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Effects of Nurses' Workload on Creativity and Innovation: Examining the Role of Trait Mindfulness as a Moderator

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EFFECTS OF NURSES' WORKLOAD ON CREATIVITY AND INNOVATION: EXAMINING
THE ROLE OF TRAIT MINDFULNESS AS A MODERATOR

by

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ABSTRACT

The workload is one of the dominant stressful factors among the nursing occupation that results in negative consequences at the individual, team, and organizational levels. On the other hand, creativity and innovation can help nurses and organizations to provide better patient care and maintain a competitive edge in a fast dynamic environment. However, this becomes challenging when nurses are exposed to a frequent increase in workload. Within this study, I first examine the form of the relationships between 1) workload (stressor) and creativity (outcome 1); and 2) workload and innovation (outcome 2) to comprehend the optimal conditions to achieve positive results. Second, I utilize positive reappraisal theory to observe the moderating effects of trait mindfulness between the two stressor-outcome relationships. Lastly, I introduce the bandwidth-fidelity principle to understand the breadth and depth of mindfulness and innovation scales. The study used archival data from 100 registered and licensed practical nurses under the state of the Florida Board of Nursing Registry collected as part of a larger intervention project. The curvilinear regression moderated regression, and multiple regression with bivariate correlation analyses were conducted for their respective hypotheses. Results remained inconclusive for the formation of stressor-outcome relationships. Trait mindfulness was positively related to creativity and innovation but was not a significant moderator. Additionally, results indicated different predictive strength for matched and mismatched relations, but the differences were not significant. The present work is intended to bring awareness to the non-linear relationship of workload-creativity and innovation, comprehend the benefits and potential of mindfulness, and extend the use of the bandwidth-fidelity principle in the field of Occupational Health Psychology. Limitations and implications of this study are discussed.

ACKNOWLEDGMENTS

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CHAPTER ONE: INTRODUCTION

Work stress is inevitable in the presently competing modern world and it is a common occurrence in the health organizations. Although many stressors exist in the workplace, including time pressure, role conflict, job ambiguity, and lack of autonomy, research supports the importance of considering workload as a predominant job stressor (Casper et al., 2017). In general, stress is a reaction to a situation which is not necessarily always negative. Although some research suggests that there are positive outcomes associated with stress, it is also important to acknowledge the negative consequences associated with stressors such as workload. For example, high workload is associated with poor well-being, increased strain, decreased job satisfaction, and increased absenteeism and turnover (Lee & Ashforth, 1996; Alarcon, 2011; Nixon et al., 2011). One of the other major negative consequences of high workload is a reduction in creativity and innovation (Binnewies & Wornlein, 2011).

Despite the wealth of research on creativity and innovation in general, there is a lack of research on these concepts in certain professions. For instance, it is traditionally believed that nurses follow a strict set of work procedures that leaves little to no room for creativity. Contrary to this belief, hospitals are the fast-paced dynamic environment where nurses can encounter unexpected situations and where originating and implementing of novel ideas are the keys to organizational survival and effectiveness (Oldham, 2003; Porter-O'Grady, 2003; Shalley, Zhou, & Oldham, 2004). Previous research suggested that creativity and innovation among nurses result in improved quality of patient care, greater comfort of patients and coworkers, and reduction of healthcare design costs (Isfahani et al., 2015). It also results in improvement in nurses' quality of work, personal and social lives (Isfahani et al., 2015). Therefore, global nursing experts are now aggressively encouraging research to enhance creativity and innovation among nurses. Research on workplace demands and stressors provides promising directions for interventions in the occupational health promotions (Baethge & Rigotti, 2013). Several benefits of creativity and innovation such as increased

performance, employee well-being, positive work environment and reduced absenteeism, make it essential to continue research to determine ways of enhancing creative behaviors in the presence of workload.

Despite knowing the benefits offered by creativity and innovation, organizations are finding it difficult to encourage innovative behaviors when employees are frequently exposed to job stressors. As a result, researchers are now focusing on identifying psychological processes and contextual factors to boost innovation in the context of stressful work conditions; and previous research support that there are contextual factors that moderate the effects of workload on creativity and innovation (Hon & Kim, 2007; Hon et al., 2013). Therefore, in this study I first summarize the literature on workload, creativity and innovation, and examine their relationship. I then discuss the possibility of trait mindfulness as a moderator that may affect the strength of this relationship. Lastly, I test the concept of bandwidth-fidelity principle on the measures of mindfulness and innovation.

CHAPTER TWO: THEORETICAL BACKGROUND

<u>Workload</u>

Workload is defined as the sheer volume or amount of work required to do by an employee (Spector & Jex, 1998), and is one of the predominant job stressor (Casper et al., 2017) across occupations as indicated by StressPulse Survey (2006) where 46% of employees identified workload as their major cause of stress. Although this study uses the above mentioned definition of workload, for nurses, workload has no common definition (MacPhee et al., 2017). Human factors framework evaluates nurses' workloads at three levels – unit, job, and task levels (Holden et al., 2011). Unit-level includes staffing level; job-level includes specific demands of the job that signifies amount and difficulty level of work, and the amount of concentration required to do it; and task-level includes nurses' resources to do a specific task, for example, administering medicine to a patient (Holden et al., 2011; MacPhee et al., 2017). Through these definitions, it appears that this study's workload measure would be considered under job-level workload as it measures the general amount of work to be done.

Despite the definitions and levels of workload, research has provided evidence that in general, workload can result in either positive or negative outcomes across occupation, depending on several factors. Some research has shown that high workload may be perceived as a challenge demand which may lead to favorable outcomes such as personal growth (LePine et al., 2005), vigor (Hon et al., 2013) and increased task performance (LePine et al., 2005). However, there have been several studies where high workload is perceived as an energy-consuming demand or hindrance (Alarcon, 2011) that results in negative consequences such as strain (Alarcon, 2011; Lee & Ashforth, 1996), reduced engagement, poor performance, and impaired well-being and health (Nixon et al., 2011). Additionally, high workload is considered to be the highest predictor of employee exhaustion (Alarcon, 2011; Lee & Ashforth, 1996). A meta-analysis by Crawford and colleagues (2010) indicates that workload results in higher engagement and better performance, however, it is also associated with higher emotional exhaustion and burnout (Leiter & Maslach, 2009).

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Specifically concentrating on nursing occupation, workload possesses certain risks and harmful outcomes as it negatively influences cognitive load, leading to errors and emotional constraints (MacPhee et al., 2017). Greater workload also adversely impacts patient safety and outcomes (MacPhee et al., 2017). Burnout is commonly examined in relation to workload (MacPhee, et al., 2017), which in turn is associated with absenteeism, turnover, and decreased job satisfaction (Hayes et al., 2012). Research on nurses' workload has noticed that lack of adequate resources to meet workload demands, exposes nurses to be dissatisfied with their work and be emotionally exhausted (Leiter & Maslach, 2009). This could lead to extreme negative action of not only leaving the organization but exiting the profession altogether (Hayes et al., 2012). MacPhee and colleagues (2017) performed hierarchical logistic regression to examine the effects of levels of nurses' workload on patient and nurse outcomes. They observed that compared to nurses who experienced high workload less frequently, nurses who experienced high workload on a daily basis reported emotional exhaustion three and a half times more (MacPhee et al., 2017). Cross-sectional and longitudinal studies have provided evidence that workload and other workplace stressors are associated with decreased well-being, and this relationship is mediated by work irritation – a type of emotional and cognitive strain. (Hoge, 2009). Since, workload has a high potential of adverse consequences, especially among the nursing population, it is important to continue research on how to achieve positive consequences such as creativity and innovation despite the presence of stressful working conditions.

Creativity and Innovation

Creativity is defined as the production of novel ideas (Amabile, 1988) which are unique to current ideas available in the organizations. An idea is considered creative when it is not only novel but also useful, meaning it has the potential to add direct or indirect value to the organization (Amabile, 1996; Shalley et al., 2004). Creativity is the precursor of innovation which is referred to as the implementation of novel ideas (Amabile 1998). Innovative Work behaviors include idea

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generation, idea promotion, and idea implementation (Janssen, 2000; Scott & Bruce, 1994). Idea generation refers to creativity, idea promotion aims to sell the creative idea to others, and idea implementation refers to ultimately applying the idea within a work role and experiencing it (Janssen, 2000).

Creativity is a requirement in certain occupations in response to task demands, such as interior designs, however, it is considered as an extra-role behavior in some occupations such as nursing, where it lacks organizational support (Isfahani et al., 2015). Nevertheless, on-going research is now suggesting creativity and innovation are essential and required in all occupations in order to adjust to the rapidly changing working conditions and to be able to take advantage of the emerging opportunities and gain a competitive advantage (Mayfield et al., 2020; Shalley et al., 2004). Research has also suggested that creativity and innovation are crucial for organizational survival and effectiveness, particularly, in times of economic uncertainty (Shin et al., 2017).To further emphasize, hospitals are the fast-paced dynamic environment where nurses encounter unexpected situations every now and then and where creativity is essential to problem-solve the unforeseen obstacles (Porter-O'Grady, 2003). To exemplify, a nurse designed a stretcher equipped with a drawer under it to place the radiology cassette so that patients are not required to move from stretcher to radiology bed to take X-rays; thus saving crucial time during incoming trauma (Isfahani et al., 2015). This was one of the many creative examples among nurses that are needed especially in the times of unbelievably high incoming traumas.

Other than being the prime factors for organization's change, survival, and effectiveness, creativity and innovation result in several positive outcomes that are beneficial at an individual-level, team-level, and organization-level. For instance, they enhance employee's well-being that creates a positive work environment, reduces absenteeism and increases performance (Mayfield et al., 2020). Moreover, creativity provides employees with a sense of empowerment that promotes active learning and job satisfaction (Idris et al., 2018). Isfahani and colleagues (2015) conducted a study to examine Iranian nurses' expressions and perceptions of creativity in healthcare organizations. Nurses were

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asked to participate in an in-depth structured interview and a qualitative approach using content analysis was conducted to depict the results in four themes – improvement in quality of patient care, improvement in nurses' quality of work, promotion of organizations, and unpleasant outcomes. The results indicated that practice of creativity among nurses improves their quality of work, personal, and social lives (Isfahani et al., 2015). This eventually positively impacts nurse-patient relationships and enhances patient care and comfort (Isfahani et al., 2015). Additionally, nurses with the opportunity of flexibility and creativity may lead to major changes in nursing practice and organizational performance.

Nurses often encounter unexpected patient-related issues with different racial, ethnic, and health history backgrounds that demand different decision-making processes for treatments and this requires creativity and critical thinking (Chan, 2012). Since creativity is still considered as an extra-role behavior for nurses, the work environment may not encourage it by lacking support from a supervisor or incentives for creativity (Isfahani et al., 2015). This discourages nurses to engage in creative and innovative thinking processes as they feel their hard work would not be appreciated as quoted by one of the nurses in a study by Isfahani and colleagues (2015).

"...outcome is not pretty for me both from incentives (I mean the system), and financial aspects" (Isfahani *et al.,* 2015, pg. 4).

A source of empowerment, encouragement and support from supervisors and the organization nurtures a learning environment that enhances the action of solving difficult problems by creative thinking (Hon & Kim, 2007) In addition, Hon and colleagues (2013) indicate that no support from supervisors will less likely direct employees' attention to learning and innovating on the job. It is, therefore, crucial for organizations and supervisors to draw their attention to practice of creativity and encouragement of innovative behaviors among nurses. Nonetheless, this study focuses on what individuals could themselves do to enhance creativity and innovation, rather than how organizations can help them.

Based on Amabile's comprehensive model on creativity and working conditions, creativity is dependent on three components: expertise, creative-thinking skills, and intrinsic motivation (Amabile, 1996). Factors that enhance or maintain intrinsic motivation helps to increase creative and innovative behaviors (Mayfield et al., 2020; Amabile, 1996) which is why it is essential to study moderators that would help establish and maintain intrinsic motivation.

However, it is first important to know that although creativity and innovation are used interchangeably, they are two distinct concepts (Isfahani et al., 2015) where creativity refers to generation of ideas and innovation refers to the implementation process of those ideas. It may appear that as creativity increases, innovation does as well, however, this may not always be true as innovation is multifaceted and is affected by organizational and environmental contexts. As a result, this study will consider creativity and innovation as two separate outcomes. The reason for considering innovation as our second independent variable was to comprehend nurses' perceptions of organizational support towards their creative ideas, as past research suggests that creativity and innovation are considered as extra-role behaviors that lack support. Furthermore, it could also provide insights into the correlation between creativity and innovation.

Additionally, despite several advantages of encouraging nurses to be creative and innovative, there's only limited research out there to demonstrate ways to achieve it during the high presence of stressors that nurses experience daily. Thus, this study aims to expand the understanding of the relationships between (1) workload and creativity, and (2) workload and innovations by first reviewing the literature of their relationship with stressors in general.

Research Evidence on Effects of Stressors on Creativity and Innovation

Prior research indicates contradictory effects of job stressors on creativity and innovation in the organizations. Research study by Hon and colleagues (2013) indicated that various stressors lead to different outcomes. Many researchers suggest that stress may have a positive influence on

organizational effectiveness and creativity (Hon & Kim, 2007). Similarly, studies have reported that job stressors induce adrenaline that intensifies mental focus and creates a channel for creativity and innovation (Govindarajan, 2012). A meta-analysis confirmed that not all job stressors are associated with negative outcomes (LePine et al., 2005), as it can create a competitive edge, encouraging employees to demand change and generate novel ideas to solve complex problems (Hon et al., 2013). On the contrary of positive outcomes, researchers also argue that job stressors impair information processing, and memory thus inhibiting creativity and innovation (Govindarajan, 2012).

A diary study by Binnewies and Wornlein (2011) examined the effect of daily job stressors such as time pressure and situational constraints on daily creativity among interior architects. Hierarchical linear modelling depicted that daily creativity was higher during intermediate levels of daily time pressure but lower during non-intermediate levels of daily time pressure, indicating an inverted U-shape/curvilinear relationship between time pressure and creativity. Constant exposure to high intensity of any stressor may lead to lower creativity and well-being over time (Binnesweis & Wornlein, 2011). This is because employees under constant high stressful conditions are exhausted to merely finish their work routine to even show signs of creativity. However, the same study showed insignificant results for the other job stressor, where situational constraint was unrelated to daily creativity.

The limited research evidence on the relationship between stressors and creativity and innovation indicate unclear form and strength. Moreover, it indicates that the relationship is much more complex and might not be described as positive or negative, highlighting the need to consider theories to explain the underlying mechanism behind these relationships. This study focuses on stress appraisal theory to explain the potential mechanism between stressor-outcome relationships.

Theories Describing a Curvilinear Form of Stressor-Outcome Relationship

Stress appraisal theory, also known as transactional stress model, argues that stress resides in the transaction between the person and the environment and is not solely dependent on one of the two (Lazarus, 1999) and it is the cognitive appraisals to what an individual experiences and how they feel in a particular encounter, that provide a link between the two (Dewe, et al., 2010; Lazarus, 1999). An individual's evaluation and categorization of a stress encounter with respect to that individual's well-being is referred to as the appraisal process (Lazarus & Folkman, 1984). Stress appraisal model is differentiated into primary and secondary appraisals. Individuals first categorize their encounters as harm/loss (something that has already occurred) or positive (challenge), or stressful (threat) under primary appraisal. These primary appraisals categories are associated with positive and negative emotions and are the active search for information and meaning to evaluate an action plan (Dewe et al., 2010; Lazarus, 1999, p. 76). Individuals then evaluate their coping options and focus on "what can be done about it" (Lazarus, 1999) to face the encounter under secondary appraisals. Lazarus and Folkman (1984) described coping mechanisms as problem-focused (focus is on managing the encounter) and emotion-focused (focus is on regulating the emotion).

This model views the coping process not just as the nature of objective stressors but also as the individual's subjective appraisals of these stressors and whether the individual perceives him/her as having the resources and thereby efficacy to effectively meet these challenges. Thus, coping process is dependent on several factors such as (a) environmental stressors, (b) individual resources to meet those demands, and (c) primary and secondary appraisal processes that are contingent upon (a) and (b) factors (Dvořáková et al., 2018). Individuals appraise stress as either hindering or promoting mastery, future gains, and personal growth (Crawford et al., 2010; Lazarus & Folkman, 1984; LePine et al., 2005). Hindrance appraisals result in negative emotions such as guilt and anger that elicit a harmful strain response (Webster et al., 2011), whereas challenge appraisals result in positive emotions such as enthusiasm and joy and negatively related to strain response (Webster et al., 2011).

As a result, challenge appraisals foster individuals' potential for high goal attainment and are associated with favorable behavioral and attitudinal outcomes (Webster et al., 2011), and an active problem-solving style that results in positive outcomes (LePine et al., 2005). Additionally, this model argues that stressors can be appraised as both hindrances and challenges at the same time and also different individuals appraise the same stressor differently (Lazarus & Folkman, 1984).

Since the coping mechanism depends on subjective perception of stressors, Lazarus (1990) conceptualized the relationship between stressors, such as workload, and outcomes such as performance and creativity, as nonlinear. Intermediate levels of stressors are appraised as challenging that stimulate and engage employees at his or her work which then fosters creativity and innovation at work (Baer & Oldham, 2006). On the contrary, relatively low or high levels of stressors reduce stimulation which in turn lowers creativity and innovation. Also, Binnewies and Wornlein (2011) indicated that if the level of stressors is constantly high, the employer would negatively associate with the stressor, may no longer appraise it as a challenge and would rather consider it as a threat, resulting in negative outcomes.

The non-linear relationship of stressor-outcome proposed by the stress appraisal theory is also supported by Farrell (1983), and Withey and Cooper (1989), that explain that employees respond to work stress in one of the four ways: voice, neglect, loyalty, and exit. Voice response involves staying in the organization and fighting the stress by seeking creative ideas to improve conditions and performance. Neglect response involves staying in the organization with minimal efforts and portraying passive behaviors of withdrawal. Loyalty response involves staying in the company by accepting the conditions as they are and seeking no improvement. Lastly, exit response involves leaving the organization. Out of all these responses, only voice response involves making an active and constructive response to improve conditions, work performance, and correct problems (Hon et al., 2013; Ng & Feldman, 2012). Voice behaviors channel stress into a positive desire for change, thus encouraging employees to creatively think of solutions to meet complex demands. Research indicated that it is essential for nurses to exhibit optimistic voice response behavior to improve overall

performance, creativity and innovation (Ng & Feldman, 2012) but this is difficult to maintain when there is a constant rise of stressor/job demands. Researchers indicate that employees will engage in voice behaviors when they perceive the stressful and unfavorable situation, for instance, high workload, as potentially effective (Hon et al., 2013) in the sense that they can perform their tasks and bring about the desired change (Withey & Cooper, 1989). Hence, employees who perceive the stressful situation as potentially effective and ability to resolve the problem will exhibit voice behaviors (Hon et al., 2013). A recent meta-analysis by Ng and Feldman (2012) supported this argument by showing that work stressors such as high workload, were associated with creativity as an expression of voice behaviors.

The theories and the above empirical evidence state the possibility of a positive link between workload (stressor) and creativity and innovation (outcomes) given the optimal conditions. But under the non-optimal conditions research has supported that workload reduces employee innovation potential and is associated with poor business outcomes (Binneswies & Wornlein, 2011). Hence, it appears that the relationship between a stressor and an outcome is non-linear and complex depending on the variables in context; and is highly contingent on the individual's perceptions of the stressful event and their evaluations of the coping mechanisms (Farrell, 1983; Lazarus, 1999; Withey & Cooper, 1989). However, there's only limited research evidence confirming this curvilinear relationship for different stressor-outcome(s) relationships, and so this study is particularly interested to examine the form of relationship between workload as a stressor, and creativity and innovation as two separate outcomes. Creativity involves cognitive thinking that includes identification of a problem, collection and evaluation of that information to come up with a novel solution. These efforts are heightened in the process of innovation as it also involves overcoming members' potential resistance and obtaining support for the ideas generated. Hence, these cognitive efforts imply that both creativity and innovation may be sensitive to workload.

Research Question 1. Does workload have an inverted-U/curvilinear relationship with creativity?

Research Question 2. Does workload have an inverted-U/curvilinear relationship with innovation?

The negative effects of workload on creativity and innovation is detrimental to organizations, especially where development is the key to success (Oldham, 2003), hence, it is important to examine the contextual factors that would help mitigate the negative effects. Research has shown that some contextual factors serve as boundary conditions to explain the positive influence of work stress on creativity and organizational effectiveness (Hon et al., 2013); especially the ones that enhance self-efficacy. It may help an employee realize that they have the necessary abilities and skills to develop creative and innovative ideas during stressful situations. Hence, the study aims to consider mindfulness as a moderator in the relationship between workload-creativity and innovation.

Mindfulness

Mindfulness stems from ancient Indian yoga traditions known as "samaadhi" and Theravada Buddhist philosophy as a means of achieving long-lasting happiness, comprehending the true nature of existence, and gaining personal insights into meaning of life (Ramasubramanian, 2017); however it is gaining importance in the modern world. Research on job stressors provide promising directions for interventions to improve working conditions in the occupational health promotions (Baethge & Rigotti, 2013); and mindfulness could be one of the ways to decrease emotional and negative strains caused by workload. Mindfulness consists of non-judgement and present-moment awareness (Aikens, 2014). The action of not evaluating our thoughts, feelings, experiences as good or bad, or right or wrong, is known as being non-judgemental (Baer & Oldham, 2006). Present-moment awareness refers to an action of paying full attention to our surroundings and to the happenings in the current moment, rather than worrying about the future or reliving the past (Baer & Oldham, 2006). It is the process of being sensitive to perspective and context and actively adjusting to it, which is why it is important in a dynamic work environment such as hospitals. Hence, mindfulness is about fully engaging oneself to

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the present. It is the essence of engagement as it makes you sensitive to perspective and context (Stevenson et al., 2019).

Mindfulness has been identified as both a state and a trait that can be fostered by training (Zeidan, 2010). State mindfulness refers to meditative mindfulness that can be altered through meditation practices and is subject to fluctuations within individuals. On the contrary, trait mindfulness is a dispositional trait that varies across individuals and refers to being mindful in everyday life and is the focus of this study (Kiken et al., 2015). Additionally, trait mindfulness refers to one's average or baseline mindfulness (Stevenson et al., 2019). The terms mindfulness and meditation are sometimes used interchangeably as well. However, mindfulness can be practiced both through mindfulness meditation or the creation of a general psychological state in everyday activities (Brown et al., 2007).

Mindfulness has greatly influenced thinking and workplace functioning in many industries such as Google, Aetna, and the U.S. Army (Jha et al., 2015; Tan & Martin, 2012). Mindfulness literature is rapidly evolving and spreading across disciplines (Good et al., 2016) due to its positive impacts on human functioning (Brown et al., 2007). Disciplines such as neuroscience, medicine, management, and psychology provide evidence of positive impact of mindfulness on cognition, emotion, and behavior (Good et al., 2016), and even better workplace functioning (Jha et al., 2015).

Mindfulness offers multiple benefits and is extremely effective because it instills confidence, regulates negative emotions such as frustration and anger, and mood swings (Zeidan et al., 2010). It improves focus of attention to rapid changes in the work environment and in job roles and thus improves absorption of new information and adaptability skills. It also improves working memory and cognition (Zeidan et al., 2010). It liberates you from distractions, further helping with problem solving, decision-making, and facilitating creativity (Ostafin & Kassman, 2012). It improves resilience, vigor, and engagement, thereby reducing stress and enhancing well-being (Aikens, 2014). The action of avoiding auto-pilot behavior and being fully aware of what is happening around us, can

help reduce stress, unlock creativity and innovation, and improve performance and well-being (Aikens, 2014). Aikens (2014) also mentioned that it avoids work irritation, thus reducing emotional and cognitive strains. Tan and Martin (2012) and Bakker (2011) found that mindfulness increases self-efficacy, self-esteem and resilience among adolescents that impacts the way employees cope with stressors, such as workload, at work. Other scholars have demonstrated that mindfulness helps in alleviating psychological symptoms such as depression and anxiety, stimulate positive emotions, and in general improve quality and functioning of life (Zoogman et al., 2014).

Several research evidence indicate that mindfulness reduces stress and stress-related symptoms and induces periods of calmness. Research has demonstrated urgency of implementing mindfulness in educational institutions as a stress-reducing tool and adaptive coping strategy for college students (Tan & Martin, 2012). Individuals with trait mindfulness have better ability to make accurate appraisals, respond adaptively under stress, and engage in adaptive coping strategy (Ramasubramanian, 2017). Palmer and Rodger (2009) provided evidence that students with moderate or high levels of trait mindfulness perceived less stress than those with low level of trait mindfulness. A meta-analysis has shown mindfulness to be effective in helping individuals to reduce stress and cope with clinical and non-clinical problems (Grossman et al., 2004). Although limited, there is some research evidence to support the increase of creativity and innovation as a result of mindfulness as it is associated with flexible cognition (Good et al., 2016). Flexible cognition is an individual's ability to adjust one's behavior to a changing situation or an environment (Ding et al., 2015) by generating novel ideas, responses, and perspectives. Both trait mindfulness and mindfulness training are linked to insight problem solving (Ostafin & Kassman, 2012), divergent and convergent thinking, and thus creativity (Colzato et al., 2012). Through the mindfulness training research study, Ding and colleagues (2015) found that participants with mindfulness training had greater attention control, more cognitive flexibility and were more likely to pursue new perspectives to problems.

Based on these research findings, it is supported that mindfulness helps to lower stress as well as unlock creativity but these results were independent of each other; hence, this study aims to

observe the interaction effects of trait mindfulness between a stressor (workload) and creativity in a relationship. There are several coping strategies but mindfulness is highly related to a coping style that is adaptive, and involves self-regulation and conscious volitional efforts (Ramasubramanian, 2017). Thus, positive reappraisal explains the role of trait mindfulness as a desire to bring changes in oneself and its surroundings (Bakker, 2011).

<div align="center">Role of Mindfulness in Positive Reappraisal Concept</div>

Positive reappraisal theory is an emotional regulation strategy that enables individuals to successfully adapt to stressful changes and can explain the role and benefits of mindfulness under stressful situations. Garland and colleagues (2009) suggested that is an essential component to meaning-based coping mechanics to stressful situations as it enhances adaptability skills to stressful situations. As opposed to defense mechanisms, positive reappraisal allows reengagement with the stressor event making it an adaptive strategy rather than avoidant. A person who got a negative remark by his supervisor, might positively reappraise the event as an opportunity to be aware of his weakness and the opportunity to grow. Hence, it is critical and central to the stress process.

The meta-mechanism of mindfulness model by Shapiro and colleagues (2006), demonstrated that the role of mindfulness in positive reappraisal is to reperceive a stressful situation because stress is a function of your perspective towards the events. Reperceiving is the objectification of the mental contents (Shapiro et al., 2006), which helps in self-regulation, cognitive, emotional, and behavioral exposure and flexibility, and enhance clarification. Previous research found that mindfulness influences liberation of fixed negative narratives of self and world, and re-construes one's appraisal to stressful situations (Garland et al., 2009; Shapiro et al, 2006). Shapiro and colleagues (2006) also suggested that through reperceiving brought by mindfulness, a strong emotionally connected story would simply become a story (Garland et al., 2009), which then allows for positive reappraisal. One must decenter and withdraw from initial negative associations to stressful situations to re-construe her

appraisal. Hence, this mechanism facilitates the attribution of new meaning to previously stressful events that may engender hope, resilience, and intrinsic motivation to face a stressful situation. Overall, decentering is the primary mechanism of coping, followed by reappraisal and value clarification as secondary mechanisms (Baer, 2003). Additionally, it would encourage active engagement to cope and benefit from a stressful situation. Wu and colleagues (2017) also found that the fresh perspective to events increases chances of creativity and innovation.

Overall, research supported the role of mindfulness in positive reappraisal coping mechanisms. Palmer and Rodger (2009) indicated that mindfulness was positively associated with adaptive coping strategy. Mindfulness consists of five facets – observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience (Baer & Oldham, 2006). It is implied that out of all these facets, acting with awareness, non-reactivity, and non-judgment, are strongly associated with the adaptive emotional regulation and are more closely related to positive reappraisal and coping mechanism (Stevenson et al., 2019). Ramasubramanian (2017) claims that because coping involves self-regulation and conscious volitional effects, the aspects of being non-reactive and being fully aware of themselves and the environment help individuals to make accurate appraisals and respond adaptively under stress.

As previously mentioned, workload is a common recurring stressful condition in hospitals, which is why nurses might have negative associations with the workload. As a result, mindfulness as a part of a positive reappraisal framework would allow nurses to decentralize negative emotions from prior high workload situations and would encourage them to objectively reperceive such situations. It would encourage them to actively engage in coping mechanisms to find creative and innovative solutions. Hence, positive reappraisal is a relevant theory to link this study's model.

The countless benefits of mindfulness even among the high-risk occupations, such as nursing (Aikens, 2014; Zeidan et al., 2010), particularly those related to appraisal toward a stressful environment, highlight the potential utility of examining this construct as a moderator of the

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relationship between workload-creativity and innovation. Although, past research indicates that mindfulness increases likelihood of creativity, there has not been direct evidence to support that trait mindfulness mitigates the effects of workload on creativity and innovation.

Despite the unclear relationship between stressor and outcome, several scholars report harmful/negative consequences of high workload, especially, in the nursing occupation. Although workload is a daily occurrence, it seems to rapidly increase whenever there is an incoming trauma or occurrence of the major incident that surpasses the optimal level of workload, which is why this study particularly focuses on the strength of the negative relationship between workload and the two outcomes. With respect to the positive reappraisal theory, individuals with high levels of trait mindfulness will engage in a two-step coping mechanism. Decentering will first allow individuals to observe external stressors and consciously reflect on it by disrupting automatic conditioned reactions. This will liberate past associations to the stressors and provide cognitive flexibility to reperceive the events, laying the foundation for reappraisal and value clarification. This will then broaden the scope of attention to attain previously unnoticed information and reframe associations as growth-promoting and meaningful, and promote self-regulation by adhering to one's values and authentic actions (Brown & Ryan, 2003). On the other hand, individuals with low levels of trait mindfulness will have a narrower scope of attention that may prevent them from noticing useful information. These individuals might also develop negative expectations about their capabilities and may not act in accordance with their values that increases sensitivity to and lowers control over external conditions, such as workload. As a result, trait mindfulness will moderate the relationships between (1) workload and creativity, and (2) workload and innovation, as shown in figure 1.
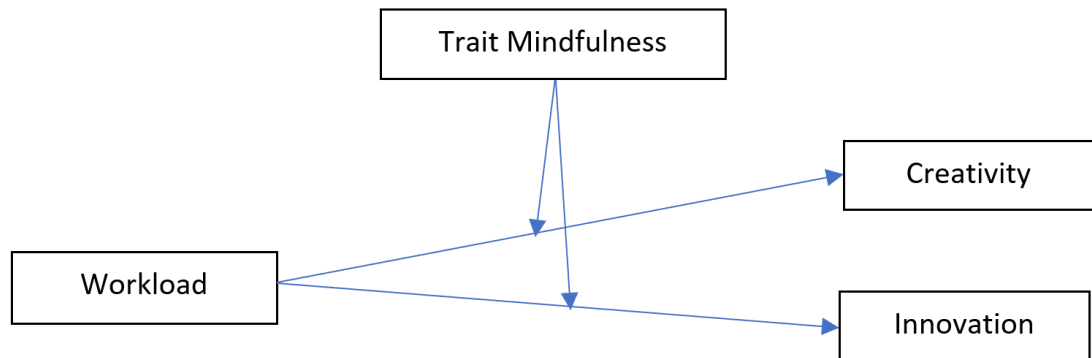
Figure 1: Conceptual model for proposed relationships

Hypothesis 1. Trait mindfulness will moderate the relationship between workload and creativity such that individuals with high levels of trait mindfulness will have a weaker negative relationship between workload and creativity.

Hypothesis 2. Trait mindfulness will moderate the relationship between workload and innovation such that individuals with high levels of trait mindfulness will have a weaker negative relationship between workload and innovation.

<u>Bandwidth-Fidelity Principle</u>

As mindfulness and innovation are broad measures and each include facets, bandwidth-fidelity principle would be used to observe the effects between these two measures. Cronbach (1960) states that bandwidth-fidelity explains two separate but related concepts that is a tradeoff between breadth and depth of measurements. Bandwidth is a continuum from wide to narrow (Hogan & Roberts, 1996) and explains the complexity and variability of information one tries to obtain within a measure; and fidelity is a continuum from high to low (Hogan & Roberts, 1996) and explains the accuracy, specificity, and thoroughness of testing to obtain desired information (Salgado et al., 2015). It suggests that broad measures, such as global personality factors are better able to predict broad

outcomes/criteria, such as overall job performance (Cronbach & Gleser, 1957). In addition, narrow measures, such as verbal reasoning tests are better able to predict narrow outcomes/criteria, such as academic performance in specific subjects (Cronbach & Gleser, 1957). Although, there is an agreed upon consensus to match the predictors with the outcomes, the desire to achieve a balance between bandwidth and fidelity when trying to select measures, started an interesting research or debate between the use of broad versus narrow measures. Some researchers argue that broad measures are better predictors overall because it provides variety of information within a measure (Ones & Viswesvaran, 1996) but some argue that specificity provides explanatory power associated with variance unique to narrow traits (Schneider, Hough, Dunette, 1996). These researchers argue that narrow traits provide better understanding than broad traits alone (Schneider et al.,1996). However, this disagreement exists due to the criteria of job performance which is a complex criterion in itself. The concept of bandwidth-fidelity has been vastly used in the research of personality and performance (Hogan & Roberts, 1996; Ones & Viswesvaran, 1996; Schneider et al., 1996; Salgado et al., 2015) but there has been limited research on its use in occupational health psychology (Hoepf, 2010).

Although the disagreement between researchers exists, the main take-away is that there is a need to match the characteristics of predictors to the characteristics of criteria (Hogan & Roberts, 1996) to enhance validity, and that the misalignment in measurement levels will attenuate results (Ones & Viswesvaran, 1996). Hence, in order to increase innovation in the workplace, it is first important to find an instrument to measure innovation accurately. Thus, this study will try to bridge the research gap by extending the use of bandwidth-fidelity in the relationship of mindfulness and innovation. As a result, predictive validity will be compared between matched and mismatched relationships. An example of a matched relationship is where a domain level mindfulness measure is used to predict domain level innovation. An example of a mismatched relationship is where a facet level mindfulness measure is used to predict domain level innovation. This principle would also be used to determine whether facet-level mindfulness or a domain-level mindfulness is a better predictor overall for innovation.

Hypothesis 3A. Domain-level mindfulness will be a better predictor of a domain-level innovation compared to a facet-level mindfulness predictor.

Hypothesis 3B. Facet-level mindfulness will be a better predictor of a facet-level innovation compared to a domain-level mindfulness predictor.

Hypothesis 4A. Domain-level mindfulness will predict domain-level innovation better than predicting facet-level innovation.

Hypothesis 4B. Facet-level mindfulness will predict facet-level innovation better than predicting domain-level innovation.

<u>Nurses' Contribution to Healthcare Transformation</u>

Nurses were selected as participants due to the complexity of their work , high risk exposure to stressors, and because they are the primary advocates of patients' healthcare (Thomas et al., 2016). Nurses are the primary and the crucial face of individuals' health care and is defined as the optimization of health, facilitation of healing, and advocacy in the care of individuals (Thomas et al., 2016). A 2014 study from the American Medical Association (AMA) and the Mayo Clinic established that about 54% of healthcare providers indicated signs of burnout (Shanafelt et al., 2015) due to stressful working conditions. This number is above average, and it has also been reported that if these healthcare providers may afford to quit, they would have already done so. Nursing is a first-hand caring profession that is built upon nurse-patient relationships (MacPhee et al., 2017); as a result, the factors that negatively affect nursing occupation have the high potential to have an adverse impact on patient care and safety as well. Furthermore, as nurses are the front-line healthcare professionals, they naturally become the critical voices in managing a health-care crisis as well. Critical Care Societies Collaborative (CCSC) has emphasized the importance of addressing burnout issues among nurses due to the massive workload of incoming trauma that appears to elevate during a healthcare crisis (Kleinpell et al., 2020). Megan Brunson, MSN, RN, CNL, CCRN-CSC, who serves as the president of

American Association of Critical-Care Nurses (AACN) for the year 2020, suggested that nurse leaders should support innovation by empowering others to think out-of-the-box and implement solutions (Thew, 2020). Moreover, many nurses out there believe that innovation is a part of who they are since they are always with patients to exactly know what needs to happen to make a difference, thus enabling them to add insights and expertise to implement valuable innovations (Johnson & Johnson, 2020). Therefore, either as a daily occurrence or during a traumatic event, need for innovation to deal with high workload is clearly evident among nurses. Thus, health care organizations are now drawing immediate attention to creativity and innovation and are researching ways to achieve it to actively cope with challenging, stressful situations.

As a result, this study includes nurses as participants to study three goals: 1) determine the effects of workload on both creativity and innovation; 2) examine trait mindfulness as a moderator that could make it plausible to enhance patient care under stressful conditions; and 3) compare the predictability of matched and mismatched relationships in the context of bandwidth-fidelity principle.

CHAPTER THREE: METHODOLOGY

Participants and Procedure

Due to the dynamic work environment and lack of research on creativity and innovation among nurses, the sample of this study consisted of employed nurses. They were recruited as a part of a larger study evaluating a mindfulness intervention to improve employee health behaviors. The intervention study aimed to recruit about 300 nurses, as this sample size is needed to produce adequate power for the intervention evaluation analyses. However, this study's sample size was depended on the requirement for the moderation analysis which requires substantially larger sample size compared to non-moderation analysis (Dawson, 2014). The study's sample size ranged from 132-155; and Shieh (2009) indicated that a sample size in that range will result in a relatively large effect size with 90% power. The data collection of this study was part of only the baseline study of the intervention to avoid any possible contamination and which is why mindfulness is measured as a trait. The following measures were combined in a single Qualtrics survey and an email was sent out to the participants with the details and instructions for the survey. The participants were asked to complete the baseline survey.

Measures

The baseline survey, also known as the intervention pre-test survey, contained items on workload, creativity, innovation, mindfulness constructs, and demographics.

Workload measure. Workload was measured using the items from the Quantitative Workload Inventory Scale (Spector & Jex, 1998). It measures perceptions of the amount of work in terms of volume and work pace. This inventory scale includes five items, each statement concerning the amount of work required of an employee. The respondent reported levels of frequency from a scale of 1 (never) to 5 (always) on statements such as "*how often does your job require to work very*

fast". High scores represent a high level of workload. In previous research, this scale demonstrated an internal reliability consistency (Cronbrach's alpha) of 0.82 across 15 studies (Spector & Jex, 1998). In this study, the measure had an internal consistency of 0.91.

Creativity and Innovation measures. Recommendations by Bjonberg (2017) were followed to accurately capture creativity and innovation. Creativity and Innovation were measured using items from the two scales - Tierney and Farmer's (2011) creativity scale and Janssen's (2000) Innovative Work Behavior (IWB) scale. Janssen's (2000) IWB scale is assessed by nine items based on Scott and Bruce's (1994) scale on individual innovative behavior in the workplace. The IWB scale includes items on three aspects of innovation: three items on idea generation, three items on idea promotion, and three items on idea realization. The scale asked participants to report the level of agreement with statements such as "*Creating new ideas for difficult issues*" on a scale from 1 (strongly disagree) to 5 (strongly agree). The factor analysis of the IWB scale demonstrated high inter-correlations between these three aspects of innovation. Furthermore, Scott and Bruce (1994) supported that these three aspects additively combine to create the overall IWB scale. The scale demonstrates an internal reliability consistency of (Cronbrach's alpha) 0.92. The measure in this study had an internal consistency of 0.96. Creativity was measured by using the items from Tierney and Farmer's (2011) creativity scale, however, some adaptations were made by Bjonberg (2017). For instance, 'demonstrates originality of work' item was removed due to behavioral ambiguity. This is a three-item scale that asked participants to report their level of agreement to statements such as "*Identified opportunities for new products/processes*" on a scale from 1 (strongly disagree) to 5 (strongly agree). In previous research, this scale demonstrates an internal consistency (Cronbrach's alpha) of 0.90. In this study, this measure had an internal consistency of 0.87. Although they were measured as one scale, their analyses were conducted separately.

Trait mindfulness measure. Mindfulness was measured using the items from the 15 item Five Facet Mindfulness Questionnaire (FFWQ-15; Baer et al., 2004). FFMQ scale is developed from five previously used mindfulness questionnaires - Mindfulness Attention Awareness Scale (MAAS),

the Freiburg Mindfulness Inventory (FMI), the Kentucky Inventory of Mindfulness Skills (KIMS), the Cognitive and Affective Mindfulness Scale (CAMS), and the Mindfulness Questionnaire (MQ; Baer et al., 2004). Factor analyses of the combined pool of items from all the above five scales suggest that there are five clear, interpretable facets of mindfulness. The FFMQ scale includes these five facets: Observing, Describing, Acting with Awareness, Non-judging, and Non-reactivity. FFMQ inventory used in this study includes 15 items (3 items per facet) and is scored based on the 5-point Likert scale. Respondents reported the level of frequency on statements such as "*I perceive my feelings and emotions without having to react to them*" on a scale from 1 (never) to 5 (always). All the 5 facets of FFMQ inventory demonstrate good internal consistency (Cronbach's alpha): observing = .83, describing = .91, acting with awareness = .87, non-judging = .87, and non-reactivity = .75. The five facets are modestly correlated with each other. In this study, the measure had an overall internal consistency of 0.81.

Control Variables. Research indicates that age and tenure are related to and affect all the main variables of the study - workload, creativity, innovation and mindfulness. Hence, the present study chose to study its relationships above and beyond what is accounted for by the demographics and included age and tenure as control variables in the main effect and moderation hypotheses.

Method of Analyses

Data was cleaned using Microsoft Excel to identify missing data and careless responding; and out of 210 participants, only 154 of them completed the survey items excluding demographics, and 132 completed the survey including the demographics. However, among the 154 participants, data was mean-imputed for creativity and innovation variables as less than 5% of it was missing (Jakobsen et al., 2017; Schafer, 1999). This means that the response rate among those who completed the survey without demographics was 73.33% and those who completed the survey with demographics was 66.00%. In both cases, some amount of data was lost that could have possibly affected the results. No

outliers were identified using the Cook's Distance values as all values were under 1. In addition, multivariate outliers were also checked using Mahalanobis Distance and none of the new probability values were below .001, indicating that this assumption was not violated. Assumption for multicollinearity was also met by checking the VIF scores that were below 10 and tolerance scores that were above 0.2. Moreover, assumptions for normality for the error terms and homoscedasticity were also met. Three main data analyses were conducted to test their respective research questions and hypotheses, such as curvilinear regression analysis was performed to examine the relationship between the stressor (i.e., workload) and two separate outcomes (i.e., creativity and innovation). Hierarchical regression analysis was conducted to test the moderating effects of trait mindfulness on the above-mentioned relationships. Lastly, bivariate correlations and multiple regressions were conducted to test the bandwidth-fidelity principle between the mindfulness and innovation measures.

To test the stressor-outcome relationship, curvilinear regressions were performed in which workload was entered in step one and workload squared was entered in step two against creativity as a dependent variable. The same procedure was repeated for innovation as a dependent variable. Changes in variance explained were assessed from step one to step two.

Main effects and moderation hypotheses were performed once with control variables and once without as the sample size differed across the two occasions. To test the main effects hypothesis with control variables, hierarchical regressions were performed in which age and tenure were entered as control variables in step one. Workload as a predictor variable was entered in step two and the changes in variance explained were assessed from step one to step two. Regression analysis was repeated to test the main effects hypothesis without the control variables this time where workload was entered in the first step itself and F value was assessed to identify its significance. The entire procedure of with and without demographics was repeated once for creativity and once for innovation as two dependent variables.

Moderation hypotheses were tested using the hierarchical regression procedure, once with the control variable and once without, separately for creativity and innovation. One with the control variables, tenure and age were entered in step one. Workload as a predictor variable and mindfulness as a moderator variable were entered in step two. The interaction term between workload and mindfulness was entered in step three. Changes in variance explained were examined across steps. One without the control variables, predictor and moderator variables were entered in step one and the interaction term was entered in step two and the change in variance explained was assessed. The issue of mean-centering variables was addressed by running the data with and without mean-centered variables but the results did not differ between these analyses. Moreover, research has indicated that centering does not remove the issue of multicollinearity so the raw uncentered format is described in the results section (Dawson, 2014).

The bandwidth-fidelity hypotheses were first tested using bivariate correlations between the domains of mindfulness and innovation and their facets to observe if the relationship between these variables exist. Correlation coefficients and their significance were assessed across these variables. Secondly, R-squared values from multiple regressions were used to observe the amount of explained variance in the model and compare the predictive strength of matched relations where a predictor and the outcome are of the same measurement level (i.e., domain-domain or facet-facet) with mismatched relations where a predictor and the outcome are not of the same measurement level (i.e., domain-facet or facet-domain) relations. In addition, multiple regression analyses were performed to engage in the debate between the use of broad versus narrow measures as predictors by observing the predictive ability of predictors. This was accomplished by running the four sets of analyses; 1) domain-level mindfulness predicting domain-level innovation; 2) facet-level mindfulness predicting facet-level innovation; 3) domain-level mindfulness predicting facet-level innovation; and 4) facet-level mindfulness predicting domain-level innovation. The first two analyses are matched and the last two are mismatched. Each set of analyses would either include one or three regression models depending

on the domain-level and facet-level outcomes and would either include one or five predictors depending on the domain-level and facet-level predictors.

CHAPTER FOUR: RESULTS

Correlations and the descriptive statistics for the study variables can be found in table 9 in Appendix C. In terms of demographics, participants reported a mean of 51.25 years for age and a mean of 11.8 years for tenure. Descriptive statistics revealed that participants reported relatively high levels of workload (M = 3.50, SD = .95), high levels of creativity (M = 3.03, SD = .95), moderate levels of innovation (M = 2.87, SD = .96), and high levels of trait mindfulness (M = 3.39, SD = .51). Significant correlations among study variables were examined and it was observed that creativity increases, so does the innovation (r =.92), as expected from the previous research, but it is unclear how high the correlation should be. While some researchers argue the relationship to be moderately correlated (.30 < r < .50; Kickul & Gundry, 2001), others have found it to be highly correlated (r > .70; Sarooghi et al., 2015). Daniels and colleagues (2011) also found a higher correlation when the scores are averaged (r = .90). Additionally, Sarooghi and colleagues (2015) indicated that the correlation between creativity and innovation is stronger at the individual level compared to organizational level further explaining the reason for achieving a high correlation in this study as it measures innovation from individuals' perspective. Regardless of the evidence found in the past literature, a high correlation of .92 between creativity and innovation raises some concern and could be mainly due to using a combined scale of these variables to collect data. I found negative correlation between workload and mindfulness (r = -.24), as consistent with previous research (r = -.21; Montani et al., 2020). Lastly, mindfulness was positively correlated with creativity (r = .29) and innovation (r = .26) as expected, indicating that as trait mindfulness increases, so does creativity and innovation, however the correlations were weak. Lastly, the internal consistencies for workload (α = .91), creativity (α = .87), innovation (α = .96), and mindfulness (α = .81) were adequate.

Results of the curvilinear regression analyses can be found in Tables 1 and 2 for creativity and innovation respectively. Accounting for control variables would have further restricted the sample size which is why it is not included for the curvilinear regression analyses. The study aimed to examine the curvilinear relationship between 1) workload and creativity; and 2) workload and innovation. Step one of the regression suggests the relationship between workload and creativity is not significantly linear (F (1,152) = 1.19, ΔR^2= .01, p = .28). However, step two of the regression suggests that the relationship between workload and creativity is not significantly curvilinear either (F (1,151) = .63, ΔR^2= .00, p = .53). Similar results were found for the relationship between workload and innovation as it was not significantly linear (F (1,152) = 1.27, ΔR^2= .01, p = .26) or curvilinear (F (1,151) = .65, ΔR^2= .00, p = .53). Although in both cases, the curvilinear relationships between 1) workload-creativity and 2) workload-innovation were not observed, the results are inconclusive as it did not support linear relationships between these variables either.

Table 1: Summary of the Curvilinear Regression for the Variable Predicting Creativity

Model	B	SE B	β	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.01	.00	0.01	1.19	1.19
Workload	.09	.08	.09					
Step 2				.01	-.01	0.00	.63	.08
Workload	.21	.44	.21					
Workload*Workload	-.02	.07	-.12					

Note: (N = 154) *p<.05, **p<.01

Table 2: Summary of the Curvilinear Regression for the Variable Predicting Innovation

Model	B	SE B	β	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.01	.00	.01	1.27	1.26
Workload	.09	.08	.09					
Step 2				.01	-.01	.00	.65	.04
Workload	.17	.44	.17					
Workload*Workload	-.01	.07	-.08					

Note: (N = 154) *p<.05, **p<.01

<u>Main Effects Hypothesis</u>

Summary of the main effects for both creativity and innovation and with control variables are mentioned in the tables 3 and 4 below. Results of the same analyses without control variables are mentioned in the tables 10 and 11 in the Appendix C. The results of main effect hypotheses depicted that the overall model is a significant predictor of creativity, with (F (2,127) = 4.67, ΔR^2= .13, p < .01) and without (F (2,151) = 9.25, ΔR^2= .11, p < .01) control variables. The same results are observed for innovation with (F (2,127) = 3.67, ΔR^2= .10, p < .01) and without (F (2,151) = 7.75, ΔR^2= .09, p < .01) control variables. Workload and trait mindfulness accounted for additional 13% of the variance in creativity and 10% of variance in innovation above and beyond control variables. However, the standardized coefficient beta depicts that workload is a significant predictor only without control variables and is positively related to creativity (β = .17, p < .05) and innovation (β = .16, p < .05), indicating that as each unit of workload increases, creativity has a tendency to increase by .17 and innovation as a tendency to increase by .16. On the other hand, mindfulness is a significant predictor above and beyond control variables and is also positively related to creativity (β = .36, p < .01) and innovation (β = .32, p < .01), indicating that as each unit of trait mindfulness increases, creativity has a tendency to increase by .36 and innovation has a tendency to increase by.32.

Table 3: Summary of the Main-Effects Hypothesis for Creativity Above and Beyond Control Variables

Model	B	SE B	β	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.00	-.02	0.00	.02	.02
Age	.00	.33	-.01					
Tenure	.00	.01	.02					
Step 2				.13	.10	.13**	4.67**	9.33**
Age	-.00	.01	-.06					
Tenure	.00	.01	.03					
Workload	.13	.09	.13					
Mindfulness	.69	.16	.36**					

Note: (N = 132) *p<.05, **p<.01

Table 4: Summary of the Main-Effects Hypothesis for Innovation Above and Beyond Control Variables

Model	B	SE B	β	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.00	-.02	0.00	.00	.00
Age	.00	.01	.00					
Tenure	.00	.01	.00					
Step 2				.10	.08	.10**	3.67**	7.34**
Age	-.00	.01	-.04					
Tenure	.00	.01	.01					
Workload	.14	.09	.13					
Mindfulness	.62	.17	.32**					

Note: (N = 132) *p<.05, **p<.01

Moderation Hypothesis

Results of the moderation analyses with the control variables for creativity and innovation are contained in tables 5 and 6 respectively, and the ones without the control variables are mentioned in the tables 12 and 13 in the Appendix C. Hypothesis 1A and 1B predicted that trait mindfulness will

moderate the negative relationship between workload-creativity, and workload-innovation, such that the relationship will be weaker for those who report higher trait mindfulness. The step two of the regression model was significant above and beyond control variables for both creativity (F (2,127) = 4.67, ΔR^2= .13, p < 0.01) and innovation (F (2,127) = 3.67, ΔR^2= .10, p < 0.01). This indicates that the main effects of workload and mindfulness are significant predictors of creativity and innovation. However, the purpose was to examine the moderating effects of trait mindfulness, so the study focuses more on the analysis of the interaction term in the model. The final step of the regression included the interaction term between workload and trait mindfulness and the overall model of this step was significant above and beyond control variables for both creativity (F (1,126) = 3.73, ΔR^2= .00, p < .01) and innovation (F (1, 126) = 2.93, ΔR^2= .00, p < .01). This depicts that when the interaction term which is the moderator is accounted for with other predictors, the model is significant. However, when the interaction term is analyzed individually, it was not significant. Hence, trait mindfulness did not moderate the relationship of workload-creativity and workload-innovation, and hypotheses 1A and 1B were not supported.

For both dependent variables, examination of the conceptual model and moderating effects with and without the control variables did not alter the significance of the results. Lastly, before running the moderation tests, the collinearity diagnostics were acceptable with no tolerance below 0.2 and no variance inflation factors (VIF) over 10. However, after conducting the moderation analyses, the collinearity diagnostics were only acceptable for main effects but were no longer acceptable for moderation effects with tolerance ranging from .02 to .05, and VIF ranging from 18.2 to 56.6. Perhaps, this might have affected the results.

Table 5: Summary of the Hierarchical Regression and Moderation Test for Variables Predicting Creativity Above and Beyond Control Variables

Model	B	SE B	β	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.00	-.02	.00	.02	.02
Age	.00	.01	-.01					
Tenure	.00	.01	.02					
Step 2				.13	.10	.13**	4.67**	9.33**
Age	-.00	.01	-.06					
Tenure	.00	.01	.03					
Workload	.13	.09	.13					
Mindfulness	.69**	.16	.36**					
Step 3				.13	.09	.00	3.73**	.11
Age	-.00	.01	-.05					
Tenure	.00	.01	.03					
Workload	.34	.63	.32					
Mindfulness	.91	.67	.48					
Workload*Mindfulness	-.06	.18	-.21					

Note: (N = 132) *p<.05, **p<.01

Table 6: Summary of the Hierarchical Regression and Moderation Test for Variables Predicting Creativity Above and Beyond Control Variables

Model	B	SE B	B	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.00	-.02	.00	.00	.00
Age	.00	.01	.00					
Tenure	.00	.01	.00					
Step 2				.10	.08	.10**	3.67**	7.34**
Age	-.00	.01	-.04					
Tenure	.00	.01	.01					
Workload	.14	.09	.13					
Mindfulness	.62	.17	.32**					
Step 3				.10	.07	.00	2.93*	.08
Age	-.00	.01	-.04					
Tenure	.00	.01	.01					

Model	B	SE B	B	R^2	Adjusted R^2	ΔR^2	F	F change
Workload	-.04	.64	-.04					
Mindfulness	.43	.69	.23					
Workload*Mindfulness	.05	.19	.18					

Note: (N = 132) *p<.05, **p<.01

Bandwidth-Fidelity Hypothesis

Results of the bivariate correlations is contained in the table 14 in Appendix C. Hypotheses 3A-4B predicted that the relationships in which both constructs are analyzed at the domain level (or at facet level; i.e., matched relation) will have a higher predictive strength than relationships in which one construct is measured at the domain level (or facet level) and another one is measured at the facet level (or domain level; i.e., mismatched relation). First off, the correlation between the domain-levels mindfulness and innovation (i.e., matched; r = .26, p < 0.01), was relatively higher compared to the correlations between domain-level mindfulness and facet-level innovation (i.e., mismatched) - idea promotion (r = .25, p < 0.01), and idea realization (r = .22, p < 0.01), except for idea generation (r = .26, p < 0.01).

The correlation between the domain-levels mindfulness and innovation (i.e., matched relation; r = .26, p < 0.01), was relatively higher compared to the significant correlations between facet-level mindfulness and domain-level innovation (i.e., mismatched) - observing (r = .21, p < 0.01) and describing (r = .20, p < 0.01), except for non-reacting (r = .26, p < 0.01). The correlations between domain-level innovation and the remaining two facets of mindfulness (awareness and non-judging) were non-significant.

In addition, it was observed that the correlations between facets of the two scales (i.e., matched) were not stronger compared to the correlations between mismatched relations where either the predictor or the criteria was at facet level. Again, the exceptions were non-reacting facet from

mindfulness and idea generation facet from innovation. Although the values of correlations among these relationships differed a little, Hotelling's test were ran to examine whether or not these differences are significant. Upon analyses, it was observed that these differences are not significant. Next, multiple regressions were performed to observe the strength of these relationships and to also determine which measurement level of mindfulness was a better predictor overall for innovation.

The R-squared values are averaged from the three regression outputs for the facet-level innovation. The results indicate that domain-level mindfulness significantly predicted domain-level innovation ($R^2 = .07$, p < 0.01); domain-level mindfulness significantly predicted facet-level innovation (avg. $R^2 = .06$, p < 0.01); facet-level mindfulness significantly predicted domain-level innovation ($R^2 = .10$, p < 0.01); and facet-level mindfulness significantly predicted facet-level innovation (avg. $R^2 = .10$, p < 0.05). Comparing the R-squared values between all four instances indicate that domain-level mindfulness ($R^2 = .07$) relatively had a lower predictive strength for domain-level innovation compared to facet level mindfulness ($R^2 = .10$) as a predictor. Facet-level mindfulness (avg. $R^2 = .10$) had higher predictive strength for facet-level innovation compared to domain-level mindfulness (avg. $R^2 = .06$) as a predictor. Domain-level mindfulness had a higher predictive strength for domain-level innovation ($R^2 = .07$) compared to the predictive strength for facet-level innovation (avg. $R^2 = .06$). Lastly, the results indicate that facet-level mindfulness had the same prediction for both facet-level innovation ($R^2 = .10$) and domain-level innovation (avg. $R^2 = .10$). Tables 15 -22 (Appendix C) demonstrate all multiple regressions, and table 7 provides the summary of the regression analyses.

Although, the differences in R-squared values suggest that facet-level mindfulness is a better measure compared to domain-level mindfulness as it explains more variance, Hotelling's test was performed to examine whether or not these differences are significant, and yet again, the test indicated that the differences were not significant. Although no support was found for the bandwidth-fidelity principle as the differences were not significant, the indication of the R-squared values being even

slightly different highlight the potential of achieving significant differences in the future if repeated

with larger sample size and high power.

Table 7: Summary of the Multiple Regression to Examine Bandwidth-Fidelity Principle across Measurement Levels

		Un-adjusted R^2 Values of the Regression Models	
		Outcome	
		Domain-level	Facet-level
Predictors	Domain-level	.07**	.06**
	Facet-level	.10**	.10*

Note: (N = 154) *p<.05, **p<.01

The results for all the research questions, hypotheses, and the major findings of this study are

summarized in the table 8

Table 8: Summary of the results

Objectives of the Study	Findings
Research Question 1: Does workload have a curvilinear relationship with creativity?	Inconclusive Results
Research Question 2: Does workload have a curvilinear relationship with innovation?	Inconclusive Results
Main effects of workload predicting creativity and innovation	Supported (without control variables)
Main effects of mindfulness predicting creativity and innovation	Supported (above and beyond control variables)
Hypothesis 1: Trait mindfulness will moderate the relationship between workload and creativity	Not Supported

Objectives of the Study	Findings
Moderation Hypothesis 2: Trait mindfulness will moderate the relationship between workload and innovation	Not Supported
Bandwidth- Fidelity Hypotheses 3A-4B: Matched relations will have higher predictive strength than mismatched relations	Not Supported

CHAPTER FIVE: DISCUSSION

The study first aimed to replicate the findings of the curvilinear relationship between a stressor and an outcome, in this case, workload as a stressor and creativity and innovation as two separate outcomes. The study then aimed to examine the effects of trait mindfulness as a moderator between workload-creativity and workload-innovation relationships. Lastly, the study aimed to examine the concept of bandwidth-fidelity in the context of occupational health psychology.

In consideration with the first aim, stress-appraisal theory states that a stressor usually has a curvilinear relationship with an outcome, meaning as a stressor increases, so does the outcome until it reaches its optimal point. After this point, if the stressor continues to increase it will result in a decline in the outcome. The study aimed to test this finding between workload-creativity and workload-innovation relationships as the examination of these relationships have been limited in the past or have resulted in the contradictory results. Unexpectedly, the study did not replicate and support the past finding between a stressor-outcome relationship. In addition to not finding support for the curvilinear relationship, the study also did not depict a significant linear relationship between workload-creativity and workload-innovation, thus the results remain inconclusive. Results did not demonstrate a linear relationship either, indicating that there is a possibility of achieving a curvilinear relationship and such a pattern of unexpected results clearly needs to be replicated in the future. Nonetheless, there are a few conceptual or methodological features that could explain these results. Stress appraisal states that stress resides not only in the nature of the objective stressor but also in the individual's perceptions of the stressor. This means that even though objectively workload is considered as a stressor, it highly depends on how an individual perceives it. Since workload is a daily occurrence for nurses, they may have perceived as a normal part of the job and possibly as a minor inconvenience, instead of a stressor. Tenure could play a factor here as well because the mean observed was 11.8 years indicating that the participants in the sample had a number of years of work experience in the field of nursing. Possibly, this is why, nurses might have been used to the amount of

workload and did not react to it as strongly as expected to observe an extreme or a negative effect on creativity and innovation which would have then resulted in a possible curvilinear effect. This could explain no significant relationship between workload-creativity and innovation. Moreover, research indicates that individuals react to stressors either positively or negatively depending on the contextual factors such as continued commitment or perceived organizational support (Hon et al., 2013). This argues that contextual factors that were not controlled for could have affected the results and explain the non-significant effect.

In consideration with the second aim, positive reappraisal theory states that mindfulness will encourage individuals to reperceive a stressful situation and provide the strength to face it by involving in a two-step coping mechanism of decentering and value clarification. Thus, the study predicted that mindfulness will significantly moderate the relationship between workload-creativity and workload-innovation. Prior to discussing the results of moderation analyses, the result of the main effects demonstrate that mindfulness is a significant predictor of creativity and innovation. Nevertheless, it is not a significant moderator possibly due to the following reasons. Measurement error either in the independent variable or the moderator greatly complicates the moderation analysis and results in low power (Baron & Kenny, 1986). Apart from unavoidable random error, mindfulness scales including FFMQ scale demonstrate inadequate content validation (Park et al., 2013) as mindfulness is an internal state/trait that is difficult to observe and measure (Good et al., 2016). Consistent with the research finding that respondents do not understand the items of the mindfulness scale (Park et al., 2013), the SMEs of this study also did not quite agree to the relevance of the items to their nursing profession. Age could also play a factor here as the mean observed was 51.25 years which indicates that the study sample consisted of elderly nurses. Although, the concept of mindfulness is traditionally known, it is often confused as meditation and the application of it in workplaces is relatively new which is why the participants in my sample might have not fully comprehended the items. With respect to measurements, Bjonberg's (2017) combined adapted version of the original creative and innovative scales were used as the data collection was a part of the bigger

intervention project but creativity and innovation were then analyzed as two separate outcomes for this study; this could have affected the results. In addition, idea generation construct of innovation also refers to creativity, thus, creating an overlap between the variables of creativity and innovation. Possibly due to this, participants might have engaged in careless responding while completing their surveys as the items of creativity and innovation might have seemed similar to them, thus, responding to them in a consistent manner. This would also explain a high correlation between creativity and innovation and the reason for achieving similar results for all analyses despite considering them as separate outcomes. Furthermore, this study assumed that the moderation is linear, however, knowing that the stressor-outcome could have a curvilinear effect or that a moderator could have a curvilinear effect even though the variables in question have a linear effect (Dawson, 2014), the moderation could have altered the relation either in a quadratic or a step function (Baron & Kenny, 1986). Lastly, the study predicted the moderation effects for a negative relationship between workload and creativity and innovation, however, analyses depict a positive relationship. It is possible that mindfulness is not a significant moderator for a positive relationship but is for a negative relationship, signifying the need to reexamine the moderation effects of mindfulness.

The third and final aim of this study regarding bandwidth-fidelity states that broader predictors will be a better measure for broader outcomes and narrow predictors will be a better measure for narrow outcomes. The study had four hypotheses (3A, 3B, 4A, and 4B) under this concept that basically predicted matched relations (i.e., domain-domain or facet-facet) will have a higher predictive strength than mismatched relations (i.e., domain-facet or facet-domain). Overall, the correlations and R-squared values between these relations differed a little but the differences were not significant enough to state support for 3A-4B hypotheses. One of the reasons could be that averaging R-squared values from three separate analyses for facet-level innovation outcomes may have compromised the accurate comparisons. Secondly, there are three types of facets - residualized, pure, and compound/blended facets. Residualized facet contain only specific facet variance; pure facet contain factor plus facet variance; and compound facet contain specific facet plus two or more factors

variance (Salgado et al., 2015). Mindfulness and innovation facets are categorized as pure facets in this study, and it is argued that the differentiation among these types of facets may limit the prediction (Salgado et al., 2015). In addition, facets were aggregated into domain-level measure creating composite scores as the current software is unable to differentially weight the facets' prediction when they are combined into domain-level measure; this may have also limited the accuracy of the results. Despite no support, the results indicated that the facet-level mindfulness relatively had a higher predictive strength for both facet- and domain-level innovation, compared to domain-level mindfulness as a predictor. This is consistent with the research of some authors who indicate that narrow predictors provide more power and understanding of the outcome than the broad predictors (Ashton, 1998). Additionally, researchers support the utilization of narrow measures on both sides of the equation to improve concurrent validities (Bartram et al., 2010). Although they refer to it in the context of job performance as an outcome, mindfulness literature is consistent with this finding as it suggests to use the individual subscales of FFMQ mindfulness scale rather than simply relying on the analysis of the overall scale (Park et al., 2013). In all, despite the different reasons stated to explain the findings of the three objectives of the study, it is important to note that low power and sample noise could have been the main reasons for achieving insignificant results, especially for the stressor-outcome relationship as the power was .18.

<u>Implications</u>

Previous research has suggested that work stress results in negative consequences both at the individual and organizational levels (Nixon et al., 2011). Nonetheless, the effect of stress including workload on creativity and innovation has seldom been studied. Creativity and innovation are crucial to enhance employees' performance and to provide a competitive edge to organizations in finding sustainable solutions during the time of change and evolution (Mayfield et al., 2020). As a result, this study contributes to research by investigating the relationship between workload and creativity and innovation. The results of this study indicate that workload is not necessarily an undesirable condition

in an organization and that nurses could consider it as a challenge stressor instead, to reap the potential benefits of creativity to enhance performance and working conditions. Thus, it is important for managers to understand that reducing workload is not always associated with favorable outcomes or that employees' experiencing workload could exhibit positive behaviors. Either way, managers should rather focus more on creating a positive and supportive work environment to encourage creativity as it is still considered as an extra-role behavior for nurses. It is challenging to come up with innovative and useful ideas and requires effort which is why it is important for employees to feel supported or else they would react passively to stress (Mayfield et al., 2020). Additionally, when the job market is undergoing a financial crisis, it is more important for managers to view employee's workload as an opportunity to encourage creativity to overcome such issues.

Furthermore, this study provides promising direction for interventions in the occupational health industry as it investigates the moderating effects of mindfulness. Positive correlation between mindfulness and creativity and innovation merits over other factors because mindfulness is conceptualized as both a trait and a state which could be cultivated through interventions and training (Zeidan, 2010). Health organizations could also take a unique approach to hiring practices by looking for the trait of mindfulness in nurses. Mindfulness is a lifelong skill that could guide individuals through difficult transition times in various contexts including personal and work-life; and knowing the numerous benefits it offers, it is important to continue research on this topic and for organizations to conduct mindfulness training. Understanding individual differences in terms of mindfulness could also help in creating more efficient teams.

Lastly, this study took a step further by expanding the research on bandwidth fidelity in the context of occupational health psychology, and indicating the importance of analyzing predictors and criteria at the same measurement level. Researchers supporting the use of narrow measures argue that when the measure is focused at a narrow level, a different story emerges (Ashton, 1998). Thus, at least for the developmental purposes, both researchers and managers should focus more on the narrow traits of mindfulness to explore accuracy of results and to get an in-depth understanding of the facets.

Limitations and Future Research Directions

On the contrary to several implications, the study possesses certain limitations, for instance, it restricts the generalizability of the results as the study included only nurses as participants. Also, the sample size (n = 154) to test the moderation effects was significantly smaller compared to the previous research done on mindfulness as a moderator (n = 800; Sugiura & Sugiura, 2018). Lower sample size is also a cause of low power. As a result, researchers should recruit more participants from various backgrounds in the future to increase sample size and improve the generalizability of the results.

Other than the sample size, timing of the measurement is also important to consider while collecting data. Although nurses might perceive workload as a part of their job, it is possible that during the times of trauma or global crisis such as Covid-19, the levels of workload might rise so much that the nurses would then perceive it as a hindrance instead of a challenge, possibly resulting in different consequences as emphasized by Critical Care Societies Collaborative (CCSC; Kleinpell et al., 2020). Additionally, timing is also an important factor to examine the moderation effect. For instance, mindfulness could have been a significant moderator only in the initial stage of the stress process. However, this was not examined in this study as only baseline scores were analyzed . As a result, it is important in the future to examine in more detail at which point in time in the stress process is mindfulness more helpful by engaging in a longitudinal study design. This is also consistent with past research that suggests data should be collected at multiple points when a model includes a moderator or a mediator (Bjonberg, 2017). Data collection across multiple points and over a longer period will also strengthen the findings by providing a better assessment of casual relationships. With respect to achieving a better assessment of within-person variations, one could also conduct a daily diary study to observe the fluctuations in creativity as the levels of workload changes on a daily basis.

As discussed earlier, the workload framework for nurses is categorized into three levels – unit, job, and task levels. According to the definitions of each level, it is implied that this study's

workload measure for nurses is categorized under job-level as it measures the nurses' perception of the amount of work to be done. Nevertheless, in the profession of nursing, the number of work interruptions is also considered as a measurement of workload as it affects the cognitive load and causes emotional duress and error (MacPhee et al, 2017). In the future, it will be interesting to compare among the levels and types of workload and test their curvilinear relationships with creativity and innovation as outcomes. Furthermore, this study relies on stress appraisal theory (Lazarus & Folkman, 1984) to explain the relationship between workload-creativity and innovation but does not categorize stress (workload) as a hindrance or a challenge because it was outside the scope of the larger data collection. Hence, I recommend researchers to categorize workload either as a hindrance or a challenge in the future to plausibly obtain different results and to also gain better understanding of the results. Workload does not usually result in stronger adverse consequences compared to other stressors as it is often considered as a challenge (Crawford et al., 2010). Thus, in future, it is important to test the effects of other stressors on creativity and innovation, and then examine the moderating effect of mindfulness between their relationships.

Moreover, this study solely relied on self-report measures which could have caused self-serving bias and common method variance. Stressors are a measure of individuals' perception of their work environment; this is why self-report measure for stressors is important. However, in order to achieve more convincing evidence and accurate results, I recommend researchers to use qualitative measures such as critical incident descriptions along with quantitative measures. Nurses evaluate workload into 3 categories and define the application of creativity differently compared to other professions, thus, making it important to have some sort of qualitative measures at least for the variables of workload and creativity. Further emphasizing on instruments, it is crucial for researchers in the future to pilot-test the mindfulness scale to determine if SMEs find the scale items to be relevant which unfortunately, was not the case in this study. Researchers could also use frame of reference to enhance the specificity and relevancy of the survey items.

Overall, this study serves as an introductory piece for those who are interested in learning more about the moderation effects of trait mindfulness. Researchers may also go a step further by involving a mediator into this model, ideally work engagement, as it goes hand in hand with active coping. One may test if trait mindfulness (moderator) influences work engagement (mediator) that explains the positive relationship between workload and creativity and innovation.

Conclusion

The study consisted of three main purposes; first, was to examine the form of relationship between workload – creativity and innovation, second, was to test the moderation effect of trait mindfulness, and third, was to extend the use of bandwidth-fidelity principle to the field of occupational health psychology. Overall, the study suggests that workload is not always negatively associated with creativity and innovation, and the relationship between them is not necessarily linear. Although the study did not indicate trait mindfulness as a significant moderator, it did show trait mindfulness to be positively correlated with creativity and innovation, Thus, companies should conduct and encourage employee participation in mindfulness training. Lastly, the study suggests academic professionals should consider focusing more on the facets of mindfulness to gain an in-depth understanding of its relation with the constructs of innovation and its overall scale, and advises professional to pay attention to employees' scores on individual facets of mindfulness, in addition to the overall score, for professional development and training purposes.

APPENDIX A: MEASURES

Quantitative Workload Inventory Scale (Spector & Jex, 1998)

Select how often the following things happened at work over the last month

1. Your job required you to work very fast

2. Your job required you to work very hard

3. Your job left you with little time to get things done

4. There was a great deal to be done

5. You had more work to do than you could do well

Never = 5

Seldom = 2

Sometimes = 3

Often = 4

Always = 5

<u>Combined scale of Creative Self-Efficacy (Tierney & Farmer, 2011) and Innovative Work Behavior
Scale (Janssen, 2000), adopted by Bjonberg (2017)</u>

*Creativity (Tierney & Farmer, 2011): Think about your activities at work over the past month. Rate
the frequency at which you performed each activity*

1. Identified opportunities for new products/processes

2. Tried out new things and approaches to problems

3. Generated novel, but operable work-related ideas

*Idea Generation (Janssen, 2000): Think about your activities at work over the past month. Rate the
frequency at which your performance…*

1. Created new ideas for difficult issues

2. Generated original solutions for problems

3. Searched out new working methods, techniques, or instruments

*Idea Promotion (Janssen, 2000): Think about your activities at work over the past month. Rate the
frequency at which you performed each activity*

1. Mobilized support for innovative ideas

2. Acquired approval for innovative ideas

3. Made important organizational members enthusiastic for innovative ideas

*Idea Realization (Janssen, 2000): Think about your activities at work over the past month. Rate the
frequency at which you performed each activity*

1. Transformed innovative ideas into useful application

2. Introduced innovative ideas into the work environment in a systematic way

3. Evaluated the utility of innovative ideas

Never = 5

Seldom = 2

Sometimes = 3

Often = 4

Always = 5

Five-Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2004)

Observing items: Please read each statement and select the option that you think has been generally true for you over the past month

1. When I take a shower or a bath, I stay alert to the sensations of water on my body

2. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions

3. I pay attention to sensations, such as the wind in my hair or sun on my face

Describing items: Please read each statement and select the option that you think has been generally true for you…

1. I'm good at finding words to describe my feelings

2. I have trouble thinking of the right words to express how I feel about things

3. If I am feeling terribly upset I can find a way to put it into words

Acting with Awareness items: Please read each statement and select the option that you think has been generally true for you over the past month

1. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted

2. I do jobs or tasks automatically without being aware of what I'm doing

3. I find myself doing things without paying attention

Non-Judging items: Please read each statement and select the option that you think has been generally true for you over the past month

1. I believe some of my thoughts are abnormal or bad and I shouldn't think that way

2. I think some of my emotions are bad or inappropriate and I shouldn't feel them

3. I tell myself I shouldn't be feeling the way I'm feeling

Non-Reactivity items: Please read each statement and select the option that you think has been generally true for you over the past month

1. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.

2. When I have distressing thoughts or images I am able just to notice them without reacting

3. When I have distressing thoughts or images I just notice them and let them go

Never = 5

Seldom = 2

Sometimes = 3

Often = 4

Always = 5

APPENDIX B: IRB DETERMINATION LETTER

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

UNIVERSITY OF CENTRAL FLORIDA

NOT HUMAN RESEARCH DETERMINATION

May 28, 2020

Dear Kinjal Chheda:

On 5/28/2020, the IRB reviewed the following protocol:

Type of Review:	Initial Study
Title of Study:	Examination of mindfulness on effects of work stress
Investigator:	Kinjal Chheda
IRB ID:	STUDY00001872
Funding:	None
Grant ID:	None
Documents Reviewed:	• Faculty review form , Category: Faculty Research Approval; • Request for NHSR form, Category: IRB Protocol; • Variables , Category: Test Instruments;

The IRB determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations.

IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human in which the organization is engaged, please submit a new request to the IRB for a determination. You can create a modification by clicking **Create Modification / CR** within the study.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Racine Jacques, Ph.D.
Designated Reviewer

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APPENDIX C: SUMMARY OF THE STATISTICAL ANALYSES

Table 9: Descriptive Statistics and Correlations among the Variables in the Study

Variable	Mean	SD	1	2	3	4	5	6
1.Tenure	11.8	8.32						
2.Age	51.25	12.78	.291**					
3.Workload	3.5	0.95	-.04	-.22**	(.91)			
4.Creativity	3.03	0.95	.01	.03	.09	(.87)		
5.Innovation	2.87	0.96	.002	.02	.09	.92**	(.96)	
6.Mindfulness	3.39	0.51	.016	.19**	-.24**	.29**	.26**	(.81)

Note: (N = 132?) *p<.05, **p<.01; Internal consistencies are presented in parentheses along the

diagonal.

Table 10: Summary of the Main-Effect Hypothesis for Creativity (without Control Variables)

Model	B	SE B	β	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.11	.10	.11	9.25**	9.25**
Workload	.17	.08	.17*					
Mindfulness	.61	.15	.33**					

Note: (N = 154) *p<.05, **p<.01

Table 11: Summary of the Main-Effects Hypothesis for Innovation (without Control Variables)

Model	B	SE B	β	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.09	.08	.09	7.75**	7.75**
Workload	.16	.08	.16*					
Mindfulness	.57	.15	.30**					

Note: (N = 154) *p<.05, **p<.01

Table 12: Summary of the Hierarchical Regression and Moderation Test for Variables Predicting Creativity (without Control Variables)

Model	B	SE B	β	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.11	.10	.11**	9.25**	9.25**
Workload	.17	.08	.17*					
Mindfulness	.61	.15	.33**					
Step 2				.11	.09	.00	6.13**	.01
Workload	.10	.54	.10					
Mindfulness	.55	.57	.29					
Workload*Mindfulness	.02	.16	.07					

Note: (N = 154) *p<.05, **p<.01

Table 13: Summary of the Hierarchical Regression and Moderation Test for Variables Predicting Innovation (without Control Variables)

Model	B	SE B	β	R^2	Adjusted R^2	ΔR^2	F	F change
Step 1				.09	0.08	0.09**	7.75**	7.75**
Workload	.16	.08	.16*					
Mindfulness	.57	.15	.30**					
Step 2				.10	0.08	0.00	5.24**	.29
Workload	-.13	.55	-.13					
Mindfulness	.26	.58	.14					
Workload*Mindfulness	.09	.16	.30					

Note: (N = 154) *p<.05, **p<.01

Table 14: Correlation-Matrix for the Bandwidth-Fidelity Principle

Variable	1	2	3	4	5	6	7	8	9	10
1.Mindfulness							.26**	.26**	.25**	.22**
2.Observing							.21**	.20*	.20*	.19*
3.Describing							.20*	.17*	.20*	.18*
4.Awareness							.09	.06	.10	.09
5.NJ							.07	.09	.80	.03
6.NR							.26*	.32**	.23**	.22**
7.Innovation	.26**	.21**	.20*	.09	.07	.26**				
8.IG	.26**	.20*	.17*	.06	.09	.32**				
9.IP	.25**	.21*	.20*	.11	.08	.23**				
10.IR	.22**	.19*	.18*	.09	.03	.22**				

Note: (N = 154) *p<.05, **p<.01

Table 15: Summary of the Multiple Regression for the Facet-Level Mindfulness Variables Predicting Domain-Level Innovation

Model	B	SE B	β	Adjusted R^2	R^2	F
				0.07	0.10**	3.42**
Observing	.14	.10	.12			
Describing	.15	.11	.12			
Awareness	.01	.11	.01			
Non-judging	-.09	.11	-.01			
Non-reacting	.27	.11	.22**			

Note: (N = 154) *p<.05, **p<.01

Table 16: Summary of the Multiple Regression for the Facet-Level Mindfulness Variables Predicting Idea Generation

Model	B	SE B	β	Adjusted R^2	R^2	F
				0.09	0.12**	4.11**
Observing	.13	.10	.12			
Describing	.09	.11	.08			
Awareness	-.04	.11	-.03			
Non-judging	-.06	.11	-.05			
Non-reacting	.35	.11	.29**			

Note: (N = 154) *p<.05, **p<.01

Table 17: Summary of the Multiple Regression for the Facet-Level Mindfulness Variables Predicting Idea Promotion

Model	B	SE B	β	Adjusted R^2	R^2	F
				0.06	0.09*	2.87*
Observing	.16	.12	.12			
Describing	.18	.12	.13			
Awareness	.04	.13	.03			
Non-judging	-.08	.12	-.06			
Non-reacting	.23	.12	.17			

Note: (N = 154) *p<.05, **p<.01

Table 18: Summary of the Multiple Regression for the Facet-Level Mindfulness Variables Predicting Idea Implementation

Model	B	SE B	β	Adjusted R^2	R^2	F
				0.05	0.08*	2.54*
Observing	.14	.11	.11			
Describing	.16	.12	.12			
Awareness	.03	.12	.02			
Non-judging	-.13	.12	-.10			
Non-reacting	.22	.11	.17*			

Note: (N = 154) *p<.05, **p<.01

Table 19: Summary of the Multiple Regression for the Domain-Level Mindfulness Variable Predicting Domain-Level Innovation

Model	B	SE B	β	Adjusted R^2	R^2	F
				0.06	0.07**	11.10**
Mindfulness_avg	.49	.15	.26**			

Note: (N = 154) *p<.05, **p<.01

Table 20: Summary of the Multiple Regression for the Domain-Level Mindfulness Variable Predicting Idea Generation

Model	B	SE B	β	Adjusted R^2	R^2	F
				0.06	0.07**	11.31**
Mindfulness_avg	.50	.15	.26**			

Note: (N = 154) *p<.05, **p<.01

Table 21: Summary of the Multiple Regression for the Domain-Level Mindfulness Variable Predicting Idea Promotion

Model	B	SE B	β	Adjusted R^2	R^2	F
				0.06	0.07**	10.68**
Mindfulness_avg	.54	.17	.26**			

Note: (N = 154) *p<.05, **p<.01

Table 22: Summary of the Multiple Regression for the Domain-Level Mindfulness Variable Predicting Idea Implementation

Model	B	SE B	β	Adjusted R^2	R^2	F
				0.04	0.05**	7.62**
Mindfulness_avg	.43	.16	.22**			

Note: (N = 154) *p<.05, **p<.01

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