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EDITORIAL ORGANIZATION

Editorial Address
STIE Malangkuçeçwara (Malangkuçeçwara School of Economics)
Malang 65142 – INDONESIA
Phone: 62 341 491813
Fax.: 62 341 495619
E-mail: jabm_int@stie-mce.ac.id

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Supervisory Styles, Stress, and Decision Making: An Application of Prospect Theory

James Montgomery*

Abstract

The purpose of our paper was to investigate the influence of supervisory styles on the manager's perceived stress and decision making. Supervisory styles are a combination of the leadership dimensions, consideration and initiation structure behaviors, and performance measurements, objective and subjective. We used a within-subjects experimental structure to determine the relative effects of perceived stress while making a decision under each supervisory style as well as relative risk-taking under each supervisory style. We found that managers whose supervisors use considerate leadership styles make riskier decisions than managers whose supervisors use initiates structure leadership styles. Furthermore, managers whose organizations use objective performance measures will report more stress than managers whose organizations use subjective measures. The initiates structure with objective performance measures supervisory style induced more perceived stress and resulted in lower risk-taking by the subjects than the other supervisory style combinations. Our research provides evidence that combinations of team-level leadership and organization level performance measures combine to produce unintended outcomes from the firm's managers.

Keywords: organizational neuroscience, supervisory styles, prospect theory, decision making, stress.

I. INTRODUCTION

Multiple scholars and business professionals have been discussing the need for employees to take appropriate risks in the business world (Kwoh, 2013; Wachsberg, 2017). Kwoh (2013) argues that employees need to take proper levels of risk depending on the situation. Furthermore, Wachsberg (2017) states that "without risks, very little is cultivated, and customers become easily bored with your product, service, or program." (para 2). These authors highlight an inherent structural challenge of risk-taking in businesses. Our research attempts to explain this deficiency in risk-taking by examining middle managers as they make decisions while exposed to various supervisory styles by using prospect theory.

Supervisory styles, as presented by Hartmann et al. (2010), are the combination of The Ohio state leadership studies classifications of considerate leadership and initiates structure leadership with the performance measures types objective and subjective. This structure creates a 2x2 combined typology of the four classifications. Hartmann et al. (2010) found evidence that certain supervisory style combinations can vary with goal clarity and evaluation fairness. Our research furthers that discussion by analyzing supervisory style's impact on employee stress through the theory of cognitive appraisal (Lazarus & Folkman, 1984) and risk-taking through prospect theory (Kahneman & Tversky, 1979).

* Assistant professor of management. Sorrell College of Business, Troy University. E-mail: james.montgomery1066@gmail.com.

Prospect theory provides an ideal point of view to investigate the relationship between supervisory styles and risk-taking (Kahneman & Tversky, 1979). Prospect theory explains how people make decisions in certain situations, vice making the rational decision. Supervisory styles provide varying conditions that influence the decisions making of managers in businesses. Our research provides evidence, through a within-subjects experimental design, that managers make decisions based on loss aversion, as highlighted in prospect theory. Furthermore, Trepel et al. (2005) review of cognitive neuroscience and prospect theory calls for work to gain an understanding of the neural basis of decision making. Our exploratory research provides some insight into brain activity while making decisions. Particular inroads may be made in the area of loss and risk aversion. By understanding the neural basis of loss and risk aversion, we may be able to develop a program to right-size risk management.

Neuroscience is the broad area of research that focuses on the structure, functions, and processes of the brain. A neuroscience perspective of business research has already made contributions in multiple fields. Frydman and Camerer (2015) contributed to finance research by using neuroscience is to investigate investor regret. Dimoka (2010) contributed to online retail research by using neuroimaging to study trust and distrust. These two examples are a small representation of the power of neuroscience research that may provide benefits to the business community. Furthermore, few neuroscience studies have been conducted in the area of leadership research, and none have been conducted in the area of supervisory style research. Due to the potential power of neuroscience research, we use functional Magnetic Resonance Imaging, or fMRI, to explore the brain processes that are used by managers when their supervisors use each of these leadership styles. An additional contribution that our study will provide is the use of fMRI to conduct our study. Very few fMRI studies have been conducted for leadership research, and no fMRI studies have been conducted for supervisory style. This study aims to fill this void in understanding the brain processes that are used by managers when they are exposed to different supervisory styles.

An experimental study will allow a combination of an fMRI exploratory study as well as satisfying critiques of the RAPM literature. Such critiques include Hartmann et al. (2010) that identified supervisory style research is subject to the traditional weaknesses associated with survey method research. Furthermore, Anderson et al. (1999) show that laboratory experiments provide more external validity than previously thought. The combination of these arguments helped us determine that an experimental study will aid the supervisory style discussion.

Our research provides insight for both researchers and business practitioners. As noted above, our experiment contributes to the discussion of risky employee decision making by highlighting the unintentional influence that supervisory styles have on risky decision making. Secondly, our experiment shows that supervisory styles will influence the perceived stress of employees while they are making decisions for the company. Thirdly, our experimental design provides a new method of investigating supervisory styles. Until our study, no one has conducted an experimental study of supervisory styles and their neural effects. Our exploratory fMRI analysis will provide foundational information on the neural processes related to prospect theory application.

II. LITERATURE REVIEW

2.1. Supervisory Style

Supervisors can use accounting systems to guide employee actions towards company goals. Hopwood (1972) began this investigation by classifying the reliance on

accounting for performance measures (RAPM) into three categories: budget-constrained style, profit-conscious style, and nonaccounting style. His research found that supervisors using a budget-constrained performance measurement style on managers caused more job-related tension felt by managers. RAPM research continued to develop until the discussion became inconsistent and convoluted, according to Otley and Fakiolas (2000). They reviewed RAPM research and concluded that a shift in research should match the shift in the business world. Businesses no longer strictly use budget restriction styles. Other accounting measures are being used to measures manager performance.

Supervisory style, as developed by Hartmann et al. (2010), is the combination of two dimensions, a style dimension, and a measures dimension. The style dimension is the leadership style that the manager chooses to use, and the measures dimension is the type of performance measure that their company uses. The style dimension is a leadership style, as identified by The Ohio state leadership studies. The two leadership styles are consideration leadership and initiation of structure leadership (Fleishman, 1953).

Considerate leaders orient their support toward relationships, friendships, mutual trust, and interpersonal warmth (Bass & Bass, 2008). Considerate leaders exhibit behavior such as finding time to listen to group members, making expectations clear, and making group members feel at ease when talking with them (Halpin, 1957). Initiation of structure leaders initiate activity in the group, organize it, and define the way work is to be done (Bass & Bass, 2008). Behaviors of initiation of structure leaders are critical of poor work, maintain standards of performance, and providing clear expectations (Halpin, 1957).

The performance measure dimension may either be subjective performance measures or objective performance measures (Kinicki & Williams, 2012). The supervisor's perception of the traits or behaviors of the employee is the basis of subjective performance measures. In a sense, the supervisor does not focus on the output of the employee so much as the supervisor focuses on the behaviors the employee uses to get the result. Measurable outcomes of the employee's actions are the basis of objective performance measures. Common objective performance measures include revenue, number of clients, and market share.

Combined, the leadership style dimension and the performance measure dimension make up four types of supervisory style, as shown in Figure 1. Supervisory styles are the result of two levels of management decision making. Performance measurements are usually mandated throughout organizations. For example, the U.S. Navy uses a subjective evaluation system for all its members. Each sailor is given a fitness evaluation once a year. Their supervisor rates, on a 1 – 5 scale, the seven traits on the fitness evaluation report (Navy Personnel Command, 2010). Subsequently, the leadership style is the decision of the individual supervisor. He or she may use considerate or initiates structure style. Therefore, a U.S. Navy supervisor may use a considerate/subjective supervisory style or an initiates structure/subjective supervisory style.

Figure 1
Supervisory Styles Figure

		Leadership Style	
		Considerate	**Initiates Structure**
Performance Measures	Subjective	C. S. Supervisory Style	I. S. Supervisory Style
	Objective	C. O. Supervisory Style	I. O. Supervisory Style

Table 1
Supervisory Styles Definitions

Term	Definition
C.S. Supervisory Style	A Supervisor that uses considerate leadership style and subjective performance measures
C.O. Supervisory Style	A Supervisor that uses considerate leadership style and objective performance measures
I.S. Supervisory Style	A Supervisor that uses initiates structure leadership style and subjective performance measures
I.O. Supervisory Style	A Supervisor that uses initiates structure leadership style and objective performance measures

2.2. Stress

Stress is a phenomenon that has been studied in multiple facets in varying degrees of intensity for decades. Like most topics, topic reviews are published to discuss the state of the topic and to give suggestions for future research directions. Beehr and Newman (1978) published an article that conceptualized job stress into seven facets of environmental, personal, process, human consequences, organizational, adaptive responses, and time. Using this conceptualization as a guide, it is important to understand that many things could influence the level of job stress that a person will feel. Examples of things that could influence job stress are previous experience to stress, changes in perceived workload, and setting realistic goals. In the case of the current study, the supervisory style of the manager's supervisor is considered an environmental facet. Elements that are considered a part of the environmental facet are the employee's task, the employee's role, and the employee's organization.

The theory of cognitive appraisal will be used to understand the process by which a person identifies a stressful event. This seminal theory was developed by Lazarus and Folkman (1984), to systemize our understanding of emotional reaction to events. They proposed that when an event comes into the perceptual area of people, they will start the appraisal process to determine their emotional reaction to the event. The appraisal process takes three forms; primary appraisal occurs when the event is introduced, secondary appraisal occurs when the person is attempting to cope with the event, and reappraisal occurs when the person reflects on the effectiveness of the coping strategy. These concepts will be discussed in depth in the following sections.

What is stress? Psychological stress, as defined by Lazarus and Folkman (1984, p. 19) is, "the relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being." This definition highlights the required components and processes in a stressful encounter. It is obvious that a person and the environmental characteristic must be in the same perceptual arena. The fundamental concept is that the environmental characteristic or event must be able to be perceived by the person. Upon the person perceiving the event, the appraisal process will begin to determine the relationship between the person and the event. The person, event, and relationship between the two may or may not induce stress in the person.

Cognitive appraisal. Appraisal is defined as, "the action or an act of estimating or assessing the quality or worth of something or someone" (Merriam-webster.com, n.d.). The theory of cognitive appraisal considers three forms of appraisal: primary, secondary, and reappraisal (Lazarus & Folkman, 1984). The appraisal process is used to determine the significance and the extent of the relationship between the person and the event.

The first form of appraisals, primary appraisals, is used to determine if an encounter is irrelevant, benign-positive, or stressful (Lazarus & Folkman, 1984). Essentially, the person evaluates whether he or she has anything at stake in this encounter (Folkman et al., 1986). If the encounter is determined to be irrelevant, the relationship between the person and the event will result in no gain or no loss on the part of the person. If the encounter is determined to be benign-positive, the relationship between the person and the event will result in the person's well-being remaining constant or improved from the encounter. Emotions felt from a benign-positive encounter would include joy, happiness, or peacefulness. If the encounter is determined to be stressful, the relationship between the person and the event will be further appraised on three forms: harm/loss, threat, and challenge (Lazarus & Folkman, 1984). Harm/loss appraisals indicate that the harm or loss has already been sustained. When a person learns that he or she has lost a loved one, the stressful encounter is the person and the learning of the news.

Threat appraisals anticipate a loss in the future, and the loss may or may not have already happened. The threat appraisal can coincide with a harm/loss appraisal in many ways. For instance, a manager in charge of a cost center has just learned that the budget for the department will be reduced while the same level of output is expected. The harm/loss appraisal is pertinent due to the reduction in the budget already occurring. The threat appraisal is also pertinent due to the expectation that the department is expected to maintain the same level of output with a smaller budget. In fact, the threat is the future loss of the person's reputation due to a reduction in departmental output. A person that is presented with a threat appraisal may use coping methods to minimize or negate the future loss of a threat appraisal.

The last primary appraisal is the stressful challenge appraisal. Challenge appraisal will indicate a future gain for the person. People that are presented with a challenge appraisal will feel positive, motivating feelings such as eagerness as they develop coping methods to secure the future gain. It is important to note that threat and challenge appraisals are not mutually exclusive. Take the budget cut scenario as an example. The cost center manager may appraise the relationship between herself and the event as a challenge as well as a threat. If the manager is successful at maintaining the same output with a reduced budget, the manager will be able to use this accomplishment to leverage for a compensation increase or a promotion. Appraisals are essentially resource-dependent based on the individual. A manager that has had experience in overcoming a budget reduction may be more inclined to appraise the reduction as more of a challenge rather a threat. Likewise, a manager with the same budget reduction with no experience dealing with this circumstance may appraise the reduction as more of a threat rather than a challenge.

The second form of appraisal is secondary appraisal. During the secondary appraisal, the person evaluates what, if anything, can be done to overcome or prevent harm or to improve the prospects for a benefit (Folkman et al., 1986). Secondary appraisals occur at the same time as primary appraisals. As mentioned above, the secondary appraisal of the coping method will aid in the result of the primary appraisal.

The last form of appraisal, reappraisal, refers to a changed appraisal based on new information from the environment and/or a person (Lazarus & Folkman, 1984). Upon the presentation of new information, a person may change the primary appraisal, for example, from benign-positive to a threat appraisal. For instance, if a person is fired from her job, upon learning of the firing, she may determine this as a threat appraisal. A

few days later, she learns that she has been offered a new position in another firm. The new information may modify her stress from threat appraisal to benign-positive.

Coping. As mentioned in the introduction, a stressful encounter encompasses three broad time periods; the introduction of the event (primary appraisal), the secondary appraisal (coping), and the immediate outcome. Coping is the construct in the theory of cognitive appraisal that encompasses the strategy in which the person will manage the stress. Specifically, coping is defined as the person's constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the person's resources (Lazarus & Folkman, 1984).

The definition of coping encompasses three features. The first is that the coping mechanism is process-oriented. In fact, people will conduct a cognitive appraisal of an event to determine the significance of the event to them. According to Folkman et al. (1986), coping is what the person actually thinks or does to interact with the event. Secondly, coping is contextual. The resources of the person in relation to the specific event will be the starting point in which a person will begin coping with the event. Each individual event is unique with respect to developing coping strategies. Even an event that is similar to a previous event, e.g., another writing assignment for a writing class, will present a unique context due to the resources of the person changing. It would be safe to assume that the person learned from previous writing assignments and will be more prepared for this new assignment. Lastly, coping is the action to manage the event. The success of the coping behavior does not affect the immediate felt emotion from the event because the coping action is occurring immediately after the event.

Coping is a construct that contains multiple functions. Those functions are to regulate the distressing emotions (emotion-focused coping) and to do something to make positive changes to the problem causing the distress (problem-focused coping) (Folkman & Lazarus, 1980). Folkman and Lazarus (1980) developed the two functions by studying a middle-aged community and their stressful events. They sampled 100 people over a 12-month period to study stress, coping, and emotions. The two researchers found that 98% of coping episodes contained both functions. The stressful encounter did influence the coping function that was used more prominently. When an encounter was determined to be changeable, the problem-focused coping function was used. Likewise, when an encounter was determined to be unchangeable, the emotion-focused coping function was used.

Overall, the theory put forth by Lazarus and Folkman (1984) has withstood dozens of tests. It has proved to be a strong framework that researchers may use to conceptualize a stressful event. The three appraisals, primary, secondary, and reappraisal, provide an understanding of how a person determines if an event is a threat or a challenge. Furthermore, the theory helps to provide an understanding of coping, the process in which a person determines if she has the resources necessary to overcome the situation or if it is outside their ability to resolve. Based on the robust research providing support for the theory of cognitive appraisal, this study will use this theory as the foundation of our study.

2.2.1. Stress in the workplace

Stress in the workplace is an issue that researchers have focused on since the call by the APA task force on health research (1976). Health problems among business persons were a growing concern in 1976. Globalization, constantly changing business environments, and a renewed focus on health care have caused the research on health problems to become even more vital now.

As noted above, while discussing the facets of job stress, stress in the workplace can be caused by many elements. Specifically, Bliese and Castro (2000) found a correlation between role clarity and stress. Role Clarity is conceptualized as knowing *what* to do. Their nonexperimental multilevel random coefficient modeling study on 1538 enlisted U.S. army soldiers found that in the presence of high supervisory support, high role clarity will reduce the stress felt by a high work demand. In other words, when there is a lot of work to do, the workers will be less stressed if they know exactly what they need to do, and the supervisors provide a lot of support. Bliese and Castro (2000) further found that when supervisory support is low, role clarity will have a positive correlation on the stress caused by a high work demand. This study is important to note for several reasons. The first is that it provides evidence that supervisory style is a combination of supervisor behavior toward the employee and supervisor structure of the employee's work environment. Second, Bliese and Castro (2000) provided evidence of the association between supervisor behavior and employee stress. However, their research falls short on providing a causational explanation of this phenomenon.

In 2000, Cavanaugh et al. (2000) published their research concerning work stress among U.S. managers. They categorized stress as challenge-related stress and hindrance-related stress. Challenge-related stress is defined as stress that creates feelings of challenge and fulfillment. Hindrance-related stress is defined as "stress associated with job demands that involve excessive or undesirable constraints that hinder the achievement of valued goals" (Cavanaugh et al., 2000, p. 67). Upon surveying 1886 high-level managers, Cavanaugh et al. (2000) found that challenge-related, self-reported stress had a positive relationship to job satisfaction and negative relationship to job search and voluntary turnover. They also found that hindrance-related, self-reported stress is negatively related to job satisfaction and positively related to job search. This study provided evidence that stress is not a unidimensional construct; rather, it is a contextual construct that is the summation of multiple inputs. Upon the appraisal, the person may find the source of stress to be a motivator or an obstacle.

While a person appraises a situation to determine if it is a motivator or an obstacle, other variables will come into play. Specifically, Kaiseler et al. (2014) found evidence among police recruits that work engagement will influence the way a person appraises a scenario. Yagil (2012) defines work engagement as "an employee's cognitive state, characterized by high motivation, and has been shown to be related to positive work-related outcomes." Using this definition, Kaiseler et al. (2014) provided a questionnaire to 387 police recruits in Portugal. Along with items to measure work engagement levels, the recruits were asked to self-select the most intense stressor they felt in the previous 14 days. They then listed how stressed the event made them feel and how much control they perceived they had over the stressor. Using a linear hierarchal regression analysis, the research team found that a person is more likely to appraise a stressor as a challenge versus an obstacle with higher work engagement, but there will not be a difference in the intensity of stress felt from the stressor.

Stress has been linked to negative outcomes in both the short-term and long-term time periods. In the short term, stress will have both a direct and indirect impact on problem drinking of employees (Bacharach et al., 2002). Bacharach et al. (2002) used a sample of blue-collar workers to study the impact of certain work-related risk factors that may influence problem drinking. Three thousand three hundred ninety-two questionnaires from eight labor unions provided evidence that workplace stress, measured as role conflict, and a permissive attitude toward drinking were correlated with problem drinking. In the long term, chronic stress, emotional exhaustion,

depersonalization, and reduced personal accomplishment can lead to burnout among employees (Hobfoll & Freedy, 1993).

Upon the mounting evidence of workplace stress, researchers have begun testing the effectiveness of some methods to manage or cope with stress. Gardner et al. (2005) studied the use of cognitive therapy in the workplace. Gardner et al. (2005) defined cognitive therapy as "a technique for modifying cognitive appraisals" (p. 139). As opposed to dealing with the stressful encounter in the secondary appraisal phase, cognitive therapy is designed to influence thinking, emotions, and well-being, which is used to appraise a stressful event in a more favorable point of view. To test the effectiveness of cognitive therapy, the researchers developed a three-group study. The first group received no training, the second group received coping methods training, and the final group received cognitive therapy training. A group of 138 National Health Service employees was divided among the three groups. They were given the general health Questionnaire (GHQ-12) at the end of the course and three months following the course. The group that was given cognitive therapy training showed a significant reduction in work-related stress. The group that was given coping method training showed a smaller but still significant reduction in stress.

A vital consideration upon reviewing research conducted in the workplace is the methodology used in these studies. Every study included in this review used a questionnaire survey to investigate its hypotheses. The important next step to be taken is to investigate causation between workplace anticipations and employee stress. In order to find causation, an experimental methodology must be used. Therefore, in order to fill the gap in workplace stress literature, this study will use an experimental methodology to study workplace stress.

An important consideration of stress in the workplace is that the stressor alone will not cause stress. In the case of the performance measure, the measure could be a stressor but only when applied as a standard to the employee. In a sense, it depends on how the stressor, the performance measure, is applied to the employee. Consideration of the effects of performance measures on stress must be considered as a whole rather than a system of steps. A performance measure by itself is meaningless. A leadership style, by itself, is meaningless. Performance measures and leadership styles combined and applied to the manager will cause the stressful event.

2.2.2. Stress hypotheses

a. Initiation of structure leaders using objective performance measures will create more stress in managers than considerate leaders using objective performance measures.
b. Initiation of structure leaders using objective performance measures will create more stress in managers than initiation of structure leaders using subjective performance measures.

2.3. Decision Making

Prospect theory plays an integral role in understanding the dynamic between the supervisor and the manager. Prospect theory is used to understand how people make decisions (Kahneman & Tversky, 1979). Unlike earlier theories, prospect theory states that people will not always make a rational choice. Kuhberger (1998) meta-analysis showed that people make more risk-averse choices than risk-seeking choices in gains. People tend to do the opposite when faced with a loss decision.

Supervisory style is an environmental aspect that frames the decision for the managers as they make decisions. The decision frame is the "decision-makers conception of the acts, outcomes, and contingencies associated with a particular choice." (Tversky &

Kahneman, 1981). Specifically, supervisors will frame the scenario by presenting the performance measures and how they will be applied. Objective performance measures, such as budget maintenance, are easily and directly contributed to the manager and his/her decision making. Subjective performance measures usually do not link to a single decision or outcome. Therefore, the framing of subjective performance measures to a single decision will weigh less heavily on the manger. Furthermore, a supervisor that uses initiates structure leadership styles will focus on the task rather than the relationship. By focusing on the task, initiates structure leaders are more likely to frame the scenario directly to the performance of the manager. Consideration leaders will focus more on the relationship with the manager. They will be less concerned with the application of the consequences of the manager's actions. Therefore, a combination of an initiate structure leader with objective performance measures will frame the scenario for the manager to be more focused on the manager's decisions. A manager will be more loss aversive in these scenarios because they will understand that they will be measured against the outcomes.

2.3.1. Decision making hypotheses

a. Initiation of structure leaders using objective performance measures will influence managers to make more conservative decisions than considerate leaders using objective performance measures.
b. Initiation of structure leaders using objective performance measures will influence managers to make more conservative decisions than initiation of structure leaders using subjective performance measures.

1). Separation of leadership style and performance measures

The next set of hypotheses will predict the impact that each portion of the supervisory style will have on reported stress and decision making. We hypothesize that the type of performance measure used to evaluate managers will create more stress in managers than the leadership style used by supervisors. Using the theory of cognitive appraisal, the secondary appraisal portion is particularly important to support the above statement. As a reminder, the secondary appraisal is an evaluation of what the person can do to overcome or prevent harm or to improve the prospects for a benefit from a stressful situation (Folkman et al., 1986). A person will have more power to influence the relationship they have with their supervisor than to change the performance evaluation method of his or her company. Therefore, a manager will determine that the performance measures are more stressful than the leadership style of his or her supervisor.

To determine if objective or subjective performance measures will induce more stress onto managers, we use the theory of cognitive appraisal again. The secondary appraisal of subjective performance measures will yield more influence that a person can have over subjective ratings. Conversely, many objective ratings are influenced by factors outside the control of the person. An economic downturn can influence quarterly sales, a supply disruption can influence logistics statistics, and supply decisions can influence budgets. Therefore, objective performance measures will impart more stress on managers. The formal hypothesis for this section is:

2.3.2. Stress report hypothesis: managers whose organizations use objective performance measures will report more stress than managers whose organizations use subjective performance measures.

To investigate decision making and risk-taking, we use prospect theory to understand the interactions between the decisions and leadership style. As stated above, in regard to decision making, the performance measures are not as important as how they are applied. The leadership style of the supervisor will influence the decision-making style

of the manager by the way the supervisor uses the performance measure. An initiating structure leader will be more focused on outcomes and consequences than considerate leaders. Therefore, the manager will be more cautious of limits and boundaries with his or her initiates structure supervisor. The formal hypothesis for this section is:

2.3.3. Risk-taking hypothesis: managers whose leaders use considerate leadership style will make riskier decisions than managers whose leaders use initiates structure leadership style.

1). fMRI and BOLD response

In addition to the hypotheses above, we conducted an exploratory study using fMRI of the subjects while they analyzed the scenarios. fMRI uses blood oxygenation level dependent (BOLD) contrast to increase the temporal resolution of the imaging. FMRI is able to measure voxels quickly and repeatedly to determine a change in blood movement as a proxy for neuron activation. fMRI is unable to directly measure the activity of an individual neuron. Neurons operate using a chemical and electrical process. However, the brain does not have an internal energy store. In order to gain the energy needed to develop a synaptic pulse, blood must bring the materials needed for metabolism (Petzold et al., 2008). With this limitation in mind, fMRI uses the blood in the area of the neurons as a proxy for the activation of the neurons.

Blood has many characteristics, but the one that is particularly important to fMRI is the amount of oxygen that the blood is carrying. Oxygen is necessary for oxidative metabolism to occur (Vazquez et al., 2010). This process occurs in the mitochondria, which is considered the powerhouse of cells, in this case, neurons. Hemoglobin is the substance that carries the oxygen in the blood. When the hemoglobin is carrying oxygen, it is called oxyhemoglobin. When the hemoglobin is not carrying oxygen, it is called deoxyhemoglobin. The other major difference between oxyhemoglobin and deoxyhemoglobin is that the former is diamagnetic, and the latter is paramagnetic (Pauling & Coryell, 1936). This means that oxyhemoglobin will respond to a magnetic field and produces an fMRI signal, whereas deoxyhemoglobin will not respond to a magnetic field and will suppress the fMRI signal. fMRI takes advantage of this difference to measure blood flow in the brain.

Understanding the BOLD response to neural activity is vital for developing a well-thought-out experiment. It must be understood that the BOLD response is a proxy for neural activity. This means that fMRI does not directly measure neural activity but rather a different characteristic that has a high correlational value with neural activity. As discussed above, oxygen provides the energy needed for neurons to activate. Due to this chain from oxygen to energy to neuron firing, the BOLD response is a good proxy for neuronal activity. However, measuring the BOLD response acts differently than from how measuring neuronal activity directly. BOLD responses are delayed and dispersed relative to neural activity. This is a function of blood oxygenation, flow, and volume (Buxton et al., 1998).

III. RESEARCH METHODOLOGY

The research method used for this exploratory study is a within-subject design with three conditions. A within-subject design is appropriate due to the inherent strengths of the paradigm. fMRI experiments are expensive to conduct. Therefore efforts to maximize the utility of the subjects are essential. The within-subjects experimental design provides more power for each subject because all the experimental conditions are applied to each subject. The other strength of the within-subjects design is the elimination of the individual difference. In a within-subjects design, the conditions

are compared within the same subject. In this sense, the subjects act as their baseline. Therefore, the only differences between the data sets are those that have been introduced in the experiment. Within-subjects experiment designs also have drawbacks. Traditional threats to internal validity include confounding variables from environmental variables and time-related variables.

3.1. Subject Selection

The population that this study is focusing on are managers of a department that makes decisions that impact the performance of the company. These managers report to a direct supervisor that tracks their performance and use appropriate behavior modification as they see fit. While it is difficult to estimate the number of managers who make up this population, every medium and large business contains many of these managers.

The scenarios are written to create the environment of the supervisor and the management expectation. Therefore, the subjects merely must be aware of the ramifications of poor decision making. Based on this logic, experimenters vetted the subjects with at least one year of management experience as well as the fMRI restrictions listed above. The complete list of restrictions for subjects to participate in the study are (1) less than one year of management experience, (2) claustrophobic, (3) metal pieces or medical device (pacemaker or insulin pump) in the body, (4) pregnant, (5) not English-speaking, and (6) place and screw for bone fracture placed within six weeks or on the skull or face.

We used two techniques to pull a sample from the population of interest. The first method was to conduct presentations at the beginning of each MBA class at a large midwestern university. Experimenters told potential candidates that the study involves a non-invasive procedure that employs magnetic fields, a list of restrictions, and the focus of the study. Considering the increasing number of students who start their MBA immediately after their bachelor's, it is necessary to conduct networking in the area to advertise the study. Therefore, a member of the research team joined a business networking group to provide information regarding our study.

In order to ensure that the candidates obtained from the networking group meet the requirements, a researcher verbally screened the candidates. The candidates informed the research member of their interest in the study, and the first conversation verified their work experience as well as other restriction requirements. Upon verification of the candidate eligibility, from either recruitment technique, he or she was given a unique identifier code. The code was used to match the online questionnaire survey with the brain scan. Upon completion of the online questionnaire, Experimenters scheduled the subjects for their fMRI session at their convenience. On average, participants conducted their scans 33 days after completing the questionnaire. Therefore, concerns of priming the participants about the variables of interest are minimal. Subjects completed their fMRI scans on Sunday afternoons between 2:00 PM and 7:00 PM. Upon completion of the fMRI scan, the subjects received a $100 visa gift card for their participation.

One hundred three subjects were initially recruited into the study and completed the questionnaire. Out of 103 subjects, 53 subjects completed the fMRI. Therefore, the total number of subjects that participated in the study were 53. Table 2 contains demographic data of the participants.

Table 2
Participant Demographics

Participant Demographics	
Number	53
Age (Mean)	39.4
No Response (n)	0
Gender:	
Female (n)	31
Male (n)	22
Race:	
White (n)	49
Hispanic or Latino (n)	1
Asian (n)	2
Black or African American (n)	1
Education:	
Bachelor's degree (n)	26
MBA (n)	6
MSA (n)	8
No Response (n)	13
Experience (Industry - Mean/SD)	9.93 (1.26)
Experience (Similar Positions - Mean/SD)	11.26 (1.49)
Experience (Current Position - Mean/SD)	6.91 (1.22)
Industry Classification:	
Service (n)	39
Retail (n)	7
Manufacturing (n)	5
No Response (n)	2

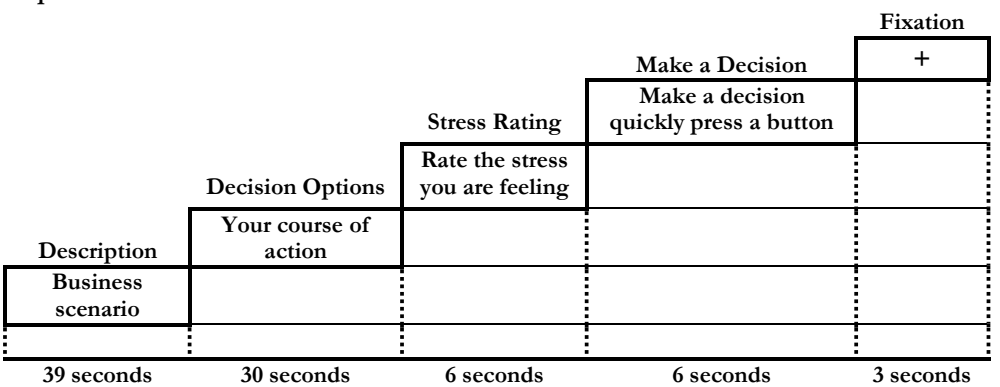
3.2. Experimental Protocol

The experimental protocol consisted of two steps. The first step was an online questionnaire developed by HassabElnaby et al. (2017). The questionnaire consisted of questions regarding demographic information. The second step is the fMRI scan of the subjects. Following the completion of the questionnaire, the subjects were shown available appointment times for their scan. All appointments took place on Sundays between 2 PM and 7 PM. First, the subjects were screened by the fMRI technicians to verify the safe usage of the scanner. Subjects were removed from the study if they were pregnant, claustrophobic, or had metal pieces in their body. Next, they were ushered into the fMRI scanner to participate in the study.

In the scanner, the experimenters showed the subjects three different scenarios that required the subjects to make a difficult decision. Following HassabElnaby et al. (2017), we developed the three scenarios included in this study. Each scenario is written using four slides. The first slide is a description of the business scenario. Scenarios contain two parts. The first part is a quick explanation of the type of business, the overall status of the company, and a specific task given to the participant. The first part, in all four scenarios, differ based on the specifics of the scenario but contain the same necessary information. The second part describes their supervisor. The supervisor description is the critical variable that differs for each scenario. Supervisor descriptions contain a quick supervisor style explanation and expectation from the manager. The three supervisor styles used are a considerate supervisor using objective performance measures, initiation of structure supervisor using subjective measures, and initiation of structure supervisor using objective measures. A supervisor who uses objective

performance measures will inform the manager that they are expected to stay under budget. A supervisor that uses subjective measures will emphasize that the manager's motivation and well-being are important. The experiment protocol in Figure 2 illustrates the timeline for the slides and the duration of the scenarios.

Figure 2
Experiment Protocol



The second slide showed the decision options available to the subject. The first option is more aggressive but will likely allow the subject to meet the task requirements. The second option is less aggressive but will likely force the subject to miss the task requirements. Options 1 and 2 also differ in a critical variable. Option 1 will force the subject to violate a supervisor rule, whereas option 2 does not. Overall, option 1 will likely succeed but will violate a rule, and option 2 will likely not succeed but will not violate a rule. Anticipated brain activations associated with slide two will include many of the activations associated with slide 1 with an important addition. The subjects will begin considering the decision they plan on making for the scenario. Therefore, decision making will become a major brain activation function for the subjects. Slide 3 asked the subjects to self-evaluate their stress level. Finally, slide 4 asked the subjects to decide on the scenario.

3.3. Data Model

There are two broad steps, or levels, regarding the analysis of fMRI data. The first step is to do a calculation of the activation of each voxel in each subject. This is called a Mass Univariate Approach. For each voxel, a basic predictor matrix formula is used. The formula for this model is:

$$\mathbf{Y = X\beta + e} \quad \text{.....} \quad (1)$$

$$\mathbf{e} \propto \mathbf{N(0,V)}$$

Where:

Y is the dependent variable as a vector, in this case, the observed BOLD signal data from the scan.
X is the design matrix, which includes the components which explain the observed data.
β is the model parameters that are used to determine the contribution of the design matrix.
ε is the vector of residuals.
The goal is for the β values to minimize the value of ε.
The β matrix will include a β_0 and β_1. β_0 is the parameter for no activation, and β_1 is the model parameter for brain activation.
ε is the residual vector for the model. β_1 is the variable of interest for our study. Since our study is an exploratory study, it is important to conduct a whole-brain scan and analysis to determine all the brain activations associated with making a decision while under different supervisory styles.

The design matrix includes the experimental regressors as well as regressors of no interest, such as head movement. For our experiment, the regressor of interest was the moment that the subjects will be forced to make a decision regarding their scenario. When the subject is forced to make a decision, the dummy code was "1", otherwise the code was "0". This matrix also includes a baseline regressor as well as six regressors for head movement, three for translation along one of the axes, and 3 for rotation. The baseline regressor was a vector of "1" and will be used as a reference.

The next step of the first level analysis was to determine if there is a significant increase or decrease in each voxel. A t-test will be used to determine if this is the case. A p-value of 0.001 will be used. The equation for calculating the t statistic is:

$$\mathbf{t = c'b/\sqrt{s^2 c'(X'X)(X'X)^{+}c}} \quad \text{.....} \quad (2)$$

The basic hypothesis is that the experimental manipulations will not cause an activation in the voxels, $H_0 = \beta_1 = 0$. The second level of modeling for fMRI is the group analysis. Whereas the first level determined within-subject activation of each voxel, the second level of analysis tests between-subject variability of the specific effects of interest. In our case, the variables of interest are the brain activations induced by making a decision under different management styles. The basic equation that is used is the general linear model for a group level is stated as:

$$\boldsymbol{\beta = X_g \beta_g + \eta} \quad \text{.....} \quad (3)$$
$$\boldsymbol{\eta \sim N(0, V_g)}$$

As stated above, the research question of this research project is the difference in manager brain activations induced by each supervisory style used by the supervisors. The method that will be used to investigate the research question will be the subtraction technique or a paired t-test. The subtraction technique compares the images from the decision point phase and another decision point phase. The equation for this technique is:

$$\mathbf{t = \frac{X_1 - X_2}{s_{X_1 - X_2}}} \quad \text{.....} \quad (4)$$

Where:

$$s_{\bar{X}_1 - \bar{X}_2} = \sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}$$

And:

$$s_p^2 = \frac{\Sigma(X_1 - \bar{X}_1)^2 + \Sigma(X_2 - \bar{X}_2)^2}{n_1 + n_2 - 2}$$

In the case of comparing considerate leadership style using objective performance measures and initiates structure leadership style using subjective performance measures, the equation would be written as:

$$\mathbf{t = \frac{X_{CO} - X_{IS}}{s_{X_{CO} - X_{IS}}}} \quad \text{.....} \quad (5)$$

Where:

$$s_{X_{CO} - X_{IS}} = \sqrt{\frac{s_p^2}{n_{CO}} + \frac{s_p^2}{n_{IS}}}$$

$$s_p^2 = \frac{\Sigma(X_{CO} - \bar{X}_{CO})^2 + \Sigma(X_{IS} - \bar{X}_{IS})^2}{n_{CO} + n_{IS} - 2}$$

These would be repeated to compare each supervisory style with the other.

IV. RESULTS AND DISCUSSIONS

4.1. Analysis Results

The first set of analyses were focused on discovering the differences in perceived stress induced by the scenarios. Paired samples t-tests were used to analyze the data among the scenarios. The results of the first set of analyses are shown in Table 3. As annotated in Table 3, the perceived stress is significantly different between the C.O. and I.O. scenarios and the I.O. and I.S. scenarios. In both cases, subjects indicated that the I.O. scenario induced more perceived stress.

Table 3
Supervisory Style Stress Paired Samples T-Test

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Dev.	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
CO Stress Report-IO Stress Report	-0.529	1.398	0.240	-1.017	-0.042	-2.209	33	0.034
CO Stress Report-IS Stress Report	0.265	1.238	0.212	-0.167	0.697	1.246	33	0.221
IO Stress Report-IS Stress Report	0.549	1.083	0.152	0.244	0.854	3.621	50	0.001

We furthermore, conduct an analysis to determine if the leadership style or performance measure influenced perceived stress more. To do this, we create a stress report index for each category; consideration, initiates structure, objective, and subjective. The average of each scenario containing the categories is averaged to determine the stress report index value for each subject. Then the average of all subject stress report indices is averaged to determine a mean stress report index. The difference between the consideration and initiates structure scenarios are not significant ($p > 0.05$). However, the difference between objective and subjective scenarios is significant ($p \leq 0.01$). Then, we test the hypothesis that the use of objective performance measures will cause a higher stress report from managers than the use of subjective performance measures. We estimate the following model:

$$\textbf{SR-Index}_{pm} = \alpha_0 + \alpha_1 \textbf{Performance Measures} + \alpha_2 \textbf{Controls} + \xi \quad \text{.....} \quad (6)$$

Where:

SR-Index_{pm} is the stress report index, measured as the average of stress responses relative to the number of responses. Performance Measures an indicator variable that equals 1 for objective performance measures used and 0 if subjective performance measures used.

As explained above, the stress report index (SR-Index) to measure the reported stress from the subjects while they make their decisions. Our findings indicate a relationship between performance measures used and stress. Such that the use of objective performance measures creates more stress for managers ($p < 0.10$), as shown in Table 4. Hypothesis 3 is supported.

Table 4
Performance Measure Stress Report Regression Table

Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.206	.411		7.799	.000
1 1= Obj., 2= Suj.	-.357	.190	-.184	-1.878	.063
What is your age?	-.002	.007	-.028	-.282	.779

Notes: dependent variable= stress report.

The second set of analyses compared the decisions made by the subjects. In all three scenarios, the first decision is the conservative decision. Conservative decisions were less likely to meet the goal set out by the supervisor but did not violate budget restrictions. Aggressive decisions made it more likely that the supervisor's goal would be reached but will violate budget restrictions. A paired samples t-test analysis showed that participants made different decisions between the I.O. and C.O. scenarios and the I.O. and I.S. scenarios. In both scenarios, the participants choose the more conservative decision in the I.O. scenario. Specifically, the participants choose to stay within the budget restraints with a higher risk of not meeting the goal set forth by the supervisor. The outcomes of all the paired samples t-tests can be seen in Table 5.

Table 5
Supervisory Style Decision Paired Samples T-Test

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Dev.	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
CO Decision-IO Decision	-0.354	0.699	0.101	-0.557	-0.151	-3.509	47	0.001
CO Decision-IS Decision	-0.106	0.477	0.070	-0.246	0.034	-1.529	46	0.133
IO Decision-IS Decision	0.234	0.758	0.111	0.012	0.457	2.117	46	0.040

We furthermore, conduct an analysis to determine if the leadership style or performance measure influenced perceived stress more. To do this, we create a risk-taking index for each category; consideration, initiates structure, objective, and subjective. The average of each scenario containing the categories is averaged to determine the risk-taking index value for each subject. Then the average of all subject risk-taking indices is averaged to determine a mean risk-taking index. The difference between the consideration and initiates structure scenarios are significant ($p \leq 0.01$). However, the difference between objective and subjective scenarios are not significant ($p > 0.05$). Then, we test the hypothesis that the use of consideration leadership style by supervisors will cause managers to have a higher risk-taking index than managers whose supervisors that use initiates structure leadership. We estimate the following model:

$$\textbf{RT-Index}_{pm} = \alpha_0 + \alpha_1 \textbf{Leadership Style} + \alpha_2 \textbf{Controls} + \xi \quad \text{.....} \quad (7)$$

Where:

$RT\text{-}Index_{pm}$ is the risk-taking index, measured as the number of risk-taking decisions relative to the number of all decisions. Leadership Style an indicator variable that equals 1 for consideration leadership style used and 0 if initiates structure leadership style is used. As explained above, the

risk-taking index (RT-Index) is used to measure the decisions that the subjects made during the scenarios. Our model controlled for age. Our findings indicate a relationship between leadership style used by supervisors and decisions made based on risk. Such that the use of consideration leadership styles by supervisors encourage the subjects to make riskier decisions ($p < 0.05$) as shown in Table 6. Hypothesis 4 is supported.

Table 6

Leadership Style Decision Making Regression Table

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.022	.162		6.298	.000
	1= C, 2= IO	-.189	.074	-.257	-2.568	.012
	What is your age?	.000	.003	-.015	-.147	.883

Notes: dependent variable: risk taking.

4.2. fMRI Exploratory Analysis

In addition to the hypothesis above, we leveraged the fMRI technology to conduct an fMRI exploratory study of the subjects while they were making their decisions. To focus on the decision-making portion of the study, we compared the brain scans of the subjects between the following scenarios: C.O. and I.O., CO and I.S., and I.O. and I.S.

Insert Table 7 here.

The first exploratory analysis is a subtraction analysis of the considerate leader using objective measures (C.O.) brain activations minus the initiates structure leader using objective measures (I.O.) brain activations. This analysis resulted in 11 activation areas with functions that range from working memory to emotional judgment and are shown in Table 7 associated with the C.O. supervisory style. Each activation site could be the result of one or more functions. Therefore, a literature review was done on each activation site to determine possible reasons for their activation.

Table 7

CO > IO Brain Activation Clusters Table

Considerate leader using objective measures > Initiates structure leader using objective measures

Cluster Index	Brain Region	Voxels	p-Value	Peak Voxel Coordinates		
				X	Y	Z
1	Right Putamen	141	0.0465	26	-4	-6
2	Frontal Pole	170	0.0215	30	58	-2
3	Middle Temporal Gyrus, temporooccipital part	183	0.0154	-56	-54	2
4	Brain-Stem	192	0.0123	-6	-28	-12
5	Middle Frontal Gyrus	546	8.34E-06	46	6	60
6	Middle Frontal Gyrus	555	7.15E-06	-38	2	48
7	Left Pallidum	725	4.17E-07	-22	-8	-4
8	Inferior Frontal Gyrus, pars opercularis	815	1.19E-07	48	10	10
9	Right Cerebral Cortex	1213	3.05E-10	12	28	68
10	Inferior Frontal Gyrus, pars opercularis	1302	9.20E-11	-50	12	10
11	Occipital Fusiform Gyrus	13457	0	18	-70	-18

The functions of the activation sites can be grouped into six categories: learning, movement, emotion, memory, reading, and decision making. The protocol influenced the results of this analysis. Since the scenarios were shown the same order for every subject, it is likely that the learning function that was seen as the result of the subjects seeing the C.O. scenario first. Therefore, there are two possibilities of what the subjects were learning during this analysis. The first possibility is that they were learning about the scenario structure. The second possibility was that the C.O. scenario required more learning than the I.O. scenario. A considerate leader is expressing a more complex set of behaviors than an initiate's structure leader. While the initiates structure leader is only focusing on the performance of the manager, the considerate leader is expressing concern about the relationship between the supervisor and the manager. The subjects may be learning how to deal with the considerate leader.

The second category of functions that occurred is the movement category. The most likely reason for these activations is that the subjects likely pressed the button for the decision in the second slide. The subjects are not instructed to make their decision until slide four. They likely realized their mistake due to the activation in the inferior frontal gyrus. Aron et al. (2004) found that the right inferior frontal gyrus is associated with canceling intended movement.

The third category of activation sites that were seen during the C.O.-I.O. comparison is emotion. The emotional activation sites ranged from emotional engagement to reappraisal. A considerate leader is more concerned with the relationship between their manager than an initiate's structure leader. Therefore, it is likely that the subjects, representing the manager, engaged emotionally with the considerate leader scenarios than with the initiates structure leader scenarios.

The fourth and fifth categories of activation sites are memory and reading. Since the C.O. scenario was the first scenario that the subjects saw, the subjects were learning the format of the scenarios. Therefore, the subjects likely paid extra attention while reading the first scenario. Furthermore, the subjects were focusing on using their memory to complete the task.

The last category of activation sites is decision making and evaluation sites. The subjects were tasked with making a decision. Christopoulos et al. (2009) found evidence that the inferior frontal gyrus is also used to evaluate risky decisions. Therefore, the subjects may have considered the C.O. scenario riskier than the I.O. scenario.

Table 8

CO > IS Brain Activation Clusters Table

Considerate leader using objective measures > Initiates structure leader using subjective measures						
Cluster Index	**Brain Region**	**Voxels**	**p-Value**	**Peak Voxel Coordinates**		
				X	**Y**	**Z**
1	Occipital Fusiform Gyrus	202	0.0153	-22	-72	-14
2	Left Cerebral Cortex	222	0.00979	-32	-72	-36
3	Frontal Pole	238	0.00691	-40	46	0
4	Cingulate Gyrus, posterior division	306	0.0017	2	-34	22
5	Frontal Pole	338	0.000911	40	50	0
6	Insular Cortex	354	0.000672	-44	14	-8
7	Frontal Operculum Cortex	458	0.000103	44	20	0
8	Middle Frontal Gyrus	708	1.85E-06	42	32	28
9	Right Cerebral Cortex	766	7.75E-07	22	-56	-28
10	Paracingulate Gyrus	1296	6.81E-10	4	26	40
11	Precentral Gyrus	7890	4.67E-34	-38	-20	60

The second analysis is a subtraction analysis of the considerate leader using objective measures (C.O.) brain activations minus the initiates structure leader using subjective measures (I.S.) brain activations. This analysis produced 11 activation sites as listed in Table 8 associated with the C.O. supervisory style. The functions are grouped into categories the same as the second analysis, contrast. The categories are learning, movement, emotion, memory, reading, and decision making. Since the categories are the same for contrast C.O. > I.S. as contrast C.O. > I.O., it is likely that the same reasoning for the activations can be used for contrast C.O. > I.S. Therefore, the subjects most likely had the same thought processes with contrast C.O. > I.S. as contrast C.O. > I.O.

Table 9
IO < IS Brain Activation Clusters Table

Initiates structure leader using objective measures < Initiates structure leader using subjective measures

Cluster Index	Brain Region	Voxels	p-Value	Peak Voxel Coordinates		
				X	Y	Z
1	Precentral Gyrus	148	0.0347	-50	-6	30
2	Parietal Cortex	151	0.032	46	-54	64
3	Precentral Gyrus	178	0.0155	-58	-6	50
4	Juxtapositional Lobule Cortex	181	0.0143	-8	2	60
5	Inferior Frontal Gyrus, pars opercularis	455	3.42E-05	-50	12	10
6	Intracalcarine Cortex	2284	3.04E-16	-8	-84	0

The final analysis is a subtraction analysis of the initiates structure leader using objective performance measures (I.O.) brain activations minus the initiates structure leader using subjective performance measures (I.S.) brain activations. This analysis produced six activation sites associated with the I.S. supervisory style, as shown in Table 9. The literature review of the activation sites produced many references to decision making. This implies that the subjects used more brain processing to make a decision when faced with subjective performance measures than objective performance.

4.3. Discussion

A major discussion point of the results is the comparison of the supervisor that uses the initiation of structure leadership style in combination with objective performance measures (I.O.). I.O. supervisory styles were significantly different from supervisors that used considerate leadership styles with objective performance measures (C.O.) and supervisors that used initiation of structure leadership styles with subjective performance measures (I.S.). In both cases, participants reported higher perceived stress and made more conservative decisions.

As discussed in the literature review, a person identifies a stressful event as a mismatch between their own resources and the resources required to complete a task. The participants did not change from one scenario to the next. Therefore, the only differences were the perceived availability of resources that the participant felt in each scenario. In the case of the I.O. supervisory style, the participants were made acutely aware of their limitations in regard to the budget. If they violated the budget restriction, they were told they would be held directly responsible for violating the budget. In combination with the initiation of structure leadership style, the participants likely placed extra emphasis on the budget. This extra emphasis made them aware that the budget was not a resource they could expand or violate. Since the aggressive option caused them to go over budget, they were less likely to choose the aggressive option. The stressor was

the difference in the possibility of meeting the supervisor's stated goals and violating the budget restriction. In the conservative option, the participants would violate the budget but have a better chance of meeting the supervisor's stated goal.

Using the theory of cognitive appraisal (Lazarus & Folkman, 1984), stress creation is clear. The difference in scenarios helps to understand the change in perceived stress. The three portions of the cognitive appraisal theory are primary, secondary (coping), and reappraisal. The coping portion of cognitive appraisal is the key portion that explains our research. During the coping potion of cognitive appraisal, a person is developing a strategy to manage the stress (Lazarus & Folkman, 1984). In a sense, the person is evaluating their own resources to determine if they are able to overcome the task. In this case, the participants are presented with a task by their supervisor in each scenario. Participants analyzed their resources, such as their experience, budget control, and knowledge, to determine if they have the ability to meet the goal.

In the initiation of structure leader scenarios, the supervisor emphasizes the task rather than the relationship between the supervisor and participant. Therefore, the participant knew that they would be evaluated by their outcomes rather than their effort. In the objective performance measures scenarios, the participant knew that they would be judged using hard data outcomes. The combination of initiation of structure leaders using objective performance measures leads to a challenging coping situation. The participant knew their goal but realized they had fewer resources to accomplish their goal. They did not have room to expand their budget to meet the goal. Therefore, this reduction in perceived resources and maintenance of the same goal level becomes a stressor for the participants.

The next major outcome of our study is the tendency of the participants to choose a more conservative decision in the I.O. scenario and thus providing support for hypotheses 2a and 2b. The key takeaway from these decisions is the support for prospect theory in these scenarios. Supervisors frame the decision making of their managers indirectly by choosing a certain leadership style and performance measurement technique. This research provides evidence that managers will make more conservative decisions when they are held directly responsible for the outcomes. Otherwise, the managers will make more aggressive decisions when they are not reminded that they will be held responsible.

The decision-making outcome provides an important lesson to supervisors when they are directing goals to their managers. By setting a goal, the supervisor is directing their managers to move toward a future state. In a sense, the managers are given a fiduciary responsibility to act on behalf of the supervisor. However, when a supervisor holds the outcomes of a manager's actions as the basis of performance measurement rather than the actions themselves, then the manager will be more likely to make conservative decisions. Managers in this study are more likely to make a decision that is less likely to meet the goal. The managers are minimizing their losses rather than focuses on the stated goals.

On the other side, supervisors that shift focus from the realized outcomes, and the punishments may influence managers to focus on the stated goal. The manager may make decisions that will maximize the attainment of goal objectives rather than minimizing their own losses.

V. CONCLUSION

Our research shows that a supervisor's style will influence the decision making of subordinates. By understanding how subordinates will subtly be influenced through supervisor actions, employers may be able to use a consistent message technique to promote subordinate activity. This primary conclusion allows us to claim the following implications.

The implications for scholars are the contributions of experimental research in RAPM research regarding stress and decision making. This research provides evidence that using certain performance measure structures will influence the outcome of a manager's decisions. Prospect theory provides a foundation to understand the interaction between a supervisor's selection of performance measures and decision outcomes from managers.

The implications for practitioners are clear. Supervisors are caught in a struggle between accountability and goal attainment. Supervisors must be aware of the types of goals being set and the desired performance of their managers. If the goal requires drastic action, the manager may be forced to make aggressive decisions. If the supervisor emphasizes that the manager will be held accountable for the outcomes, the manager may make more conservative decisions. The goal may be missed because of the more conservative actions.

A limitation of this study is the short time period of the protocol. While a considerate leader focuses on the relationship between the leader and the follower, our study does not give time for much social capital to be built between the supervisor and manager of our study. Therefore, the significant brain activations we observed during our study may be representative of new supervisor/manager relationships. A longitudinal study will likely obtain different results if an established supervisor/manager dyad is observed.

Further research is needed regarding leadership from a neuroscience point of view. A major area of research that is needed is in the realm of decision making. If a manager is in a stressful situation, it seems likely that they would make more conservative decisions. A more conservative decision may be the result of the manager minimizing additional requirements on their resources. FMRI and neuroscience will help management researchers understand the thought process that managers have while they make these decisions.

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