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The relationship between mindfulness and ambiguity tolerance

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THE RELATIONSHIP BETWEEN MINDFULNESS

AND AMBIGUITY TOLERANCE

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A Research Project

Presented to the Faculty of

The Graziadio Business School

School of Business and Management

Pepperdine University

_____

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

in

Organization Development

_____

by

Jason Adamson

July 2018

This research project, completed by

JASON ADAMSON

under the guidance of the Faculty Committee and approved by its members, has been

submitted to and accepted by the faculty of The Graziadio Business School in partial

fulfillment of the requirements for the degree of

MASTER OF SCIENCE

IN ORGANIZATION DEVELOPMENT

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Abstract

While ambiguity may be a universal experience, it fluctuates depending on the circumstances. As there is no single definition of ambiguity, its manifestations range from role uncertainty to chaos to simple process issues. Because it is impractical and undesirable to completely eliminate ambiguity, an increased ability to tolerate ambiguity plays an important role in allowing individuals to cope with ambiguity in productive ways. Among the previously studied coping mechanism is mindfulness. The purpose of this study is to examine whether there is a relationship between individuals who self-report high levels of mindfulness and an increased ability to tolerate with ambiguity. A convenience sample of eight employees were interviewed and took a measure on mindfulness and ambiguity tolerance. Key findings were that there is a probable relationship between a higher level of mindfulness and an increased ability to tolerate ambiguity, which is consistent with other research findings.

Keywords: MINDFULNESS, AMBIGUITY, MAAS, MSTAT-I

Table of Contents

List of Tables

Chapter 1: Introduction

Kabat-Zinn (1994) is widely recognized as the figure who introduced the concept of "mindfulness" to the West in 1979 (Wilson, 2014). While mindfulness is relatively new to the West in its current incarnation, it was described, taught, and practiced by mental healthcare professionals, such as Dr. Weekes, as early as the 1960s (Weekes, 1969). Weekes (1969) introduced the concept of "acceptance" as a means to allow uncomfortable physical sensations, thoughts, and feelings to flow through the body and mind, instead of resisting them. Resistance to pain and discomfort, as Weekes (1969) argues, leads to disability. Through individuals such as Kabat-Zinn and Weekes, mindfulness has found its way into the world of mental health and physical wellbeing.

Purpose of Research

While there are other practices for being for being present and being accepting, this thesis examines the relationship between individuals' level of mindfulness and ambiguity tolerance. Ambiguous situations, especially those associated with change, have the ability to arouse potentially disruptive stress in individuals (Chesley & Wylson, 2013). Wehrenberg and Prinz (2007) discussed how the body's limbic system behaves in response to subjectively stress. In particular, Wehrenberg and Prinz (2007) lay out how the production of corticotrophin release factor from the hypothalamus regulates the stress response and how the amygdala sets the tone for emotions. Wehrenberg and Prinz (2007) go on to describe how the amygdala plays an especially important role in determining whether stimuli are categorized as negative or positive: "The amygdala assigns an emotional significance to incoming stimuli [and] directly stimulates the stress response and the sympathetic nervous system," (Wehrenberg & Prinz, 2007, p. 28). The stress

response triggered by the amygdala, setting off the sympathetic nervous system, can be reversed by engaging the parasympathetic nervous system (Wehrenberg & Prinz, 2007).

Mitigating the stress response can be achieved through psychopharmacological, cognitive-behavioral, and behavioral interventions. Of the three interventions, cognitive-behavioral interventions contain a component that engages the prefrontal cortex to override the amygdala by reframing stimuli as nonthreatening and accepting them in order to prevent triggering the sympathetic stress response. As Weekes (1969) and Kabat-Zinn (1994) describe, mindfulness is the ability to be aware and present in a situation with an accepting state of mind. By reducing resistance and the stress associated therewith, individuals who possess high levels of mindfulness could be able to displace the stress response associated with ambiguity. They do this by reframing the unknowns, uncertainty, and chaos associated with ambiguity, much in the same way individuals who undergo cognitive-behavioral interventions are able to reframe stimuli, thus overriding the stress response and the sympathetic nervous system.

Importance and Significance of the Research

As mindfulness continues to be taught and practiced as a means to reduce the overstimulation of the sympathetic stress response, we are learning more about how the brain works and how the workings of the brain influence organizations. Rock (2009) has distilled much of the information behind the neuroscience and the brain's relationship to how we behave in the workplace. Rock (2009) describes how the brain functions binarily with regard to how it perceives the world. The two states that Rock (2009) describes are an "away state" and a "toward state". Problems arise when the brain enters an away state, as the fight-flight-freeze response is triggered via the sympathetic nervous system. A

prolonged state in the fight-flight-freeze response at the personal level can result in a lack of productivity, low morale, and health problems (Rock, 2009). At an organizational level, being stuck in the fight-flight-freeze response as a result of a prolonged "away state" can be disruptive in terms of how people relate to work (positively or negatively) and their overall effectiveness on the job (Rock, 2009). Simply put, the science is clear that putting the brains of individuals in the workplace into the fight-flight-freeze response can have long-term negative consequences personally and organizationally (Rock, 2009).

When organizational interventions are carried out, the teaching of mindfulness practices is sometimes included, with the goal of facilitating better stress management for individuals in the workplace. Barrett (2014) describes how some individuals are able to "…be at ease with uncertainty," (p. 36). Barrett (2014) goes on to state that in order to develop this capacity of being at ease with uncertainty, individuals must learn how to be accepting through mindfulness of their feelings, thoughts, and emotions.

The objective of this thesis is not to propose a solution that eliminates ambiguity. Rather, the goal is to explore potential relationship between mindfulness and the ability to tolerate ambiguity, possibly leading to adaptive behaviors that can help ameliorate the toll ambiguity takes on our ancient mental hardware. Findings in this area can perhaps help individuals build resilience to lead lives in which they can manage ambiguity in a conscious and deliberate way that limits its potentially detrimental effects to their wellbeing.

Neuroscience of Stress

Wehrenberg and Prinz (2007) have provided a solid foundation for the neuroscience behind what causes the stress response. Rock (2009) has outlined that uncertainty generally creates an away state (i.e., stress response). Barrett (2014) has provided an explanation for how individuals can achieve an ability to deal with uncertainty (i.e., mindfulness). And Kabat-Zinn (1994) and Weekes (1969) have articulated practices by which individuals can practice mindfulness.

This study's aim is to test the hypothesis of a relationship between mindfulness and individuals' ability to tolerate ambiguity. I propose there is a relationship between having a high level of mindfulness and the ability to tolerate ambiguity, with lower levels of mindfulness being associated with higher amounts of ambiguity intolerance and higher levels of mindfulness being associated with lower amounts ambiguity tolerance.

Organization of the Study

Chapter 1 has outlined the purpose of the study and the significance of the research. Chapter 2 is a review of the literature that supports this study, including research on the benefits of being present, tolerance of ambiguity, how mindfulness influences ambiguity tolerance, and the benefits of practicing mindfulness. Chapter 3 is an outline of the methods used in the study, including a description of the study design, participant profiles, the means used to collect data, and the methods used to analyze the data. Chapter 4 provides analysis of the results that came out of the study and is organized by the measures and interview questions used in the study. Chapter 5 outlines the study's key findings, recommendations for individuals and organizations that experience ambiguity, and suggestions for further research.

Chapter 2: Review of Literature

This research project is an exploration of the relationship between mindfulness and the ability to deal with ambiguity. While our ancestors certainly dealt with a significant degree of ambiguity in their day-to-day lives, the context is entirely different today. And yet, our brains are still soft-assembled to respond to subjectively dangerous external stimuli in the same way (Siegel, 2011). How this stress response plays out in the office wearing neckties or pencil skirts versus hunting or being hunted in the jungle is a topic worth considering as a means to understand how the human condition can be improved. Research on this subject can be especially useful given that chronic stress seems to be endemic to most of humanity, despite the enormous advances that science has made in improving the human condition.

This chapter reviews the literature and is organized into five specific categories as follows: definition and application of mindfulness; amygdala arousal in responses to ambiguity; mindfulness research; the practice of mindfulness on the ability to cope with ambiguity; and research on ambiguity.

Definition and Application of Mindfulness

Mindfulness is defined as "…paying attention in a particular way: on purpose, in the present moment, and non-judgmentally," (Kabit-Zinn, 1994, p. 4).

For centuries, individuals have practiced mindfulness as a means to reduce stress, (Kabit-Zinn, 1994). As Siegel (2011) points out, the brain of a child born 40,000 years ago and a child born today are probably physiologically identical. This means that the mechanisms which cause stress are ancient and have not changed for millennia (Siegel, 2011). Kabit-Zinn (1994) ties the practice of mindfulness to ancient Buddhism. While no

specific date is known when the practice of mindfulness began, its origins in ancient Buddhism indicate the practice could have originated in the mid-6th and mid-4th centuries (Kabit-Zinn, 1994). Siegal's (2011) explanation of the structure of the brain paints a picture of the importance of a long-term practice of mindfulness for proper brain hygiene. However, Gotink and colleagues (2016) that an 8-week MBSR program results in changes to the brain similar to long-term practice of meditation (Gotink, Meijboom, Vernooij, Smits, & Hunink, 2016).

Amygdala Arousal in Responses to Ambiguity

Researchers have clearly documented the role the amygdala plays in the fight/flight/freeze response (Wehrenberg, Prinz, & Wehrenburg, 2007). Davis, Maital, Moran, and Whalen (2016) found that when they presented subjects with pictures of faces that had unpleasant expressions—such as anxiety or anger—an involuntary fear response in the subjects occurred via arousal of the amygdala. The authors also found a lesser but still aroused amygdala response even in benign facial expressions, when those facial expressions were unexpected (Davis et al., 2016). While predictable facial expressions elicited only mild amygdala arousal, similar facial expressions resulted in more arousal when unpredictable. The authors concluded from these findings that uncertainty associated with what the subjects expected to see suggests that ambiguous social cues are, by default, perceived negatively and arouse the amygdala, indicating a stress response (Davis et al., 2016).

Evidence also points to the amygdala playing a role in attempting to disambiguate complex visual scenes and detecting threatening situations (Kryklywy & Nantes, 2013).

The research findings indicate that the amygdala both attempts to disambiguate situations and plays a central role in responding to perceived danger.

Walker and Davis (2002) make the case that the amygdala, via its glutamate receptors, is a key player in the brain's fear response and fear modulation.

Research clearly points to the role of the amygdala in response to threats and the subsequent involuntary fight/flight/freeze response. Studies also point to a connection between ambiguity and the activation of the amygdala. Ishizu (2013) argues that the very act of disambiguation may itself be involuntary. Ishizu (2013) also argues that prior knowledge significantly aids the brain's attempts to disambiguate and that prior knowledge biases our interpretations of ambiguous stimuli.

The research regarding the amygdala suggests that this small cluster of neurons in the brain plays a definitive role in responding to fear and disambiguating situations. With this in mind, further understanding of how the amygdala plays a role in the fear response and how this response can be managed has implications for the wellbeing of individuals. Of particular interest is the assertion that "…unpredictability is inherently aversive…" (Davis et al., 2016, p. 775). Unpredictability is a feature of ambiguity. Therefore, this suggests that ambiguity also has the potential to be aversive. Additionally, the findings that the amygdala involuntarily attempts to disambiguate otherwise ambiguous stimuli, and that ambiguous stimuli arouse the amygdala, suggest that stress related to ambiguity is a universal human experience.

Mindfulness Research

Given the well-documented role of the amygdala in the fight/flight/freeze response and involuntary attempts to disambiguate information, questions arise about

whether and how one can change the amygdala's soft assembly. In an eight-week study on changes to the brain based upon Mindfulness Based Stress Reduction (MBSR) practice, Gotink and colleagues (2016) found that there was a substantial effect on the amygdala. Namely, in response to eight weeks of MBSR exercises, participants showed a decrease in the activity in the amygdala and improved connection to the prefrontal cortex (Gotink et al., 2016).

In addition to the practice of MBSR, Doll and colleagues (2016) found a relationship between the practice of attention-to-breath (ATB) exercises and the down-regulation of emotional activity in the amygdala. This study also showed an improved connection between the amygdala and the prefrontal cortex as a result of ATB (Doll et al., 2016). Given the role the prefrontal cortex plays in emotional regulation and rational thought, this relationship is important.

An integrative review on the topic of mindfulness, Good and colleagues (2015) found that its practice had far-reaching effects on cognition, emotion, behavior, and psychology. In particular, the findings of the review held that from a functional point of view, the practice of mindfulness improved cognitive flexibility, reduced responses to stress, and improved behavioral self-regulation (Good et al., 2015). Additionally, the review pointed to improved workplace outcomes, citing better job performance, communication, teamwork, and well-being (Good et al., 2015). However, the research left important questions to be answered regarding the effects of mindfulness in the workplace. In particular, the review points out that "buffering"—the ability to keep a distance from things at work that can be disruptive by co-opting attention—requires further research (Good et al., 2015). Additionally, the relationship between resilience and

mindfulness has not yet been well studied (Good et al., 2015). To date, the research

indicates that the practice of mindfulness—especially MBSR and ATB—has positive

effects on how individuals perform in the workplace.

Practice of Mindfulness on the Ability to Cope with Ambiguity

While the practice of mindfulness has an influence on many regions of the brain,

the role of the amygdala is prominent (Doll et al., 2016). Given the role the amygdala

plays in emotional reactivity, expression, and homeostasis, changes in how the amygdala

operates and the connections it builds to the prefrontal cortex as a result of MBSR and

ATB are significant findings regarding how the practice of mindfulness affects

individuals neurologically.

Research points out the role of the amygdala as regards to the stress response.

Furthermore, the results of studies about mindfulness indicate that the practice of MBSR

and ATB down-regulate the emotional reactivity of the amygdala and improve its

connectivity to the prefrontal cortex. Given what we know about how the amygdala

responds to stress related to ambiguity by way of the amygdala, and what the research

indicates about how MBSR and ATB alter the functioning of the amygdala, there is a

possible relationship between the practice of mindfulness and improved resilience related

to coping with ambiguity (Gotink et al., 2016).

Research consistently implicates the limbic system in response to subjectively

stressful stimuli, with the amygdala featured prominently. In particular, findings single

out the amygdala for the arousal of the fight/flight/freeze response when presented with

subjectively negative stimuli and the fact that the amygdala by default perceives

ambiguity as a threat (Wehrenberg, Prinz, & Wehrenburg, 2007). Research regarding the

mindfulness practices of MBSR and ATB indicates an ameliorating effect on the arousal of the amygdala and improved connections with the prefrontal cortex (Gotink et al., 2016).These findings invite further research to determine the possible relationship between mindfulness and the response to ambiguous stimuli.

The phenomenon of the reducing amygdala arousal via mindfulness is further explored by Wylson and Chesley (2013). Wylson and Chesley (2013) found that being mindful helps develop leaders' interpersonal skills and sustain a level of emotional connection to others in their organizations, creating support networks that facilitate the effectiveness of change, which change can otherwise bring about states of stress (Wylson & Chesley, 2013). These findings offer hope in terms of how practically useful mindfulness can be when engaging in activities that create ambiguity—in the case of their study, change management.

Research on Ambiguity

There are multiple definitions of ambiguity. Meyerson (1994) studied the phenomenological manifestations and interpretations of ambiguity in the fields of medicine and social work. Influenced by a culture in which the practice of medicine abhors uncertainty, social workers operating in all but "chronic" care hospitals reported that ambiguity was "…an abnormal constraining condition that had to be controlled." (Meyerson, 1994, p. 641). Study participants agreed that that ambiguity occurs "…when things [are] going wrong, or times of crisis and change" (Meyerson, 1994, p. 641). This view of ambiguity suggests a negative connotation. These findings indicate that, at least for social workers operating in most hospital situations, ambiguity is not only a negative

phenomenon, but one that is associated with high-stress emotional states, such as crisis and the need to control (Meyerson, 1994).

Bacharach, Bamberger, and Mitchell (1990) studied the phenomenological manifestations and interpretations of ambiguity in primary and secondary schools. Whereas Meyerson (1994) observed the interpretation of ambiguity in the medical field, Bacharach, Bamberger, and Mitchell (1990) reported that in elementary and secondary school settings, ambiguity was defined as "…that information that is necessary in order to fulfiull the obligaitons of an organizatonal position." (Bacharach, Bamberger , & Mitchell, 1990, p. 417). This means when role ambiguity remains unresolved, conflict is likley to result.

While the results presented above result in differing interpretations of ambiguity—one having to do with crisis and control and the other having to do with lack of necessary role definition in order to fulfiull the obligations, resulting in conflict—both experiential manifestations of ambiguity have in common a lack of clarity, be it about desired outcomes, optimal decision making in crisis situations, or the ability to satisfactorily fullfill job requirements. And in both cases, presence of ambiguity caused suboptimal conditions: conflict or burnout (Bacharach, Bamberger , & Mitchell, 1990; Meyerson, 1994).

As this study's aim is to test the hypothesis of a relationship between mindfulness and individuals' ability to tolerate ambiguity. The study includes the use of a measurement tool for ambiguity.

Summary

The literature indicates that even though responses to ambiguous stimuli may be involuntary, there is evidence to support the theory that the practice of MBSR and ATB meditation (i.e., a state of mindfulness) can have an ameliorating effect on the stress individuals experience by way of sympathetic nervous system arousal via the amygdala. While there are multiple definitions of what constitutes ambiguity, a common theme is distress, be it due to chaos and the desire to control or lack of information resulting in confusion about how to perform an assigned job role. If mindfulness can indeed downregulate the stress response of the amygdala and if ambiguity is indeed associated with a stress response such that it can even lead to burnout, then perhaps the improved cognitive flexibility, reduced responses to stress, and improved behavioral self-regulation associated with mindfulness reported in the literature can also increase individuals' ambiguity tolerance.

Chapter 3: Research Methods

The purpose of this study was to examine whether there is a relationship between individuals who have high levels mindfulness and their ability to tolerate ambiguity. This chapter describes the research design, followed by a description of the procedures to recruit participants, data collection, ethical considerations, and method of data analysis that was used in the study.

Research Design

This study used a mixed method, including two quantitative measures and qualitative interviews (Creswell, 2014; Maxwell, 2013). The Mindful Attention Awareness Scale (MAAS) was used to determine participants' level of mindfulness (Brown & Ryan, 2003). The MAAS contains 15 items and assess whether an individual possesses the characteristic of being able to observe what is taking place in the present moment using selective awareness, which allows them to keep a receptive state of mind. Brown and Ryan (2003) contrast this state of selective awareness of a receptive state of mind (i.e., mindfulness) with a state of mind in which "…events and experiences are filtered through cognitive appraisals, evaluations, memories, beliefs, and other forms of cognitive manipulation," (p. The MAAS is intended to take about five minutes to complete and has shown reliability (Brown & Ryan, 2003, p. 2).

Budner (1962) introduced a scale to measure an individual's tolerance for ambiguity. However, Budner's scale was found to have low internal reliability (Benjamin, Riggio, & Mayes, 1996). In their critique of Bunder's scale, Benjamin, Riggio, and Mayes (1996) found that "…the results of two confirmatory factor analyses failed to substantiate the plausibility of Budner's proposed single-factor model of tolerance for

ambiguity…" (p. 625). Furthermore, Budner's scale reportedly also had low internal reliability, "…[low] reliability estimates for [Budner's] measure, coupled with the apparent lack of a replicable factor structure, suggest that the…scale is a poor measure of tolerance for ambiguity (Benjamin, Riggio, & Mayes, 1996, p. 625). Thus, while Budner's scale was a tool used for measuring individuals' tolerance for ambiguity, based upon research calling into question the tool's validity, it will not be used for this study. Instead, a more recent tool introduced by McLain (1993) will be used to measure participants' tolerance for ambiguity. The MSTAT-I is considered a psychometrically valid measure (McLain, 1993).

Participation in the study was voluntary and not based on compulsion or reward. Individuals completed both the MAAS and MSTAT-I and then were interviewed. Participants were provided the follow definitions of ambiguity and mindfulness:

Ambiguity: "…the perception of inadequate information to clearly understand stimuli or their temporal or spatial interrelationships"

Mindfulness: a state of mind in which "…events and experiences are filtered through cognitive appraisals, evaluations, memories, beliefs, and other forms of cognitive manipulation." The following questions were used:

1) Can you provide an example of when you were mindful based upon the definition of mindfulness provided?

2) Can you provide an example of when you were had low or high tolerance for ambiguity based upon the definition of ambiguity provided?

3) What are your thoughts on the measurements that you took?

4) What is your experience in the workplace where mindfulness is concerned?

5)   What is your experience in the workplace where ambiguity is concerned?

In order to examine a relationship between levels of mindfulness and tolerance for ambiguity, the MAAS and MSTAT-I were administered to eight participants. Participation was based on convenience sampling (Maxwell, 2013). While a portion of the participants work from home, the headquarters employees dozens of individuals in a traditional office setting. While examining the relationship between mindfulness and ambiguity tolerance among employees who work from home would be an interesting exercise, it is outside of the scope of this study. Thus only individuals who work full-time (i.e., 36 or more hours in an office setting) were included in the study. The benefits of using the MAAS and MSTAT-I is that both measures have been shown in research to be reliable (McLain, 1993). However, neither the MAAS or the MSTAT-I were designed with the other measure in mind. Therefore, there is a risk is using two discrete tools designed for separate purposes together to show a relationship when those tools are not designed to complement each other per se. The benefit of using employees at one organization is that continuity of experiences is likely to be high, meaning that the same work organization is probably going to have a culture with either a high, medium, or low amount of extrinsic ambiguity in the workplace. However, because participation will be limited to one organization, the same variables that promote possible continuity also limit the spectrum of experience that individuals bring to the MAAS, MSTAT-I, and personal interviews. This makes it hard to generalize the results, as the organization may have factors in its culture that mitigate or exacerbate extrinsic ambiguity or that encourage or discourage mindfulness to manifest.

Once the data from the MAAS and MSTAT-I were gathered, Spearman's rank order correlation was conducted on the quantitative data from the two measures to identify the level of correlation. This information was cross-referenced with synopses of the interviews to add additional understanding to the data. For example, where an individual's scores were high in mindfulness and high in tolerance for ambiguity, this participant's responses to the interview questions were referenced to show how their subjective experience compares to the responses on the measurements. The same method of cross-referencing was used for individuals who have low levels of mindfulness and low tolerance for ambiguity and for those with mixed results. The quantitative data derived from the MAAS and the MSTAT-I was synthesized to determine what level of quantitative and qualitative relationship exists between mindfulness and ambiguity tolerance. In addition, Spearman's rank order correlation was conducted on the quantitative data from the MAAS and the MSTAT-I to determine a correlation between the ranks of the two measures.

Lastly, all data from the personal interviews was synthesized and presented with common themes, outlining answers, and a cross-reference to the available quantitative data from the MAAS and MSTAT-I.

Participants

The recommended sample size for qualitative research is 5-25 participants (Kvale, 1996). Therefore, the target sample for this research project was 25, with a minimum of five. Individuals were selected based upon their willingness to participate in all three aspects of the study (i.e., the MAAS, MSTAT-I, and personal interviews). Only individuals who completed all three aspects of the study were included in the findings.

The ideal candidates for this study were individuals who spent at least 36 hours in a workplace with coworkers on a regular basis. Additionally, ideal participants were those who have worked at the organization for at least one year, to account for the period of transition to a new job that can be accompanied by stress and anxiety.

Ethical Considerations

The researcher participated in activities related to this research under the supervision of the Pepperdine University Institutional Review Board. Each person who agreed to participate in the study was asked to sign a consent form and all data derived from the study is either password-protected if in digital form or placed in a locked safe if in physical form. Upon conclusion of the study, all data will be destroyed.

Summary

This chapter outlined the measurement tools, study participant profile, design of the research, how the data was collected, how the data was analyzed, and ethical considerations for the study. This study used measurements that have been shown to be reliable and valid (i.e., the MAAS and MSTAT-I) and the collection of qualitative data to add depth to the quantitative data gleaned from the MAAS and MSTAT-I. The next chapter will outline and report on the results and analysis.

Chapter 4: Results

The purpose of this study was to examine the relationship between mindfulness

and ambiguity tolerance. This chapter reports the results of the study. Eight employees

took the MAAS, MSTAT-I, and were interviewed for this study. Profiles of the

participants interviewed are presented first, followed by a reporting of the thematic

findings organized by interview question.

Participant Profiles

A summary of participant profiles can be found in Table 1.

Table 1

Summary of Participants

Participant Number	Years of Experience	Direct Reports	Mindfulness Training	Level of Ambiguity Reported in Job
1	10	No	No	High
2	12	No	No	High
3	10	No	Yes	High
4	11	No	No	High
5	15	No	No	High
6	20	Yes	No	High
7	19	Yes	No	High
8	9	No	No	High

Examples of When Participants Were Mindful

Each interview began with participants being asked to reflect on a time when

he/she was mindful in the workplace. All eight participants indicated that they had

experienced a situation at work in which they behaved mindfully. However, seven of the

eight participants indicated that they were not intentionally mindful. Only one participant

indicated that they were intentionally mindful, and that they even prepared for work with

a mindfulness regime when they expected things to be potentially stress-inducing.

The primary theme that stood out for the seven participants who had indicated being unintentionally mindful was that, compared to earlier in their careers, they had developed the ability to restrain their desire to engage in something, their wish to do so notwithstanding, as a result of professional maturation. One participant indicated that their mindfulness was a result of a deliberate action on their part to become more mindful.

One participant cited an example of observing email communications occurring among subordinates as they executed instructions. The participant indicated experiencing a desire to interject, but an awareness of that desire and an ability to allow the situation to unfold without their interference, even if things were not taking place exactly as they had envisaged. As the participant noted, "I can see real-time what people are doing based upon my instructions. Sometimes it's tempting to get involved, but I try to stay out of it."

Another study participant explained having received unpleasant emails, being aware of their negative response and being able to sit with the discomfort and emotional distress the emails had caused without responding in kind.

One study participant also indicated that the nature of their job is such that there can be a lot of unknowns given the complexity of the network system they operate in. This participant described being able to be aware of the unknowns without always becoming overwhelmed by them. As the participant noted, "The system we work in is very complex and no single person knows the whole system, so it can be overwhelming sometimes."

Another study participant indicated that customers can sometimes be curt, aggressive, or even hostile when they interact with them. This participant indicated that

they are able to be aware of the tension around these communications without responding in kind. Furthermore, they indicated that their ability to observe and experience their own unpleasant emotions without responding to them was a result of their deliberate cultivation of mindfulness. As the participant observed, "When I think I'm going to have a stressful day, I do a lot of preparation in advance to help deal with it."

One study participant explained in detail how they attempt to be intentionally mindful and "present," especially during meetings. As the study participant explained, "I often email and text notifications during meetings that can be distracting." While the participant indicated an ability to keep their attention on the meeting for a time, if the meeting drags on or if the topic being discussed is of little or no relevance to then, the participant indicated they succumb to the desire to respond to digital invitations. The study participant indicated that this is not only something they are aware of, but something they work to resist at times. This participant indicated that they feel more able to be present and mindful in meeting situations when either they are presenting, speaking, or the topics being discussed are otherwise germane to them. Nevertheless, the participant did not indicate that their mindfulness during meetings is as a result of deliberate cultivation of mindfulness, but a consequence of their professional maturity and experience.

Examples of When Participants Had Low or High Tolerance for Ambiguity

All eight study participants were able to identify instances in which they were able to tolerate ambiguity. Analysis of their responses indicated two general ideas. In relating their experiences with ambiguity and in response to follow-up clarification about how they interact with ambiguity in the workplace, seven of the eight participants

indicated a willingness and desire to disambiguate. Therefore, it is perhaps not so much that the seven aforementioned study participants had a predisposition for or developed the ability to tolerate ambiguity as much as they developed skills to troubleshoot ambiguous situations. One participant indicated not only an example of when they were able to tolerate ambiguity without attempting to disambiguate, but, upon further questioning, a self-reported general ease with ambiguity.

One study participant recounted how the nature of their work operates in a complex software architecture system where there are many unknowns and where they are called upon to resolve issues in the system. The participant explained that working on similar issues at other employers, they would have experienced more distress associated with the unknowns in the environment than their current job. At their current organization, the processes for the role they fulfill has been sufficiently well documented such that they are able to troubleshoot otherwise ambiguous situations by relying on the robust process documentation that exists. Another participant explained how the roles and responsibilities associated with their job changed shortly after they were hired and how the ambiguity that created caused distress. However, the participant went on to explain how they had been able to manage the distress through reducing ambiguity. In order to do this, this participant talked about seeking clarification from their superiors in order to create clarity around the expectations they have. Another participant explained that they often encounter ambiguous situations but have been able to manage the ambiguity though tactful questioning. As the participant explained it, they learned how to ask enough questions in order to create the clarity they wanted without asking too many questions. In

doing so, this created doubt that they were up to the task. The participant indicated that this was a fine line they had learned to walk though many years of experience.

As the lone participant who did not indicate a preference to disambiguate explained, "Over time [they] have developed the skill to always take a pause before [they] react." The participant reported that they are a "calm person" by nature, but that over time they also developed the ability to tolerate ambiguity, even if the temptation to disambiguate arises. The participant indicated that when ambiguity arises as a result of "administrative tasks" that need to be completed in order for clarity to prevail, they would prefer the ambiguity over doing the administrative tasks, as the participant found them unpleasant and did not mind ambiguity. The participant also noted that they are happy letting others take the lead in ambiguous situations and letting things become clear in their own time, which is something they reported to be "comfortable with."

Thoughts on The Measurements That Participants Took

While the MAAS and MSTAT-I are psychometrically valid measures that have been used in other academic studies, it is not a given that all study participants will have fluency in the lexicon associated with mindfulness and ambiguity used on the measure, thus making participants' perceptions of the measures relevant for consideration (Brown & Ryan, 2003).

All eight study participants were asked to recount their experience taking the MAAS and MSTAT-1. All eight study participants were able to recall and identify their experience taking the measures. Analysis of their responses indicated three general ideas.

Half of the study participants reported that they were able to take both the MAAS and MSTAT-I without any known misunderstanding or confusion about the questions.

These participants reported that while they were not fully aware of the of the lexicon used in the questions, they were able to use context to answer the questions in what they felt was a confident and accurate way.

Two study participants reported that the concepts and lexicon used in the MAAS and MSTAT-I were sufficiently unfamiliar to them that they had to do online research to define words and concepts, including "ambiguity" and "mindfulness." As one participant remarked, they had not been familiar with the concept of ambiguity prior to taking the MSTAT-I and was not sure whether they answered the questions as intended after completing the measure. As another study participant reported they were totally unfamiliar with the concept of mindfulness and, despite attempts to research and understand mindfulness, felt that they did not fully comprehend the meaning of the MAAS questions.

One study participant indicated that they felt both familiar with and comfortable answering the questions. The participant reported that they experienced no confusion about the concepts or lexicon used in either the MAAS or MSTAT-I.

One study participant reported that they were comfortable with the language and concepts in the MAAS and MSTAT-I but felt that their responses may have been inconsistent due to the fact that the answers to the questions were highly contextual. This study participant cited when thinking about their home life they felt inclined to answer the questions one way and when thinking about their work like felt inclined to answer the questions differently. This study participant expressed some reservations about the validity of their responses and even cited an example of when she took personality tests

in the past, the results of which were inconclusive due to inconsistent responses based upon context switching that occurred between answering questions.

Overall Experience in The Workplace Where Mindfulness Is Concerned

In addition to the specific questions about experiences with mindfulness and the administration of the MAAS, study participants were also asked to reflect on their general experience with mindfulness in the workplace to help get a baseline of the extent to which mindfulness manifests as a part of the workplace culture.

All eight study participants were able to respond to the overall experience of mindfulness in the workplace. Analysis of their responses indicated three general ideas. Almost universally, study participants responded that mindfulness was not something that manifests either in word or deed in the workplace.

One participant expressed that mindfulness is something that is discussed with their colleagues, but in terms that did not match the lexicon used to define or describe mindfulness either in the literature or the MAAS. Instead, the study participant said that there was sometimes discussion about not becoming "overwhelmed" with the "fast pace" of the work carried out and how to cope with the fast pace of the work without mentioning mindfulness per se.

Upon being asked to reflect on the extent to which they experience mindfulness in the workplace, the remaining seven study participants indicated that not only was mindfulness not a topic of discussion or practiced in a way that even remotely reflected the lexicon and descriptions associated with mindfulness in the MAAS and the literature, but that it was something altogether absent from the workplace culture. However, two of

the participants acknowledged that while mindfulness is not spoken of or practiced in the workplace, they could see how the organization could benefit from it.

Overall Experience in The Workplace Where Ambiguity Is Concerned

In addition to the specific questions about experiences with ambiguity and the administration of the MSTAT-I, study participants were also asked to reflect on their general experience with ambiguity in the workplace to help get a baseline of the extent to which ambiguity manifests as a part of the workplace culture.

All eight study participants were able to respond to the overall experience of ambiguity in the workplace. Analysis of their responses indicated one general idea. Universally, study participants responded that ambiguity is something that manifests both in word or deed in the workplace.

One study participant observed that ambiguity is a constant, owning to the organization's "startup" culture. As the participant explained, the nature of being a startup company meant that many processes had either yet to be established or were still in flux. Another participant described how the topic of ambiguity sometimes came up around email communications and the lack of clarity associated with said email communications, which resulted in moderate amounts of consternation and complaining.

One study participant described how certain people in the office frequently complain about the ambiguity associated with the situations they are put in, which, as the participant described, is a result of "undefined roles, procedures, and authority levels." The participant went on to explain that this lack of clarity about roles, procedures, and authority has led people to behave "passive-aggressively" in choosing to get involved or not involved in attempts to disambiguate. The participant also noted that some people,

frustrated by the ambiguity, intentionally choose to not get involved in ambiguous situations in order to avoid the angst associated with entering the fray of attempts to create clarity out of ambiguity.

Results of the MAAS Responses

All eight study participants were administered the MAAS. The MAAS score is calculated by averaging the responses of the 15 items, with higher scores indicating higher levels of mindfulness (Brown & Ryan, 2003). The range for the MAAS scores is typically 0.1 to 0.6. For the participants of this study, the range was 0.28 to 0.45. Four of the participants indicated on the MAAS that they experience low levels of mindfulness somewhat infrequently to very infrequently (range: 0.406 – 0.6). Three of the participants replied that they experience attributes associated with low levels of mindfulness frequently to somewhat infrequently (range: 0.206 - 0.4). One participant indicated that they experience attributes associated with low levels mindfulness very frequently to somewhat frequently (range: .01 to .02). No participants scored in the ranges of almost always to somewhat frequently or very infrequently to almost never regarding low level mindfulness.

The results of the MAAS suggest that four of the eight participants fall in the upper ranges of mindfulness, with the remaining are in the mid- and low ranges of mindfulness.

The qualitative responses provided by the subjects regarding mindfulness tend to corroborate the quantitative responses of the participants' MAAS scores. For example, participant 1 expressed feelings of being overwhelmed and distressed with circumstances at work, even though things have improved. The self-reported qualitative experiences reported by Participant 1 are consistent with their MAAS score of 0.28, which corresponds to a low level of mindfulness (i.e., very frequently to somewhat frequently). Additionally, participant 4 reflected that their mindfulness had increased over the years as they had become more comfortable with work, but that they experience unease with both ambiguous and otherwise stressful situations. The self-reported qualitative experiences reported by Participant 4 are consistent with a MAAS score of 0.32, which corresponds to a mid-level of mindfulness (i.e., somewhat frequently to somewhat infrequently). Participant 6 reported that that while they can become occasionally distracted by competition for her attention, they are mostly able to remain present and mindful, which corresponds to their higher MAAS score of 0.45. Participant 8 reported that they were intentionally and frequently mindful, which they attributed to their ability both to work with lower levels of distress and more effectively with co-workers and subordinates. By way of example, participant 8 indicated that they were able to observe their subordinates executing their instructions without interfering, which they attributed to their mindfulness. This corresponds to participant 8's high-level MAAS score of 0.41. A potentially anomalous result is that of participant 5, who had a score of 0.43 on the MAAS, but was either unwilling or unable to recall experiences of mindfulness.

Results of the MSTAT-I Responses

All eight study participants were administered the MSTAT-I. The MSTAT-I is a 11-item scale that uses a Likert scale from 1 to 7, where 1 means strongly disagree and 7 means strongly agree. The MSTAT-I 11 questions correspond to ambiguity intolerance. Scores for the MSTAT-I range from 0.1 on the low of ambiguity tolerance end and 0.6 on the high end of ambiguity tolerance.

The qualitative responses provided by the participants regarding ambiguity tolerance tend to corroborate the quantitative responses of the participants' MSTAT-I scores. For example, participant 1 expressed feelings of being overwhelmed and distressed with circumstances at work. The self-reported qualitative experiences reported by Participant 1 are consistent with their MSTAT-I score of 0.31, which corresponds to a low level of ambiguity tolerance. Additionally, participant 5 reported that they experienced a low level of ambiguity tolerance, especially with unknowns about how others' behavior and the lack of ability to control it, which corresponds to their MSTAT-I score of 0.24, indicating a low level of ambiguity tolerance. The self-reported qualitative experiences reported by Participant 6 are consistent with their MSTAT-I score of 0.46, which corresponds to a moderate level of ambiguity tolerance, evidenced by their ease with the unknowns associated with onboarding new employees. Participant 7, who had the highest MSTAT-I score at 0.52, reflected on how they can sit with and even seek out ambiguous situations with ease, which is consistent with their MSTAT-I score.

Spearman's Rank Order

Spearman's rank order correlation was conducted on the quantitative data from the MAAS and the MSTAT-I (Table 2). The results of Spearman's rank order correlation

was $p=0.45$, indicating a moderate correlation between the ranks of the two measures. Table 2 displays the ranking of each participant according to their scores for the MAAS and MSTAT-1, with the individual who received the highest score on the MAAS (i.e., Participant 6) getting the highest rank and the participant who received the lowest score on the MAAS (i.e., Participant 1) getting the lowest rank. The same ranking scheme was applied to the MSTAT-I. Using Spearman's rank order, a correlation between the ranking of participants for the MAAS and MSTAT-I was conducted, for a result of $p=0.45$.

Table 2

Results of Spearman's Rank Order Correlation

	MAAS (score)	MSTAT-I (score)	Rank (MAAS)	Rank (MSTAT-I)	d	d^2
Participant 1	0.28	0.31	8	6	2	4
Participant 2	0.41	0.4	3.5	4	0.5	0.25
Participant 3	0.34	0.48	6	2	4	16
Participant 4	0.32	0.27	7	7	0	0
Participant 5	0.43	0.24	2	8	6	4
Participant 6	0.45	0.46	1	3	2	4
Participant 7	0.37	0.52	5	1	4	16
Participant 8	0.41	0.37	3.5	5	1.5	2.25

$p=0.45$

Summary

In summation, the qualitative and quantitative results from the interviews, MAAS, and MSTAT-I moderately support the hypothesis of a relationship between individuals' level of mindfulness and ambiguity tolerance. Of the eight participants, three reported low ambiguity tolerance and scored in the range of low ambiguity tolerance on the MSTAT-I. Four of the eight participants reported a high level of ambiguity tolerance and three of those four scored in the high range for ambiguity tolerance on the MSTAT-I.

One participant reported low ambiguity tolerance and scored in the mid-range for ambiguity tolerance on the MSTAT-I. 75% of the participants' self-reported levels of ambiguity tolerance were consistent with their scores on the MSTAT-I. Of the eight participants, two exhibited low levels of mindfulness per the MAAS, five exhibited moderate levels of mindfulness per the MAAS, and one exhibited high levels of mindfulness per the MAAS. The quantitative data from the MAAS compared to the qualitative answers from the interviews indicate congruence with five participants while the quantitative data from the MAAS compared to the qualitative from the interviews indicate misalignment in the cases of three participants. When the qualitative data from the MSTAT-I and MAAS are compared, five of the eight participants showed results indicating congruence between their self-reported level of mindfulness and self-reported level of ambiguity tolerance (i.e., high-level mindfulness associated with high-level ambiguity tolerance and low-level mindfulness associated with low-level ambiguity tolerance).

Chapter 5: Discussion

The purpose of this study was to examine the relationship between mindfulness and ambiguity tolerance. Two measures were administered: the MAAS to measure mindfulness and the MSTAT-I to measure ambiguity tolerance. Additionally, five interview questions were asked.

This chapter provides a discussion of the study results. A summary of key findings is presented first, followed by study conclusions. Recommendations for mindfulness in the context of ambiguity for professionals, companies, and OD practitioners are also provided. The limitations of the study are acknowledged. Lastly, suggestions for further research are provided.

Key Findings

The Effects of Mindfulness on Ambiguity Tolerance. Research shows a relationship between mindfulness and positive workplace outcomes. The practice of mindfulness had positive effects on cognition, emotion, behavior, and psychology (Good et al., 2015). Additionally, the practice of mindfulness improved cognitive flexibility, reduced responses to stress, and improved behavioral self-regulation, and improved work outcomes (Good et al., 2015).

A significant factor in the benefits reaped by mindfulness are its ability to reduce the responsiveness of the amygdala, even when practiced in an eight-week Mindfulness Based Stress Reduction (MBSR) setting (Gotink et al., 2016). In response to practicing MBSR for eight weeks, participants demonstrated a decrease in the activity of the amygdala and improved connection to the prefrontal cortex (Gotink et al., 2016).

In addition to findings about the role of decreased amygdala arousal as a result of practicing MBSR for eight weeks and how the practice of mindfulness improved cognitive flexibility, reduced responses to stress, and improved behavioral self-regulation, Wylson and Chesly (2013) reported that being mindful enables the development of individuals' interpersonal skills and helps them to sustain a level of emotional connection to others in their organizations. This reinforces the theory that those who are mindful tend to have a higher level of tolerance for ambiguity, while those who do not possess high levels of mindfulness not only resort to developing coping mechanisms in order to disambiguate, but also self-report distress associated with ambiguity.

The Prevalence of Ambiguity. The results of this study found that at a startup culture, ambiguity is commonplace. Other studies have found the general prevalence of ambiguity as well. Meyerson (2014) found that social workers faced such ambiguity when working in hospital settings that they experienced a nontrivial consequence of burnout. Meyerson (1994) found that much of this ambiguity for social workers in hospital settings was attributable to a culture of control, especially "…when things [are] going wrong, or times of crisis and change," (p. 641). This indicates that ambiguity is not simply a benign phenomenon, but a negative one associated with high-stress emotional states.

Additionally, Bacharach, Bamberger, and Mitchell (1990) found that role ambiguity was prevalent in primary and secondary schools. They reported that in elementry and secondary school settings, ambiguity was defined as "…that information

that is necessary in order to fulfiull the obligaitons of an organizatonal position," (p. 417). Thus, when role ambiguity remains unresolved, conflict is likely to result.

Dealing with Ambiguity. The literature indicates that even though responses to ambiguous stimuli may be involuntary, there is evidence to support the theory that the practice of MBSR and ATB meditation (i.e., states of mindfulness) can have an ameliorating effect on the stress individuals experience by way of reducing sympathetic nervous system arousal via the amygdala. While there are multiple definitions of what constitutes ambiguity, a common theme is distress, be it due to chaos and the desire to control or lack of information resulting in confusion about how to perform an assigned job role. If mindfulness can indeed downregulate the stress response of the amygdala and if ambiguity is indeed associated with a stress response such that it can even lead to burnout, then perhaps the improved cognitive flexibility, reduced responses to stress, and improved behavioral self-regulation associated with mindfulness reported in the literature can also increase individuals' ambiguity tolerance. The study found that participants generally attempted to avoid ambiguity, reinforcing previous research indicating that ambiguity is related to aversiveness.

Conclusion

Individuals who reported high levels of mindfulness also reported lower levels of distress associated with ambiguity and did not feel a need to resolve it, whereas individuals who reported a low level of mindfulness expressed how ambiguity is not only disruptive to them personally and organizationally, but something they actively seek to resolve.

Recommendations

Practice of Mindfulness to Cope with Ambiguity. Based on the available literature and the findings of this study, organizations that experience high levels of ambiguity, either because they are startups, undergoing significant change, or otherwise have an environment predisposed to ambiguity, should consider administering a psychometrically valid measure, such as the MAAS, to understand the level of personal and aggregate mindfulness. Then, based on these findings, make informed decisions about how mindfulness can be a part of their organizational culture, either by offering on-site MBSR training, providing work time set aside for individuals to practice mindfulness, or providing other mindfulness training and practice opportunities to help individuals and the organization develop tolerance for ambiguity.

Prevalence of Ambiguity in the Workplace. The consequences of ambiguity, as evidenced in this study and in other research, point to ambiguity leading to individuals' attempts to disambiguate, sometimes without success, and increased conflict and burnout. These are potentially unproductive and harmful responses to ambiguity that have the possibility to undermine personal heath, workplace morale, and organizational effectiveness. Therefore, organizations that chronically experience ambiguity resulting in burnout, conflict, and unsuccessful attempts to disambiguate should consider how to develop effective coping skills, chief among them mindfulness.

Organization Development Practitioners. Based upon the available evidence of how mindfulness reduces the amygdala's stress response, the fact that ambiguity has been shown in the literature to cause stress (e.g., unsuccessful attempts to disambiguate, conflict, and burnout), and given that ambiguity is not something that can be entirely and permanently eliminated from organizations, organization development practitioners should focus on building capacities within organizations to tolerate or successfully handle ambiguity, rather than implementing systemic approaches to removing ambiguity. While there may be situations where ambiguity can be reduced through process improvement or organizational maturation, these are likely short-term solutions to a phenomenon of ambiguity that is inherent to not only work but life.

Limitations

It is recognized that there may have been a bias in the results regarding the MAAS, as the questions on the measure tend to support affirmative responses with the use of stigmatized language. In addition, this study only had eight participants, all of whom worked at the same company. The company in question was also a startup, potentially predisposing the current culture of the organization to higher levels of ambiguity than others. It is also acknowledged that because convenience sampling was used and because the study was advertised as related to mindfulness and ambiguity, some individuals may have elected to participate due to dissatisfaction with the level of self-perceived ambiguity or a self-perceived attraction to the topic of mindfulness. Also, with only eight participants, statistical analysis could not be used to garner a more robust finding.

Lastly, while the MAAS and MSTAT-I are psychometrically valid measures, it is acknowledged that the interview questions used in the study could be improved. Two questions in particular focused on single experiences with ambiguity and mindfulness. And even though participants did not limit themselves to one experience, open-ended questions about patterns of behavior related to mindfulness and ambiguity could have resulted in more useful data.

Suggestions for Future Research

For further research, it is recommended that researchers undertake longitudinal studies of how the practice of mindfulness impacts business outcomes across organizational domains (e.g., operations, human resources, marketing). Each of these domains is likely to have varying degrees of ambiguity inherent to the functions performed therein. Longitudinal research by domain could yield interesting data about the limits of mindfulness on ambiguity tolerance, the level of ambiguity within various domains, and additional data on how long and in what ways mindfulness needs to be practiced in order to affect improved business outcomes through ambiguity tolerance.

Summary

The purpose of this study was to examine the relationship between mindfulness and ambiguity tolerance. Using convenience sampling and a mixed method of data collection, eight individuals, each with approximately one year of experience at the company, volunteered to participate in the study. Each participant was asked to take the MAAS and MSTAT-I. Additionally, each participant answered five interview questions to add additional information to their responses on the MAAS and MSTAT-I.

The participants were asked about examples of when they experience mindfulness, ambiguity, how they experienced taking the MAAS and MSTA-I, and the overall culture of mindfulness and ambiguity. The key findings were that a possible modest relationship between mindfulness and tolerance for ambiguity existed in this sample. Additionally, ambiguity is a universal phenomenon. Therefore, attempts to eliminate ambiguity though disambiguation strategies, while natural, are unlikely to have long-term meaningful effects. Lastly, individuals who reported high levels of mindfulness also reported lower levels of distress associated with ambiguity and did not feel a need to resolve it, whereas individuals who reported a low level of mindfulness expressed how ambiguity is not only disruptive to them personally and organizationally, but something they actively seek to clarify.

The findings of this research helped support recommendations for organizations looking to develop mechanisms for tolerating ambiguity through mindfulness, without necessarily trying to eliminate ambiguity altogether. The recommendations for experienced professionals participating in organizations dealing with ambiguity are to resist the temptation of clients to seek a panacea to eliminate ambiguity through process improvement or organizational maturation and to instead work on building personal, interpersonal, and organizational tolerance for ambiguity built on a strong foundation of a culture that includes support for, the development of, and the practice of personal and organizational mindfulness.

References

Bacharach, S. B., Bamberger , P., & Mitchell, S. (1990). Work Design, Role Conflict, and Role Ambiguity: The Case of Elementary and Secondary Schools. *Educational Evaluation and Policy Analysis*, 415-432.

Barrett, R. (2014). *The Values-Driven Organiation.* New York: Routledge .

Benjamin, A. J., Riggio, R. E., & Mayes, B. T. (1996). Reliability and Factor Structure of Budner's Tolerance for Ambiguity Scale. *Journal of Social Behavior and Personality*, 625-632.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 822-848.

Budner, S. (1962). Intolerance of Ambiguity as a Personality Variable. *Journal of Personality*, 29–50.

Creswell, J. H. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* . London: SAGE Publications, Inc. .

Daniel J. Siegel, M. (2011). *Mindsight: The New Science of Personal Transformation* . New York: Bantam Book .

David Rock, M. (2009). *Your Brain at Work.* New York: HarperCollins.

Davis, F. C., Maital, N., M., J. K., Moran, J. M., & Whalen, P. J. (2016). Interpreting Ambiguous Social Cues in Unpredictable Contexts. *Social Cognitive and Affective Neuroscience*, 775-782.

Doll, A., Hölzel, B. K., Bratec, S. M., Boucard, C. C., Xie, X., Wohlschläger, A. M., & Sorg, C. (2016). Mindful Attention to Breath Regulates Emotions Via Increased Amygdala-Prefrontal Cortex Connectivity. *NeuroImage*, 305-313.

Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., . . . Lazar, S. W. (2015). Contemplating Mindfulness at Work: An Integrative Review. *Journal of Management*, 114-142.

Gotink, R. A., Meijboom, R., Vernooij, M. W., Smits, M., & Hunink, M. M. (2016). 8-week Mindfulness Based Stress Reduction Induces Brain Changes Similar to Traditional Long-term Meditation Practice - A Systematic Review. *Brain and Cognition*, 32-41.

Ishizu, T. (2013). Disambiguation of ambiguous figures in the brain . *Frontiers in Human Neuroscience* , 1-9.

Kabit-Zinn, J. (1994). *Wherever You Go, There You Are: Mindfulness Meditation in Everyday Life.* New York City.

Kryklywy, J. H., & Nantes, S. G. (2013). The Amygdala Encodes Level of Perceived Fear But Not Emotional Ambiguity in Visual Scenes. *Behavioural Brain Research*, 396-404.

Kvale, S. (1996). The 1,000-Page Question . *Qualitative Inquiry*, 275-284.

Margaret Wehrenberg, P., Prinz, S. M., & Wehrenburg, Psy.D., M. (2007). *The Anxious Brain.* New York: W. W. Norton & Company.

Maxwell, J. A. (2013). *Qualitative Research Design: An Iterative Approach.* London: SAGE Publications, Inc.

McLain, D. L. (1993). The MSTAT-I: A New Measure of an Individual's Tolerance for Ambiguity. *Decision Sciences Institute* (pp. 183-189). Educational and Psychological Measurement.

Meyerson, D. E. (1994). Interpretations of Stress in Institutions: The Cultural Production of Ambiguity and Burnout. *Administrative Science Quarterly* , 628-653.

Walker, D. L., & Michael, D. (2002). The Role of Amygdala Glutamate Receptors in Fear Learning, Fear-Potentiated Startle, and Extinction. *Pharmacology, Biochemistry and Behavior*, 379-392.

Weekes, C. (1969). *Hope and Help for Your Nerves.* Signet.

Wehrenberg, M., & Prinz, S. (2007). *The Anxious Brain: The Neurobiological Basis of Anxiety Disorders and How to Effectivley Treat Them.* New York: W. W. Norton & Company, Inc. .

Wilson, J. (2014). *Mindful America: The Mutual Transformation of Buddhist Meditation and American Culture.* Oxford University Press.

Wylson, A., & Chesley, J. (2013). Ambiguity: The Emerging Impact of Mindfulness for Change Leaders. *Journal of Change Management*, 317-336.

Appendix A: Study Invitation

Hello,

My name is Jason Adamson. I am an employee at CrowdStrike, and a student in Pepperdine's Master of Science in Organizational Development program. With the approval of our Chief Human Resources Officer, Lisa McGill, I am conducting a research study examining the relationship between mindfulness and the ability to tolerate ambiguity. You are invited to participate in the study. If you agree, you will be asked to a take short 15-item Mindful Attention Awareness Scale (MAAS) measure and 11-item Multiple Stimulus Types Ambiguity Tolerance (MSTAT-I) measure. Additionally, there will be a brief in-person interview of five questions. The whole process is estimated to take about 30-60.

Participation in this study is voluntary. *Your identity as a participant will remain anonymous and confidential*. Participation in this research will be conducted under the supervision of the Pepperdine University Institutional Review Board. *All data derived from the study will be either password-protected if in digital form or placed in a locked safe if in physical form. Upon conclusion of the study, all data will be destroyed.*

If you have questions or would like to participate, please contact me at 210-316-1289 or jason.adamson@crowdstrike.com.

Thank You,
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