found in Appendix G, the proposed solutions can be found in Appendix H, and the instructions can be found in Appendix I.

Recommending a Solution for Funding

Creativity of the recommended solution was operationalized as the quality and originality of the solution participants indicated they were most likely to recommend. Quality has been defined as the completeness, coherence, and usefulness of the idea (Mumford et al., 2002; Dailey & Mumford, 2006). Originality has been defined as the novelty and unexpectedness of the idea (Mumford et al., 2002; Dailey & Mumford, 2006). Participants were asked to rank the proposed solutions from 1-3 according to the likelihood that they would recommend the solution for funding (1= *first choice or most likely to recommend*, 3 = *last choice or least likely to recommend*). The quality and

originality of the solutions were rated by quasi-experts in a previously conducted study

(French et al., 2021). This information was collected for exploratory purposes to facilitate

potential future studies. The instructions for this task can be found in Appendix J.

Demographics

Following the completion of the survey, participants were asked to provide

information regarding their gender identity, age, ethnicity, educational level, and

employment status. This information was collected for exploratory purposes. The

demographic questions can be viewed in their entirety in Appendix K.

CHAPTER III: RESULTS

Descriptive Statistics

Table 1 shows the sociodemographic characteristics of the participants at

baseline. As can be seen, participants were evenly distributed across emotion conditions.

Table 1.

Sociodemographic Characteristics of Participants at Baseline

Baseline characteristics	Anger		Fear		Neutral		Full sample	
	n	%	n	%	n	%	n	%
Age								
20-29	12	10.7%	16	14.3%	12	10.7%	40	35.7%
30-39	13	11.6%	9	8.0%	11	9.8%	33	29.5%
40-49	9	8.0%	8	7.1%	8	7.1%	25	22.3%
50-59	3	2.7%	2	1.8%	5	4.5%	10	8.9%
60-69	0	0.0%	1	0.9%	2	1.8%	3	2.7%
70-79	0	0.0%	1	0.9%	0	0.0%	1	0.9%
Gender								
Man	12	11.6%	6	5.4%	12	10.7%	31	27.7%
Woman	24	21.4%	29	25.9%	26	23.2%	79	70.5%
Non-binary	0	0.0%	2	1.8%	0	0.0%	2	1.8%
Highest educational level								
Bachelor's degree	21	18.8%	25	22.3%	25	22.3%	71	63.4%
Master's degree	13	11.6%	8	7.1%	10	8.9%	31	27.0%
Doctoral degree	3	2.7%	4	3.6%	3	2.7%	10	8.9%
Ethnicity								
White or Caucasian	24	21.4%	31	27.7%	26	23.2%	81	72.3%
Hispanic or Latino	6	5.4%	2	1.8%	1	0.9%	9	8.0%
Asian	2	1.8%	0	0.0%	5	4.5%	7	6.3%
Black or African American	4	3.6%	3	2.7%	2	1.8%	9	8.0%
Multi-ethnic	1	0.9%	1	0.9%	4	3.6%	6	5.4%
Experience with population of interest								
Mental health community[a]	28	25.0%	25	22.3%	20	17.9%	73	65.2%
Incarcerated community[a]	8	7.1%	6	5.4%	5	4.5%	19	17.0%
Both[a]	8	7.1%	6	5.4%	5	4.5%	19	17.0%
Neither[a]	9	8.0%	12	10.7%	18	16.1%	39	34.8%
Total	**37**	**33.0%**	**37**	**33.0%**	**38**	**33.9%**	**112**	**100.0%**

Note. [a] Reflects the number and percentage of participants answering "yes" to this question.

Manipulation Check

In order to verify that the manipulation was effective, three one-way between-subjects ANOVAs were conducted to compare the effect of the emotion manipulation on the ratings for each emotional state (fear, anger, and enjoyment).

Fear Condition

The one-way between-subjects ANOVA ($\alpha = .05$) indicated there was a significant difference in mean fear ratings for the three emotion conditions, $F(2, 70.10) = 17.20$, $p < .01$. Pairwise comparisons using the Tukey HSD procedure with a familywise alpha of .05 indicated that the mean state fear ratings for the fear condition ($M = 2.68$, $SD = 1.87$) were significantly higher than the mean state fear rating for the anger condition ($M = 1.73$, $SD = 0.80$) which were significantly higher than the neutral condition ($M = 1.34$, $SD = 0.73$). Figure 2 displays the state fear ratings for each emotion condition after the emotion manipulation. These results indicate that the emotion manipulation worked as intended. Participants who viewed the fear induction video and wrote about a time when they experienced fear in their personal lives subsequently reported feeling more fear than participants who viewed anger or neutral emotion induction videos followed by a congruent autobiographical story.

Figure 2.

State Fear Ratings After Emotion Manipulation
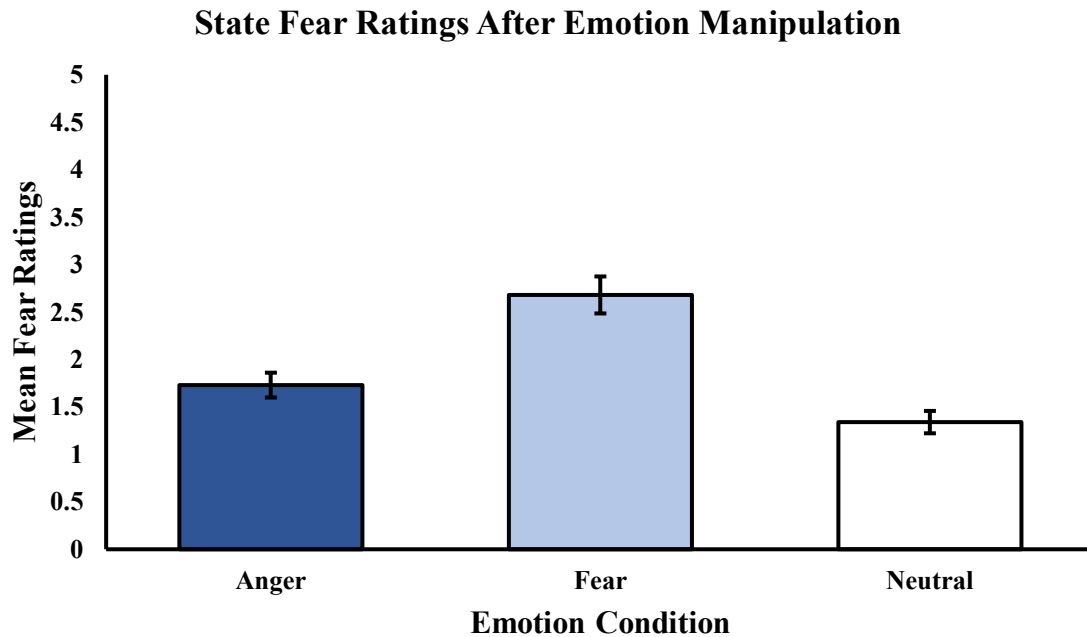
Note. Y-axis reflects the state fear ratings range (0-5).

Anger Condition

  The one-way between subjects ANOVA ($\alpha = .05$) indicated there was a significant difference in mean anger ratings for the three emotion conditions, $F (2, 70) = 16.50$, $p <.01$. Pairwise comparisons using the Tukey HSD procedure with a familywise alpha of .05 indicated that the mean state anger ratings for the anger condition ($M = 2.77$, $SD = 1.20$) were significantly higher than the mean state anger ratings for the fear condition ($M = 2.04$, $SD = 1.19$) which were significantly higher than the mean anger ratings for the neutral condition ($M = 1.40$, $SD = 0.85$). Figure 3 displays the state anger ratings for each emotion condition after the emotion manipulation. These results indicate that the emotion manipulation worked as intended. Participants who viewed the anger

induction video and wrote about a time when they experienced anger in their personal lives subsequently reported feeling more anger than participants who viewed fear or neutral emotion induction videos followed by a congruent autobiographical story.
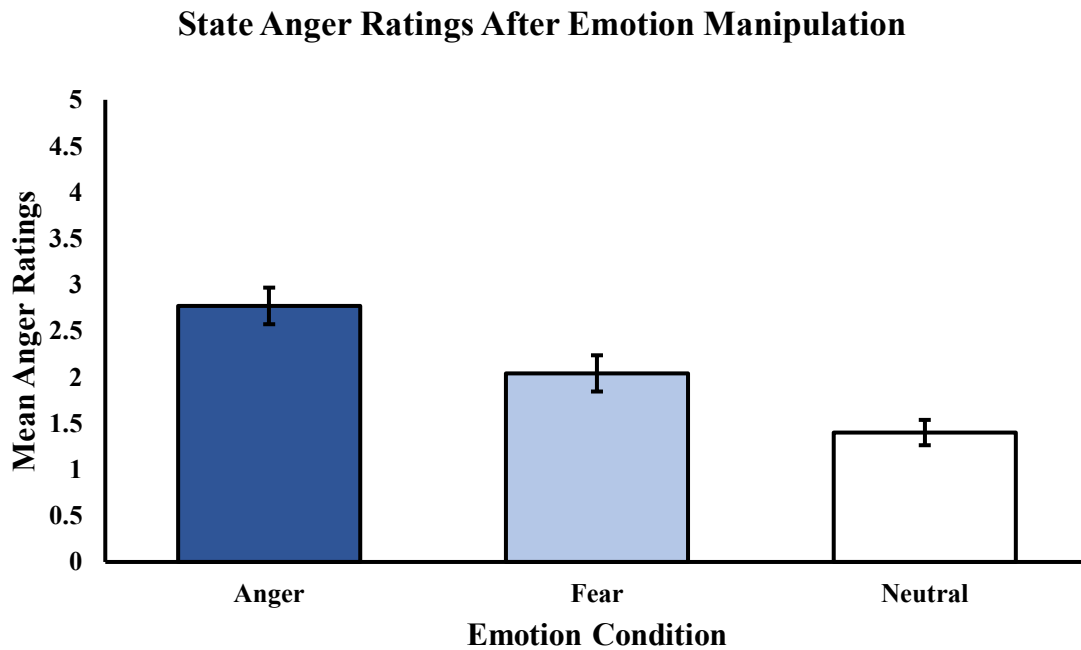
Figure 3.

State Anger Ratings After Emotion Manipulation

Note. Y-axis reflects the state anger ratings range (0-5).

Neutral Condition

The one-way between subjects ANOVA ($\alpha = .05$) indicated there was a significant difference in mean enjoyment ratings for the three emotion conditions, F (2, 72.60) = 4.32, $p = .02$. Pairwise comparisons using the Tukey HSD procedure with a familywise alpha of .05 indicated that the mean state enjoyment ratings for the neutral condition (M = 2.67, SD = 1.11) was significantly higher than the mean state enjoyment

rating for the anger condition (M = 2.11, SD = 1.07) and the state enjoyment rating for

the fear condition (M = 1.97, SD = 1.02). Figure 4 displays the state enjoyment ratings

for each emotion condition after the emotion manipulation. These results indicate that the

emotion manipulation worked as intended. Participants who viewed the neutral induction

video and wrote about a time when they experienced a neutral emotion in their personal

lives subsequently reported feeling more enjoyment than participants who viewed fear or

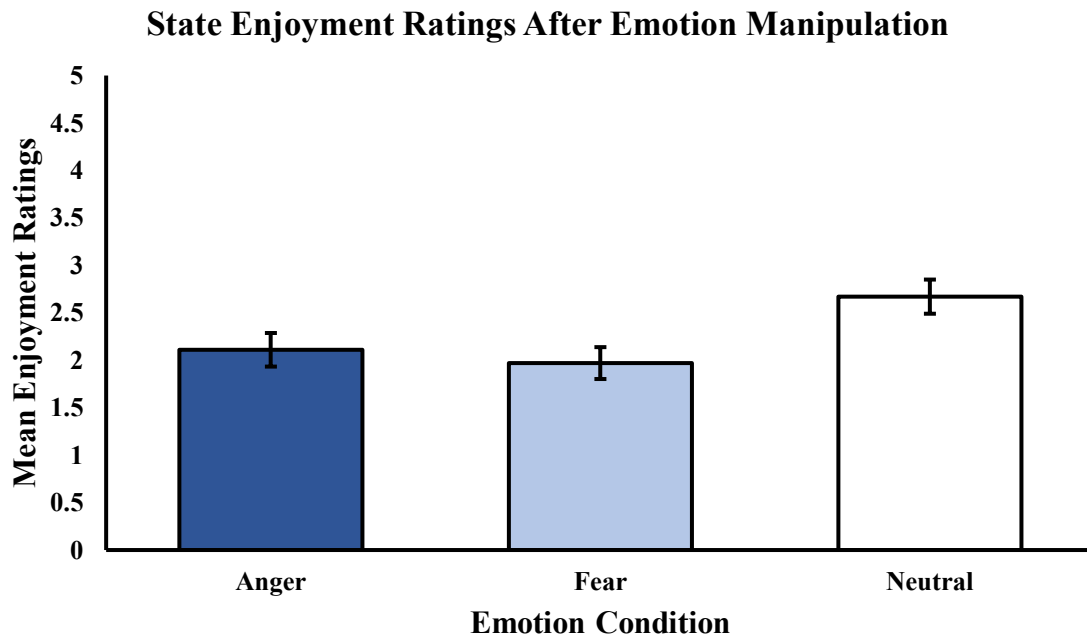anger induction videos followed by a congruent autobiographical story.

Figure 4.

State Enjoyment Ratings After Emotion Manipulation

Note. Y-axis reflects the state enjoyment ratings range (0-5).

Experimental Analyses

Correlations and Scale Reliabilities

Scale reliabilities for each of the individual difference measures, the manipulation check, and the outcome variable (forecasting extensiveness) can be found in Table 2. Correlations among experimental and exploratory variables can be found in Table 3.

Table 2.

Scale Reliabilities for Individual Difference Measures, Manipulation Check, and Outcome Variables

Scale	M	SD	Cronbach's α
Individual Differences			
Fluency	4.444	1.873	0.908
Trait Anger	1.93	0.828	0.860
Trait Fear	1.84	0.872	0.915
Trait Joviality	3.43	0.813	0.826
Manipulation Check			
State Anger	2.07	1.220	0.957
State Fear	1.91	1.080	0.972
State Enjoyment	2.25	1.100	0.892
Outcome Variable			
Forecasting Extensiveness Total	7.122	2.279	0.794
Forecasting Positive Consequences	2.77	1.050	0.661
Forecasting Negative Consequences	2.092	0.878	0.703
Forecasting Implementation Obstacles	2.259	0.776	0.686

Note. N = 112

Table 3.

Correlations

| Variable	1	2	3	4	5	6	7	8	9	10	11
1. Education	-										
2. Trait Joviality	-.13										
3. Trait Fear	-.01	-.30**									
4. Trait Anger	.02	-.32**	.66**								
5. Fluency	.15	0	.01	-.01							
6. State Fear	.14	0	.29**	.26**	-.12						
7. State Enjoyment	-.14	.48**	-.12	-.23*	.13	-.31**					
8. State Anger	.14	-.16	.34**	.43**	-.02	.55**	-.30**				
9. Forecasting Positive Consequences	.24**	-.04	.16	.20*	.41**	.13	-.01	.16			
10. Forecasting Negative Consequences	.16	.13	-.09	-.03	.39**	.07	.15	.03	.56**		
11. Forecasting Implementation Obstacles	.27**	.12	-.12	-.04	.40**	.02	.13	.01	.48**	.68**	
12. Forecasting Extensiveness	.27**	.07	0	.07	.47**	.10	.10	.09	.84**	.87**	.82**

Note. * $p < .05$, ** $p < .01$

Emotion and Forecasting Extensiveness

Recall that hypothesis 1a stated that fear will produce significantly more extensive forecasts than a neutral emotion. Hypothesis 1b stated that a neutral emotion will produce significantly more forecasts than anger. Hypothesis 1c stated that fear will produce significantly more extensive forecasts than anger. Four one-way between-subjects ANCOVAs were conducted to compare the effect of emotion condition (fear, anger, and enjoyment) on forecasting extensiveness as well as each of the three facets of forecasting extensiveness (forecasting positive consequences, forecasting negative consequences, and forecasting implementation obstacles) while controlling for fluency, trait anger, trait fear, and trait joviality.

All assumptions were met for testing the effect of emotion on forecasting extensiveness. Therefore, the analysis *should* be robust. The one-way between subjects ANCOVA ($\alpha = .05$) indicated no significant differences in forecasting extensiveness scores for any of the emotion conditions (fear, anger, neutral), $F(2, 109) = .56$, MSE = 2.30, $p = .57$, $\omega^2 = -.01$. In other words, emotion did not impact forecasting extensiveness. See Figure 5.

Figure 5.

Mean Forecasting Extensiveness Scores for Emotion Conditions
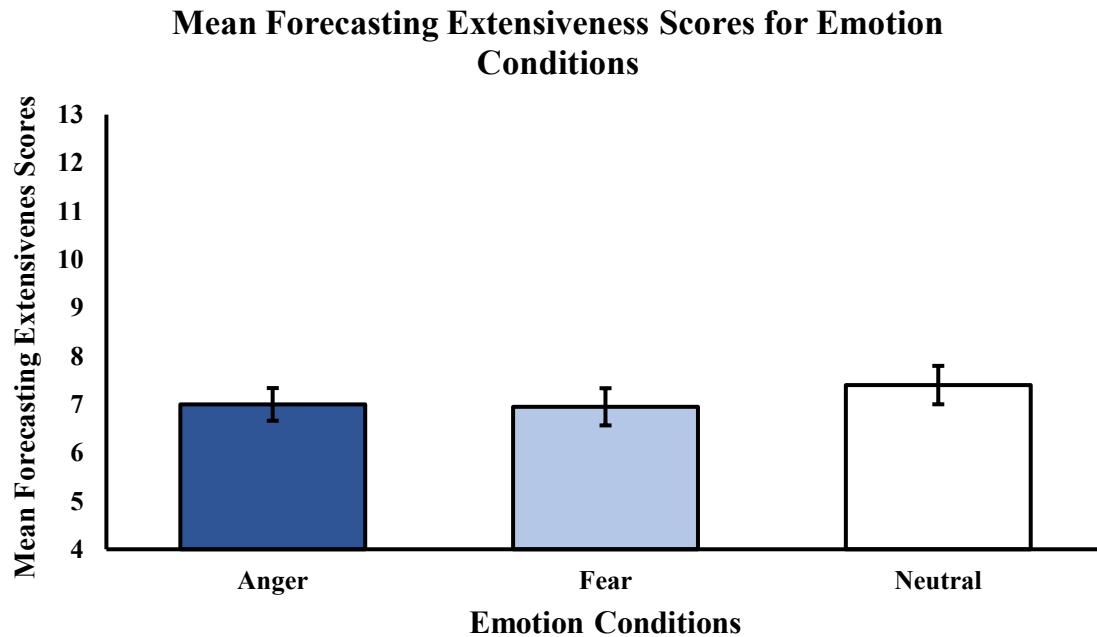
Note. Y-axis reflects the forecasting extensiveness scores range (4-13).

All assumptions were met for testing the effects of emotion on forecasting positive consequences. Therefore, the analysis *should* be robust. The one-way between-subjects ANCOVA ($\alpha = .05$) indicated that the average positive consequences forecasted were not significantly different between each emotion condition (fear, anger, neutral), $F (2, 109) = .92$, $MSE = 0.84$, $p = .40$, $\omega^2 = - .01$. Emotion did not impact forecasting positive consequences. See Figure 6.

Figure 6.

Mean Positive Consequences Forecasted for Emotion Conditions
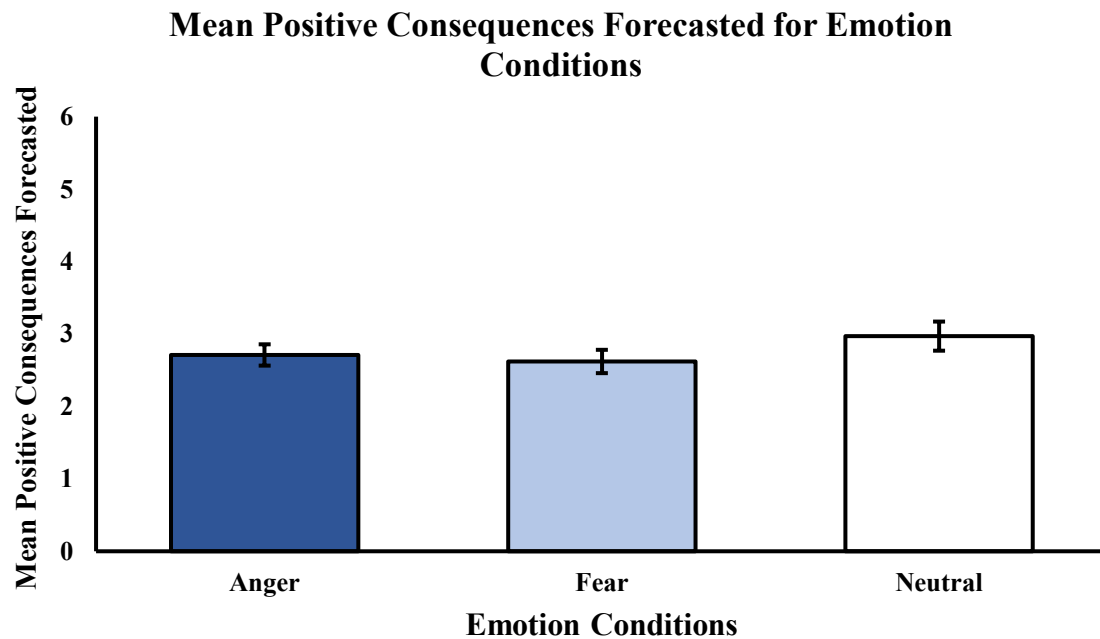
Note. Y-axis reflects the positive consequences forecasted range (0-6).

All assumptions were met for testing the effects of emotion on forecasting negative consequences. Therefore, the analysis *should* be robust. The one-way between-subjects ANCOVA ($\alpha = .05$) indicated that the average negative consequences forecasted were similar for each emotion condition (fear, anger, neutral), $F(2, 109) = .39$, $MSE = 0.26$, $p = .68$, $\omega^2 = -.01$. Emotion did not impact forecasting negative consequences. See Figure 7.

Figure 7.

Mean Negative Consequences Forecasted for Emotion Conditions

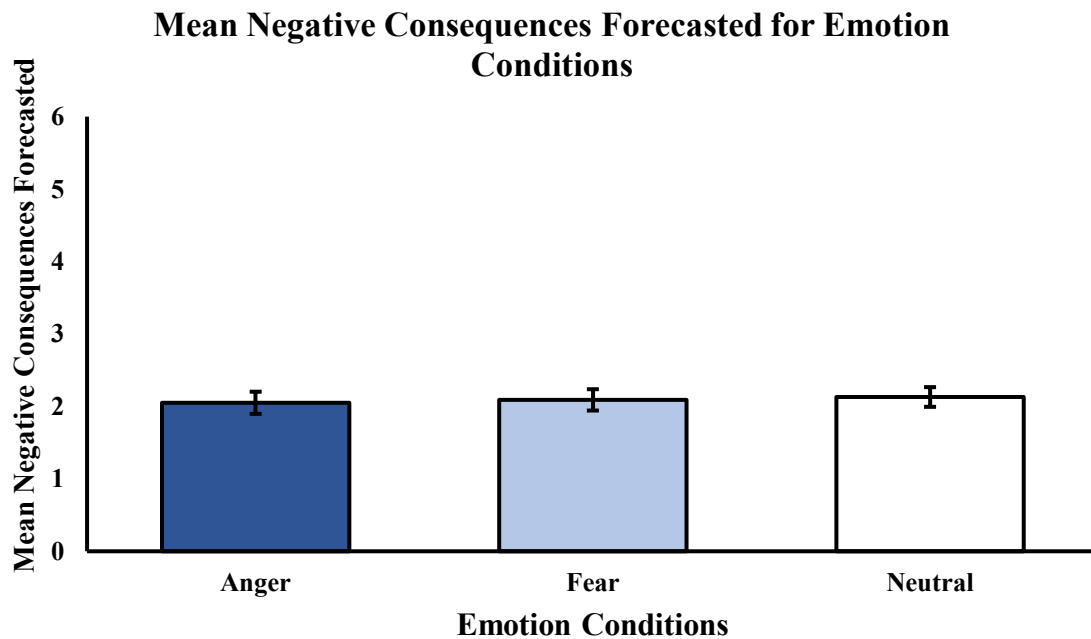*Note.* Y-axis reflects the negative consequences forecasted range (0-6).

All assumptions were met for testing the effects of emotion on forecasting implementation obstacles. Therefore, the analysis *should* be robust. The one-way between-subjects ANCOVA ($\alpha = .05$) indicated that the average implementation obstacles forecasted were similar for each emotion condition (fear, anger, neutral), F (2, 109) = .36, MSE = 0.18, p = .70, ω^2 = - .01. Emotion did not have an effect on forecasting implementation obstacles. See Figure 8. Taken together, these results suggest that emotion does not have any effect on forecasting extensiveness. Therefore, hypotheses 1a – 1c were not supported.

Figure 8.

Mean Implementation Obstacles Forecasted for Emotion Conditions
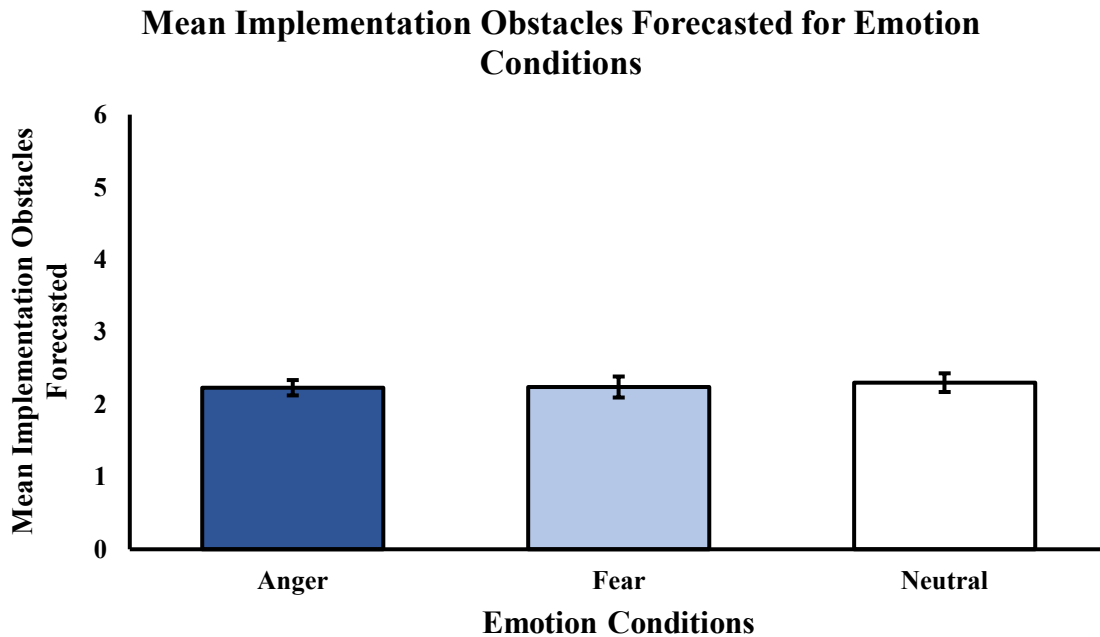
Note. Y-axis reflects the implementation obstacles range (0-6).

Exploratory Analyses

Several individual difference measures were found to be significantly correlated with the outcome variable (forecasting extensiveness) in this study. The following analyses explore the nature of those relationships.

Fluency and Forecasting Extensiveness

Preliminary analyses revealed that fluency was significantly positively correlated with each forecasting extensiveness ($r = .47$, $p < .01$), forecasting positive outcomes ($r = .41$, $p < .01$), forecasting negative outcomes ($r = .39$, $p < .01$), and forecasting implementation obstacles ($r = .40$, $p < .01$). As fluency scores increase, scores on

forecasting extensiveness, forecasting positive consequences, forecasting negative

consequences, and forecasting implementation obstacles all increase as well.

A regression analysis was performed to test whether fluency scores significantly

predicted participants' forecasting extensiveness scores. Fluency scores explained 22.5%

of the variance in forecasting extensiveness scores ($R^2 = .225$, $F(1, 110) = 31.89$, p

<.001). The unstandardized regression coefficient for fluency scores was .57 ($t(110) =$

5.65, $p < .001$). These results can be taken to mean that with one point increase in fluency

score, the forecasting extensiveness score will increase by .57 points on average.

Education Level and Forecasting Extensiveness

Preliminary analyses revealed that education level was significantly positively

correlated with each forecasting extensiveness ($r = .27$, $p < .01$), forecasting positive

outcomes ($r = .24$, $p < .01$), and forecasting implementation obstacles ($r = .27$, $p < .01$).

However, while education level was positively related to forecasting negative outcomes,

that relationship was not significant ($r = .16$, $p = .09$).

Three one-way between-subjects ANCOVAs were conducted to compare the

effect of education level (bachelor's degree, master's degree, and doctoral degree) on

forecasting extensiveness as well as each of the two facets of forecasting extensiveness

found to be significantly positively correlated with education level (forecasting positive

consequences and forecasting implementation obstacles) while controlling for fluency.

All assumptions were met for the effect of education level on forecasting

extensiveness and each of the three facets of forecasting extensiveness. Therefore, the

analyses *should* be robust. The one-way between-subjects ANCOVAs ($\alpha = .05$) indicated

there were no significant differences in any aspect of forecasting extensiveness for

education levels (bachelor's degree, master's degree, and doctoral degree) after

controlling for fluency.

Experience With Populations of Interest

To determine whether experience working with the mental health community

impacted forecasting extensiveness scores independent samples t-tests were performed.

The results revealed there was not a significant difference in forecasting

extensiveness scores between participants who *do* have experience working in the mental

health community ($M = 2.26$, $SD = .89$) and participants who *do not* have experience

working in the mental health community ($M = 1.77$, $SD = .77$), $t(110) = 1.74$, $p = .09$, d

$= .34$. There was not a significant difference in positive consequences forecasted between

participants who *do* have experience working in the mental health community ($M = 2.83$,

$SD = 1.05$) and participants who *do not* have experience working in the mental health

community ($M = 2.67$, $SD = 1.06$), $t(110) = 0.77$, $p = .45$, $d = .15$. There was also not a

significant difference in implementation obstacles forecasted between participants who

do have experience working in the mental health community ($M = 2.30$, $SD = 0.78$) and

participants who *do not* have experience working in the mental health community ($M =$

2.18, $SD = 0.77$), $t(110) = 0.79$, $p = .43$, $d = .16$. There was, however, a significant

difference in forecasting negative consequences scores between participants who *do* have

experience working in the mental health community ($M = 2.26$, $SD = 0.89$) and

participants who *do not* have experience working in the mental health community ($M =$

1.77, $SD = .77$), $t(110) = 2.94$, $p < .01$, $d = .58$. These results indicate that participants

who *do* have experience working with the mental health community did not forecast

more positive consequences, forecast more implementation obstacles, or produce more

extensive forecasts than participants who *do not* have experience working with the mental

health community. However, participants who *do* have experience working with the

mental health community did forecast more negative consequences than participants who

do not have experience working with the mental health community.

CHAPTER IV: DISCUSSION

Experimental Findings

This study was the first to examine the relationship between emotion and performance in forecasting during idea evaluation. Previous research has provided substantial evidence that emotions can and do affect decision-making (Lerner et al., 2015; Lerner & Keltner, 2001; McKenzie, 2005; Smith & Ellsworth, 1985; Tiedens & Linton, 2001), so providing evidence that the effect extends to decisions regarding the viability of creative ideas was the logical next step. Since Lonergan et al. (2004) reported that forecasting is the initial stage of creative idea evaluation, the effects of emotion during forecasting was explored in this study. The results of this study indicate that emotion does not impact forecasting during idea evaluation.

Hypothesis 1a stated that fear will produce significantly more extensive forecasts than a neutral emotion. Hypothesis 1b stated that anger will produce significantly more extensive forecasts than a neutral emotion. Hypothesis 1c stated that that fear will produce significantly more extensive forecasts than anger. The analyses compared forecasting extensiveness scores between participants experiencing fear, those experiencing anger, and those experiencing a neutral emotion. The assumptions were two-fold. First, it was assumed that those experiencing fear would produce significantly more extensive forecasts than those experiencing anger or a neutral emotion, indicating that the incidental fear engaged cognitions of uncertainty about potential causes and consequences and situational control, yielding systematic and effortful processing of the potential causes and consequences of the social innovation problem presented in the study Second, it was assumed that those experiencing anger would produce significantly

less extensive forecasts than those experiencing fear or a neutral emotion, indicating that

they had engaged cognitions of certainty about causes and consequences and control in

their own hands, yielding fast, heuristic processing of the potential causes and

consequences of the social innovation problem. The findings, however, were

nonsignificant, meaning there were no notable differences in forecasting extensiveness

scores between participants experiencing fear, anger, or a neutral emotion. These findings

are in contrast with those found by Tiedens and Linton (2001), who found that incidental

anger, which is associated with judgements of certainty, elicited heuristic processing in

subsequent decisions, and incidental fear, which is associated with judgements of

uncertainty, elicited systematic processing in subsequent decisions.

In comparison to the Tiedens and Linton (2001) study, a lack of support for the

current hypotheses may be due to differences in study design. First, participants in this

study were a minimum of 22 years old, levels of education ranged from bachelor's degree

to doctoral degree, and all worked in the social-services domain, while participants in the

Tiedens and Linton (2001) study were a minimum of 18 years old, were undergraduate

students, and likely had widely dispersed experiences in work-domains. The knowledge

and skills possessed by experienced social-services professionals may have allowed them

to separate the emotional effects from the decision task at hand. Indeed, the specific

training social work professionals receive emphasizes separating emotion from their tasks

(Grant & Alexander, 2014). Additionally, as part of the information given to the

participants about the social innovation problem in this study, substantial evidence for the

reasons people within the mental health community are repetitively incarcerated was

provided. The degree of information provided regarding causes for the problem may have

reduced the uncertainty induced by incidental fear and may have redirected the certainty induced by incidental anger. It is also possible that emotions are integral, or directly related to the experimental task.

Watts et al. (2020) found that while shifting between emotions opposite in tone and arousal significantly impacted performance in idea generation and implementation planning, no effects were found for affective shifts on performance in idea evaluation. The current findings extend those found in the Watts et al. (2020) as emotion was also found to have no effect during the initial stage of idea evaluation (forecasting). Thus, it is indeed possible that emotion does not affect performance in idea evaluation, and those results may be generalizable.

Exploratory Findings

Since fluency scores were found to be significantly moderately to strongly positively correlated with forecasting extensiveness scores, an additional regression analysis was performed to test whether fluency scores significantly predicted participants' forecasting extensiveness scores. The findings were that fluency significantly predicts forecasting extensiveness. While previous researchers have shown fluency to be strongly significantly positively related to creative performance (Byrne et al., 2010), this is the first study known to the current researchers to show that fluency significantly predicts forecasting performance specifically. As Lonergan et. al (2004) revealed forecasting to be the initial stage of idea evaluation, forecasting may mediate the relationship between fluency and creative performance.

As there was also a weak to moderate significant positive relationship between education level and forecasting extensiveness. Further analyses were conducted to

compare the difference in forecasting extensiveness scores for participants with a

bachelor's degree, participants with a master's degree, and for participants with a

doctoral degree. The findings revealed that, when controlling for fluency, education level

has no significant impact on forecasting performance.

Finally, to explore the impact of domain expertise on forecasting performance,

analyses were conducted to compare the differences in forecasting extensiveness scores

for participants who have had experience working with the populations of interest in the

social innovation problem (mental health and incarceration). The findings indicated that

more negative consequences were forecasted by participants with experience working in

the mental health community than those with no experience in the mental health

community. This supports the idea that domain-specific expertise facilitates creative

performance (Baer, 2015).

Practical Implications

This study presented notable findings that may be relevant to organizations. First,

the lack of emotional effects on idea evaluation conveys that the emotional state of the

decision-maker has no significant impact on decisions about the viability of creative

ideas. For organizations, this could mean that efforts to manage the emotional influences

on the decision maker in the workplace may not result in better decision outcomes

regarding the viability of creative ideas. In fact, the results of exploratory analyses in this

study revealed that individual differences, such as creative fluency and expertise, have a

significant positive impact on performance in forecasting during idea evaluation. In light

of these findings, it is recommended that organizational attempts to improve decision

outcomes regarding creative ideas should focus on improving the creative fluency or

expertise of employees. Organizations may choose to select individuals with higher

scores in creative fluency or with previous experience in the field of interest.

Alternatively, organizations may choose to focus training efforts on the improvement of

fluency skills.

Limitations and Future Research

One possible limitation of this study was the strength of the emotional

manipulation. While the emotional manipulation was shown to be effective, the

maximum average ratings for any emotional state was 2.68 which falls below the

midpoint of the scale. It is possible that the emotion was found not to impact forecasting

extensiveness simply because the emotion manipulation was not strong enough. Future

research should aim to find videos or other modes of emotion elicitation that garner

stronger effects.

Another possible limitation related to the emotion manipulation was the lack of an

additional manipulation check at the conclusion of the experimental task. It is possible

that the emotional effects may not have lasted throughout the experimental task. Without

the additional manipulation check, there is no way to make that determination. Future

studies should aim to include a manipulation check both at the start and the conclusion of

the experimental task.

As mentioned earlier, the knowledge, training, and expertise of individuals in the

social services domain may have enabled the participants in this study to separate the

emotional effects from the task at hand (e.g. Grant & Alexander, 2014). Social workers

are likely to encounter many emotion eliciting instances regularly throughout their

workday requiring them to develop and hone the skill of emotional control. This study specifically recruited social work students and experts due to the content of the creative decision-making task. However, the limitation is that the results may not generalize to other creative problems or other populations. Future studies should seek to include participants from other domains in which there may not be specific training in emotional control and/or the regular opportunity to hone that particular skill. Additionally, future research should examine creative decision making in alternative problems. It is possible that the emotions elicited may in fact be integral to the decision task at hand.

A further limitation of this study was the exclusion of cognitive ability as a covariate. Since the sample utilized in the current study were all college graduates, it was assumed that participants would exceed the threshold of cognitive ability needed to understand the problem domain. While the impact of creative fluency on forecasting was notable and significant, a measure of cognitive ability would provide insight into a minimum ability to understand the problem domain necessary to reap the full benefits of creative fluency. Future studies should include a measure of cognitive ability to provide this clarification.

Conclusion

The focus of this study was an examination of the relationship between emotion and performance in forecasting during idea evaluation. Incidental emotions were induced during the creative decision-making process for social service workers. A series of ANCOVAs were then conducted to determine whether emotion affected forecasting performance. Fear was expected to induce systematic processing, resulting in more

extensive forecasts than a neutral emotion. Conversely, anger was expected to induce

heuristic processing, resulting in less extensive forecasts than a neutral emotion. The

hypotheses were not supported; however, several notable findings arose out of the

exploratory analyses. The first of which was that creative fluency was found to

significantly predict forecasting extensiveness. Additionally, experience working with the

population of interest was found to result in more extensive forecasting. Overall, emotion

does not appear to influence forecasting extensiveness, but initial evidence was provided

for other factors that do impact forecasting extensiveness.

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APPENDICES

Appendix A: IRB Approval

IRB
INSTITUTIONAL REVIEW BOARD
Office of Research Compliance,
010A Sam Ingram Building,
2269 Middle Tennessee Blvd
Murfreesboro, TN 37129
FWA: 00005331/IRB Regn.. 0003571

MIDDLE TENNESSEE STATE UNIVERSITY

IRBN007 – EXEMPTION DETERMINATION NOTICE

Monday, June 06, 2022

Protocol Title	*Addressing the Issue of Mental Illness and Incarceration*
Protocol ID	22-1155 2q

Principal Investigator	**Amanda Terry** (Student) *Faculty Advisor:* **Michael Hein**
Co-Investigators	Alexander Jackson
Investigator Email(s)	*aht2c@mtmail.mtsu.edu; michael.hein@mtsu.edu*
Department/Affiliation	Psychology

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXEMPT** review mechanism under 45 CFR 46.101(b)(2) within the research category *(2) Educational Tests, surveys, interviews or observations of public behavior (Qualtrics Survey).* A summary of the IRB action and other particulars of this protocol are shown below:

IRB Action	**EXEMPT from further IRB Review** Exempt from further continuing review but other oversight requirements apply
Date of Expiration	5/31/2023 *Date of Approval:* 6/6/22 *Recent Amendment:* **NONE**
Sample Size	ONE HUNDRED AND TWENTY (120)
Participant Pool	**Healthy adults (18 or older) – Fluent English spakers recruited through Prolific Academic**
Exceptions	Online consent followed by internet-based survey using Qualtrics is permitted (Qualtrics links on file).
Type of Interaction	☐ Non-interventional or Data Analysis ☒ Virtual/Remote/Online Interview/survey ☐ In person or physical– Mandatory COVID-19 Management (refer next page)
Mandatory Restrictions	1. All restrictions for exemption apply. 2. The participants must be 18 years or older. 3. Mandatory ACTIVE informed consent. 4. Identifiable information, such as, names, addresses, and voice/video data, must not be obtained. 5. NOT approved for in-person data collection.
Approved IRB Templates	*IRB Templates:* Online Informed Consent *Non-MTSU Templates:* Recruitment Script(s)
Research Inducement	$7.88 paid directly to the participant's account; PI's personal funds used with no requirement of cash receipt
Comments	The participants will receive the compensation once they enroll.

Institutional Review Board, MTSU   FWA: 00005331   IRB Registration. 0003571

Summary of the Post-approval Requirements: The PI and FA must read and abide by the post-approval conditions (Refer "*Quick Links*" in the bottom):
- *Final Report:* The Faculty Advisor (FA) is responsible for submitting a final report to close-out this protocol before 5/31/2023; if more time is needed to complete the data collection, the FA must request an extension by email. REMINDERS WILL NOT BE SENT. **Failure to close-out (or request extension) may result in penalties including cancellation of the data collected using this protocol or withholding student diploma.**
- *Protocol Amendments*: IRB approval must be obtained for all types of amendments, such as:
  - Addition/removal of subject population and sample size.
  - Change in investigators.
  - Changes to the research sites – appropriate permission letter(s) from may be needed.
  - Alternation to funding.
  - Amendments must be clearly described in an addendum request form submitted by the FA.
  - The proposed change must be consistent with the approved protocol and they must comply with exemption requirements.
- *Reporting Adverse Events:* Research-related injuries to the participants and other events , such as, deviations & misconduct, must be reported within 48 hours of such events to compliance@mtsu.edu.
- *Research Participant Compensation:* Compensation for research participation must be awarded as proposed in Chapter 6 of the Exempt protocol. The documentation of the monetary compensation must Appendix J and MUST NOT include protocol details when reporting to the MTSU Business Office.
- *COVID-19:* Regardless whether this study poses a threat to the participants or not, refer to the COVID-19 Management section for important information for the FA.

COVID-19 Management:
The FA must enforce social distancing guidelines and other practices to avoid viral exposure to the participants and other workers when physical contact with the subjects is made during the study.
- The study must be stopped if a participant or an investigator should test positive for COVID-19 within 14 days of the research interaction. This must be reported to the IRB as an "adverse event."
- The FA must enforce the MTSU's "Return-to-work" questionnaire found in Pipeline must be filled and signed by the investigators on the day of the research interaction prior to physical contact.
- PPE must be worn if the participant would be within 6 feet from the each other or with an investigator.
- Physical surfaces that will come in contact with the participants must be sanitized between use
- **FA's Responsibility:** The FA is given the administrative authority to make emergency changes to protect the wellbeing of the participants and student researchers during the COVID-19 pandemic. However, the FA must notify the IRB after such changes have been made. The IRB will audit the changes at a later date and the PI will be instructed to carryout remedial measures if needed.

Post-approval Protocol Amendments:
The current MTSU IRB policies allow the investigators to implement minor and significant amendments that would not result in the cancellation of the protocol's eligibility for exemption. *Only THREE procedural amendments will be entertained per year (changes like addition/removal of research personnel are not restricted by this rule).*

Date	Amendment(s)	IRB Comments
NONE	NONE.	NONE

Post-approval IRB Actions:
The following actions are done subsequent to the approval of this protocol on request by the PI or on recommendation by the IRB or by both.

Date	IRB Action(s)	IRB Comments
NONE	NONE.	NONE

Mandatory Data Storage Requirement:
All research-related records (signed consent forms, investigator training and etc.) must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data must be stored for at least three (3) years after the study is closed. Additionally,

the Tennessee State data retention requirement may apply (*refer "Quick Links" below for policy 129*). Subsequently, the data may be destroyed in a manner that maintains confidentiality and anonymity of the research subjects. **The IRB reserves the right to modify/update the approval criteria or change/cancel the terms listed in this notice.** Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Quick Links:
- Post-approval Responsibilities: http://www.mtsu.edu/irb/FAQ/PostApprovalResponsibilities.php
- Exemption Procedures: https://mtsu.edu/irb/ExemptPaperWork.php
- MTSU Policy 129: Records retention & Disposal: https://www.mtsu.edu/policies/general/129.php

Appendix B: Trait Positive and Negative Affectivity Schedule (PANAS-X)

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then indicate to what extent you have felt this way **in general** (on average).

	Not at all like me (1)	(2)	(3)	(4)	Very much like me (5)
Enthusiastic	○	○	○	○	○
Happy	○	○	○	○	○
Joyful	○	○	○	○	○
Calm	○	○	○	○	○
Relaxed	○	○	○	○	○
At Ease	○	○	○	○	○
Scared	○	○	○	○	○
Afraid	○	○	○	○	○
Frightened	○	○	○	○	○
Hostile	○	○	○	○	○
Angry	○	○	○	○	○
Irritable	○	○	○	○	○

Appendix C: Consequences *A-1* Test

This is a test of your ability to think of a large number of ideas in connection with a new and unusual situation.

Please review the following sample item:

Sample Item
What would be the results if people no longer wanted or needed sleep?

Sample Results
1. Get more work done
2. Alarm clocks not necessary
3. No need for lullaby song books
4. Sleeping pills no longer used
5. _____
6. _____

Of course, there are many more possible results that could have been written. You will be presented with 5 different situations similar to the one above. Four examples will be included for each item. You will be given two minutes on each page to provide as many **other** possible results of the change as you can. Your answers **do not** need to be complete sentences.

1. What would be the results if none of us needed food any more in order to live?

Examples:
1. No need for farmers
2. No plates, knives, and forks
3. No grocery stores
4. Save time

2. What would be the results if humans lost their group feeling to the extent that they all preferred to live alone ?

Examples:
1. No more marriages
2. Population decline
3. More hermits
4. No more cities

3. What would be the results if the entire United States west of the Mississippi became an arid desert?

Examples:
1. Shortage of water
2. People would move east
3. Food shortage
4. Trees would die

4. What would be the results if everyone suddenly lost the sense of balance and were unable to stay in the upright position for more than a moment?

Examples:
1. People would fall down
2. Could not walk
3. Many accidents
4. Confusion

5. What would be the results if all the people in the world lost the ability to reproduce offspring?

Examples:
1. Race would die out
2. No more babies
3. No more baby doctors
4. No more diapers, toys, etc.

Appendix D: Emotion Manipulation Videos

Link to "The Blair Witch Project" Fear Induction Video:

https://www.youtube.com/watch?v=HbnRhdGIPYU&t=57s

Link to "My Bodyguard" Anger Induction Video:

https://youtu.be/oeP8BeEKcXw

Link to "All the President's Men" Neutral Video:

https://youtu.be/akvCvFfJF7E

Appendix E: Emotion Manipulation Reinforcer Writing Prompts

Anger Condition Writing Prompt:

"Remembering an experience in your life.

Please try to remember an experience in the past 2 years that left you feeling extremely **angry**. Try to pick a situation in which you felt more **anger** than any other emotion. Try not to pick a situation in which you felt an emotion other than anger, or in which you felt mixed emotions.

Try to imagine yourself back in that situation and try to recall as vividly as you can just what being so angry felt like. Don't just think about being so angry; try to actually feel the anger, as though you were experiencing it right now; this will help you write a more realistic account. Try to focus on the experience of anger itself, what it felt like at the time, not on what came before or after.

Now try to describe that feeling to a best friend or relative. It is very important that your friend understands exactly how you felt during the incident and why you felt that way.

Please type what you would tell your friend or relative. Include as much detail as possible.

Remember: Your reply is completely confidential."

Fear Condition Writing Prompt:

"Remembering an experience in your life.

Please try to remember an experience in the past 2 years that left you feeling extremely **fearful**. Try to pick a situation in which you felt more **fear** than any other emotion. Try not to pick a situation in which you felt an emotion other than fear, or in which you felt mixed emotions.

Try to imagine yourself back in that situation and try to recall as vividly as you can just what being so fear felt like. Don't just think about being so fearful; try to actually feel the fear, as though you were experiencing it right now; this will help you write a more realistic account. Try to focus on the experience of fear itself, what it felt like at the time, not on what came before or after.

Now try to describe that feeling to a best friend or relative. It is very important that your friend understands exactly how you felt during the incident and why you felt that way.

Please type what you would tell your friend or relative. Include as much detail as possible.

Remember: Your reply is completely confidential."

Neutral Control Condition Writing Prompt:

"Remembering an experience in your life.

Please try to remember an experience in the past 2 years that **you do not associate with any particular emotion**. Try to pick a situation you would describe as **neutral**. Neutral experiences, such as going for a walk or cooking dinner, are associated with less emotion, or are not associated with any emotion at all. Try not to pick a situation in which you felt a strong emotion, or in which you felt mixed emotions.

Try to imagine yourself back in that situation and try to recall as vividly as you can just what was so ordinary about it. Try to focus on the neutral experience, what was happening during the situation, not about what came before or after.

Now try to describe that situation to a best friend or relative. It is very important that your friend understands exactly what your experience was during the event.

Please type what you would tell your friend or relative. Include as much detail as possible.

Remember: Your reply is completely confidential."

Appendix F: Differential Emotions Scale

A number of statements which people have used to describe themselves are given below. Please indicate the degree to which each statement describes you right now (at the present moment).

	Not at all like me (1)	(2)	(3)	(4)	Very much like me (5)
Scared	○	○	○	○	○
Afraid	○	○	○	○	○
Fearful	○	○	○	○	○
Happy	○	○	○	○	○
Amused	○	○	○	○	○
Joyful	○	○	○	○	○
Mad	○	○	○	○	○
Angry	○	○	○	○	○
Irritated	○	○	○	○	○

Appendix G: Social Innovation Problem

As the chair of a committee asked to address the following problem.

Please read the following information carefully.

Incarcerating mentally ill people in your county costs millions of dollars per year and does not improve their situation. Approximately 10,000 times each year in your county, adults who have serious mental illnesses are booked into jails. 7,500 of these adults also have drug and alcohol use problems. In comparison with inmates without mental illnesses, imprisoned individuals with mental illnesses tend to have longer jail stays and are at a higher risk of returning to jail upon release. The human toll of this problem—and its cost to taxpayers—is staggering. Jails spend 2 to 3 times more on adults requiring intervention because of their mental illness than those without a mental illness, yet improvements in public safety, health or quality of life are rarely observed. New research on people with mental illnesses in the justice system shows that it is caused by multiple problems. These include:

- Untreated mental illness
- Drug and alcohol use disorders
- Criminal risk factors
- Homelessness

The lack of stability in their lives causes them to cycle repeatedly through jail, hospitals, shelters, and crisis centers. These have a considerable cost to the community, but the community's current investment has not helped the hurt individuals' health and well-being. **Without change, large numbers of people who are homeless and mentally ill will continue to cycle through the criminal justice and healthcare systems. The citizens of your county are relying on you to provide a new solution.**

Appendix H: Proposed Solutions

Solution #1

To help both the mentally ill and homeless to gain stability after being released from jail, I propose halfway house for rehabilitation. It will be a costly start up but will save money in the long run while helping those who need it. It will help people reintegrate into society as functioning adults, instead of being a costly burden to society.

Solution #2

There are two problems you must address: the point of entry problem where the police book these individuals into jails, and the issue of long-term care. For the first problem, the police need better options and training when dealing with these individuals so they are not booked into jail and instead referred to a facility that can give them aid. Even starting the process of the prison cycle can be extremely harmful for individuals. Investing in some form of long-term care, where these individuals could be housed, cared for, referred to as opposed to a temporary crisis center.

Solution #3

The largest hurdle is not just getting people access to help/treatment but getting them to see that they may need it or to want it in the first place. Of course, destigmatization is helpful, but finding a way to connect with these people, outside of a doctor's office, as a gateway to treatment may be a practical place to start. Perhaps there could be a program where people who have successfully undergone treatment, who understand the problem, go out into the communities, and find a certain number of people to mentor. Most programs that I am aware of require the people to come to the program. This would be unique in that the program seeks out the people. The program itself could be supervised by doctors and trained staff, but the mentors would be people who successfully completed the program. They pay for the treatment they have received by mentoring a new group of people. With certain forms of mental illness, medication is the best or only course of action. There needs to be an easier way to get the medication to people and it needs to be affordable. Perhaps it should be delivered to people via doctors in the program, with the mentors helping keep track of the person's residence or location. With drug and alcohol disorders, there is some research on a cognitive treatment where a neuropsychologist observes activity in the brain when shown pictures of their preferred drug of choice. Then, they train them to think about the loss of things in their life that they loved because of the drug. Over time, through several temporally spaced exercises like this, the person can train their brain to suppress the urge to take the drugs. This is a much more sustainable technique than administering more drugs, eventually minimizing cost. Finally, appropriate skills training should be offered as part of the program, skills for jobs and for forming relationships and operating in society.

Appendix I: Forecasting Instructions

In your role, you are responsible for evaluating ideas for potential solutions to the problem provided by your team. Additionally, you are responsible for recommending a solution to the problem that will receive funding for implementation. Once you have evaluated the solutions provided by your team, you are also encouraged to suggest any ideas you may have for an alternative solution.

You will now be presented with three ideas for potential solutions proposed by members of your team. Then, you will be asked to provide the following:

- Positive outcomes that may occur if the solution is implemented
- Negative outcomes that may occur if the solution is implemented
- Potential obstacles that could arise during the implementation of this solution

Appendix J: Ranking Solutions Instructions

Your boss requires you to recommend one of the proposed solutions for funding. Please review the solutions and decide which option would be your first choice (or best choice), which option would be your second choice, and which option would be your third choice (or worst choice).

Please use the following rating scale:

1 = First choice option
2 = Second choice option
3 = Third choice option

You can only use each number once (only one response can be rated '1', only one response can be rated '2', and only one can be rated '3'). If you feel that multiple options equally deserve to be funded, you must choose one to rank above the other. There can be no ties.

Please type the number that corresponds to the order of your recommendation in the box next to each option below.

Appendix K: Demographics

Please indicate the gender with which you most identify.

○ Man

○ Woman

○ Non-binary

○ Agender

○ Prefer not to say

○ Other _____

What is your current age (in years)?

_____

Which ethnic category best describes you?

○ White or Caucasian

○ Hispanic or Latino

○ Asian

○ Black or African American

○ American Indian or Alaska Native

○ Native Hawaiian or Other Pacific Islander

○ I prefer not to answer

○ Multi-ethnic _____

○ Other _____

Please indicate the highest level of education you have completed.

○ Some high school, no diploma

○ High school graduate, diploma or the equivalent (for example: GED)

○ Some college credit, no degree

○ Trade/technical/vocational training

○ Associate degree

○ Bachelor's degree

○ Master's degree

○ Doctorate degree

○ Other (Please describe)

_____

Are you currently employed?

○ Yes

○ No

How many hours per week do you work on average?

Appendix K: Data Cleaning Items

Did you watch the entire video presented in this study?

○ Yes

○ No

Did you have sound during the video you were presented in this study?

○ Yes

○ No

Were you paying attention during the study?

○ Yes

○ No

Do you have experience working with the incarcerated community?

○ Yes

○ No

Do you have experience working with the mental health community?

○ Yes

○ No

Please provide a brief description of what you think this study is about.

_____

_____

_____

_____

_____

Should we use the data you provided in this study?

○ Yes

○ No

Why should we NOT use your data?

     ○ I wasn't paying attention

     ○ I just clicked randomly

     ○ I didn't understand the task/questions

     ○ I just skimmed through the questions

     ○ Other _____