A Mindfulness Model of Emotion Regulation in Nursing Students Working Memory Capacity as a Regulatory Mechanism

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SEE PROFILE
Nursing students often struggle with transitioning from education into clinical practice. These students may be overwhelmed with the emotional demands and high cognitive load resulting from the unpredictable post-graduation/professional work environment. A lack of research exists investigating how nursing students regulate their emotions and what cognitive emotional regulation strategies they use when dealing with the cognitive and emotional demands of nursing school. The integration of mindfulness training into nursing curricula has the potential to facilitate the development of nursing students’ working memory capacity (WMC) and improve emotion regulation (ER) skills. Although a few studies have investigated mindfulness training with nursing students, there is a lack of empirical evidence examining how dispositional mindfulness and WMC influence a nursing student’s ability to regulate their emotions.

Research evidence suggests that dispositional mindfulness is linked to ER. However, whether: (a) ER is influenced by dispositional mindfulness; (b) WMC mediates this relationship; and (c) if these factors are different between education levels has not yet been determined in nursing students.

This cross-sectional study examined the relationships between mindfulness, WMC, and ER in a pre-licensure nursing student population from a southeastern Georgia university. Two questionnaires and a WMC task were completed by the sample (n = 80). A path model of the relationships between mindfulness, WMC and ER was tested using
structural equation modeling. Factor differences between the four education levels were tested using one-way ANOVA.

Mindfulness was positively associated with ER ($r = 0.1905, p = 0.045$) and WMC ($r = 0.2977; p = 0.004$). The path analyses revealed that there was a direct effect of mindfulness on ER ($\gamma_{11} = 0.292, p = 0.034$) and WMC ($\gamma_{21} = 4.975, p = 0.004$). However, the indirect effect of mindfulness on ER was not statistically significantly mediated by WMC ($\beta = -0.03, p = 0.236$). Furthermore, mindfulness was significantly different between the first semester students having the highest level of mindfulness and the fourth semester students having the lowest level of mindfulness, $F(3, 76) = 4.12, p < 0.05$.

Dispositional mindfulness may influence ER and WMC in nursing students, but the downward trend of mindfulness from first to last semester is concerning. Nurse educators may consider using mindfulness training to enhance mindfulness, WMC and ER.

INDEX WORDS: Mindfulness, Working Memory Capacity, Emotion Regulation
A MINDFULNESS MODEL OF EMOTION REGULATION

IN NURSING STUDENTS:

WORKING MEMORY CAPACITY AS A REGULATORY MECHANISM

by

Christy J. Dubert

Submitted to the Faculty of the College of Graduate Studies
of the Georgia Regents University in partial fulfillment
of the Requirements of the Degree of Doctor of Philosophy

April

2013
A MINDFULNESS MODEL OF EMOTION REGULATION
IN NURSING STUDENTS:
WORKING MEMORY CAPACITY AS A REGULATORY MECHANISM

This dissertation is submitted by Christy J. Dubert and has been examined and approved by an appointed committee of the faculty of the College of Graduate Studies of the Georgia Regents University (formerly Georgia Health Sciences University).

The signatures which appear below verify the fact that all required changes have been incorporated and that the dissertation has received final approval with reference to the content, form and accuracy of the presentation.

This dissertation is therefore in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Date Major Advisor

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Department Chairperson

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Associate Dean for Graduate Programs

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Dean, College of Graduate Studies
DEDICATION

The cornerstone of my success throughout this endeavor has been my beloved, my husband, Jeffrey. My deepest gratitude and heartfelt appreciation and love goes without saying when I think of the many sacrifices he has made during this time. Thank you for your patience and understanding.

I also want to dedicate this dissertation to Rhianna, our much-loved 15 year-old Jack Russell terrier, who became very jealous of the computer. Now, she will have my attention back.
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LIST OF ABBREVIATIONS

ANOVA ................................................................. Analysis of Variance
AOSPAN ................................................................. Automated Operation Span Task
B & K ................................................................. Baron and Kenny approach
ER ................................................................. Emotion Regulation
ERQ ................................................................. Emotion Regulation Questionnaire
ERQ-R ................................................................. Emotion Regulation Questionnaire - Reappraisal
ERQ-S ................................................................. Emotion Regulation Questionnaire – Suppression
MAAS ................................................................. Mindful Attention Awareness Scale
SEM ................................................................. Structural Equation Modeling
WMC ................................................................. Working Memory Capacity
CHAPTER I: INTRODUCTION

Today’s complex, cognitive (mental processes) and emotionally demanding health care environment requires more expertise immediately when nursing students graduate now compared to the past, making the transition into nursing practice challenging. Nursing education has not kept pace with the rapid changes in health care practice over the last 40 years, resulting in nursing students being less prepared to manage the cognitive and emotional demands of current nursing practice (Benner, Sutphen, Leonard & Day, 2010). Nurse educators are focused on nursing students’ acquisition of knowledge, whereas nursing practice is focused on the utilization of knowledge (Benner et al., 2010). Acquisition of nursing knowledge is the process of obtaining information about natural sciences, social sciences, humanities, technology, nursing, and biomedical sciences. However, nursing practice requires the integration and processing of knowledge as well as its contextual application in a skilled manner (Benner et al., 2010).

Nursing students are expected to draw from the knowledge gained in nursing school and apply it to complex situations with high patient acuities. Further challenging students is practicing in an environment that is dynamic, unpredictable, ambiguous, and emotionally demanding, with a high cognitive load. This complex clinical environment requires them to juggle multiple demands and make frequent cognitive shifts in their attention. Therefore, nursing students frequently struggle with transitioning from education into practice and ineffectively using their knowledge; causing them to
grapple with regulating their emotions while coping with multiple stressors in their new profession.

Simply adding more content into an already burdened nursing curriculum will not be an adequate solution to this dilemma. Nursing education must somehow effectively prepare nursing students to handle the cognitive and emotional challenges they will encounter in their practice. To bridge this nursing education-practice gap, nursing students need to have the cognitive capacities to analyze complex and dynamic patient situations, and evaluate the pros, cons, and implications of their course of action (Benner et al., 2010). Students also need to develop the emotional capacities to effectively regulate their emotions when dealing with the demands encountered in practice. Recent research has found that current nursing education methods are effective in forming professional identity and ethical conduct of nursing students (Benner et al., 2010). Yet many administrators and preceptors state that graduating nurses are not prepared for the challenges that await them in a complex health care system (Hickey, 2009). Moreover, graduate nurses report that the emotional challenges they encounter during the first year are daunting (Duchscher, 2008). Current nursing education literature suggests there is little guidance and direction on how nurse educators can prepare nursing students in training their mind to regulate emotions and improve cognitive capacity. The conceptualization of these capacities within nursing education is less clear and, thus far, sparsely researched.

**Working Memory Capacity**

An important cognitive capacity known as *working memory capacity* helps a person to manage information in reasoning and problem solving, as well as manage
emotions and keep the brain functioning well under stress (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010). Working memory capacity is the ability to sustain and manipulate relevant information over short time intervals, to attain a goal without becoming distracted by irrelevant information or alternative goals (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Schmeichel, Volokhov, & Demaree, 2008). An ineffective working memory capacity may decrease an individual’s ability to regulate emotions (Schmeichel & Demaree, 2010). Researchers have found that nurses who have “less” rather than “strong” emotional stability are more likely to exhibit intense emotional reactions in stressful situations, are less proactive, and struggle more with problem solving (Teng, Hsu, Chien, & Chang, 2007). Furthermore, nurses who have strong emotional stability have a positive impact on patient safety (Teng, Chang, & Hsu, 2010). In a parallel manner, researchers have found a positive correlation between working memory capacity and a person’s academic as well as workplace performance (Higgins, Peterson, Pihl, & Lee, 2007). Therefore, nursing students who have a strong working memory capacity may perform better academically and solve problems more effectively in their new profession. In doing so, they may be better able to regulate their emotions, which could potentially influence patient safety. Nurse educators need a better understanding of how best to help students develop the internal skills of regulating emotions and improving working memory capacity. Thus, research is needed to investigate factors that enhance the development of these skills. Mindfulness training may be a helpful method to train working memory capacity and improve emotion regulation.
**Mindfulness**

Over the past 20 years, the study of *mindfulness* has grown significantly to empirically explore its clinical benefits and key conceptual descriptions (Shapiro & Carlson, 2009). Rooted in Eastern contemplative traditions such as Buddhism, mindfulness is defined as “the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003, p. 145). Mindfulness can be considered both a process (mindful practice) and an outcome (mindful awareness) (Shapiro & Carlson, 2009). Mindfulness practice is the systematic practice of intentionally developing skills to direct and sustain one’s attention, cultivating less reactivity, and attending in an open, receptive manner. Mindfulness practice helps to cultivate mindful awareness, which is an abiding presence or deep knowing of self that exhibits as freedom of reflexive conditioning or thinking (Shapiro & Carlson, 2009). Mindfulness is an innate “universal human capacity” (Shapiro & Carlson, 2009, p. 4) within everyone; all people are mindful or not mindful to one degree or another. The general innate tendency to be mindful in one’s daily life is called *dispositional mindfulness* (Brown & Ryan, 2003). People possess intrapersonal differences in both the frequency and quality of this naturally occurring capacity to engage present-centered attention and awareness (Brown & Ryan, 2003; Kabat-Zinn, 2003).

Various types of therapy have incorporated mindfulness practice as a key ingredient in the therapeutic treatment protocol; the best known ones are Mindfulness-based Stress Reduction (MBSR; Kabat-Zinn, 1990), and Mindfulness-based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002). Mindfulness-based therapies have
been studied primarily in clinical populations concerning mental or physical health problems such as depression (Teasdale, Segal, Williams, Ridgeway, Soulsby, & Lau, 2000), anxiety (Evans, Ferrando, Finder, Stowell, Smart, & Haglin, 2008; Goldin, & Gross, 2010), cancer (Bauer-Wu, Sullivan, Rosenbaum, Ott, Powell, McLoughlin, & Healey, 2008), binge eating (Baer, Fischer, & Huss, 2005), and chronic pain (Kabat-Zinn, Lipworth, & Burney, 1985; Rosenzweig, Greeson, Reibel, Green, Jasser, & Beasley, 2010).

While the majority of mindfulness research has been conducted with clinical populations, it has also been studied with health care professionals related to psychological well-being as well as mental and physical health. Research findings have shown significant reductions of stress, anxiety, occupational burnout, and depression with improved empathy, quality of life, and self-compassion (Shapiro, Schwartz, & Bonner, 1998; Beddoe & Murphy, 2004; Cohen-Katz, Wiley, Capuano, Baker, & Shapiro, 2005; Shapiro, Astin, Bishop, & Cardova, 2005). Del Prato, Bankert, Grust & Joseph (2011) proposed that mindfulness training be incorporated into nursing curricula to empower students to cognitively handle the emotional challenges of school and clinical training. The integration of mindfulness training into nursing curricula has the potential to facilitate the development of working memory capacity and improve emotion regulation skills.

**Statement of the Problem**

Although over time nursing students may develop effective cognitive and emotion regulation capacities commensurate with the demands of nursing practice, nursing scholars have suggested that nursing education leaves too much of this facet of
professional development to chance (Aled, 2007). The limited attention paid to cultivating cognitive and emotional capacities among nursing students may result in ineffective working memory capacity and poor emotion regulation. Consequently, this may eventually result in burnout, poor retention, increased turnover, increased medication errors, and decreased patient safety (Elfering, Semmer, & Grebner, 2006; Jennings, 2008; Rudman & Gustavsson, 2011). Clearly, a gap exists between nursing education and nursing practice that profoundly impacts nursing student development and ultimately patient care outcomes. Therefore, enhancing a nursing student’s ability to pay attention to patient needs and manage their emotions may potentially improve treatment and decrease errors and omissions in patient care (Potter et al., 2005). Nursing students may benefit from training their mind to optimally manage the stressors of nursing school and clinical practice. Nursing researchers and educators need to explore new methods to cultivate cognitive and emotion regulation skills for nursing students to successfully transition into clinical nursing practice and to become safe practitioners. Mindfulness training may be a practical method for bridging this gap. Although current mindfulness research suggests a few links between mindfulness training and emotion regulation (Goldin & Gross, 2010), there is a lack of empirical evidence examining how dispositional mindfulness and working memory capacity influence a nursing students’ ability to regulate their emotions. Moreover, no research has explored the relationship between nursing students’ education level and the extent of mindfulness, working memory capacity and emotion regulation.
Purpose

The purpose of this study was to examine how emotion regulation is influenced by dispositional mindfulness and explore if working memory capacity influences prelicensure nursing students’ ability to regulate their emotions.

Research Questions

The primary research questions were:

1. How does a nursing student’s dispositional mindfulness affect their emotion regulation?

2. Does working memory capacity influence the relationship between dispositional mindfulness and emotion regulation?

3. What is the relationship between these inherent cognitive factors and educational level within a prelicensure nursing program?

The primary aim of the study was to examine the relationship between mindfulness, working memory capacity, and emotion regulation in a nursing student population enrolled in a prelicensure nursing program. Mediation analysis techniques were used to clarify the relationships between these three constructs. Specifically, this study tested a mediation hypothesis about the direct and indirect relationships between mindfulness and emotion regulation via working memory capacity. The results of this investigation will promote an understanding of how dispositional mindfulness relates to crucial outcomes of nursing education. Additionally, this research will provide a valuable model for guiding the development of future interventional studies concerning nursing education initiatives and bridging the nursing education – practice gap.
Specific Aims

This study investigated the relationship between mindfulness and emotion regulation and examined whether working memory capacity mediated mindfulness in a prelicensure nursing student population. The study tested a mediation hypothesis about the direct and indirect relationships between mindfulness and emotion regulation through a pathway involving working memory capacity.

The specific aims were:

Specific Aim 1: Determine the correlation between mindfulness, working memory capacity and two indicators of emotion regulation (reappraisal and suppression) among the prelicensure nursing students at Georgia Southern University.

Hypothesis 1.1: Mindfulness will exhibit a significant positive correlational relationship with working memory capacity.

Hypothesis 1.2: Mindfulness will exhibit a significant positive correlational relationship with emotion regulation (reappraisal).

Hypothesis 1.3: Mindfulness will exhibit a significant negative correlational relationship with emotion regulation (suppression).

Hypothesis 1.4: Working memory capacity will exhibit a significant positive correlational relationship with emotion regulation (reappraisal).

Hypothesis 1.5: Working memory capacity will exhibit a significant positive correlational relationship with emotion regulation (suppression).

Specific Aim 2: Determine how much mindfulness and working memory capacity influence emotion regulation (reappraisal) using a series of linear regression tests.
Hypothesis 2.1: Working memory capacity will partially mediate the effect of mindfulness on emotion regulation.

Specific Aim 3: Examine the relationships between nursing students’ educational level and mindfulness, working memory capacity, and two indicators of emotion regulation (reappraisal and suppression).

Hypothesis 3.1: There will be a significant correlation between mindfulness and each level of education.

Hypothesis 3.2: There will be a significant correlation between working memory capacity and each level of education.

Hypothesis 3.3: There will be a significant correlation between emotion regulation (reappraisal) and each level of education.

Hypothesis 3.4: There will be a significant correlation between emotion regulation (suppression) and each level of education.

Summary

There is growing consensus that new approaches are required in nursing education aimed toward developing the capacities of students to perform optimally in complex practice environments. Mindfulness training for nursing students has potential as a supplemental learning opportunity that may enhance working memory capacity and emotion regulation in stressful practice situations. Given that mindfulness training for nursing students is for many a novel idea, and little research on mindfulness training for nursing students has been conducted, substantial empirical knowledge based on descriptive and experimental investigations has yet to be developed. This descriptive study, considered foundational to future intervention research, examined the relationship
between dispositional mindfulness, emotion regulation and working memory capacity in a nursing student population. The study was expected to yield descriptive findings that will inform future efforts to measure, promote, and understand how mindfulness training may influence nursing students’ professional development and performance in demanding clinical practice environments.
CHAPTER II: CONCEPTUAL MODEL

This chapter presents the study’s conceptual model called *A Mindfulness Model of Emotion Regulation in Nursing Students: Working Memory Capacity as a Regulatory Mechanism*. The key concepts of emotion regulation, mindfulness, and working memory capacity will be discussed, along with a brief review of current theoretical foundations of each concept.

**Key Concepts of Study**

**Emotion and Emotion Regulation**

**Emotion.** An integral part of understanding the regulation of emotions is to first understand what is being regulated: emotions. From a functional perspective within the field of psychology, emotions help a person solve problems by adapting to the environment for survival, maintain cooperative social relationships, and avoid physical threats (Keltner & Gross, 1999). While no gold standard exists to conceptualize and define “emotions” (Campos, Frankel, & Camras, 2004), they are generally viewed as multi-faceted, whole body phenomena that arise when a person attends to a situation important or relevant to their goals (Gross & Thompson, 2007). Emotions are generated in response to internal mental representations of an event and/or external stimuli; these responses involve physical, subjective, and behavioral changes (Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000; Ochsner & Gross, 2005). Emotions differ from mood in that they usually have specific identifiable, related triggers that produce the response
Gross and Thompson (2007) proposed a Process Model of Emotion Regulation that has been used extensively in contemporary psychology research as a foundation for understanding the generation and regulation of emotions (Figure 1). These authors define emotion as “a person-situation transaction that compels attention, has particular meaning to an individual, and gives rise to a coordinated yet flexible multisystem response to the ongoing person-situation transaction” (p. 5). In their model, a sequence of processes occurs between a person and a relevant psychological internal or external situation that leads to the generation of emotions.

For a nursing student, an externally relevant situation would include being evaluated by an instructor during clinical practice; an internally relevant situation would be having a cognitive or mental representation of wanting to succeed academically in nursing school. The student attends to the external or internal situation, which leads to the appraisal of it, which involves assessing the relevance or value of the event. In turn, the appraisal evokes an emotional response in the behavioral, experiential, and neurobiological response systems (Gross and Thompson, 2007). Emotions are response tendencies that are malleable, dynamic, and transient, which can manifest differently depending on how long they take to develop as well as their duration and magnitude. In this manner, emotions can be regulated (Gross, 1998).

**Emotion Regulation.** Gross (1998) defined *emotion regulation* as “the processes by which individuals influence which emotion they have, when they have them, and how
they experience and express these emotions” (p. 275). According to Gross and Thompson’s (2007) *Process Model of Emotion Regulation*, three core assumptions of emotion regulation emerge from this definition. First, people regulate both positive and negative emotions by either decreasing or increasing them. Second, emotion regulation occurs on a continuum from conscious, effortful, and controlled regulation to unconscious, effortless, and automatic regulation. Third, no a priori assumptions are made as to whether any form of emotion regulation is deemed good or bad (Thompson & Calkin, 1996, as cited in Gross & Thompson, 2007). Thus, emotion regulation strategies may improve things or make them worse, depending on the context of the situation (Gross & Thompson, 2007).

![Figure 1. Process Model of Emotion Regulation (Gross, 2002, p. 282). According to this model, emotions are regulated along a continuum of five points. Two main categories of emotion regulation occur along the continuum of emotions being generated: antecedent-focused emotion regulation occurs before emotion response tendencies are fully activated, whereas response-focused emotion regulation occurs after the emotion response has been activated. The emotion regulation strategy of reappraisal is antecedent-focused and suppression is response-focused. The arrows indicate the multiple junctures where emotion regulation can occur along this continuum.](image-url)
Emotion generation occurs during a sequence of processes that are potential targets for how individuals may alter the course by which manner emotions are experienced and expressed. Emotion regulation strategies occur along this continuum of emotion-generative processes, and differ according to when they occur.

As shown in Figure 1, two main categories of emotion regulation strategies occur that are either antecedent-focused or response-focused. The first four emotion regulation strategies are antecedent-focused, meaning specific strategies a person uses or deploys before full emotion response tendencies are fully experienced and have changed a person’s experiential, behavioral and physiological response. An example of antecedent-focused regulation for a nursing student is seeing clinical skills checkoffs as an opportunity to demonstrate one’s clinical skills competency rather than a pass-fail test. In contrast, response-focused emotion regulation strategies occur after the emotion response tendencies are already generated and felt (Gross, 2002). An example of response-focused regulation for a nursing student is keeping his or her anxiety from showing to their instructor and patients during clinical learning situations.

Within these two main categories of emotion regulation strategies, five specific families of emotion regulation strategies can be deployed. The five families of emotion regulation processes are called situation selection, situation modification, attentional deployment, cognitive change, and response modulation (Gross, 2002; Gross & Thompson, 2007).

During the situation stage of generating emotions, situation selection occurs to avoid or approach certain people, places, or things to help regulate emotions (Gross, 2002). A person takes action to decrease the likelihood of placing themselves in a
situation that provokes a negative emotional response and, conversely, takes action to increase the likelihood of placing themselves in a situation that provokes a positive emotional response. For example, a nursing student may decide to go out for dinner and a movie with a classmate the night before an exam, rather than joining a study group with other nervous nursing students. Situation selection involves weighing short and long term emotional benefits and costs (Gross, 2002). Once a potentially emotion-eliciting situation is selected, a person continues to actively and directly modify the external, physical situation to alter its emotional impact through situation modification (Gross, 1998; Gross & Thompson, 2007). For instance, continuing the example of a pending exam, a nursing student who is asked by a classmate if they are ready for the exam could state that they prefer to talk about something else.

A person’s external situation is shaped by the emotion regulation strategy of selection and modification of the situation. However, emotions can continue to be regulated by using attentional deployment, which refers to how a person directs his or her attention to particular aspects of a situation to influence the emotions experienced (Gross & Thompson, 2007). Two main attentional deployment strategies used are distraction and concentration. Distraction involves focusing attention on different aspects of a situation or away from the situation altogether (Gross & Thompson, 2007). Distraction may also involve changing internal focus, whereas concentration pulls attention to particular emotional features of a situation. A person can draw attention to well-chosen features or to emotional triggers. Attentional deployment may take many forms such as physically withdrawing attention (a nursing student turning their head away when a patient vomits) or internally redirecting attention through distraction or concentration.
(Gross & Thompson, 2007). For example, a nursing student might use distraction from the feeling of anxiety by focusing on music playing on their iPod or could use concentration to direct attention to feelings of adequacy or inadequacy concerning performance in nursing school.

After a situation has been selected, modified, and attended to, a person continues to regulate their emotions through cognitive change, which occurs during the meaning phase of generating emotions. Cognitive change refers to altering how one appraises and selects possible meanings and significance of a situation and also to one’s ability or capacity to respond to and manage the situation demands (Gross & Thompson, 2007). Reappraisal is one form of cognitive change that involves redefining the meaning of a potentially emotion-eliciting situation in unemotional terms (Gross, 1998; Gross & Thompson, 2007). For example, a nursing student reappraises the situation of his or her first clinical practicum to be an exciting opportunity to apply what they have learned in class, rather than a situation where they may make a mistake. The meaning assigned to a situation can powerfully influence which experiential, behavioral, and physiological response tendencies are generated in each situation (Gross, 2002).

Finally, after response tendencies have been generated, response modulation occurs. This refers to emotion regulation strategies that directly influence experiential, behavioral, and physiological responses (Gross, 1998). Various types of external response modulation strategies can be used, such as drugs that focus on physiological responses of sympathetic hyperactivity (beta blockers), exercise, and relaxation to decrease physiological and experiential responses of negative emotions. Food, alcohol, tobacco, and illicit drugs may also be used to modulate emotion experiences like anxiety.
and depression (Gross, 2002; Gross & Thompson, 2007). Suppress is one form of response modulation and involves internally inhibiting ongoing expression of emotion during a felt emotion (Gross, 2002). For example, a nursing student might maintain an emotionless expression by suppressing feelings of revulsion while changing a colostomy bag that smells pungent.

**Mindfulness**

The construct of mindfulness can be abstract, mysterious, ancient, but also modern in its approach and application in therapeutic programs. Mindfulness is defined as a method of awareness, a type of meditation practice, a psychological process (Germer, 2005), and a state or trait (Chambers, Gullone, & Allen, 2009). However, there is a lack of consensus, underscoring the need for further exploration and clarification.

**Conceptual Definition of Mindfulness.** The word mindfulness is the English translation of the Pali word “sati” (Germer, 2005). Pali, the language of the Buddhist tradition, was used over 2,500 years ago. According to the Buddhist tradition, mindfulness is viewed as an activity and cannot be defined because it is presymbolic: beyond verbal logic. Sati is described as the space of time or awareness before one conceptualizes a thought, before identifying it and naming it (Henepola Gunaratana, 2002). In Buddhism, techniques such as mindfulness meditation train the mind to prolong that moment of awareness.

The Buddhist description of mindfulness does not lend itself easily to operationalization for research purposes (Chiesa & Malinowski, 2011) but modern psychological definitions of mindfulness provide a more tangible description. A review of Western psychology literature revealed that mindfulness is defined and conceptualized
differently by various psychotherapists and researchers, and no consensus was found between them. This ambiguity is due to 1) the difficulty of being able to separate mindfulness from clinical outcomes or results; 2) varying practice techniques that incorporate mindfulness; and/or 3) the abstract nature of how different or similar the construct is from other psychological constructs. The following is a description of the evolution of the operational definition of mindfulness.

**Original Contemporary Definition.** Jon Kabat-Zinn, who developed the Mindfulness-based Stress Reduction program, provided one of the first Western contemporary definitions of mindfulness as “paying attention in a particular way, on purpose, in the present moment, and nonjudgmentally” (1994, p. 4). More recently, his definition of mindfulness was stated as, “the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003, p. 145).

Shapiro, Carlson, Astin & Freedman (2006) proposed a model that breaks mindfulness into three “building blocks”: (a) intention, (b) attention, and (c) attitude. They proposed that these elements are not separate stages from each other but rather cyclic processes occurring simultaneously, and this moment-to-moment process is mindfulness (Shapiro et al., 2006). These core concepts are analogous to the Kabat-Zinn (1994) mindfulness definition: “on purpose” (intention), “paying attention” (attention), and “in a particular way” (attitude) and are described further as follows.

First, intention, as described by Shapiro and colleagues, is valuable to the model because it explains why one is practicing meditation and sets the stage for what is possible (2006). A person’s intention of why they are meditating is dynamic, evolving
and can change over a continuum from self-regulation, to self-exploration, and to self-liberation (Shapiro, 1992). Furthermore, the outcomes of meditating are correlated with intentions. For example, Shapiro (1992), found that participants whose intention was stress-management and self-regulation attained self-regulation; those whose intention was self-exploration attained self-exploration; and those whose intention was self-liberation progressed toward self-liberation and compassion.

Second, attention, (Shapiro et al., 2006) is described as observing the process or functioning of one’s moment-to-moment, internal and external experiences. Furthermore, this observation of experiences involves suspending the interpretation of these experiences and attending to the raw contents of consciousness as it occurs in the here and now. From a cognitive psychology perspective, the self-regulation of attention involves different facets of attentional abilities. For example, the capacity to focus on or attend an object for periods of time (sustained attention); the ability to inhibit secondary thoughts, feelings or sensations (divided attention); and ability to shift the focus of attention between objects or mental events at will (attention shifting; Shapiro et al., 2006).

The third element of mindfulness is attitude (Shapiro et al., 2006). According to Shapiro and colleagues (2006), attitude refers to how a person attends or the quality one brings to attention. For example, a person can bring an attitude of being cold, judgmental, critical and striving or an attitude of patience, curiosity, compassion, non-striving, friendliness and openhearted presence to their attentional practice of mindfulness. By intentionally practicing with the latter attitude, a person develops the capacity to not push away aversive experiences or not to strive for enjoyable experiences (Shapiro et al.,
2006). In a similar manner, Kabat-Zinn (1990) noted that the foundation of mindfulness should have the attitudinal bearing of non-judgment, patience, beginner’s mind (i.e., curiosity), trust, non-striving, acceptance, and letting go. These foundational attitudinal aspects reflect the Buddhist tradition inherent in mindfulness – the cultivation of compassion for all beings.

**Definition by Committee.** In 2004, Scott Bishop and ten other prominent mindfulness researchers, theorists, and clinicians met to discuss, establish consensus and offer one operational definition of mindfulness that could be testable. Bishop and colleagues proposed a two-component model of mindfulness (Bishop et al., 2004) in terms of specific psychological and cognitive processes. The first component involved self-regulation of attention with respect to the immediate present moment or experience, which involves sustaining attention, flexible switching of attention and cognitive inhibition of complex processing of thoughts, feelings, and sensations. The second component involved adopting a particular orientation toward one’s experiences of whatever is occurring in the present moment with curiosity, openness and acceptance (Bishop et al., 2004). They stated that being mindful is not to bring about a particular state but rather to directly experience all aspects as they are in the present moment with an attitude of curiosity. In other words, allowing thoughts, feelings and sensations to flow and observing them come and go, which in turn leads to a greater understanding of the feelings that are occurring and the nature of thoughts (Bishop et al., 2004).

**Definition by Brown and Ryan.** Another definition of mindfulness was proposed by Brown and Ryan (2004); they define mindfulness as an “open and receptive attention to and awareness of ongoing events and experiences” (p. 245). Like Bishop et al., Brown
and Ryan first agreed that acceptance was integral to mindfulness. However, through their investigation of developing and testing a mindfulness scale, they found that the distinct construct of acceptance was functionally redundant of mindfulness. Hence, they defined mindfulness as an open or receptive attention and awareness of ongoing events and experiences. They further explained that what is embedded in the capacity to sustain attention to and awareness of what is currently occurring is an openness and acceptance of that experience whereas when a person does not accept what is happening at any given moment, a natural process occurs of redirecting attention away from that experience and becoming inattentive and unaware to avoid that experience. A person may intentionally seek to avoid or escape from the experience, mentally or behaviorally, by ceasing to be present; in other words, by being mindless. Therefore, resistance to the experience and acceptance of the experience cannot happen at the same time (Brown & Ryan, 2004).

**Mindfulness as a Universal Capacity**

Mindfulness is an inherent mental capacity of all human beings (Garland, Gaylord, & Park, 2009). While Bishop and his colleagues’ definition of mindfulness emphasized the concept as a process variable and found that the “state” of mindfulness could be developed with meditation practice, they also acknowledged that mindfulness is a universal capacity or “trait” in everyone as well. Furthermore, Brown, & Ryan (2003) espouse that mindfulness does not necessitate the formal practice of mindfulness meditation and have found evidence that mindfulness occurs to various extents within humans and not just with mindfulness training. Through their research, they demonstrated that individuals who did not practice mindfulness training showed that mindfulness is still present within all people and, to different degrees, between people.
Intra-individual variations in mindfulness indicate that mindfulness is a variable trait with awareness and attention to present experiences/events. Therefore, mindfulness occurs to various extents within all human beings.

**Mindfulness vs. Suppression vs. Nonattachment**

*Nonattachment* and *suppression* are conceptually antithetical and distinctly different. The following argument will support this position. To better understand this notion, the concept of *attachment* will be explored. Attachment can be defined either from the parenting view as in “Attachment Theory” or from the Buddhist philosophy perspective. According to attachment theory, there is a strong emotional bond between two persons for purposes of protection and survival (Bretherton, 1992). Whereas, from the Buddhist worldview, the concept of attachment is broader and described as the “origin, the root of suffering; hence is the cause of suffering” (Dalai Lama, 1988, p. 37). Suffering is caused by craving and clinging (*attachments*) to emotions, material items, sensations, people, routines, habits, and thoughts and expectations of the past, present, and future. Attachment is likened to clinging, when one cannot let go of desire and craving, when desire becomes excessive (Komagata, 2009). Furthermore, suffering is a consequence of the automatic tendency to attach to persons, objects, thoughts or emotions.

Conversely, *suppression* from the Buddhist perspective is not equated with mindfulness and indicates that attachment is present (Hirst, 2003). Suppression is one type of strategy deployed during emotion regulation and represents a process of consciously inhibiting expression of emotions (Gross, 1998). Suppression of emotions refers specifically to terminating, avoiding or reducing the experienced feeling of
emotions and is an “attempt to act directly on a response to put it “out of mind” or to push it away” (Salters-Pendeault, Steenkamp, & Litz, 2010, p. 138). Paradoxically, attempts to suppress aspects of the emotional response may eventually produce delayed but stronger experiences of emotion and attachment and consequently result in increased suffering.

*Nonattachment* falls midway between the extremes of attachment and suppression (Komagata, 2009). Within the Buddhist paradigm, *nonattachment* is the middle way of being with one’s emotions and alleviating emotional suffering. Nonattachment means seeing/observing the phenomena (i.e., emotions, thoughts, and sensations) unclouded and not getting caught up in preconceptions. Moreover, nonattachment means not distorting these phenomena and accepting them as impermanent states that will wax and wane, and allowing them to unfold naturally, simply being with them (Williams & Lynn, 2010).

Inherent in mindfulness is an “aware nonattached state of mental acceptance” (Marlatt, 1999). The emphasis of mindfulness is being fully aware and accepting of all emotional experience, irrelevant to degree of emotional response, type or perceived value of the emotion (Chambers, Gullone, & Allen, 2009).

**Mindfulness and Emotion Regulation**

The exact mechanism of how mindfulness may influence emotion regulation is unknown. However, several theories have been proposed to explain the relationship between these two concepts and possible mechanisms of regulating emotion.

*Attentional Processes*. Mindfulness may enhance healthy emotion regulation through the process of *attention regulation* and a cognitive *awareness* of ongoing events and experiences. In mindfulness, the focus is on maintaining an *open and receptive*
attention to and awareness of ongoing events and experiences (Brown & Ryan, 2004). Mindfulness involves activating and maintaining attention and awareness of internal and external experiences while disengaging from irrelevant or distracting thoughts (Bishop, 2002). The simultaneous processing and disengaging from elaborative thinking about irrelevant information is essential so that the primary mental event can be observed in an open and non-judgmental manner (Bishop, 2002).

**Reperceiving.** Another potential mechanism of mindfulness is proposed by Shapiro et al. (2006) based on their view that the axioms of mindfulness — intention, attention and attitude — prompt a significant shift in perspective or decentering, called reperceiving. Reperceiving is a metamechanism of action of mindfulness and is a process in which a person is able to disidentify from one’s thoughts and see his or her moment-to-moment experience with greater objectivity and clearness (Shapiro et al., 2006). A person simply witnesses an experience objectively instead of being immersed in the drama of the narrative or commentary of their life story. Hence, the relationship to one’s internal and external experiences becomes objective. Consequently, the process of intentionally attending in an open and non-judgmental manner leads to this shift in perspective and also to other positive outcomes such as self-regulation and cognitive, emotional, and behavioral flexibility (Shapiro et al., 2006).

**Reappraisal.** Garland, Gaylord and Park (2009) further hypothesized that mindfully reperceiving facilitates the “flexible selection of cognitive appraisals” (p. 4). For one to reappraise a given stressful situation as positive, a person disengages and withdraws from the initial appraisal through the natural state of mindfulness and attributes a new meaning (Garland et al., 2009). Positive reappraisal can be
conceptualized as a cognitive reorienting process involving decentering of the attention from the initial meaning or appraisal of an object, reperceiving and engaging in a new meaning of a stressful situation (Garland et al., 2009). Furthermore, research findings support that mindfulness may promote positive reappraisal through attentional mechanisms (Coffey & Hartman, 2008; Jha, Krompinger, & Baime, 2007; Chambers, Lo, & Allen, 2008). Therefore, attentional control and cognitive abilities play an essential role in regulating emotions, thereby determining how information within an individual and the environment will be processed and reappraised.

**Proposed Regulatory Mechanism of Emotion Regulation:**

**Working Memory Capacity**

Working memory is a cognitive system consisting of an integrated attention and memory system that is responsible for processing information (Kane, Conway, Hambrick, & Engle, 2007). To help understand working memory, it may be compared to short-term memory. Short-term memory occurs when simple information is maintained in memory for only a few seconds or minutes (Schmeichel, Volokhov, & Demaree, 2008). In contrast, working memory refers to the cognitive system that activates and maintains information while simultaneously processing other information or engaging other cognitive operations (Schmeichel, Volokhov, & Demaree, 2008). Specifically, information is activated and maintained by executive attention processes that regulate the contents of activated stored information. During a task two processes are simultaneously occurring: information is activated and maintained that is pertinent to that task, and non-relevant task information is blocked (Kane et al., 2007). According to Kane and Engle’s *Executive Attention Theory of Working Memory Capacity* (2003), a working memory
system consists of: (a) long term memory being retrieved and activated into short-term memory stores; (b) strategies to achieve this activation as well as maintain short-term memory; and (c) executive attention. Furthermore, Kane and Engle propose that the executive attention system is the most critical component of working memory capacity for individual differences (Kane, Conway, Hambrick, & Engle 2007). Working memory capacity is not really about memory storage per se, but about the capability of the executive attention system to selectively activate and maintain goal-relevant information in a highly active, available state without getting distracted over short intervals of time by competitive or irrelevant information (Engle & Kane, 2003; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Tuholski, Engle, & Baylis, 2001). Therefore, working memory capacity is critical for handling distractions, conflicts and interferences that would draw attention away from maintenance of mental representations of memory and information or to retrieval of information from inactive memory. This capacity permits task-relevant information to be easily available to facilitate accomplishing the current goal (Jha et al., 2010).

With this explanation as a backdrop to understanding working memory capacity, successful emotion regulation can also be viewed as a process that requires accomplishing two goals simultaneously: monitoring selected behavior while also inhibiting a natural emotional response tendency (Volokhov, 2010). Thus, working memory capacity is proposed as a possible regulatory mechanism of emotion regulation.
A Mindfulness Model of Emotion Regulation in Nursing Students: Working Memory Capacity as a Regulatory Mechanism

In this study, a model was tested in which there is an association between mindfulness and emotion regulation that may be explained, in part, by the cognitive regulatory mechanism of working memory capacity. Implicit in this model is the assumption that mindfulness is considered a dispositional trait of individuals, and presents in varying degrees within individuals (Brown, Ryan, & Creswell, 2007; Jimenez, Niles, & Park, 2010). In a parallel manner, it is also assumed that working memory capacity is an inherent or innate trait of individuals and that individuals differ in their ability to control attention to process information in the midst of a competing external environment or internal thoughts (Ilkowska & Engle, 2010). Lastly, another assumption of this model is that emotion regulation is inherent in individuals and that individuals differ in the how they express, experience, and regulate their emotions (Gross & John, 2003).

Mindfulness promotes emotion regulation by cognitive-attentional control [i.e., controlling one’s attention] (Coffey & Hartman, 2008; Chambers et al., 2008; Jha et al., 2007; Tang et al., 2007). Second, mindfulness also promotes emotion regulation by cognitive positive reappraisal (Garland et al., 2009; Garland, Gaylord, & Fredrickson, 2011). Third, mindfulness may be associated with healthy emotion regulation that involves the cognitive information processing regulatory mechanism of working memory capacity (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). Individuals with high working memory capacity show better cognitive control and greater flexibility in antecedent-focused emotion regulation
than individuals with low working memory capacity (Schmeichel, Volokhov, & Demaree, 2008). Both attentional deployment and cognitive reappraisal are strategies used during antecedent-focused emotion regulation (Gross, 1998). Attention and working memory capacity are closely related cognitive systems; therefore, mindfulness may promote healthy emotion regulation, in part by the regulatory mechanism of an effective working memory capacity (Jha et al., 2010; Redick & Engle, 2006). Figure 2 illustrates the conceptual model used in examining the relationship between mindfulness and emotion regulation and the influence of a mediator, working memory capacity.

**Figure 2.** A Mindfulness Model of Emotion Regulation in Nursing Students: Working Memory Capacity as a Regulatory Mechanism. A proposed mediation model in which there is an association between mindfulness and emotion regulation that may be explained in part by the cognitive regulatory mechanism of working memory capacity.
Definitions of Variables

For purposes of this study, these variables will be defined in the following manner:

Mindfulness

**Conceptual Definition:** Mindfulness is as an “open and receptive attention to and awareness of ongoing events and experiences” (Brown & Ryan, 2004, p. 245). “Dispositional mindfulness” is defined as individual differences in mindfulness that are inherent or innate to individuals, and are not a result of specific mindfulness training techniques (Brown & Ryan, 2003).

**Operational Definition:** An individual’s extent of mindfulness was measured using the Mindful Attention Awareness Scale (MAAS). The MAAS is a self-report questionnaire for assessing dispositional mindfulness, specifically the focal characteristics of mindfulness: open and receptive awareness of and attention to what is currently taking place in the present (Brown & Ryan, 2003). A mean score of 15 items is calculated, higher scores reflecting higher levels of dispositional mindfulness.

Working Memory Capacity

**Conceptual definition:** Working memory capacity reflects a person’s capability to selectively activate and maintain goal-relevant information in a highly active, available state without getting distracted over short intervals of time by competitive or irrelevant information (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Schmeichel, Volokhov, & Demaree, 2008).

**Operational Definition:** Individual differences in working memory capacity were measured using the Automated Operation Span Task (AOSPAN) which is a
laboratory computer-generated test that involves remembering stimuli such as letters over short intervals of time while simultaneously performing simple math problems. An AOSPAN score is based on the sum of all recalled letters from letter sets that were recalled without error in the correct order (Unsworth, Heitz, Schrock, & Engle, 2005).

**Emotion Regulation**

**Conceptual Definition:** Emotion regulation is conceptually defined as “the processes by which individuals influence which emotion they have, when they have them, and how they experience and express these emotions” (Gross, 1998, p. 275).

**Conceptual Definition of Emotion Regulation – Reappraisal and Suppression:** Reappraisal is defined as changing the way one thinks about a potentially emotion-eliciting event in nonemotional terms. Suppression is defined as inhibiting the way one responds behaviorally to an emotion-eliciting event (Gross, 2002).

**Operational Definition:** An individual’s habitual practice of using emotion regulation strategies was assessed using the Emotion Regulation Questionnaire (ERQ), a self-report instrument (Gross & John, 2003). Two common but distinct dimensions of emotion regulation are measured: expression suppression and cognitive reappraisal. A mean score of each dimension is reported separately and indicates the extent of use of each emotion regulation strategy.
CHAPTER III: LITERATURE REVIEW

Emotion Regulation

Correlates of Emotion Regulation

Emotion regulation research has shown that individuals differ in their use of emotion regulation processes and that these differences have consequences for outcomes in affect, social relationships, and well-being (Gross & John, 2003). Two commonly used emotion regulation processes or strategies are reappraisal and suppression. Reappraisal is defined as changing the way one thinks about a potentially emotion-eliciting event in nonemotional terms. Suppression is defined as inhibiting the way one responds behaviorally to an emotion-eliciting event (Gross, 2002). Research conducted by Gross and John (2003) demonstrated that the emotion regulation process of reappraisal has an overall healthier profile of short-term affective, cognitive, and social consequences than the emotion regulation process of suppression. Individuals who use reappraisal processes experience and express greater positive emotion and less negative emotion compared to individuals who use suppression. Those who use suppression processes experience and express less positive emotions than reappraisers; moreover, they experience greater negative emotion than reappraisers. Individuals who use reappraisal as an emotion regulation strategy had an association with positive well-being and better interpersonal functioning, whereas those who used suppression as an emotion regulation strategy had an associated negative well-being and worse interpersonal functioning (Gross & John, 2003). Other studies indicated that lower levels of social support, closeness and social
satisfaction are predicted by suppression of emotions (Srivastava, Tamir, McGonigal, John, & Gross, 2009). Also, individuals who had “high” levels of suppressed emotions reported having worse general memory than individuals with “low” suppression levels (Gross, 2001). Individuals who used a reappraisal emotion regulation strategy had a decreased experience and expressions of negative emotion, with no impact on general memory. Individuals who use a suppression emotion strategy decrease their behavioral expression of negative emotion but fail to decrease the actual internal negative emotion experience, and correspondingly have an increase in sympathetic activation of the cardiovascular system (Gross, 2002).

**Emotion Regulation and Neurological Physiology Correlates**

Emotions are biologically generated responses to help a person manage demands and opportunities encountered in life. Emotions may be seen only as a response to stimuli that is directly perceived and encoded in a neurological bottom-up processing fashion, but this view would fail to fully explain individual variability in emotion regulation (Ochsner & Gross, 2004). Emotions are proposed to also be appraised and regulated by top-down higher order cognitive processes such as working memory, selective attention, language and long term memory (Ochsner & Gross, 2004). See Table 1 for brain structures that are important for processing emotions, their functional role and application in processing emotional information, and whether they are automatic or controlled.
Table I

*Brain Structures Involved in Processing Emotions (Ochsner & Barrett, 2001)*

<table>
<thead>
<tr>
<th>Brain Structure</th>
<th>Regions involved in <strong>bottom-up appraisal</strong></th>
<th>Regions involved in <strong>top-down appraisal</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amygdala</td>
<td>Basal Ganglia</td>
<td>Ventral &amp; Medial Orbital Frontal Cortex</td>
</tr>
<tr>
<td>Function</td>
<td>Detecting &amp; learning about potential threats</td>
<td>Context-dependent action selection for situational goals</td>
</tr>
<tr>
<td>Use and Application</td>
<td>Detect arousing, potentially threatening stimuli and associate them with corresponding physiological responses and appropriate actions</td>
<td>Inhibit on-going responses based on analyses of context; generate affective reactions based on these analyses that guide further regulatory judgments</td>
</tr>
<tr>
<td>Type of Process</td>
<td>Automatic but requires attention</td>
<td>Controlled</td>
</tr>
<tr>
<td></td>
<td>Retrieval can be automatic or controlled</td>
<td>Conflicts detected automatically but making changes takes control</td>
</tr>
</tbody>
</table>

Within healthy adults, there is considerable variability in the ability to regulate the nature and strength of emotional responses (Ochsner & Gross, 2005). Behavioral and cognitive studies have investigated these differences and the cognitive control of regulating emotions. Current neurocognitive studies have revealed that key brain structures are correlated with emotion regulation strategies (Ochsner & Gross, 2008). Emotion regulation tasks have been found to be activated in the left lateral prefrontal...
cortex, dorsal anterior cingulate cortex and the dorsomedial prefrontal cortex (Ochsner & Gross, 2004).

During the emotion regulation process of reappraisal, there is a dynamic interaction between specific areas of the brain, most notably interactions between the prefrontal and cingulate regions that are involved in cognitive control as well as the amygdala and insula regions that are activated in emotional responding (Ochsner & Gross, 2008). More specifically, neuroimaging studies investigating the neural basis of reappraisal have found that the lateral and medial prefrontal cortex and the anterior cingulate cortex are consistently activated during reappraisal while also exerting a down-regulatory effect on the amygdala and orbito-frontal cortex (Ochsner, Bunge, Gross, & Gabrieli, 2002; Phelps & LeDoux, 2005). The prefrontal area is also responsible for others forms of cognitive control, such as working memory and response selection (Ochsner & Gross, 2004).

**Emotion Regulation and Nursing Students**

The academic pursuits of college students in general can be emotionally demanding, but for nursing students the experience of nursing school is particularly emotionally straining. Compared to other health professional students, nursing students report higher stress levels (Beddoe & Murphy, 2004; Jones & Johnston, 1997). High levels of stress and anxiety have been found to impede general memory, concentration and problem solving ability, which can be detrimental to academic performance and learning (Beddoe & Murphy, 2004).

The phenomenon of nursing school being emotionally demanding for nursing students is attributed to many external factors. Nursing students ascribe their stress to
interpersonal relationships with faculty and clinical staff, as well as financial, academic, and work-related factors (Beck, Hackett, Srivastava, McKim, & Rockwell, 1997; Jones & Johnston, 1997). The most common factors include experiencing clinical practice for the first time where students fear making a mistake, being evaluated by faculty, feeling lack of support from clinical nursing personnel, and the incongruence between what is taught in the classroom and what is actually experienced in clinical practice (Moscaritolo, 2009). Shipton (2002) conducted a qualitative study to explore and identify the specific stressors that senior baccalaureate nursing students report as emotionally demanding. The students appraised the following as stressful experiences with faculty: being evaluated and observed by their clinical instructor, the unpredictability of faculty members and not knowing what sort of mood they might be in, incompetent behavior of instructors and having to wait for the instructor during clinicals (Shipton, 2002). The nursing students also reported that negative attitudes, actions and comments by the nursing staff during clinicals were stressful, in that they felt demeaned and taken advantage of (Shipton, 2002). Interestingly, interactions with peers and classmates contributed to their stress, specifically competing over grades and comparing performance in clinical and academic settings (Shipton, 2002). Lastly, the students reported increased stress when they lacked experience implementing a new procedure, managing time and the daunting workload to prepare for clinical assignments and rotating to new clinical sites (Shipton, 2002). Other areas of stress that are emotionally demanding for nursing students include financial constraints, academic concerns (i.e., exams, workload, assignments, theory), encountering new experiences of death and dying (Timmins & Kaliszer, 2002), handling
emergencies in clinical areas (Clarke & Ruffin, 1992), lack of free time (Jones & Johnston, 1997), and feelings of helplessness (Mahat, 1998, Jones & Johnston, 1997).

Several investigators have examined the experience of stress and fatigue over the course of a nursing student’s enrollment in a nursing program. Rella and colleagues (2008) investigated when burnout began in an Australian nursing student population, and found that levels of fatigue and poor recovery increased over the three-year program. Deary and colleagues (2003) conducted a longitudinal three-year study in the United Kingdom examining stress, burnout, and attrition. Their findings indicated that nursing students experienced increased levels of stress, negative coping mechanisms, and psychological morbidity. Personality was found to be a more significant indicator of attrition than cognitive ability (Deary, Watson, & Hogston, 2003).

These perceived stressors and anxieties may impede students from learning, retaining and applying what they have acquired. Unfortunately, nursing students are not routinely taught how to manage these emotional demands and challenges that they experience within nursing school (Grossman & Wheeler, 1999; Heaman, 1995; Mahat, 1996; Manderino, Ganong, & Darnell, 1988; Meisenhelder, 1987). Furthermore, there is a lack of research into how nursing students regulate their emotions and what cognitive emotion regulation strategies nursing students use when dealing with the emotional demands of nursing school.

Working Memory Capacity

Correlates of Working Memory

The role of working memory is essential to performing many complex cognitive activities such as language comprehension, reasoning and problem solving, mental
arithmetic, and spatial thinking. A limited working memory capacity constrains cognitive performance, such that a person with “lesser” working memory capacity performs worse on a range of cognitive tasks than those with “greater” capacity (Conway, Jarrold, Kane, Miyake, & Towse, 2007). Individuals with greater working memory capacity typically outperform people with lesser capacity in a number of cognitive domains such as complex learning, reasoning, and comprehension (Conway et al., 2007); reading comprehension (Daneman & Carpenter, 1983; Daneman & Merikle, 1996); language comprehension (Just & Carpenter, 1992; King & Just, 1991; MacDonald, Just & Carpenter, 1992); listening comprehension — and problem solving (Adams & Hitch, 1997; Carpenter, Just & Shell, 1990); note-taking in class (Kiewra & Benton, 1988); reasoning (Barrouillet, 1996; Kyllonen & Christal, 1990); spelling (Engle, Carullo & Collins, 1991); vocabulary learning (Daneman & Green, 1986); emotional processing (Bliss-Moreau, Hristic, Feldman Barrett, & Tugude, 2003); and ability to reason, solve novel problems, and adapt to new situations (Conway, Cowan, Bunting, Theriault, & Minkoff, 2002; Engle, Tuholski, Laughlin, & Conway, 1999; Kyllonen & Christal, 1990).

**Measures of Working Memory Capacity**

Working memory is assessed using a variety of laboratory tasks that attempt to capture key cognitive components of information processing that involve storing and retrieving information over short intervals of time while simultaneously resisting distraction and interference (Jha, Stanley, & Baime, 2010, p 209). The term *capacity* can be misleading and suggests that there is a limited amount of information that a person can store in short-term memory (e.g., 7+/− 2 chunks of data). Actually, however, working memory capacity is about individual differences in the ability to control attention to
“maintain information in an active, quickly retrievable state” (Engle, 2002, p. 20).

Working memory capacity is critical, both for maintaining a single representation (i.e., information of a goal) in mind as well as keeping active numerous representations of information. According to Engle (2002), working memory capacity is about the interplay between attention and memory; specifically, using attention to suppress or maintain information. Thus, greater working memory capacity can result in more information being maintained and active, but this is due to a greater ability to control attention and not because of greater memory storage abilities. Furthermore, greater working memory capacity means a better ability to maintain attention to avoid distraction (Engle, 2002).

Measuring working memory capacity relies on using complex laboratory span tasks that reflect individual differences in the ability to control attention for retrieving information from inactive memory and maintaining it over short intervals of time while resisting distraction. In other words, a person’s working memory capacity is evaluated using a task that requires them to simultaneously maintain information in an active state to be recalled later, and also requires a secondary controlled processing task to engage executive attentional processes. The tools most widely used to measure working memory capacity are the counting span, operation span, and reading span tasks (Conway, Kane, Bunting, Hambrick, Wilhelm, & Engle, 2005). The Operational Span Task (OSPAN) is one widely used and well-validated instrument where participants are required to engage in a primary processing task such as memorizing presented information, while simultaneously engaging in an interfering secondary processing task (Conway et al., 2005; Hoffman, Schmeichel, Friese, & Baddeley, 2011). In this task, the subject is presented with a math operation such as “10/2 + 1 =?” for a brief period of time; the next
screen on the computer shows a digit such as 6. The subject is to click on the “no” or “yes” box on the screen to indicate whether the digit is the correct answer to the math operation. Next, the subject is presented with a letter on the screen for 800 milliseconds. Letters to be recalled later are alternated with math operations to be verified. After three to seven alternating operations with letters, the subject performs the reading span portion of the task by recalling the letters in the correct serial order, using the computer mouse to click on a matrix of letters. (Unsworth, Heitz, Schrock, & Engle, 2005). An OSPAN score is based on the sum of all letters recalled from the letter sets that were recalled without error in the correct order. The OSPAN has shown a high level of reliability over a time span of 9-10 weeks and with repeated measures (reliability coefficient of 0.83) (Unsworth et al., 2005; Klein & Fiss, 1999).

Errors in nursing students’ working memory performance could occur frequently in a clinical setting and be due to distraction and interference. For example, a patient’s family member is attempting to talk to the student while the student is completing their physical assessments (verbal interference); the student is looking at a patient’s chart to review lab values and comes across new orders (visual interference); or the student is pulling medications from a drawer while the instructor is talking to them (distraction).

**Interpersonal and Intrapersonal Differences in Working Memory Capacity**

Working memory is considered both a state and a trait variable (Engle, 2010). Working memory capacity can be deemed a trait variable because there are individual differences in working memory capacity, meaning that the degree of working memory capacity can be different from person to person, yet remain relatively unchanged over time for an individual (Engle, 2010). Working memory capacity, though, can also be
considered a state variable because it depends on the context of a situation. For example, a reduction in working memory capacity has been found to be associated with fatigue and sleep deprivation. In one recent study, ten U.S. Air Force pilots’ flying performance was measured every two hours by a flight simulator, along with a series of other measures such as the Operation Span Task (OSPAN), while the pilots were kept awake for 35 hours (Engle, 2010). The number of flying errors increased during the last half of the 35-hour period and was found to be highly predicted by performance on the OSPAN. Therefore, as fatigue increased, working memory capacity declined along with an associated increase in flying errors (Engle, 2010). Working memory capacity has also been shown to decline in high-pressure situations (Beilock & Carr, 2005; Schoff, Wolf, & Smeets, 2009).

**Working Memory and Neurological Physiology**

Neuroimaging studies examining working memory and executive attention functions have revealed that specific areas of the brain are consistently activated when a person is presented with working memory tasks (Kane & Engle, 2002). Most notably, the prefrontal cortex and the anterior cingulate cortex are consistently observed to be activated (Kane & Engle, 2002; Osaka et al., 2003). The primary neurological structure that contributes to the function of working memory capacity is the dorsolateral prefrontal cortex, which has a “unique executive-attention role in actively maintaining access to stimulus representations and goals in interference-rich contexts” (Kane & Engle, 2002, p. 637). A meta-analysis of 24 studies investigating working memory using neuroimaging found that the dorsolateral prefrontal cortex was a primary cortical region involved in working memory tasks, due to the “strategic reorganization and control of working
memory contents” (Owen, McMillan, Laird, & Bullmore, 2005, p. 54). Dorsolateral prefrontal cortex changes have also been found to be correlated with working memory load. Manoach and colleagues (1997) reported that a high working memory load is correlated to fMRI signal changes in the dorsolateral prefrontal cortex compared to low or no working memory load.

The dorsolateral prefrontal cortex is not solely responsible for working memory; this fact accounts for differences in working memory capacity. Additional cortical and subcortical circuits that connect to the dorsal prefrontal cortex such as the anterior cingulate cortex are also integral to complex mental activity. Osaka and colleagues (2003) investigated the individual difference in working memory capacity using fMRI studies. They compared people who had a large working memory capacity (high-span) with people who had a small working memory capacity (low-span). The results indicated that there was significant activation of three regions of the brain in the subjects who had large working memory capacity compared to small working memory capacity: anterior cingulate cortex, left prefrontal cortex and the temporal language area.

**Working Memory Capacity and Nursing Students**

An efficient working memory capacity is critically important to nurses due to the nature and complexity of their work. Nurses must be able to think quickly from moment to moment, accessing previous knowledge and new information related to multiple patients. They must utilize this knowledge and information to make clinical decisions while performing patient care activities in the midst of numerous distractions,
interruptions, high cognitive load, emotional demands, frequent cognitive shifts, ambiguity and unpredictability (Ebright, Patterson, Chalko, & Render, 2003; Potter et al., 2005).

Nursing students frequently struggle with transitioning into clinical practice, making clinical decisions and managing multiple patients in a continually changing environment (Redding & Robinson, 2009). The ability to effectively make frequent cognitive shifts and pay attention is therefore crucial for a successful transition into clinical practice. However, current nursing education literature reveals no empirical research has been conducted investigating working memory capacity of nursing students.

Before undergraduate nursing faculty can utilize the concept of working memory capacity as a regulatory mechanism toward student knowledge sustainment and effective use in clinical practice, they need to understand the concept of cognitive control processes like working memory capacity and how it can regulate learning. They may thus be more conscious of how to enhance working memory capacity in their students.

The goal of nurse educators is to build knowledge and skills of nursing students that can be transferred from the classroom to clinical practice. Unfortunately, nursing education focuses on task-specific learning, whereas performance in clinical practice requires “process-specific learning” where learned tasks are transferable to new tasks and domains of learning (Slagter, Davidson, & Lutz, 2011). Process-specific learning is fundamental to higher cognition and contributes to performance across cognitive domains. Slagter and colleagues (2011) hypothesize that systematic mental training like meditation may induce process-specific learning, and that changes occur due to effects of mental training on cognitive control processes.
The psychological cognitive architecture of learning includes two main memory components (short-term and long term memory) and the cognitive control processes of these components. Slagter and colleagues (2011) define “cognitive control” as a “collection of processes that allow us to flexibly adapt our behavior in the pursuit of an internal goal, and includes processes such as selection of goal-relevant information, interference resolution, and storage and manipulation of information in working memory” (Slagter, Davidson, & Lutz, 2011, p. 2). This definition is akin to the definition of working memory capacity, which is the ability to sustain and manipulate relevant information over short time intervals for attaining a goal without becoming distracted by irrelevant information or alternative goals (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Schmeichel, Volokhov, & Demaree, 2008). In other words, a person’s working memory capacity is the ability to pay attention and focus on what they are trying to accomplish at the moment by retrieving information from long term memory while also blocking distractions and interferences.

One commonly accepted long-held view in education is that working memory capacity is fixed and limited (Miller, 1994; Cowan, 2005). Neuroscientists now recognize that working memory capacity is dynamic and modifiable with mental training (Olesen, Westerberg, & Klingberg, 2004). How do mental training practices, with various types of meditation such as mindfulness meditation, focused attention, and open monitoring, improve working memory capacity and process-specific learning? Changes may occur due to: (a) the experience of training multiple cognitive processes simultaneously (directing and sustaining attention, detecting distractions, shifting attention, activating working memory capacity); (b) variability of stimulus input (many stimuli of various
domains and types, i.e., auditory, somatosensory, emotional, internal, external); (c) the manner in which task difficulty is progressed (meditation practice changes); (d) the focus on maintaining an optimal level of arousal (maintenance of meditation requires alertness or arousal by regulation of emotions and attention); (e) the motivational state of the learner; and (f) the duration of training (expert level of performance requires more training) (Slagter, et al., 2011).

The efficiency of working memory capacity may also be affected by concurrent cognitive load. Cognitive load theory suggests that student performance is linked to the amount of work (mental activity) imposed on working memory capacity (Terrell, 2006). Expending excessive cognitive resources on understanding and learning new information is challenging for novice learners, and results in extraneous cognitive load. The total cognitive load a learner experiences is due to extraneous cognitive load (i.e., split attention, redundancy); intrinsic cognitive load of the materials; or mental effort required toward learning new content (Ginns, 2010).

Nursing education curricula must be designed to maximize human cognitive control processes that result in improved processing of information and minimize factors that disrupt information processing. More specifically, nurse educators need to minimize cognitive work load while a student is assimilating knowledge in the classroom, lab and clinical settings and enhance nursing student’s cognitive control processes (working memory capacity) though mental training. Training cognitive control process may foster process-specific learning (Slagter, Davidson, & Lutz, 2011) so that nursing students may transfer task-specific knowledge into clinical practice.
Mindfulness

Mindfulness and Neurological Physiology

The science of understanding the brain and mindfulness are converging to provide more insight into how the mind affects the brain physically and functionally. Neuroplasticity is this exciting field of inquiry in which the power of the brain literally can change the brain by changing how the mind functions (Begley, 2007).

Within the study of mindfulness, neurophysiological findings suggest that mindfulness meditation practices are associated with changes in the brain, specifically related to activation of particular brain areas as well as cerebral and subcortical structural changes (Fletcher, Schoendorff, & Hayes, 2010). For example, Lazar et al. (2005) found that meditation experience was associated with increased cortical thickness. During this study, the cortical gray matter thickness of both mindfulness meditators and non-meditators was investigated using MRI techniques. Both groups were matched for gender, age, race and years of education. Results indicated that the mean cortical thickness across the entire cortex was not significantly different between the groups for either hemisphere but the prefrontal cortex and right anterior insula was thicker in the mindfulness meditation group. These brain areas are associated with attention, interoception and sensory processing. There was also a significant age-by-group interaction, with age-related decreases in cortical thickness observed in the control group but not in the mindfulness meditation group. Between-group differences in prefrontal cortical thickness were most pronounced in older participants, suggesting that mindfulness meditation might offset age-related cortical thinning. A significant result of this study is the finding that the increase in cortical thickness was correlated to the total
duration of meditation practice. No difference was also found in cortical thickness between the young and old meditators, suggesting that mindfulness meditation may be protective against the usual decline in cortical thinning that occurs with aging (Lazar et al., 2005).

Davidson et al. (2003) conducted a study examining the effects of an 8-week mindfulness meditation program on brain functional and immunity changes as measured by brain electrical activity before and immediately after the training, and then 4 months after an 8-week training program in mindfulness meditation. Participants were randomized into either the intervention group or control group. Both groups were vaccinated with influenza vaccine at the completion of the meditation program. The results indicate that there was a significant increase in left-sided anterior activation in the meditators compared with the control group. Additionally, there was a significant increase in antibody titers to influenza vaccine in the meditators compared to the nonmeditators. Lastly, there was a correlation between the magnitude of increase in left-sided activation and the magnitude of the antibody titer rise to the vaccine. The left-sided anterior brain activation is associated with positive affect and emotion regulation (Davidson et al., 2003).

Lutz, Greischer, Rawlings, Ricard, and Davidson (2004) conducted a study investigating the impact of long term meditation practice using electroencephalographic high-amplitude gamma-band oscillations and phase-synchrony (coordination) during nonreferential compassion meditation. They found that the electroencephalogram patterns of the long term meditators differed from the control group, in particular over the lateral frontoparietal electrodes. In addition, the ratio of gamma-band activity (25-42 Hz) to
slow oscillatory activity (4-13 Hz) was initially higher in the resting baseline before meditation for the long term meditators than for the controls, over the medial frontoparietal electrodes. This difference increased sharply during meditation over most of the scalp electrodes and remained higher than the initial baseline in the post-meditation baseline. The results suggest that mental training involves temporal integrative mechanisms and may induce short-term and long term neural changes.

Brefczynski-Lewis and colleagues (2007) examined the neural activation of long term meditation practitioners and novice meditators using fMRI techniques. The results indicated that the expert meditators had more activation of brain regions related to attention and response inhibition (prefrontal cortex) and less activation of regions associated with emotions and discursive thoughts (amygdala).

**Mindfulness and Neurological Correlates with Working Memory Capacity and/or Emotion Regulation**

Functional neuroimaging techniques have advanced the understanding of how mindfulness functions neurophysiologically within the brain. Scientists are beginning to explore the neurological correlates of mindfulness with higher-order cognitive processes like working memory and emotion regulation. Imaging studies that have examined the neural correlates of mindfulness meditation have primarily focused on the functional neuro-imaging correlates and the structural neuro-imaging correlates (Chiesa, Bramilla, & Serretti, 2011).

Edwards and colleagues (2012) have proposed a theoretical neuropsychological model of the possible neurotransmitters involved during mindfulness meditation. They base their model on previous empirical studies of neurotransmitters in relation to emotion
regulation and cognitive processes in general. A review of the literature has revealed a lack of research to date that specifically investigates the neurotransmitter correlates of dispositional mindfulness or mindfulness meditation. Therefore, a brief review follows of the neuroimaging studies examining the functional neurophysiological correlates of mindfulness-based methods/dispositional mindfulness with working memory capacity and emotion regulation.

Neuroimaging studies of participants who practiced mindfulness meditation revealed increased activation of the anterior cingulate cortex and the prefrontal cortex, particularly the ventromedial prefrontal cortex and the dorsolateral prefrontal cortex in the right hemisphere (Baerentsen, Hartvig, Stodkilde-Jorgensen, & Mammen, 2001; Holzel, Ott, Hempel, Hackl, Wolf, Stark, & Vaitl, 2007; Kozasa, Radvany, Barreiros, Leite, & Amaro, 2008). This activation may be due to in part by the volitional and attentional aspects of mindfulness meditation (Edwards, Peres, Monti, & Newberg, 2012). Other neuroimaging studies have shown a correlation that the anterior cingulate cortex and prefrontal cortex are activated during emotional processing (Bush, Luu & Posner, 2000; Phan, Wager, Taylor, & Liberzon, 2002). In 2007, Holzel and colleagues hypothesized that meditators may have an improved ability to regulate emotions due to stronger cortical processing of distracting emotional events.

Emotion regulation may also be related to degree of dispositional mindfulness present. Creswell and colleagues (2007) investigated the individual differences in dispositional mindfulness and association with emotion regulation through affect labeling. They results indicated that there was an association between enhanced activation of the dorsal prefrontal cortex and decreased activation of the amygdala with
dispositional mindfulness during an affect labeling task. Further building on examining the neurophysiological correlates of mindfulness and emotion regulation, Modinos and colleagues (2010) examined individual differences in dispositional mindfulness and brain activity in reappraisal of negative emotion. Eighteen healthy university students who did not practice meditation self-reported their extent of dispositional mindfulness. They then were scanned using fMRI while completing a task that involved attending to or reappraising negative stimuli. The results indicated that individual differences in dispositional mindfulness modulated brain activity in neural areas associated with the cognitive control of emotion using reappraisal. The frontal network, specifically the dorsal lateral prefrontal cortex, dorsal medial prefrontal cortex and the anterior cingulate cortex, were activated during the reappraisal task. The dorsomedial prefrontal cortex was especially found to be significantly associated with the tendency to be mindful (increased dispositional mindfulness) during reappraisal. Increased amygdala activity was also found during viewing of negative stimuli compared to when the participants employed reappraisal. This result supports other studies that have found that the amygdala is down-regulated in emotion-generation during reappraisal of negative stimuli (Ochsner, Bunge, Gross, & Gabrieli, 2002; Schaefer, Jackson, Davidson, Arguirre, Kimberg, & Thompson-Schill, 2002). Together, these results suggest that mindfulness may play an influential role in emotion regulation via the up-regulation of the prefrontal cortex and the down-regulation of the amygdala.

Activation of the prefrontal area is associated with attention and working memory (Engle, Kane, & Tuholski, 1999; Olesen, Westerberg, & Klingberg, 2003). There are individual differences in working memory capacity (Engle, Carullo, & Collins, 1991).
Activation of the prefrontal cortex and basal ganglia has been found to be associated with individual differences in working memory capacity as evaluated by a fMRI (McNab & Klingberg, 2008). Additionally, non-fMRI studies have indicated that mindfulness-based methods modulate attentional and working memory systems (Tang et al., 2007; Chambers, Lo, & Allen, 2008; Jha, Krompinger, & Baime, 2007; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010). Since attention and working memory systems are deployed during mindfulness, it can be hypothesized that mindfulness meditation could involve the prefrontal cortex (Edwards, Peres, Monti, & Newberg, 2012). To date though, no studies have investigated the association of brain activity during a working memory task with dispositional mindfulness; nor have they evaluated the neural correlates of performance on a working memory capacity task before or after a mindfulness-based intervention.

Overall, the empirical study of the transmitters associated between mindfulness and working memory capacity and emotion regulation is lacking. Investigation of neurological correlates of mindfulness with higher-order cognitive processes (i.e., working memory and emotion regulation) is beginning to develop. The neuroimaging studies that have examined the brain activation in relation to mindfulness show support of the neural connection between mindfulness and emotion regulation. The investigation of working memory capacity with mindfulness is still in its infancy and needs to be advanced.

**Mindfulness as an Empirical Construct**

Research on mindfulness as an empirical construct, and its relationship with other biological and psychological constructs, may be divided into correlational and interventional studies. Selected empirical studies published over the past two years that
relate mindfulness with the population of the current study (nursing students), working memory capacity, or emotion regulation will specifically be discussed.

No empirical studies were conducted in the past two years that examined the correlation of or application of mindfulness with nursing students. This supports that there is a dearth of research on nursing students related to dispositional mindfulness and mindfulness-based interventions. Therefore, the scope of population type will be broadened to undergraduate students for this review.

Feldman and colleagues (2011) conducted a correlational study examining individual differences and contextual predictors of undergraduate students texting while driving. Results indicated that self-reported lower levels of mindfulness were found to be correlated with more frequent texting-while-driving of undergraduate students. Furthermore, this relationship appeared to be mediated primarily by emotion-regulation reasons as a means of reducing unpleasant emotions. These results are consistent with past research that showed how individuals low in dispositional mindfulness are more likely to struggle in regulating emotions and may be more likely to utilize maladaptive strategies to manage emotions (Arch & Craske, 2010; Baer, Smith, Hopkins, Kriememeyer, & Toney, 2006; Creswell et al., 2007; Feldman et al., 2007; Feldman, Greeson, Renna, & Robbins-Monteitha, 2011).

Mindfulness-based interventional studies with undergraduate students varied in purpose; examining the effects of mindfulness-based training (MBT) on physiological and psychological health, examining the feasibility of a modified mindfulness program and determining the extent to which dispositional mindfulness moderates the effect of MBT (Lynch, Gander, Kohls, Kudielka, & Walach, 2011; Myint, Choy, Su, & Lam,
2011; Shapiro, Brown, Thoresen, & Plante, 2011). The study conducted by Shapiro and colleagues (2011) was important to note because it is the first study to examine whether people with higher levels of trait mindfulness would benefit more than people with lower baseline levels of mindfulness. The results indicated that trait mindfulness is a moderator of the effectiveness of MBT. Overall, the interventional group improved in measures of well-being, trait mindfulness and empathy compared to the control group; high pretreatment levels of baseline trait mindfulness did, though, predict the extent of improvement in the outcome measures but was not a necessary condition for participants to benefit from MBT.

Snider (2011) conducted a study examining the cognitive effects of a low-dose MBT on working memory, visuospatial attention, and set-shifting with 27 older adults (ages 60-75). The results indicated that the interventional group did improve marginally in attentional orientation but not in working memory or set-shifting abilities compared to the control group. This study is important to note when doing an interventional study with nursing students. The cognitive effects may be dependent on the “dose” of the MBT. At this point in time, research is lacking regarding the optimal therapeutic dose for different populations, health conditions and ages, especially with nursing students.

Black and colleagues (2011) conducted a correlational study of first-year medical students to examine the interrelationships between higher order cognitive functions — working memory, mindfulness, and self-control — and their association with psychological and behavioral health. The results indicated that these executive function components had distinct variance from each other; however, self-control and mindfulness did share some variance with each other that may suggest some underlying executive
function that is shared between them. Furthermore, mindfulness and working memory was not associated with psychological well-being, positive or negative affect, but self-control was associated with these mental health measures (Black, Semple, Pokhrel, & Grenard, 2011). In this study, dispositional mindfulness was not significantly correlated with working memory capacity, but it is not known if this would be true for a prelicensure baccalaureate nursing student population. The benefit of this study is that it is the first published study to date that has evaluated dispositional mindfulness with working memory capacity in a health care student population. Important to note is that the study conducted by Jha and colleagues (2010) found that working memory capacity was significantly correlated with the amount of mindfulness meditation time, and self-reported dispositional mindfulness was not evaluated.

While there were published studies with undergraduate students, no studies were found addressing the use of MBT with emotion regulation and the mediating effects of working memory capacity with a prelicensure baccalaureate nursing student population. Given the paucity of information, this study could provide important information examining a previously unstudied emphasis area: the development of cognitive and emotion regulation skills of prelicensure baccalaureate nursing students.

**Mindfulness-based Treatments across Diverse Populations**

A review of the past 18 months’ published literature indicates that the study of mindfulness meditation has been conducted with various populations in medicine, psychology, education, and healthy populations. There is increasing scientific evidence to support the therapeutic effect of mindfulness-based treatments with improving symptoms, well-being and quality of life in clinical populations with the following conditions: cancer

Research is accumulating in examining the efficacies of mindfulness-based interventions in treating patients with psychological disorders. Mindfulness-based interventions have been associated with improvements in attention deficit hyperactive behavior (Jensen, Vangkilde, Frokjær, & Hasselbalch, 2012; Van der Oord, Bogels & Peijnenburg, 2011), anxiety (Vøllestad, Sivertsen, & Høstmark Nielsen, 2011), recurrent and current depression (van Aalderen et al., 2011), sexual dysfunction (Silverstein, Brown, Roth, & Britton, 2011), health anxiety (hypochondriasis) (Williams, McManus, Muse, & Williams, 2011), obesity (Daubenmier et al., 2011), substance abuse (Wupperman et al., 2011), marijuana use (de Dios et al., 2011), smoking cessation (Brewer et al., 2011), and schizophrenia (Johnson, Penn, Fredrickson, Kring, Meyer, Catalino, & Brantley, 2011).

Mindfulness-based interventions have also been implemented with diverse types of health care professionals and health care students. McGarrige and Walsh (2011) examined mindfulness levels and stress levels of social workers and found an improvement in these measures after a 12-week mindfulness-based program. Clinical
psychologists exhibited improvement in level of self-compassion and mindfulness scores and decreased rumination. Noteworthy in this study was the association between the amount of home practice time and measures: decreased stress, anxiety and rumination and increased empathetic concern was associated with more frequent home practice time (Rimes & Wingrove, 2011). Occupational therapy students participating in a mindfulness-based program showed improved levels of managing stress (Stew, 2011). Nurses participated in a self-directed computer mindfulness training program at Mayo Clinic and self-reported reduced levels of stress (Cutshall et al., 2011). Warnecke and colleagues (2011) examined senior medical students participating in a mindfulness-based intervention program; results indicated a reduction in stress and anxiety levels following the intervention. Occupational burnout of community mental health providers was assessed pre and post a one-day mindfulness-based program (Salyers et al., 2011). The participants reported a significant improvement in positive views toward their clients and a significant decrease in emotional exhaustion and depersonalization. However, participants also reported no significant changes in their sense of personal accomplishment, job satisfaction or intention to leave their job.

Healthy populations who participated in mindfulness-based programs have been studied as well. Stanley and colleagues (2011) examined a MBT called “Mindfulness-based Mind Fitness” that was adapted for Marines who were training prior to deployment, with the purpose of counteracting the deleterious effects of stress. The Marines self-reported levels of perceived stress and mindfulness prior to and after the intervention. Results indicated that more time spent engaging in practice corresponded with greater self-reported mindfulness, and decreases in perceived stress were associated
with increases in mindfulness. MBT has also been studied with caregivers of the frail elderly, with improvement in self-reported perceived stress, depression, and decreased burden for the caregivers (Epstein-Lubow, McBee, Darling, Armey, & Miller, 2011).

**Mindfulness and Nursing Students**

Four studies were conducted with a nursing student population assessing the outcomes of a mindfulness-based stress reduction program (MBSR; Young, Bruce, Turner, & Linden, 2001; Beddoe & Murphy, 2004; Jain, Shapiro, Swanick, Roesch, Mills, Bell, & Schwartz, 2007; Kang, Choi, & Ryu, 2009). These interventional studies examined changes in health outcomes such as stress, empathy, psychological health, etc. No studies were found that assessed dispositional mindfulness and its relationship to emotion regulation and working memory capacity in a nursing student population. Even though no studies investigating these relationships were found at this time, a brief review of the interventional studies conducted to date is still warranted.

The first study was a mixed qualitative and quantitative design used to evaluate a MBSR program with third-year Canadian baccalaureate nursing students (Young, Linden, Turner, & Bruce, 2001). Fifteen nursing students volunteered for the MBSR program; another 15 nursing students were recruited for the no-treatment/control group. The outcomes examined were the participants’ stress and health. The researchers conducted focus group discussions before, during, and after the intervention program. The themes that emerged from the focus groups included: (a) more clarity on how they respond to demands, (b) new awareness to take time to choose a reaction to stress, rather than thoughtlessly reacting, (c) a changed perception of time and sense of urgency, (d) appreciation and connectedness with the group experience, and (e) change in physical
symptoms. The outcomes were also quantitatively measured before and after the programs, using tools such as the health status profile, a symptom checklist (both physical and psychological symptoms of stress), and Antonovsky’s Orientation-To-Life Questionnaire. The researchers reported a small to moderate effect size of the MBSR program between the interventional and control groups, specifically for health-related effects, physical symptoms and sense of coherence.

The strength of this study is its use of a mixed design and focus groups to identify themes. The limitations of this study include the lack of random selection during recruitment and random assignment to interventional and control groups. The sample size was small and mindfulness was not measured to help correlate changes in health with changes in mindfulness. Little explanation was provided about how they conducted their qualitative analysis, nor were details given about specific health-related effects and changes in physical and psychological symptoms.

The second study was a nonrandomized pilot study examining the effects of a MBSR program on stress and empathy of baccalaureate nursing students (Beddoe & Murphy, 2004). A convenience sample of 16 nursing students completed the eight-week program. No control group was included for comparison of outcomes. Participants completed pretests and posttests assessing stress (Derogatis Stress Profile), empathy levels (Interpersonal Reactivity Index), and attitudes and behavior (modified Homework Questionnaire from University of Massachusetts Medical School Stress Reduction Program). The posttests indicated a significant reduction in the nursing students’ anxiety ($p > .05$). Additionally, there were strong favorable trends observed in other stress dimensions including attitude, time pressure, and total stress. There was a strong
downward trend in two subscales of the Interpersonal Reactivity Index (Empathy) — Fantasy Scale and Personal Distress Scale — but the levels were not statistically significant. The participants had a high pretest score on the Empathetic Concern Scale and remained high on the post-test. Additionally, 63% of the students reported “changes in their relationship to thoughts and feelings and their reactions to them” (Beddoe & Murphy, 2004, p. 308).

The limitations of this study include: a lack of random selection during recruitment (convenience sample/self-selection), small sample size and a 22% attrition rate from the study; lack of control group; and all female students. Mindfulness was not assessed pre- and post-intervention, nor were correlating changes in mindfulness with the outcomes measured. Lastly, another limitation is not knowing if the decrease in anxiety was due to suppressing the expression of anxiety or the reappraisal of the emotional experience of anxiety.

The third study was a randomized controlled trial that examined the effects of two active interventions — a 1-month mindfulness meditation program versus somatic relaxation training — on distress, positive states of mind, rumination, and distraction (Jain et al., 2007). Full-time medical students, graduate nursing students, and undergraduate premedical and prehealth students volunteered for the study who experienced stress and had a desire to participate in a stress reduction program. The students were randomly assigned to either an intervention group or a control group. Eighty-one students completed the study, the majority being females (n = 66). Five students were nursing majors. Participants completed instruments before, every week during, and upon completion of the study. The following outcomes were measured:
psychological symptoms of distress (Brief Symptom Inventory), positive psychological states (Positive States of Mind Scale), ruminative and distractive behaviors and thoughts associated with depression (Daily Emotion Report), spiritual experience (Index of Core Spiritual Experiences), and social desirability (Marlowe-Crowne Short Form). The results of the study indicate that both mindfulness meditation and somatic relaxation significantly decreased distress and improved positive mood states \(p < .05\) compared to the control group. However, there was no significant difference between the two intervention groups for these changes over time. Distractive and ruminative thoughts were most significantly decreased from pre to post study for the meditation group compared to the somatic relaxation and control groups. Mediation analyses were conducted to determine if improvements in distress and positive states were mediated by potential reduction in ruminative and distractive behaviors and thoughts. The data suggests that the mindfulness meditation group’s distress level was reduced, partially mediated by reductions in rumination but not distraction. Twenty-four percent of the variance in psychological distress change scores was accounted for in the mediation model (Jain et al., 2007).

The strengths of this study include that it was a randomized control study that compared two active interventions with a control group, it investigated the possible mediating effects and mechanisms of action for rumination and distraction on health outcomes. The limitations of the study include 1) the participants self-selected enrollment in the study and had a desire to improve their distress levels; 2) a limited number of nursing students participated; and 3) mindfulness was not assessed before, during or after
the intervention to determine if this was an active ingredient of the mindfulness meditation group and to correlate it to improvement in outcomes.

The fourth study was a randomized controlled trial that compared a mindfulness-based stress reduction program and a control group on the effects of stress, anxiety and depression in a Korean nursing student population (Kang, Choi, & Ryu, 2009). A convenience sample of 41 students was randomly assigned to either group. Outcomes measured were: stress (Psychological Wellbeing Index-Short Form), anxiety (State Trait Anxiety Inventory), and depression (Beck Depression Inventory). Results revealed a significant difference in anxiety scores \( p = 0.013 \) and stress scores \( p = 0.02 \), but not in depression scores \( p = 0.056 \).

The limitations of this study are: nonequivalent group sizes, self-selection of the participants, 21% attrition rate, and an unequal baseline stress and anxiety level between the two groups even though randomly assigned. Also, mindfulness was not assessed before and after the intervention. Additionally, it is unknown if the nursing education experience in Korea is different or similar to the nursing education experience in the United States.

**Mindfulness and Emotion Regulation**

Evidence is accumulating of an association between dispositional mindfulness and emotion regulation. Coffey and Hartman (2008) investigated the mechanism of action of dispositional mindfulness on psychological distress, hypothesizing that emotion regulation may be a mediator. Using correlational self-report data within an undergraduate student population, they reported that there is an inverse relationship
between dispositional mindfulness and psychological distress, and that emotion regulation does mediate this effect. On further review, however, they defined emotion regulation as the ability to regulate negative affect and did not investigate emotion regulation strategies such as reappraisal or suppression using the Emotion Regulation Questionnaire.

Creswell and colleagues (2007) investigated the underlying mechanism of emotion regulation by examining the neural correlates of dispositional mindfulness during affect labeling. Study participants completed a self-report questionnaire on dispositional mindfulness using the Mindful Attention Awareness Scale (MAAS), and then completed a labeling task while simultaneously being examined using fMRI. The labeling task involved matching appropriate affect labels with negative facial expressions (experiment) or matching gender labels with gender names (control). The results indicated that dispositional mindfulness was associated with greater prefrontal cortex activation and greater amygdala deactivation during the affect labeling task (Creswell, Way, Eisenberger, & Lieberman, 2007).

Modinos, Ormel & Aleman (2010) investigated whether individual differences in dispositional mindfulness are associated with brain activity (using fMRI) elicited during reappraisal of negative emotion. Their findings replicated and confirmed previous studies: reappraisal induced activity within the frontal networks of the brain, predominantly the dorsolateral prefrontal cortex, dorsomedial prefrontal cortex and the anterior cingulate cortex. Furthermore, their study revealed that the tendency to be more dispositionally mindful is associated with increasing activation of the dorsomedial
prefrontal cortex, “indicating that more mindful individuals reported more reappraisal success” (p. 7). An inverse relationship was present between the prefrontal activation of the brain and the amygdala response to negative stimuli, further supporting that the emotion-generation regions of the brain (i.e., amygdala) are down-regulated (decreased response) (Modinos et al., 2010).

Herwig and colleagues (2010) took a different approach to investigating neural emotion processing via brain activity using an fMRI. Instead of exposing participants to external negative or positive stimuli, the participants in their study performed a task while being scanned with fMRI, consisting of periods of cognitive self-reflection, introspection of their own feelings and emotions, and a neutral condition. Cognitive self-reflection refers to thinking about oneself (autobiographical contents) and emotion introspection is becoming aware and focusing on bodily sensations and current emotions. The experimental conditions indicated distinct activations in the medial and ventrolateral prefrontal areas, parietal regions and amygdala. Furthermore, the emotion-introspection and the control conditions were associated with decreased amygdala activity, indicating an attenuating influence on emotional arousal (Herwig, Kaffenburger, Lancke, & Bruhl, 2010). Herwig and colleagues proposed that the self-awareness component of emotion-introspection has similar features to mindfulness.

**Mindfulness and Working Memory Capacity**

No studies to date have investigated the relationship between dispositional mindfulness and working memory capacity. Three studies, though, have documented a correlation between mindfulness training and working memory capacity (Chambers, Lo, & Allen, 2008; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Zeidan, Johnson,
Diamond, David, & Goolkasian, 2010). Jha et al. (2010) studied the potential benefits of an 8-week mindfulness-based mental fitness program adapted for U.S. Marine reservists who were activated and preparing for deployment. The purpose was to determine if mindfulness practice could counteract the depleting effects of the stressful and cognitively challenging demands of predeployment on working memory capacity and emotional experience. The research demonstrated a positive improvement in working memory capacity in the Marines with a high amount of mindfulness meditation practice time, whereas working memory capacity deteriorated over time from baseline with those who had a low amount of mindfulness meditation practice time. Working memory capacity remained relatively the same in the civilian control group but degraded in the military control group who were training for deployment (Jha et al., 2010). These investigators also found that positive affect improved in those who had a high meditation practice time but was not mediated by working memory capacity, whereas negative affect decreased with those who had a high meditation practice time, and was found to be mediated by working memory capacity. Important to note is that emotion regulation strategies were not assessed during this study, only the affect experience of the Marines.

Zeidan et al. (2010) investigated the effects of a four-day mindfulness retreat (20 minutes/day of mindfulness meditation) on working memory capacity and mood compared to an active control group that listened to an audio book. Both groups improved in measures of mood; however, the mindfulness intervention group also improved in measures of fatigue, anxiety, visuo-spatial processing, executive functioning, and working memory (assessed by a computer instrument called the “n-back task” that assesses working memory, information processing, and attention).
Chambers et al. (2008) investigated the effects of a 10-day mindfulness retreat on working memory capacity and affective function. Working memory capacity was measured via the Digit Span Backward subscale of the Wechsler Adult Intelligence Scale. Results indicated significant improvements in working memory capacity of the meditators following the retreat versus a non-meditating control group.

**Working Memory Capacity and Emotion Regulation**

Previous research has focused primarily on examining the effects of emotional states on working memory capacity, but very little empirical research has investigated the effects of working memory capacity on the ability to regulate emotions (Schmeichel, Volokhov, & Demaree, 2008). A series of studies conducted by Schmeichel and colleagues (2008) examined the relationship between individual differences in working memory capacity and the regulation of expressing emotions and the experience of emotions. Overall, their studies revealed that working memory capacity is an important cognitive factor for emotion regulation. Specifically, they found that individuals with higher levels of working memory capacity correlated with successful suppression of expressing negative emotion. Second, higher levels of working memory capacity also correlated with suppressing positive emotional expressions. Third, the results indicated that working memory capacity modulated the ability to adopt neutral cognitive appraisals of negative emotional stimuli.

**Summary**

A review of the literature revealed several themes: (1) mindfulness, emotion regulation and working memory capacity are associated with each other; (2) there are intrapersonal and interpersonal differences in mindfulness, emotion regulation and
working memory capacity; (3) there are biological underpinnings of mindfulness, emotion regulation and working memory capacity which support that they may physiologically influence each other; and (4) there is a lack of empirical research examining these variables and the relationships between them within a prelicensure nursing student population. A proposed model was developed suggesting an association between mindfulness and emotion regulation as well as the regulatory process of working memory capacity. The relationship between the predictor (dispositional mindfulness) and the outcome variable (emotion regulation) is grounded in theory based on the literature review. Implicit in this model is the assumption that dispositional mindfulness, emotion regulation strategies, and working memory capacity are present in varying degrees within prelicensure nursing students. This study analyzed these variables to examine how emotion regulation is influenced by dispositional mindfulness and explores whether working memory capacity influences prelicensure nursing students’ ability to regulate their emotions.
CHAPTER IV: METHODOLOGY

Methods

Chapters one, two, and three, presented the rationale, conceptual framework, and literature review for the study of the relationship between mindfulness, working memory capacity and emotion regulation. The review of the literature supports the hypothesis that a relationship exists between mindfulness and emotion regulation and that this relationship may be mediated by working memory capacity, suggesting that further research in this area is warranted. The proposed methodology for examining these relationships and the hypothesized mediation model is explained in this chapter. Research design, study setting, instruments, data collection and statistical procedures are outlined.

Aims

The purpose of this study was to address a serious gap in the nursing education literature by exploring the relationships between mindfulness and emotion regulation, giving consideration to the mediating role of working memory capacity among baccalaureate nursing students. In addition, differences were explored between these relationships based on education level (Junior I, Junior II, Senior I, Senior II semester levels).
Research Design

A between-groups descriptive, cross-sectional study was completed during a nine-week period between September and November 2012. The participants completed a set of self-report instruments of mindfulness and emotion regulation as well as a cognitive test assessing working memory capacity.

Study Setting and Sample

The study was conducted at Georgia Southern University (GSU) in Statesboro, Georgia. This institution is a public university located in southeastern Georgia. A convenience sample was recruited from prelicensure Junior and Senior BSN students at Georgia Southern University. A total of 191 BSN nursing students are enrolled in the Junior I, Junior II, Senior I and Senior II semesters, with approximately 48 students on average enrolled in each class cohort level. For 2012, the prelicensure BSN nursing student population at Georgia Southern University was 88% female and 12% male, with an average age of 22.5 ± 4.945 years.

Sample Size Determination. The sample size was calculated based on a population size of 200, a margin of error (confidence interval) of 3, a confidence level of 95%, and a standard deviation of 13.70 from a previous study conducted using the AOSPAN instrument (Unsworth, et al, 2005). A sample size of 60 participants was calculated using the above statistical information (Scheader, Mendenhall, & Ott, 2006). To be included in the study, participants were required to achieve an 85% accuracy rate on the AOSPAN. Anticipating that 10% of candidates would not achieve this accuracy rate, the final sample size was determined to be 66 participants; however, the sample size
was rounded up to have equal cohort sizes of 17 nursing students per cohort. Thus the final sample size was 68 nursing students.

**Recruitment and Screening**

Ethics approval was first pursued from the primary site where the research was conducted, Georgia Southern University, with a request for expedited review. Following approval by the Georgia Southern University Institutional Review Board (GSU Protocol H12372, Appendix D), reciprocal approval was obtained from the Human Assurance Committee at Georgia Health Sciences University (GHSU).

Recruitment commenced once approval was granted by both institutions during the Fall 2012 semester. The participants were recruited and informed that the purpose of the study was to “Study the relationships between nursing student’s memory/attention, emotions and coping with everyday life.” Students were notified of the study through personal announcements in class, e-mail, brochures, and fliers posted in the nursing building hallways. The printed recruitment material contained information about the purpose of the study and answers to anticipated questions the students might have regarding the study. See Appendix G for the brochure and Appendix H for the flier.

The primary investigator only interacted with the Junior II, Senior I and II cohort levels for recruitment and data collection, whereas a graduate research assistant completed the recruitment and data collection for the Junior I cohort level. The purpose of this was due to concerns of perceived coercion by the Junior I students since the PI taught this cohort in several of their courses. Recruitment was conducted on a weekly basis until the participation goal was reached.
**Inclusion and Exclusion Criteria**

Inclusion Criteria included the following: (a) male or female, 18 years or older from any ethnic group; (b) enrolled at Georgia Southern University; c) academic standing as a Junior I through Senior II (d) English-speaking; (e) literate (able to read the instruments); (f) no self-disclosed current diagnosed psychiatric illness; (g) willing to complete an informed consent process; (h) willing to complete study data collection forms and tests; and (i) an 85% accuracy rate on the AOSPAN.

Individuals were excluded if: (a) they intended to withdraw from Georgia Southern University within the next 4 weeks; (b) their academic standing was a Freshman I through Sophomore II student or a graduate student; or (c) they were deemed ‘disabled’ by the Georgia Southern University Student Disability Resource Center (i.e., have learning/hearing/visual disabilities that require accommodations). No students were excluded from the study based on the previous criteria except for five participants whose data did not meet the AOSPAN criteria for inclusion.

**Instruments**

The study instruments included measures of dispositional mindfulness, emotion regulation, and working memory capacity. Participants completed two self-report instruments, Mindful Attention Awareness Scale (MAAS) and Emotion Regulation Questionnaire (ERQ); one computer cognitive test called the Automated Operation Span Task (AOSPAN); and a demographic questionnaire (Appendix C). Demographic data obtained information to determine if participants were similar in characteristics to the prelicensure nursing student population. Table 3 summarizes the instruments, and the published alphas, range and standard deviations.
Table II.

*Instrumentation Subscales, Published Alpha Coefficients, and Score Range*

<table>
<thead>
<tr>
<th>Instrument</th>
<th># of Items</th>
<th>Subscales</th>
<th>Alphas</th>
<th>Range</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mindful Attention Awareness Scale (MAAS) - Trait</td>
<td>15</td>
<td>N/A</td>
<td>0.80 - 0.90</td>
<td>1-6</td>
<td>M = 3.83 (SD = .70)</td>
</tr>
<tr>
<td>Emotion Regulation Questionnaire (ERQ)</td>
<td>10 total 64</td>
<td>Reappraisal</td>
<td>0.79</td>
<td>1-7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Suppression</td>
<td>0.73</td>
<td></td>
<td>Overall (suppression)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Men</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M = 3.64 (SD =1.11)</td>
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<td></td>
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<td></td>
<td></td>
<td>Women</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>M = 3.14 (SD =1.18)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Overall (Reappraisal)*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Men</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M = 4.6 (SD = 0.94)</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Women</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M = 4.61 (SD =1.02)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*Not statistically different between genders</td>
</tr>
<tr>
<td>Automated Operation Span (AOSPAN) Task</td>
<td>Computer test</td>
<td>N/A</td>
<td>0.78</td>
<td>N/A</td>
<td>M = 55.25 (SD =13.70)</td>
</tr>
<tr>
<td>Demographic Questionnaire</td>
<td>12</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
**Self-Report Instruments**

**Mindful Attention Awareness Scale (Appendix A).** The participants completed the Mindful Attention Awareness Scale (MAAS), a self-report measure of dispositional mindfulness, specifically the focal characteristics of mindfulness: open and receptive awareness of and attention to what is taking place in the present moment. Two clinical psychology professors from the University of Rochester, Kirk Warren, Ph.D., and Richard Ryan, Ph.D., developed the MAAS and published the psychometric results in “The Benefits of Being Present: Mindfulness and Its Role in Psychological Well-being” (2003).

The MAAS is a 15 item, 6-point Likert scale designed to assess a core characteristic of mindfulness, namely, a receptive state of mind in which attention, informed by a sensitive awareness of what is occurring in the present; simply observe what is taking place. The MAAS has frequently been used for assessing mindfulness, which is helpful when attempting to compare and review results of many studies.

Each participant was instructed to indicate how frequently they had experienced each listed statement on the questionnaire. The instructions for completing the questionnaire stated: “Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be” (Brown & Ryan, 2003, p. 826). The anticipated time to complete this questionnaire was 10-15 minutes, which was advantageous for researchers who are administering numerous questionnaires and want to prevent fatigue in participants. Other strengths of the MAAS include the
following: (a) it has been tested and found to be a reliable instrument for college-age and
general adult populations; (b) it can discriminate between mindfulness practitioners and
non-practitioners; and (c) it can predict day-to-day self-regulation and numerous well-
being outcomes (Brown & Ryan, 2003; Carlson & Garland, 2005).

Normative information is available for a college student population (14
independent samples) with $N = 2277$, $M = 3.83$, $SD = 0.70$ (Brown & Ryan, 2003). Factor
analyses confirmed a single factor with undergraduate and community populations.
Internal consistency levels (Cronbach’s alphas) generally range from 0.80 to 0.90. The
MAAS has demonstrated high test-retest reliability, discriminant and convergent validity,
and criterion validity (Brown & Ryan, 2003). To calculate the MAAS score, the mean of
the 15 items is scored. Higher scores reflect higher levels of dispositional mindfulness.

**Emotion Regulation Questionnaire (Appendix B).** The participants completed
the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), a 10-item self-report
measure of emotion regulation consisting of two subscales of emotion regulation
strategies: reappraisal and suppression. The *reappraisal* category consisted of six
statements (e.g., “I control my emotions by changing the way I think about the situation
I’m in.”) and assessed the extent to which a person modifies their emotional response by
changing the way they view a particular situation. The *suppression* category consisted of
four statements (e.g., “I control my emotions by not expressing them.”) and assessed the
extent to which a person inhibits their external expression of internal emotions. The
responses are based on a Likert scale of 1 (strongly disagree) to 7 (strongly agree).
Reliability is reported to be 0.79 for reappraisal and 0.73 for suppression (Gross & John,
2003). The test-retest reliability across three months was 0.69 for both subscales (Gross
The questionnaire was initially tested within four samples of undergraduate students (n = 1483) and found to have similar effect sizes averaging about one-half of a standard deviation (Cohen’s $d = .47$) (Gross & John, 2003). Results also indicated that minority status is associated with greater use of suppression, and that the European-Americans employed the least use of suppression to regulate emotions (Gross & John, 2003). There are gender differences on the suppression subscale but not on the reappraisal subscale (Gross & John, 2003). There were no ethnic or gender differences in use of reappraisal to regulate emotions (Gross & John, 2003). Significant discriminant validity was demonstrated between the ERQ scales and a variety of measures, including rumination, personality, and coping measures (Gross & John, 2003). Higher scores reflect higher levels of use of the emotion regulation strategies.

**Demographic Form (Appendix C).** The participants also completed a Demographic Form that collected descriptive information about the study sample (i.e., cohort level, gender, age, race, education, marital status, current employment status, and experiences of mind-body techniques).

**Cognitive Instrument**

**Automated Operation Span Task.** The participants completed the Operation Span Task, a test used to index working memory capacity. Laboratory tasks for assessing working memory attempt to measure the important components of storing information over short intervals while resisting distraction (Jha, Stanley, & Baime, 2010). One widely used working memory span task is the automated version of the Operation Span Task (AOSPAN) that is mouse-driven, requires little intervention by the primary investigator and scores itself (Unsworth, Heitz, Schrock, & Engle, 2005). The AOSPAN correlates
well with other measures of working memory capacity, with both good internal consistency (alpha = 0.78) and test-retest reliability (0.83) (Unsworth, Heitz, Schrock, & Engle, 2005).

The AOSPAN required participants to remember unrelated letters while verifying simple math statements. The participant first completed a practice session of the task, broken down into three separate components. The first practice component was simply recalling letters in the same order as they were presented. A letter was displayed on a computer screen for 800 msec. Next, the participant saw a screen that had a 4 x 3 matrix of the letters (F, H, J, K, L, N, P, Q, R, S, T, and Y). The participant attempted to recall the correct order of the letters presented on the previous screen. Recall involved clicking a box next to the appropriate letters in the correct order (Unsworth et al., 2005).

The second component of the practice session involved simple math problems. The participant solved a simple math problem as quickly as possible and then clicked the mouse to advance to the next screen where a digit was presented. The participant clicked on either “true” or “false” to indicate if the digit matched the solution to the math problem. The mean time to complete this practice portion was calculated automatically by the computer program. This practice time, plus 2.5 standard deviations, was used as a time limit for the math portion of the experimental session (Unsworth et al., 2005).

The third component of the practice session was performing both the letter recall and math solutions together, as the participant did in the experimental session. The participant was first presented with a simple math problem, and then clicked the mouse to advance to the next screen to indicate if the digit they saw matched the solution by clicking on “true” or “false.” Once selected, the screen advanced to a screen displaying a
letter that needed to be recalled. The next math problem was presented. If the participant exceeded the time limit in solving the math problem (their average practice time plus 2.5 standard deviations), the program automatically advanced and counted the trial as an error. This time limit prevented the participant from mentally rehearsing the letters when they should be solving the math problem. The participant completed three practice trials of a set size of 2.

After completing all three components of the practice session, the AOSPAN program progressed to actual experimental trials. The participant completed three sets of each set size, recalling the letters in the correct serial order, ranging from three to seven letters to be recalled. The program continued until three sets of each set size was presented. A total of 75 letters were recalled along with 75 math problems. Participants had to achieve an 85% accuracy recall rate to ensure that the participants attempted to fully participate in solving both the math operations and remembering letters. The program reported five scores to the primary investigator at the conclusion of the task: AOSPAN score, total number correct, math errors, speed errors, and accuracy errors. An AOSPAN score was based on the sum of all recalled letters from letter sets that were recalled without error in the correct order. The AOSPAN task took approximately 20-25 minutes to complete. Figure 3 illustrates the above described progression of the AOSPAN and also the screen image that the participants viewed.
Figure 3. Illustration of the Automated Operation Span Task. (Unsworth, Heitz, Schrock, & Engle, 2005). During the task, first a simple math operation was presented. After the participant solved the operation mentally, they clicked the mouse and the screen advanced. A number was presented and the participant answered the operation to be correct or incorrect. The screen automatically advanced to the next screen where a letter was presented for 800 msec (e.g. P in the illustration above). Next, the screen again progressed automatically to a screen that asked the participant to recall the correct letters from the current set, in the correct order. After recall, feedback was presented for 2,000 msec. Then subsequent sets of operations were presented in various sizes from 2 to 7 letters.

Data Collection Procedures

Data was collected once for each participant. Data collection for the entire sample occurred over a period of nine weeks during the Fall 2012 semester. The participants signed up for a research time slot through Google Calendar. Directions on how to sign up
were on the recruitment brochures and demonstrated in person by the PI and research assistant when they visited respective classes to recruit participants.

Upon arrival at the research room, located in the Georgia Southern University School of Nursing building, the participant read the Consent Form (Appendix F). Questions from the participant were answered at that moment. Next, each participant was assigned a participant number to ensure anonymity of the data and the number was written down on an index card for them to reference during the next step. The participant moved to one of the assigned computers to begin data collection.

The instruments were then administered to the participants in the following order: MAAS, ERQ, Demographic Form and AOSPAN. The MAAS, ERQ and Demographic Form was hosted by SurveyMonkey® (SurveyMonkey, Inc., Palo Alto, CA). The participants entered their participant number at the beginning of each instrument to ensure that the data was collected from each participant. The PI or research assistant gave verbal instructions on how to progress from one instrument to the next one. Once the three measures were completed, the participant raised their hand to indicate they were finished. Next, the PI or research assistant set up the AOSPAN on the same computer and directed the participant to carefully read the instructions on the screen. Each participant was given new ear plugs and instructed to insert them into their ears. The participants completed the AOSPAN and raised their hand to indicate when they were done. The PI/research assistant then gave them a 4G Georgia Southern University flash drive as compensation for their participation.
Protection of Human Subjects

Since the research was conducted at Georgia Southern University, the IRB approval process was first completed at Georgia Southern University even though the PI was a doctoral student at Georgia Health Sciences University. Once approval was granted by the Georgia Southern University IRB, an IRB Authorization Agreement and the IRB supporting documents were sent to Georgia Health Sciences University, Human Assurance Committee. The IRB Authorization Agreement Form was signed by both institutions.

There were minimal risks associated with this study. Participants may have encountered psychological discomfort from taking an hour of out of their busy schedule to participate. They may also have felt some discomfort completing the questionnaires and the computer working memory test due to disclosing demographic information, reflecting about how mindful they were, what emotion regulation strategies they use, and paying attention for 20-25 minutes to complete the computerized working memory capacity test. The participants may also have felt uncomfortable knowing that one of the nursing instructors was conducting this research study, and perceived that there was no confidentiality with participation and results. Since the PI taught the Junior I level, the Junior I cohort students may have perceived that volunteering or not volunteering might influence their course grades.

There was very low risk of data being associated with an individual participant since each participant’s study data was assigned a unique number (de-identified). Participants did not enter their name into the instruments on SurveyMonkey®, only the assigned identification number. There was minimal social risk present in the form of
social pressure from their classmates to participate or not to participate in the study. No known physical, legal, or financial risks were present for the participants.

Data from SurveyMonkey® was password protected and downloaded via a secure internet connection to a password protected computer. The data was stored in an electronic data base (Excel) with only the participant identification number. The Consent Forms were sealed in an envelope and stored in a locked file cabinet. The electronic data and Consent Forms will be kept for seven years as required by IRB, at which point they will be shredded or destroyed.

Since college students are a vulnerable population, efforts were made to ensure that the participants did not feel vulnerable or coerced to participate. They were notified in the Consent Form that they could withdraw at any time without consequence. The participant’s data, participation or nonparticipation was not shared with any faculty. The study was announced and discussed with the participants in a non-coercive manner. If a participant had questions, the questions were answered in a private area away from other students and outside of class. The PI taught the Junior I level cohort pre-licensure baccalaureate nursing students at Georgia Southern University. To prevent perception of coercion, the PI did not interface with the Junior I cohort subjects. A research assistant conducted all of the recruitment, data collection and de-identification of subjects from this cohort level. The subjects were informed of these extra measures and assured that the PI did not have access to Junior I participant names until after grades were posted.

Data Analysis

Statistical analyses were performed using Statistical Analysis Software (SAS), Version 9.3 (SAS Institute Inc., 2011) and Linear Structural Relations (LISREL), Version
8.80 (Jöreskog & Sörbom, 2006). Statistical significance was set at a probability (p) value of less than 0.05 for all analyses. The types of data generated for analysis were:

1. extent of mindfulness (MAAS) = interval level data
2. magnitude of emotion regulation processes employed (ERQ) = interval level data
3. extent of working memory capacity (AOSPAN score) = interval level data
4. demographic data such as cohort level of nursing student (Junior I, Junior II, Senior I, Senior II) = interval level data, continuous.

The research specific aims, hypotheses, variables of interest, and analyses are summarized in Table 4.

**Data Preparation**

First, to ensure that data are not out-of-range, the data entry was set up to alert the primary investigator if data did not fit the specified range for each instrument.

**Descriptive Statistics**

Descriptive statistics were obtained from participant demographics and the scales of interest on all the instruments (MAAS, ERQ, AOSPAN) to provide a profile of the participants and to determine if the class cohorts were similar in characteristics. Sample characteristics that are categorical variables (i.e., gender, class level, marital status) were described as percentages. Sample characteristics that are continuous variables (i.e., age, number of hours worked) were reported as mean and standard deviation. Cronbach’s alpha coefficients were computed to explore the reliability of each instrument for the sample and compared to published Cronbach’s alpha coefficients. The data analyses included descriptive statistics of the data, reliability estimation, correlation analysis and
analysis of variance using SAS, as well as a partial mediation tests: Structural Equation Modeling using LISREL (Version 8.80) and multiple linear regression tests using SAS.

**Hypotheses Testing**

The primary aim of the study was to examine the relationship between mindfulness, working memory capacity, and emotion regulation in a nursing student population enrolled in a prelicensure nursing program. Mediation analysis techniques were used to clarify the relationships between these three constructs. Specifically, this study tested a mediation hypothesis about the direct and indirect relationships between mindfulness and emotion regulation via working memory capacity. Figure 4 illustrates the conceptual model. The ellipses represent the latent variables of the model, meaning that they cannot be measured directly because they are not directly observed. The relationship between these latent variables is represented graphically by a one-way arrow, indicating that a variable at the beginning of the arrow predicted the variable at the end of the arrow (Raykov & Marcoulides, 2006).
Figure 4. A Mindfulness Model of Emotion Regulation in Nursing Students: Working memory capacity as a Regulatory Mechanism. A proposed theoretical mediation model in which there is an association between mindfulness and emotion regulation that may be explained in part by the cognitive regulatory mechanism of working memory capacity.

Figure 5 represents the empirical model that corresponds to the latent variables (Mindfulness, Emotion Regulation, Working Memory Capacity) for statistical analysis. The rectangles represent the observed variables that are measured and manifest performance on the questionnaires (MAAS and ERQ) and the working memory capacity test (AOSPAN). They are proxies or indicators of the latent variables (Raykov & Marcoulides, 2006). Figure 5 depicts the models illustrating the direct and indirect effects of mindfulness on emotion regulation.
Figure 5. Mediation Model. Path diagrams depicting a direct pathway (a) where $c$ is the overall effect of the Mindfulness on Emotion Regulation (ERQ-Reappraisal score). Path diagram (b) depicts an indirect pathway through partial mediation. The mediator is working memory capacity (AOSPAN score) where $c'$ is the effect of the Mindfulness on Emotion Regulation controlling for working memory capacity; $b$ is the effect of working memory capacity on Emotion Regulation; $a$ is the effect of Mindfulness on working memory capacity. In each path, the independent variable is Mindfulness (MAAS score) and the dependent variable is emotion regulation (ERQ-Reappraisal score).
### Table III

**Specific Aims, Hypotheses, Variables of Interest, and Data Analyses**

**Specific Aim 1:** Determine the correlation between mindfulness, working memory capacity and two indicators of emotion regulation (reappraisal and suppression) among prelicensure nursing students at Georgia Southern University.

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Variable</th>
<th>Analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypothesis 1.1:</strong></td>
<td>MAAS (Interval)</td>
<td>Pearson Product-Moment Correlation Coefficient</td>
</tr>
<tr>
<td>Mindfulness will exhibit a</td>
<td>ERQ – Reappraisal (Interval)</td>
<td></td>
</tr>
<tr>
<td>significant positive</td>
<td>ERQ – Suppression (Interval)</td>
<td></td>
</tr>
<tr>
<td>correlational relationship</td>
<td>AOSPAN (Interval)</td>
<td></td>
</tr>
<tr>
<td>with working memory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>capacity.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 1.2:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mindfulness will exhibit a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>significant positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>correlational relationship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with emotion regulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(reappraisal).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 1.3:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mindfulness will exhibit a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>significant negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>correlational relationship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with emotion regulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(suppression).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 1.4:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working memory capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>will exhibit a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>significant positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>correlational relationship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with emotion regulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(reappraisal).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 1.5:</strong></td>
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</tr>
<tr>
<td>Working memory capacity</td>
<td></td>
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</tr>
<tr>
<td>will exhibit a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>significant positive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>correlational relationship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with emotion regulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(suppression).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Specific Aim 2: Determine how much mindfulness and working memory capacity influence emotion regulation (reappraisal) using a series of linear regression tests.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Variable</th>
<th>Analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypothesis 2.1:</strong></td>
<td><strong>Independent Variable:</strong></td>
<td>Multistage linear regression analysis using the Baron &amp; Kenny Approach</td>
</tr>
<tr>
<td></td>
<td>MAAS (Interval)</td>
<td>(1986):</td>
</tr>
<tr>
<td></td>
<td><strong>Mediator:</strong></td>
<td>Step 1:</td>
</tr>
<tr>
<td></td>
<td>AOSPA (Interval)</td>
<td>Emotion Regulation (reappraisal) is regressed on Mindfulness to test the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hypothesis that the antecedent, Mindfulness, is a cause of the mediator,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working Memory Capacity.</td>
</tr>
<tr>
<td></td>
<td><strong>Outcome Variable:</strong></td>
<td>Step 2:</td>
</tr>
<tr>
<td></td>
<td>ERQ – Reappraisal (Interval)</td>
<td>Working memory capacity is regressed on Mindfulness to test the hypothesis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>that the antecedent, Working Memory Capacity, is related to Emotion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Regulation (Reappraisal) when Mindfulness is controlled.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Step 4: Multiple regression analysis is conducted with Mindfulness and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Working Memory Capacity predicting Emotion Regulation.</td>
</tr>
</tbody>
</table>
**Specific Aim 3:** Examine the relationships between nursing student educational level and mindfulness, working memory capacity, and two indicators of emotion regulation (reappraisal and suppression).

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Variable</th>
<th>Analyses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypothesis 3.1</strong></td>
<td><strong>Independent</strong></td>
<td></td>
</tr>
<tr>
<td>There will be a significant</td>
<td>Level in nursing school (Categorical)</td>
<td>One-way ANOVA with post-hoc comparison tests (Bonferroni correction) to prevent Type I errors.</td>
</tr>
<tr>
<td>difference in mean MAAS</td>
<td>• Junior I cohort level</td>
<td></td>
</tr>
<tr>
<td>scores between the education</td>
<td>• Junior II cohort level</td>
<td></td>
</tr>
<tr>
<td>levels.</td>
<td>• Senior I cohort level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Senior II cohort level</td>
<td></td>
</tr>
<tr>
<td><strong>Outcome Variable:</strong></td>
<td>MAAS (Interval)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ERQ – Reappraisal (Interval)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ERQ – Suppression (Interval)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AOSPAN (Interval)</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 3.2</strong></td>
<td><strong>Independent</strong></td>
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</tr>
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<td>Level in nursing school (Categorical)</td>
<td>One-way ANOVA with post-hoc comparison tests (Bonferroni correction) to prevent Type I errors.</td>
</tr>
<tr>
<td>difference in mean AOSPAN</td>
<td>• Junior I cohort level</td>
<td></td>
</tr>
<tr>
<td>scores between the education</td>
<td>• Junior II cohort level</td>
<td></td>
</tr>
<tr>
<td>levels.</td>
<td>• Senior I cohort level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Senior II cohort level</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 3.3</strong></td>
<td><strong>Independent</strong></td>
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</tr>
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<td>Level in nursing school (Categorical)</td>
<td>One-way ANOVA with post-hoc comparison tests (Bonferroni correction) to prevent Type I errors.</td>
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<td>difference in mean ERQ-R</td>
<td>• Junior I cohort level</td>
<td></td>
</tr>
<tr>
<td>scores between the education</td>
<td>• Junior II cohort level</td>
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</tr>
<tr>
<td>levels.</td>
<td>• Senior I cohort level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Senior II cohort level</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 3.4</strong></td>
<td><strong>Independent</strong></td>
<td></td>
</tr>
<tr>
<td>There will be a significant</td>
<td>Level in nursing school (Categorical)</td>
<td>One-way ANOVA with post-hoc comparison tests (Bonferroni correction) to prevent Type I errors.</td>
</tr>
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<td>difference in mean ERQ-S</td>
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<tr>
<td>scores between the education</td>
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<td></td>
</tr>
<tr>
<td>levels.</td>
<td>• Senior I cohort level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Senior II cohort level</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER V: RESULTS

Out of the 191 undergraduate nursing students enrolled in the prelicensure program at Georgia Southern University, 85 (44.5%) participated in this study. Five of these participants were excluded because they did not meet the math accuracy criteria for the AOSPAN. Therefore, data from a total n = 80 nursing students were analyzed for this study.

Sample Demographics

The sample demographics are summarized in Table IV. All demographic results are reported as mean ± standard deviation or frequency with percentage. The majority of the participants were female (n = 72; 90%), ranging in age from 20 to 52 years (23 ± 5 years). The cohort sizes were slightly unequal: 24% were Junior I’s (n = 19), 24% Junior II’s (n = 19), 22.5% Senior I’s (n = 18), and 30% Senior II’s (n = 24). Of the 80 total participants, 86% were single (n = 69), 13% married (n = 10) and 1% divorced (n = 1). Furthermore, 77% were Caucasian (n = 62), 10% were African American (n = 8), 6% were Hispanic/Latino (n = 5), and 2% were Asian (n = 2). Ninety-six percent reported that English was their primary language (n = 77). The majority of the students reported having no children, 90% (n = 73). The majority reported not being employed, 64% (n = 51) and 36% reported working part-time from 1 to 20 hours per week (n = 29), with very few working more than 20 hours per week, 3% (n = 3). Eighty percent have completed some post-secondary education (n = 64). Forty-nine percent live with unrelated friends (n = 39) and 18% live with their parents (n = 14). Seventy-four percent reported
previous experience with praying (n = 59), 60% experienced yoga (n = 48), and 19% have practiced meditation (n = 15), while 60% reported praying (n = 48), 21% experienced yoga (n = 17), and 5% practiced meditating (n = 4) during the last six months.

Table IV

*Descriptive Statistics for Demographic Variables (n = 80).*

<table>
<thead>
<tr>
<th>Continuous variable</th>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>22.90</td>
<td>5.44</td>
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</table>

<table>
<thead>
<tr>
<th>Discrete variable</th>
<th>Variable</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cohort level</td>
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<td>19</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Junior II</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Senior I</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Senior II</td>
<td>24</td>
<td>30</td>
</tr>
<tr>
<td>Gender</td>
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<td>10</td>
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<td></td>
<td>Female</td>
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<td>90</td>
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<td>86</td>
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<td></td>
<td>Separated</td>
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<td>0</td>
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<tr>
<td></td>
<td>Divorced</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
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<td>0</td>
</tr>
<tr>
<td></td>
<td>Married</td>
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<td>13</td>
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<tr>
<td>Race</td>
<td>African-American</td>
<td>8</td>
<td>10</td>
</tr>
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<td></td>
<td>Asian</td>
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<td>3</td>
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<td></td>
<td>Caucasian</td>
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<td>Hispanic/Latino</td>
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<td>0</td>
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<td></td>
<td>Pacific Islander</td>
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<td>0</td>
</tr>
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<td></td>
<td>Other</td>
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<td>4</td>
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<tr>
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<td>96</td>
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<td>91</td>
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<td>3</td>
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<td>4</td>
</tr>
<tr>
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<td>3</td>
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<td>3</td>
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<td>Employed?</td>
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<td>64</td>
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<td>5-8 hours</td>
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<td>------------------------</td>
<td>--------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>10</td>
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<td></td>
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<td></td>
<td>0</td>
<td>11</td>
<td>9</td>
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<tr>
<td>Family Structure</td>
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<td>Live with spouse/partner</td>
<td>Live with spouse/partner &amp; children</td>
</tr>
<tr>
<td></td>
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<td>7</td>
<td>7</td>
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<td>9</td>
<td>9</td>
<td>9</td>
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<tr>
<td>Previous experience with mind-body techniques (Multiple response)</td>
<td>Meditation</td>
<td>Yoga</td>
<td>Qi-gong</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>48</td>
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<td></td>
<td>19</td>
<td>60</td>
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<td>Consistency of mind-body techniques</td>
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<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td></td>
<td>73</td>
<td>27</td>
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</tr>
<tr>
<td>Mind-body techniques with consistency (Multiple response)</td>
<td>Meditation</td>
<td>Yoga</td>
<td>Qi-gong</td>
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<td>4</td>
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<td></td>
<td>5</td>
<td>21</td>
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</table>
Descriptive Statistics of Variables

The descriptive statistics for all of the variables used in the analysis are shown in Table V. The mean and standard deviation values were evaluated for each instrument. For the self-report instruments: MAAS = 3.48 ± 0.73, ERQ-R = 4.82 ± 0.99, and ERQ-S = 3.00 ± 1.25. The mean score for the working memory capacity instrument (AOSPAN) was 55.55 ± 12.20. The reliability of MAAS, ERQ-R, and ERQ-S was calculated using the Cronbach’s alpha coefficient. Their reliability was acceptable since the Cronbach’s alpha coefficient values for all three instruments (MAAS, ERQ-R, ERQ-S) were much greater than the suggested value of 0.7 given by Nunnally and Bernstein (1994).

Table V

Descriptive Statistics for Main Variables (n = 80).

<table>
<thead>
<tr>
<th>Continuous Variable</th>
<th>Range</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
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<tbody>
<tr>
<td>MAAS</td>
<td>1.6 - 5.53</td>
<td>3.48</td>
<td>0.73</td>
</tr>
<tr>
<td>AOSPAN</td>
<td>20 - 75</td>
<td>55.55</td>
<td>12.20</td>
</tr>
<tr>
<td>ERQ-R</td>
<td>1.17 - 7</td>
<td>4.82</td>
<td>0.99</td>
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<tr>
<td>ERQ-S</td>
<td>1 - 6.5</td>
<td>3.00</td>
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<thead>
<tr>
<th>Discrete Variable</th>
<th>Frequency</th>
<th>Percent (%)</th>
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<tr>
<td>Maintain &gt; 85% math accuracy for AOSPAN</td>
<td>Yes</td>
<td>80</td>
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<td></td>
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Table VI

Cronbach’s Alpha Coefficient Values for Each Instrument.

<table>
<thead>
<tr>
<th></th>
<th>MAAS</th>
<th>ERQ-R</th>
<th>ERQ-S</th>
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<tbody>
<tr>
<td>Cronbach’s alpha</td>
<td>0.8672</td>
<td>0.8246</td>
<td>0.8159</td>
</tr>
</tbody>
</table>
Testing Specific Aims and Hypotheses

Specific Aim 1. The first aim of this study was to determine the correlation between mindfulness, working memory capacity and two indicators of emotion regulation (reappraisal and suppression) among prelicensure nursing students at Georgia Southern University. To test the correlation between MAAS, AOSPN, ERQ-R, and ERQ-S, one-tailed tests for the Pearson correlation coefficients were performed at the level of significance 0.05. The Pearson correlation coefficient results are listed in Table VII, followed by specific results per hypothesis.

Table VII

Pearson Correlation Coefficient between MAAS, AOSPAN, ERQ-R, and ERQ-S Scores.

<table>
<thead>
<tr>
<th></th>
<th>AOSPAN</th>
<th>ERQ-R</th>
<th>ERQ-S</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAAS</td>
<td>0.2977</td>
<td>0.1905</td>
<td>-0.0713</td>
</tr>
<tr>
<td></td>
<td>(0.004)*</td>
<td>(0.045)*</td>
<td>(0.265)</td>
</tr>
<tr>
<td>AOSPAN</td>
<td>-0.0219</td>
<td></td>
<td>-0.1190</td>
</tr>
<tr>
<td></td>
<td>(0.424)</td>
<td></td>
<td>(0.147)</td>
</tr>
<tr>
<td>ERQ-R</td>
<td></td>
<td>-0.161</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.077)</td>
<td></td>
</tr>
</tbody>
</table>

*( ) denotes ≤ 0.05 p-value

---

1 Since the sample size (n = 80) is enough to assume the normality of the distribution of sample correlation coefficient, tests for the Pearson correlation coefficient are reasonable in this dataset.
**Hypothesis 1.1.** The hypothesis that MAAS exhibits a significant positive correlational relationship with AOSPAN was accepted, since a significant correlation was found between MAAS and AOSPAN (0.2977; \( p = 0.004 \)).

![Figure 6](image1.png)

*Figure 6.* Correlation between MAAS and AOSPAN Scores. A significant statistical positive correlational relationship between MAAS and AOSPAN exists, although this relationship is very weak (\( r = 0.2977; p = 0.004 \)).

**Hypothesis 1.2.** The hypothesis that MAAS exhibits a significant positive correlational relationship with ERQ-R was accepted, since a significant correlation was found between MAAS and ERQ-R (0.1905; \( p = 0.045 \)).

![Figure 7](image2.png)

*Figure 7.* Correlation between MAAS and ERQ-R Scores. A significant statistical positive correlational relationship between MAAS and ERQ-R exists, although this relationship is very weak (\( r = 0.1905; p = 0.045 \)).
**Hypothesis 1.3.** The hypothesis that MAAS exhibits a significant negative corralational relationship with ERQ-S was rejected, since a non-significant correlation was found between MAAS and ERQ-S (- 0.0713; p = 0.265).

*Figure 8. Correlation between MAAS and ERQ-S Scores. No significant corralational relationship was found between MAAS and ERQ-S. (r = - 0.0713; p = 0.265).*

**Hypothesis 1.4.** The hypothesis that AOSPAN exhibits a significant positive corralational relationship with ERQ-R was rejected, since no significant correlation was found between AOSPAN and ERQ-R (-0.0219; p = 0.424).

*Figure 9 Correlation between AOSPAN and ERQ-R Scores. No significant corralational relationship was found between AOSPAN and ERQ-R. (r = - 0.0219; p = 0.424).*
**Hypothesis 1.5.** The hypothesis that AOSPAN exhibits a significant positive correlational relationship with ERQ-S was rejected, since no significant correlation was found between AOSPAN and ERQ-S ($r = -0.1190; p = 0.147$).

*Figure 10.* Correlation between AOSPAN and ERQ-S Scores. No significant correlational relationship was found between AOSPAN and ERQ-S ($r = -0.1190; p = 0.147$).

**Specific Aim 2.** The second aim of this study was to determine how much mindfulness and working memory capacity influence emotion regulation (reappraisal) using a series of linear regression tests. Mediation analyses are methods to increase understanding of how one variable (M) transmits the effect of an independent variable (X) on a dependent variable (Y). In this study, only one independent variable, one dependent variable and one mediator were denoted in a mediation path model. See Figure 11 for the path diagram corresponding to the mediation hypothesis. Each concept was represented by a single score that is proposed to measure the concept. Initially, the multistage linear regression technique using the Baron and Kenny approach (B & K approach) for determining the mediation effect was proposed (Baron & Kenny, 1986). However, Structural Equation Modeling (SEM) may also be used for determining
mediation effects. Recently, statisticians suggested that SEM was a superior approach for assessing mediation questions (Bagozzi & Yi, 2012; Iacobucci, Saldanha & Deng, 2007). Therefore, both the SEM and B & K approaches were performed to answer Specific Aim 2 and also to compare and contrast findings.

**Baron and Kenny approach.** The Baron and Kenny approach (1986) was conducted using SAS (Statistical Analysis Software) Version 9.3 (SAS Institute Inc., 2011). Table VIII outlines the steps, general regression model equations, study regression model equations, and the visual representation of this approach.

The purpose of steps 1-3 is to establish causality and confirm an association among the variables. If one of these steps is nonsignificant, then mediation is not likely. For example, if path a (between X and M) or path b (between M and Y) is not significant, there is said to be no mediation; therefore, all the variance in Y attributable to X is direct and not mediated through M (Iacobucci, 2008). If steps 1-3 are significant, step 4 is conducted to determine if full or partial mediation is present. Full mediation occurs if X is no longer significant when M is controlled. Whereas, partial mediation occurs if X is still significant while both X and M significantly predict Y (MacKinnon et al., 2007). Next, the indirect pathway and its significance are calculated by using the Sobel Method (product of coefficients method) (MacKinnon et al., 2007), which is computing the product of two coefficients: $\beta_1$ in Step 2 (path a) and $\beta_2$ in Step 4 (path b). Therefore, $\beta_{\text{indirect}} = (\beta_1) (\beta_2)$. The Sobel method is an equivalent approach to computing the difference between two coefficients: $\beta_1$ in Step 1 (path c) and $\beta_1$ in Step 4 (path c’). Therefore, $\beta_{\text{indirect}} = c – c'$. Lastly, the regression coefficient for the indirect effect is
tested for significance. $\beta_{\text{indirect}}$ is divided by the standard error of the product and compared to a standard normal distribution (MacKinnon et al., 2007).

Table VIII

**Summary of Baron and Kenny Approach (MacKinnon, Fairchild & Fritz, 2007)**

<table>
<thead>
<tr>
<th>Steps</th>
<th>Analysis</th>
<th>Visual Representation</th>
</tr>
</thead>
</table>
| Step 1 | Determine if a significant relationship exists between the independent variable and the dependent variable; testing path $c$ alone.  
$Y = \beta_0 + \beta_1X + \epsilon$  
$ERQ-R = \beta_0 + \beta_1MAAS + \epsilon$ | ![Diagram](https://via.placeholder.com/150) |
| Step 2 | Determine if the independent variable significantly predicts the hypothesized mediating variable; testing path $a$.  
$M = \beta_0 + \beta_1X + \epsilon$  
$AOSPAN = \beta_0 + \beta_1MAAS + \epsilon$ | ![Diagram](https://via.placeholder.com/150) |
| Step 3 | Determine if the hypothesized mediating variable significantly predicts the dependent variable; testing path $b$ alone.  
$Y = \beta_0 + \beta_1M + \epsilon$  
$ERQ-R = \beta_0 + \beta_1AOSPAN + \epsilon$ | ![Diagram](https://via.placeholder.com/150) |
| Step 4 | Determine if a significant relationship exists between the mediator and the dependent variable when both the independent variable and the mediating variable are predictors of the dependent variable.  
$Y = \beta_0 + \beta_1X + \beta_2M + \epsilon$  
$ERQ-R = \beta_0 + \beta_1MAAS + \beta_2AOSPAN + \epsilon$ | ![Diagram](https://via.placeholder.com/150) |

$\beta_0$ (bets) are the intercepts  
$\beta_1$ and $\beta_2$ (bets) are regression coefficients capturing the relationship between the variables  
$\epsilon$ (epsilons) are term errors
The first step of the Baron and Kenny approach examined the relationship of the independent variable (MAAS) to the dependent variable (ERQ-R) without taking into account the mediator (AOSPAN) [path c as shown in Figure 11, (a)]. Results indicated that MAAS scores directly predicted ERQ-R scores ($\beta = 0.258, p < 0.05$).

Figure 11. Mediation Path Model. Path diagram (a) depicting a direct pathway where Path $c$ is the direct effect of Mindfulness on Emotion Regulation (ERQ-Reappraisal score). Path diagram (b) depicts an indirect pathway through mediation. The mediator is Working Memory Capacity (AOSPAN score) where Path $c'$ is the effect of the Mindfulness on Emotion Regulation controlling for Working Memory Capacity; Path $b$ is the effect of Working Memory Capacity on Emotion Regulation; Path $a$ is the effect of Mindfulness on Working Memory Capacity. Together, Path $a$ and Path $b$ (shown in light gray) are the indirect effect of MAAS on ERQ-R.

The second step examined the relationship between the independent variable (MAAS) and the mediator (AOSPAN) (path $a$) and indicated that MAAS scores predicted AOSPAN scores ($\beta = 4.975, p < 0.05$). The third step examined the relationship
between the mediator (AOSPAN) and the dependent variable (ERQ-R) (path b) while not controlling statistically for the independent variable. The results indicated that AOSPAN did not predict ERQ-R (β = -0.002, p = 0.423). The fourth step examined the total effect of the independent variable (MAAS) and the mediator (AOSPAN) on the dependent variable (ERQ-R) and indicated that MAAS predicted ERQ-R (β₁ = 0.292, p <0.05). The fourth step also indicated that effect of AOSPAN while controlling MAAS was not significant (β₂ = -0.007, p = 0.231). The indirect effect of MAAS through AOSPAN was the product of β₁ in Step 2 and the β₂ in Step 4 by the Sobel method (4.975 x -0.007 = -0.03). Table IX outlines the study regression model equations and results of each step conducted in a series of linear regression tests.

Table IX

Test Results of Baron & Kenny Approach.

<table>
<thead>
<tr>
<th>Step</th>
<th>Regression model</th>
<th>Coefficient</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>ERQ-R = β₀ + β₁MAAS + ε</td>
<td>β₀</td>
<td>3.927</td>
<td>0.534</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>β₁</td>
<td>0.258</td>
<td>0.150</td>
<td>0.045*</td>
</tr>
<tr>
<td>Step 2</td>
<td>AOSPAN = β₀ + β₁MAAS + ε</td>
<td>β₀</td>
<td>38.240</td>
<td>6.421</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>β₁</td>
<td>4.975</td>
<td>1.807</td>
<td>0.004*</td>
</tr>
<tr>
<td>Step 3</td>
<td>ERQ-R = β₀ + β₁AOSPAN + ε</td>
<td>β₀</td>
<td>4.922</td>
<td>0.521</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>β₁</td>
<td>-0.002</td>
<td>0.009</td>
<td>0.423</td>
</tr>
<tr>
<td>Step 4</td>
<td>ERQ-R = β₀ + β₁MAAS + β₂AOSPAN + ε</td>
<td>β₀</td>
<td>4.194</td>
<td>0.646</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>β₁</td>
<td>0.292</td>
<td>0.158</td>
<td>0.034*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>β₂</td>
<td>-0.007</td>
<td>0.009</td>
<td>0.231</td>
</tr>
</tbody>
</table>

*denotes ≤ 0.05 p-value

Hypothesis 2.1. The hypothesis that AOSPAN partially mediated the effect of MAAS on ERQ-R is not likely, since Step 3 in the Baron & Kenny approach was not significant at the 0.05 level of significance (p = 0.4234).
Figure 12. Path diagrams with the Baron & Kenny Results. Step 1: The total effect of MAAS on ERQ-R was significant, Path c, $\beta = 0.258$, $p = 0.045^*$; each one incremental increase of MAAS predicted approximately a quarter increment increase in ERQ-R. Step 2: MAAS was significantly predictive of the hypothesized mediating variable, AOSPAN, Path a, $\beta = 4.975$, $p < 0.004^*$; each one incremental increase of MAAS predicted approximately an increase by five of AOSPAN. Step 3: When controlling for MAAS, AOSPAN was not significantly predictive of ERQ-R; Path b, $\beta = -0.002$, $p = 0.423$. Step 4: The estimated direct effect of MAAS on ERQ-R, controlling for AOSPAN, was significant; Path c', $\beta_1 = 0.292$, $p = 0.034^*$.

**Structural Equation Model Approach.** The model was examined with LISREL, version 8.80 (Jöreskog & Sörbom, 2006). A model without latent variables was assumed in this analysis; hence path analysis using SEM was conducted. A path model analysis was conducted examining the observed variables (MAAS, AOSPAN, ERQ-R). Figure 13 illustrates the path diagram with structural equation modeling notations. Prior to conducting the SEM analysis, the data was examined to determine if it met the
assumptions of normality, linear relationships, and no multicollinearity. The data was confirmed to have normal distributions by the Kolmogorov-Smirnov Test. By examination of the correlation scatterplots of the AOSPAN and ERQ-R and MAAS and ERQ-R, no obvious nonlinear patterns were present. The Pearson correlation coefficient between AOSPAN and MAAS was only 0.2977. Usually, if their correlation is higher than 0.8, a multicollinearity problem would be present. However, in this case, since 0.2977 was much lower than 0.8, multicollinearity was not likely.
Figure 13. Path Diagram with SEM Notation.
Directly observable and measured variables are enclosed in rectangular boxes.
An exogenous variable (independent variable) is represented by $X$.
Endogenous variables (dependent variables) are represented by $Y$'s.
The single headed arrow represents structural parameters (regression coefficients) with the exogenous variable at the tail of the arrow and the endogenous variable at the head of the arrow.
$\gamma$ (gamma): structural coefficient of association between an endogenous and exogenous variable.
$\beta$ (beta): structural coefficient of association between two endogenous variables.
Subscript protocol: first number refers to the ‘destination’ variable, while second number refers to the ‘origination’ variable.
$\zeta$ (zeta): Error term for endogenous variables.

In this model, both ERQ-R ($Y_1$) and AOSPAN scores ($Y_2$) are the exogenous variables (dependent variables). MAAS ($X_1$) is the endogenous variable (independent variable). To specify the model, a separate equation is written for each endogenous variable (dependent variable). For ERQ-R, $Y_1 =$

$$Y_1 = \beta_{12}Y_2 + \gamma_{11}X_1 + \zeta_1$$

Degree of ERQ-R is a weighted function of AOSPAN plus a weighted function of MAAS plus error.
For AOSPAN, $Y_2 =$

$$Y_2 = \gamma_{21}X_1 + \zeta_2$$

Degree of AOSPAN is a weighted function of MAAS plus error.

For this study, the SEM equations and test results are outlined in Table X. The path model with the SEM results is labeled in Figure 14. The indirect effect was calculated by the multiplication of all estimates of coefficients on the path. That is, the indirect effect of MAAS on ERQ-R, -0.03, was obtained by $-0.007 \times 4.975 = -0.03$.

Table X

*Test Results of SEM Approach*

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficient</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERQ-R = $\beta_{12}$AOSPAN + $\gamma_{11}$MAAS + $\zeta_1$</td>
<td>$\beta_{12}$</td>
<td>-0.007</td>
<td>0.009</td>
<td>0.2311</td>
</tr>
<tr>
<td></td>
<td>$\gamma_{11}$</td>
<td>0.292</td>
<td>0.158</td>
<td>0.034*</td>
</tr>
<tr>
<td></td>
<td>$\text{Var}(\zeta_1)$</td>
<td>0.93</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AOSPAN = $\gamma_{21}$ MAAS + $\zeta_2$</td>
<td>$\gamma_{21}$</td>
<td>4.975</td>
<td>1.8707</td>
<td>0.004*</td>
</tr>
<tr>
<td></td>
<td>$\text{Var}(\zeta_2)$</td>
<td>135.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect effect of MAAS on ERQ-R</td>
<td>-0.03</td>
<td>0.05</td>
<td></td>
<td>0.236</td>
</tr>
</tbody>
</table>

$\beta$ indicates regression coefficient for paths between endogenous variables.

$\gamma$ indicates regression coefficients for paths between exogenous variables and endogenous variables.

$\zeta_1$ and $\zeta_2$ are structural error terms associated with endogenous variables.

* denotes $\leq 0.05$ level of significance.
Figure 14. Path Diagram with SEM Results. The estimated direct effect of MAAS on ERQ-R, controlling for AOSPAN, was significant; $\gamma_{11} = 0.292$, $p = 0.034$. For mediation path associations, MAAS was significantly predictive of the hypothesized mediating variable, AOSPAN; $\gamma_{21} = 4.975$, $p = 0.004$; whereas, when controlling for MAAS, AOSPAN was not significantly predictive of ERQ-R; $\beta_{12} = -0.007$, $p = 0.2311$. The indirect effect of MAAS on ERQ-R was not significant; $\beta = -0.03$, $p = 0.236$. Circles indicate error terms for each observed variable.

**Hypothesis 2.1.** The hypothesis that AOSPAN partially mediated the effect of MAAS on ERQ-R is not likely, since the effect of AOSPAN on ERQ-R ($\beta_{12}$) and the indirect effect of MAAS on ERQ-R was not significant at the 0.05 level of significance.

**Specific Aim 3.** The third aim of this study was to examine the relationships between nursing student educational level and mindfulness, working memory capacity,
and two indicators of emotion regulation (reappraisal and suppression). To test these relationships, a one-way ANOVA model was used to test these relationships at a 0.05 level of significance. For multiple post-hoc comparisons, the Bonferroni correction was used to correct Type I errors (0.05). ANOVA results are outlined in Table XI.

Table XI

Results of ANOVA by Education Levels.

<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>F value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAAS</td>
<td>4.12</td>
<td>0.0092*</td>
</tr>
<tr>
<td>AOSPAN</td>
<td>0.32</td>
<td>0.8114</td>
</tr>
<tr>
<td>ERQ-R</td>
<td>1.97</td>
<td>0.1248</td>
</tr>
<tr>
<td>ERQ-S</td>
<td>0.10</td>
<td>0.9609</td>
</tr>
</tbody>
</table>

* denotes ≤ 0.05 level of significance

Hypothesis 3.1. The hypothesis that there will be a significant difference in mean MAAS scores between the education levels was accepted, since a significant difference in mean MAAS scores was found, F(3, 76) = 4.12, p < 0.05. The means and standard deviation of MAAS for each education level are listed in Table XII. The multiple comparisons of MAAS between education levels are listed in Table XIII. Figure 13 illustrates the mean differences of MAAS between cohort levels. Significant group differences were found between MAAS and the educational levels (p = 0.0092). Posthoc testing found that the Junior I MAAS score (3.84) was significantly higher than the Senior II MAAS score (3.18). This finding indicated that the mean MAAS score was significantly different from the first semester nursing students to the last semester nursing students.
Table XII

Mean and Standard Deviation of MAAS Scores for Each Education Level.

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior I</td>
<td>3.84</td>
<td>0.75</td>
</tr>
<tr>
<td>Junior II</td>
<td>3.31</td>
<td>0.88</td>
</tr>
<tr>
<td>Senior I</td>
<td>3.69</td>
<td>0.55</td>
</tr>
<tr>
<td>Senior II</td>
<td>3.18</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Table XIII

Multiple Comparisons of MAAS Scores between Education Levels.

<table>
<thead>
<tr>
<th>Educational level comparison</th>
<th>Difference between means</th>
<th>Simultaneous 95% confidence intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior I – Junior II</td>
<td>0.5298</td>
<td>[-0.0769, 1.1365]</td>
</tr>
<tr>
<td>Junior I – Senior I</td>
<td>0.1499</td>
<td>[-0.4652, 0.7650]</td>
</tr>
<tr>
<td>Junior I – Senior II</td>
<td>0.6545</td>
<td>[0.0803, 1.2288]*</td>
</tr>
<tr>
<td>Junior II – Senior I</td>
<td>-0.3799</td>
<td>[-0.9950, 0.2352]</td>
</tr>
<tr>
<td>Junior II – Senior II</td>
<td>0.1247</td>
<td>[-0.4495, 0.6990]</td>
</tr>
<tr>
<td>Senior I – Senior II</td>
<td>0.5046</td>
<td>[-0.0785, 1.0877]</td>
</tr>
</tbody>
</table>

* denotes ≤ 0.05 level of significance

Figure 15. Mean MAAS score for each education level. The score range of the MAAS instrument is 1-6; 1 indicating “almost always” and 6 indicating “almost never” in response to instrument questions. The star denotes that the Junior I MAAS score was significantly higher than the Senior II MAAS score $F(3, 76) = 4.12, p < 0.05.$ The trend line indicates a decrease in mean MAAS scores from first semester nursing students to last semester nursing students.
**Hypothesis 3.2.** The hypothesis that there will be a significant difference in mean AOSPAN scores between the education levels was rejected. There were no significant differences in the mean AOSPAN scores between education levels ($p = 0.8114$).

![Graph of AOSPAN scores](image)

*Figure 16.* Mean AOSPAN score for each education level. The range of the AOSPAN instrument is 1-75. There were no significant differences of mean AOSPAN scores between education levels, $F (3, 76) = 0.32, p = 0.8114$. The trend line indicates a horizontal line across all nursing student cohorts.

**Hypothesis 3.3.** The hypothesis that there will be a significant difference in mean ERQ-R scores between the education levels was rejected. There were no significant differences in the mean ERQ-R scores between education levels ($p = 0.1248$).

![Graph of ERQ-R scores](image)

*Figure 17.* Mean ERQ-R score for each education level. The range of the ERQ-R instrument is 1-7; 1 indicating “strongly disagree” and 7 indicating “strongly agree” in response to instrument questions. There were no significant differences of mean ERQ-R scores between education levels, $F (3, 76) = 1.97, p = 0.1248$. The trend line indicates a
decrease in mean ERQ-R from first semester nursing students to last semester nursing students but this was not statistically significant.

**Hypothesis 3.4.** The hypothesis that there will be a significant difference in mean ERQ-S scores between the education levels was rejected. There were no significant differences in the mean ERQ-S scores between education levels ($p = 0.9609$).

![Figure 18](image)

*Figure 18.* Mean ERQ-S score for each education level. The range of the ERQ-S instrument is 1-7; 1 indicating “strongly disagree” and 7 indicating “strongly agree” in response to instrument questions. There were no significant differences of ERQ-S between education levels, $F (3, 76) = 0.10, p = 0.9609$. The trend line indicates a horizontal line across all nursing student education levels.

A summary of the hypotheses results are listed on the next page in Table XIV.
Table XIV

*Summary Results of Hypotheses Testing*

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypothesis 1.1</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Mindfulness will exhibit a significant positive correlational relationship with working memory capacity.</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 1.2</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Mindfulness will exhibit a significant positive correlational relationship with emotion regulation (reappraisal).</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 1.3</strong></td>
<td>No</td>
</tr>
<tr>
<td>Mindfulness will exhibit a significant negative correlational relationship with emotion regulation (suppression).</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 1.4</strong></td>
<td>No</td>
</tr>
<tr>
<td>Working memory capacity will exhibit a significant positive correlational relationship with emotion regulation (reappraisal).</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 1.5</strong></td>
<td>No</td>
</tr>
<tr>
<td>Working memory capacity will exhibit a significant positive correlational relationship with emotion regulation (suppression).</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 2.1</strong></td>
<td>No</td>
</tr>
<tr>
<td>Working memory capacity will partially mediate the effect of mindfulness on emotion regulation.</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 3.1</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>There will be a significant difference in mean MAAS scores between the education levels.</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 3.2</strong></td>
<td>No</td>
</tr>
<tr>
<td>There will be a significant difference in mean AOSPAN scores between the education levels.</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 3.3</strong></td>
<td>No</td>
</tr>
<tr>
<td>There will be a significant difference in mean ERQ-R scores between the education levels.</td>
<td></td>
</tr>
<tr>
<td><strong>Hypothesis 3.4</strong></td>
<td>No</td>
</tr>
<tr>
<td>There will be a significant difference in mean ERQ-S scores between the education levels.</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER VI: DISCUSSION

This study produced several important findings concerning the relationships between mindfulness, emotion regulation, and working memory capacity. Specifically, the findings showed how emotion regulation was influenced by dispositional mindfulness and how working memory capacity mediated the relationship between mindfulness and emotion regulation (reappraisal) in prelicensure nursing students. This chapter discusses the relevance of these findings, addresses the implications for nursing education and provides recommendations for future research.

Relevance of Findings

Demographic Characteristics

The demographic characteristics of the study sample were similar to the concurrent pre-licensure nursing student population at Georgia Southern University. The majority of sampled students were female, Caucasian and of similar age to the overall nursing student population. Therefore, the study sample was representative of the Georgia Southern University prelicensure nursing student population. A comparison of the sample and population characteristics is shown in Table XV.
Table XV

Comparison of Sample and Population Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Sample (n=80)</th>
<th>Population (N=191)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent (%)</td>
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<tr>
<td><strong>Cohort level</strong></td>
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<td></td>
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<tr>
<td>Junior I</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>Junior II</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>Senior I</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td>Senior II</td>
<td>24</td>
<td>30</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>Male</td>
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<td>10</td>
</tr>
<tr>
<td>Female</td>
<td>72</td>
<td>90</td>
</tr>
<tr>
<td><strong>Race</strong></td>
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<td></td>
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<td>African-American</td>
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<td>10</td>
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<td>Asian</td>
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<td>3</td>
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<td>Caucasian</td>
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<td>Hispanic/Latino</td>
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<td>6</td>
</tr>
<tr>
<td>Native American</td>
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<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td></td>
<td>22.90</td>
<td>5.44</td>
</tr>
</tbody>
</table>

In regard to their previous experience practicing mind-body techniques, most of the students self-reported some experience with yoga (n = 48, 60%), praying (n = 59, 74%), and meditation (n = 15, 19%). When asked about their more recent experience of mind-body techniques (in the past six months), overall usage dropped by 51%, suggesting that time constraints and/or other factors such as school workload may have adversely influenced practice patterns of these forms of mindfulness. One would not expect this to drop since the majority of the sample did not work while attending school (n = 41, 64%). This information suggests that students may have a difficult time consistently integrating mind-body techniques like meditation into their current school and work schedule. Other barriers may hinder their ability to practice; therefore, more research exploring
possible obstacles needs to be conducted if an intervention program such as Mindfulness-based Stress Reduction will be incorporated into a nursing curriculum.

**Instruments**

For the MAAS instrument, students self-reported their levels of mindfulness on a Likert scale of 1 to 6; higher scores represented higher levels of dispositional mindfulness. The mean MAAS score for the participants was 3.48, indicating that the students rated themselves as more mindful than not. However, this mean MAAS score was lower than reported in the literature of a college student population (3.83 ± 0.70; Brown & Ryan, 2003). The nursing students have less self-reported dispositional mindfulness compared to other college students, which may suggest that nursing students are not like other college students; less mindful in comparison to other college students.

For the ERQ instrument measuring emotion regulation, students self-reported their use of reappraisal and suppression as emotion regulation strategies on a Likert scale from 1 to 7; higher scores represented higher use of strategies. The mean ERQ-R (Reappraisal) score was 4.82 ± 0.99 meaning that the study participants saw themselves using reappraisal as an emotion strategy slightly more than the neutral level. However, this ERQ-R score is slightly higher than that reported in the literature of a college student population (4.61 ± 1.02; Gross & John, 2003). The nursing students reported using reappraisal slightly more compared to other college students, which may suggest that nursing students are different than college students studying other disciplines. This finding warrants further investigation to determine if it is similar to nursing students at other universities or if it is a unique finding to this sample.
The mean ERQ-S (Suppression) score for the participants was 3.00 ± 1.25, meaning that the study participants saw themselves using suppression as an emotion strategy slightly lower than the scale median (4 – neutral); rating themselves closer to a rating of “strongly disagree” on the suppression use statements. This ERQ-S score is slightly lower than that reported in the literature for college student populations (3.14 ± 1.18; Gross & John, 2003). The nursing students report using suppression slightly less compared to other college students. The results need to be cautiously reviewed since self-report questionnaires can be biased if the students want to be viewed in the best light (Polit & Beck, 2008).

For the instrument measuring working memory capacity, AOSPAN, the nursing students scored on average 55.55 ± 12.20 (range 20-75). This result was closely similar to another study that investigated the reliability and validity of the AOSPAN in a college age population (55.25 ± 13.70; Unsworth et al., 2005). In contrast, the average AOSPAN score from this study is higher than the average AOSPAN score of Marines who meditated (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010). The Marines’ working memory capacity was evaluated twice and compared, baseline and post meditation intervention (AOSPAN score at T1 was 36.17 vs. T2 was 32.59). The Marine meditation training groups were further divided into two subgroups based on a median split (MT-high practice time vs. MT-low practice time). However, researchers did not report the mean scores of the AOSPAN for each sub-group, only collectively, so it is difficult to know what the high-practice-time meditators’ AOSPAN score was pre and post intervention. (Jha, Stanley, Kiyonaga, & et al., 2010).
Specific Aim 1

The first specific aim, determine the correlation between mindfulness, working memory capacity and two indicators of emotion regulation (reappraisal and suppression) among prelicensure nursing students at Georgia Southern University was examined by testing the correlational relationship between each concept.

Hypothesis 1.1

The findings in this study confirmed the hypothesis that dispositional mindfulness exhibited a significant positive correlational relationship with working memory capacity. However, this correlational relationship is very weak despite its statistical significance, particularly since a stronger relationship was expected based on theoretical support from preliminary research. Three studies documented a correlation between mindfulness training and working memory capacity (Chambers, Lo, & Allen, 2008; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). Only the study conducted by Jha et al. (2010), though, examined working memory capacity using the AOSPAN instrument. These investigators reported a correlation between mindfulness meditation practice time and AOSPAN scores ($r = 0.37, p < .05$), but not between self-reported mindfulness (MAAS) and AOSPAN scores. The correlation findings from this study ($r = 0.2977; p = 0.004$) were lower than Jha’s results (2010) and may suggest that there is truly a very weak relationship between mindfulness and WM, or that self-report instruments of mindfulness are not a valid instrument compared to mindfulness meditation practice time.

More recently, one study examined the relationship between dispositional mindfulness and working memory capacity using the MAAS and AOSPAN
measurements (Black, Semple, Pokhrel, & Grenard, 2011). This study was conducted with medical students (n = 28) and found no significant relationship between these measurements (r = 0.4, p > 0.5). Considering that the nursing students’ self-reported mindfulness scores were lower than other college students (medical students’ MAAS scores not reported from Black et al. study), the findings from this study may suggest that there was really a weak correlation for the nursing students since their MAAS scores were lower; that the sample size was insufficient; or indicate poor validity of the measurements.

**Hypothesis 1.2**

The findings in this study confirmed the hypothesis that mindfulness exhibited a significant positive correlational relationship with emotion regulation (reappraisal). Even though there was a statistical significant relationship, this was still a very weak relationship; particularly that it was expected to be higher based on previous neurological studies. These studies showed support for a neural relationship between dispositional mindfulness and the use of regulating emotions by reappraisal (Creswell et al., 2007, Modinos et al., 2010). Therefore, other factors must be considered that could have influenced the results of this study, such as the limitations of self-report questionnaires (i.e., social desirability response bias).

**Hypothesis 1.3**

The findings in this study failed to confirm the hypothesis that mindfulness exhibited a significant negative correlational relationship with emotion regulation (suppression), meaning that mindfulness and emotion regulation (suppression) have no relationship with each other. Thus, despite these two constructs being antithetical of each
of other, the results did show that there is a very weak negative relationship between them. The results were expected to show a larger negative correlation. These findings could suggest that a low level of dispositional mindfulness was not as negatively correlated with suppression than if the level of dispositional mindfulness was higher. If the students had self-reported higher levels of dispositional mindfulness or suppression, the correlation between them may have shown a more significant negative correlation. Therefore, several conclusions could be drawn: that dispositional mindfulness may not be theoretically opposite of suppression as proposed but rather no theoretical relationship between each other; that the sample size was insufficient to determine a significant negative correlation; or that the self-report instruments were not valid.

**Hypotheses 1.4 and 1.5**

The findings in this study failed to confirm the hypothesis that working memory capacity exhibited a positive correlational relationship with both emotion regulation (reappraisal) and emotion regulation (suppression). While the results revealed a weak negative correlation between working memory capacity and emotional regulation (reappraisal) as well as with emotion regulation (suppression), these relationships were not statistically significant. These finding were somewhat consistent with previous findings by Schmeichel, Volokhov, and Demaree (2008). Specifically, they found that individuals with higher levels of working memory capacity correlated with successful suppression of negative and positive emotional expression. These investigators also found that working memory capacity modulated the ability to adopt neutral cognitive appraisals of negative emotional stimuli. Interestingly, Schmeichel and colleagues also found that when participants were not given specific instructions on how to regulate their
emotions, but rather in a spontaneously manner regulated their emotions without
guidance, no significant correlation was found between working memory capacity and
emotion suppression.

Several reasons could explain the current study results. The participants self-
reported their trait or dispositional emotional regulation strategies and did not engage in a
ture experiment to assess their emotion regulation state abilities. Further examination is
warranted to determine if there are differences in emotion regulation when the working
memory capacity is actively engaged to regulate emotions versus self-reporting their day-
to-day strategies for regulating emotions (trait). Another alternative explanation is that
there is a positive relationship between working memory capacity and emotion regulation
(both suppression and reappraisal) for individuals who have high capacities of working
memory but not for those with low capacities.

Specific Aim 2

The second specific aim, determine how much working memory capacity
influences mindfulness and emotion regulation (reappraisal) was examined by the Baron
& Kenny approach and SEM.

Hypothesis 2.1.

The findings from this study failed to confirm the hypothesis that working
memory capacity partially mediated the effect of mindfulness on emotion regulation
(reappraisal). This study proposed a theoretical model in which mindfulness promoted
emotion regulation by cognitive-attentional control processes. As hypothesized,
mindfulness promoted emotion regulation (reappraisal), but it was a weak relationship.
Additionally, mindfulness was hypothesized to promote emotion regulation through the
cognitive information processing regulatory mechanism of working memory capacity. Mindfulness promoted working memory capacity; however, working memory capacity did not foster emotion regulation (reappraisal). Overall, the mediation analyses revealed that mindfulness directly affected reappraisal and working memory capacity due to the findings indicating that greater mindfulness was associated with greater use of reappraisal and more working memory capacity. However, working memory capacity did not promote the ability to regulate emotions through the use of reappraisal when the results showed that working memory capacity did not significantly mediate the effect of mindfulness on reappraisal. Therefore, for this study, the theoretical model proposed that a cognitive-attentive mechanism regulating emotion regulation does not hold in a nursing student population.

These findings in this study were not consistent with those found by Jha, Stanley, Kiyonaga and colleagues (2010), who reported a direct influence of greater mindfulness training time on positive affect but was not mediated by working memory capacity. Conversely, they found that greater mindfulness training time on negative affect was mediated by working memory capacity. On the other hand, their study investigated the direct and mediational effects of mindfulness training (as measured in practice time) and not dispositional mindfulness (by self-report). They did not assess the specific cognitive strategies used to regulate emotion (i.e., reappraisal or suppression), but rather the outcome of meditation practice time; having more or less positive and negative affect. Even though the results of the current study are inconsistent with Jha’s, these results do expand on their research and attempt to explain the cognitive-attentional processes that may influence emotion regulation. Even though the results suggest that mindfulness may
influence emotion regulation and working memory capacity in undergraduate nursing students, working memory capacity may not be the cognitive-attentional process that regulates emotion regulation. Further investigation with a larger sample size is warranted to determine if the results would remain the same — that working memory capacity does not regulate emotion regulation — or reveal that working memory capacity does regulate emotion regulation.

**Comparison of the SEM and Baron and Kenny Approaches for Path Analysis**

Several statistical reasons exist for using SEM rather than B & K (i.e., multistage/multiple linear regressions) approach to investigate mediation relationships in a path analysis (Iacobucci et al., 2007). The first advantage of SEM is that the estimations of the strength and direction of the relationships between the variables within the model are tested simultaneously, not separately as in the B & K approach. Secondly, the SEM technique results in reduced standard errors compared to regressions, indicating greater estimation precision and more power to detect mediation effects (Iacobucci et al., 2007). Third, SEM accounts for measurement error whereas the B & K assumes no measurement error (Iacobucci et al., 2007). Lastly, SEM can estimate indirect effects, while the B&K approach cannot (James, Mulaik, & Brett, 2006). Because this study model did not include latent variables, both the SEM and B&K approaches provide the same values of path coefficients. For example, step 4 of the B & K approach gave the same results as in the first equation of the SEM approach. Even though for this study both approaches provided the same statistical results, SEM was the preferred statistical analysis because of the advantages cited above.
Specific Aim 3

The third specific aim, *examine the relationships between nursing student educational level and mindfulness, working memory capacity, and two indicators of emotion regulation (reappraisal and suppression)*, was investigated by determining if the mean scores of the concepts differed among the education levels. If significant group differences were found, the Bonferroni post hoc test was used to determine which specific cohort levels were significantly different from each other. No a priori studies were found to predict which education levels would differ from each other when examining these relationships. Therefore, this study is the first to investigate whether differences of mindfulness exist between different education levels of pre-licensure nursing students.

Hypothesis 3.1

The results of this study confirmed the hypothesis that there was a significant difference between education levels in regard to mindfulness. The findings showed that mindfulness scores significantly differed between the education levels; specifically, the Junior I’s (first semester nursing students) had the highest score of mindfulness and the Senior II’s (last semester nursing students) had the lowest score, and that this difference was statistically significant between these two cohorts. In fact, the mean mindfulness score of all four cohort levels (measured by the MAAS test) showed a downward trend from first to last semester nursing students.

This finding indicated that the Senior II students were not as aware and attentive compared to the Junior I students. These results are troubling, especially if this trend continues downward as the students transition into their nursing career and care for
patients. They may not be aware and attentive of critical changes occurring in their patient and thus be unable to intervene early and prevent detrimental outcomes.

This lessening mindfulness may be due to students focusing on the future as they near the completion of their undergraduate education. The Senior II’s are perhaps thinking ahead to their future goals, ambitions and decisions they need to make as they transition into their career. Asking themselves what they will do after graduating. Thinking of their “to-do lists” and what must be done in the next few months. Besides being future-centric, another possible explanation is that the Senior II’s may be less mindful due to becoming less empathetic as they progressed in their clinical education; becoming less aware, attentive, accepting, and compassionate towards themselves and others.

On further analysis of the downward trend, the Senior I cohorts’ mean MAAS score was slightly higher than the previous semester cohort, the Junior II’s. The Junior I and Senior I cohorts’ mean MAAS scores were also higher than the Junior II and Senior II cohorts. Thus, these Junior I and Senior I mean MAAS scores may differ from the other cohorts because they were admitted during the fall semesters and may have different characteristics. Historically at Georgia Southern University, the Fall Semester admissions have different GPA scores and academic progression in core classes than the Spring Semester admissions. However, it is unknown if these anecdotal observations by the faculty could account for the differences in mean MAAS scores. Further investigation is warranted to explore possible influencing factors.

One must keep in mind that the current study did not have a longitudinal design, such that it did not investigate whether nursing students’ level of mindfulness declines as
they progress through the program. Rather, this study was essentially a “snapshot” comparing each cohort’s level of mindfulness against each other, and cannot infer change over time.

**Hypothesis 3.2**

The findings from this study failed to confirm the hypothesis that working memory capacity scores differed significantly among education levels. No significant differences were found in working memory capacity scores between the cohorts. On further examination, the mean AOSPAN scores were relatively the same between all four cohorts at 55.55.

Multiple factors affect working memory capacity such as increased stress, anxiety, fatigue and lack of sleep (Gohar, Adams, Gertner, Sackett-Lundeen, Heitz, Engle, Haus, & Bijwadia, 2009; Ilkowska & Engle, 2010; Klein & Boals, 2001; Steenari, Vuontela, Paavonen, Carlson, Fjällberg, & Aronen, 2003). Thus, one would expect working memory capacity to differ between education cohorts; it is just unknown which cohorts would be significantly different from each other. An encouraging finding was that working memory capacity did not decrease significantly from Junior I semester to the Senior II semester, i.e., working memory capacity did not degrade. In Jha, Stanley, Kiyonaga, and colleagues’ study (2010), the Marines’ working memory capacity depleted over their pre-deployment training, which is a very stressful and intense time for them. Similarly, one would expect that the nursing student’s working memory capacity would deplete from semester to semester as they progress in their course work, due to lack of sleep as well as multiple demands such as family, social and financial obligations.

However, the current results showed that working memory capacity scores remained
relatively the same between cohorts, suggesting that other factors did not adversely influence working memory capacity in these nursing students.

One must bear in mind that the current study did not have a longitudinal design: it did not investigate if nursing students’ working memory capacity declines as they progress through a semester (i.e., measuring working memory capacity at the beginning of a semester and again at the end, when course assignments and clinical work increase and become more demanding). Additionally, it is unknown at this time what level of working memory capacity is sufficient to effectively regulate emotions to succeed academically in nursing school and practice as a nurse.

**Hypothesis 3.3**

The findings from this study failed to confirm the hypothesis that there would be a significant difference between each level of education in regard to emotion regulation (reappraisal). No significant differences were found between the cohorts in the use of reappraisal - the extent to which a person modifies their emotional response by changing the way they view a particular situation. The overall mean of all the cohorts was 4.82 on a scale from 1-7 The ERQ-R mean scores for each cohort showed that the Junior I cohort had the highest score and the Senior II cohort the lowest one. Overall, the trend line exhibited a downward slope or decrease in the use of reappraisal from the first semester to last semester nursing students; however, this finding was not statistically significant.

Although these findings were not significant, this downward trend from 5.1 to 4.44 suggests that the experience of nursing students differed semester to semester, which may have impacted their ability to regulate their emotions using reappraisal. This finding also suggests that as students progress in the nursing program, they may experience
fatigue, frustration and powerlessness as they are enculturated into the nursing profession, becoming disillusioned about their career. Fatigue and frustration toward nursing faculty may impede the student’s energy levels (emotional exhaustion) to reinterpret a stressful situation (use reappraisal) and lead to a lack of empathy and compassion toward themselves and others.

These findings further suggest that nursing students may be at risk for a further decrease in the use of reappraisal as an emotion regulation strategy after they graduate and transition into their new profession. Finally, the Junior I students could have over-reported their use of reappraisal due to social desirability response bias.

**Hypothesis 3.4**

The findings from this study failed to confirm the hypothesis that there would be a significant difference between each level of education regarding emotion regulation (suppression). No significant differences were found between the cohorts in the use of suppression - the extent to which a person inhibits their external expression of internal emotions. The overall mean of all the cohorts was 3.0 on a scale from 1-7, indicating they used suppression less compared to reappraisal. Also, each cohort level’s use of suppression remained fairly close to this mean score and did not trend up or down as with reappraisal.

Even though these results were not statistically significant, they are encouraging because no trend was observed increasing use of suppression from first to last semester students. In other studies, a high use of suppression was correlated with increased activation of the sympathetic nervous system (Gross, 2002), negative well-being and worse interpersonal functioning (Gross & John, 2003), as well as increased risk for
anxiety and depression (Purdon, 1999; Wenzlaff & Wegner, 2000). Although evaluation of suppression was not conducted longitudinally, this finding suggests that the use of suppression remained the same throughout four semesters. Also need to consider, the nursing students may have under-reported their use of suppression due to social desirability response bias.

**Strengths of the Study**

This descriptive study is the first one to examine dispositional mindfulness, working memory capacity and emotion regulation in a nursing student population. The results are foundational to exploring factors that influence how nursing students regulate their emotions, beyond examining whether or not nursing students are stressed. This study is also the first one to investigate working memory capacity in a nursing student population. All together, the results provide preliminary support for developing and implementing mind-body interventions that can promote emotion regulation within nursing students.

**Limitations of the Study**

This study had several limitations that need to be considered when evaluating the validity and relevance of its findings.

**External Validity**

The findings in this study cannot be generalized to other pre-licensure nursing programs or other non-pre-licensure nursing programs. The sample was not randomly selected but rather a convenience sample because all nursing students at Georgia Southern University were recruited to participate and the students self-selected to participate. Additionally, failure to randomly select the sample means that the results
cannot be generalized to future incoming nursing student populations at Georgia Southern University. Even though future Georgia Southern University nursing students may be similar to this study sample in terms of age, gender, and race, the results from this study do not imply they will be similar in terms of mindfulness, working memory capacity and emotion regulation. To improve external validity, the sample would need to be randomly selected and the study replicated in the same population, future Georgia Southern University nursing student populations and other nursing student populations.

**Statistical Conclusion Validity**

This study may not have adequate statistical conclusion validity, meaning that incorrect conclusions were drawn about the relationships of the variables. For example, the results indicated that there was no mediation effect, there was no relationship found between AOSPAN and ERQ-R, and there was no significant difference between groups in the extent of working memory capacity and emotion regulation (reappraisal and suppression). These study results may indicate a Type II error (false negative), possibly due to an insufficient sample size or poor reliability of the measurements. The reliability of instruments could have been affected by extraneous “noise” such as sounds and distractions from other students who were being tested simultaneously in the research room. However, measures were taken to ensure that these external factors would not affect participants by having each of them wear ear plugs during the data collection.

**Internal Validity**

Internal validity refers to how confident investigators are in the results of the study being due to causal relationships. Since this is a non-experimental cross sectional study, it is very difficult to draw conclusions about causal or mediational relationships
between mindfulness, working memory capacity and emotion regulation. To draw
inferences about causal relationships in a mediation study, three elements are necessary:
1) concomitant variation, 2) sequential ordering of measurement, and 3) elimination of
rival explanations (Iacobucci, 2008). First, mindfulness would need to be manipulated by
implementing mindfulness training such as a Mindfulness-based Stress Reduction
program. Concomitant variation of mindfulness would lead to easier conclusions about
changes in working memory capacity and emotion regulation. Second, for a mediational
study, it is recommended that the measurements be conducted in the correct sequence of
the hypothesized relationships to link that one concept influenced another. For example,
measure mindfulness before emotion regulation, then working memory capacity. In this
study, the measurements were conducted in the recommended sequence. However, this
was completed at one setting and not at different time frames (i.e., Time 1, Time 2, and
Time 3) as recommended by Iacobucci (2007). This was not logistically feasible for
pragmatic reasons, but it does make it more difficult to establish that the independent
variable, mindfulness, affected ER and not the other way around (ER → Mindfulness).
Lastly, no other rival or alternative explanations of factors influencing a nursing student’s
emotion regulation was explored or investigated. Therefore, the results should be
examined cautiously since the study was limited in its capacity to make causal inferences
about the role of mindfulness and working memory capacity in how nursing students
regulate their emotions.

Another threat to internal validity includes self-selection bias, due to the increased
length of the data collection period. The data collection period was originally scheduled
to be done over three weeks but because the sample size was not achieved in that time
frame, the data collection time needed to be extended to nine weeks. There may be some differences in students from the ones who volunteered to participate in the beginning of the study compared to the ones who participated toward the end. The later participants may have different qualities of mindfulness, emotion regulation and working memory capacity compared to students who volunteered early in the study or not at all.

Lastly, the internal validity of the study could have been influenced by history. Since the study was conducted over nine weeks during a fall semester, confounding variables such as midterms, exams, and assignments could affect the measurements.

**Construct Validity**

The study may not have adequate construct validity: this refers to the degree to which inferences can be made about the operationalization of the study constructs to the theoretical constructs (Polit & Beck, 2008). Threats to construct validity for this study included:

a) Hawthorne Effect: Participants may have deduced the hypothesis. Several participants did inquire about the hypothesis but the primary investigator and research assistant declined to answer.

b) Social desirability response bias may also have been present because the participants may have answered differently on the self-report instruments to be viewed by the PI in a better light (i.e., look favorable or look smart), since she was a faculty member in their nursing program.

c) Some participants were apprehensive before completing the AOSPAN task and they were encouraged to do the best they could. The primary investigator and
research assistant may have unknowingly and unconsciously influenced the participants’ responses on the AOSPAN instrument.

d) Measuring each concept with just one instrument may not fully capture or reflect the concept.

e) Self-reporting on mindfulness and emotion regulation involves a metacognitive ability to observe strategies used for emotion regulation and observing the presence or absence of attentional and awareness processes. Assessing internal psychological processes via declarative knowledge poses a challenge with measurement accuracy (Coffey, Hartman, & Fredrickson, 2010; Brown, Ryan, & Creswell, 2007).

f) Confounding variables such as compassion were not investigated, to rule out alternate hypotheses that could explain the cognitive mechanism of how mindfulness influences emotion regulation.
Implications for Nursing Education

This study advanced descriptive findings that will benefit future development of interventions that nurse educators could incorporate into nursing curricula. Although this study found no significant differences between cohort levels in the nursing student’s use of reappraisal, the mean scores trended downward from first to last semester. The concern is that the use of this emotion regulation strategy could continue to decrease after graduating as they transition into their new profession and experience intense emotions like exhaustion, powerlessness, sadness, and discouragement (Erickson, 2008). Since the nature of a nurse’s work is emotionally demanding and exhausting, nursing students need to be aware of and understand the emotional demands they will encounter so they don’t professionally burn out (Erickson, 2008).

Compounding this finding is the fact that the nursing students’ level of dispositional mindfulness decreased significantly from the first semester to the last semester and overall, trended downward from semester to semester. There is also a concern that their level of mindfulness could potentially continue to decrease after graduating as they transition into the nursing profession. Consequently, they may not be prepared because of declining mindfulness and reappraisal while simultaneously encountering the emotional demands of nursing.

Therefore, nurse educators are strongly encouraged to consider implementing a mindfulness-based intervention by adapting a traditional Mindfulness-based Stress Reduction program modified for a nursing student population. The program could be modified by: (a) decreasing mindfulness practice time to a minimum of 20 minutes per day to lessen time constraints and make it easier to integrate into their busy schedules; (b)
teaching about the relevance of mindfulness as it relates to being a healthcare professional (self-awareness of emotions, self-care, compassion for self and patients); (c) emphasize how mindfulness practices could help manage emotionally demanding experiences instead of suppressing them; (d) show how stress, fatigue, and sleep deprivation affects working memory capacity, academic and clinical performance; (e) integrate mindfulness practices into the first semester of the nursing curriculum as a foundation for continual practice; and (f) thereafter, practice one-minute mindfulness breaks during class and encourage students to use this strategy throughout the day on their own.

Since mindfulness significantly predicted working memory capacity, nurse educators should also consider incorporating best teaching practices that address working memory capacity: (a) recognize that cognitive control processes like working memory capacity are critical for process-specific learning; (b) teach students how working memory capacity impacts learning from a neurocognitive perspective; i.e., help students understand strategies to enhance working memory capacity and acquire techniques to prevent the depletion of working memory capacity; (c) teach and discuss the cognitive work that nurses typically do, how interruptions and distractions affect working memory capacity and how it relates to medical errors; (d) teach nursing students about factors that can hinder their working memory capacity, such as fatigue and sleep deprivation, and ways to bolster working memory capacity by using cognitive mental training techniques like mindfulness-based interventions (Jha, Stanley, Kiyonaga, & et al., 2010).
Implications for Future Research

This study did not address how mindfulness, emotion regulation and working memory capacity changes for nursing students from the beginning of their nursing program through to their last semester and transitioning into their nursing profession after graduating. Whether these factors improve or degrade during this time frame is unknown. For example, being mindful could be even more challenging in the midst of many distractions, interruptions and chaos that occur while working. The stressors that occur during nursing school and into the first year of their career could dramatically impact their mindfulness, working memory capacity and how they regulate their emotions. Given that this time period is critical to the future success of nursing students and setting a foundation for their profession, a longitudinal study examining these factors should be explored. Furthermore, a longitudinal methodology would negate the weaknesses associated with the cross-sectional design used for this study.

Since this study was conducted over nine weeks of a fall semester, it is unknown if mindfulness, working memory capacity and emotion regulation improves, degrades or remains relatively the same over the course of a semester. These factors should be assessed at the beginning and end of a semester at two or three time points, along with exploring other factors that could possibly mediate the effect of emotion regulation strategies such as perceived stress, anxiety, fatigue, and sleep hygiene.

Researchers should also consider conducting an experiment design by implementing a modified Mindfulness-based Stress Reduction program for nursing students and comparing these participants with a control group. Assessing changes in mindfulness, emotion regulation and working memory capacity from pre to post
intervention will help determine if the relationship between them changes, and provide a basis for making stronger inferences about causality. Ideally, several studies should be conducted to establish that working memory capacity mediates the effect of mindfulness on emotion regulation. First, a mindfulness-based intervention experiment should be done to establish that a change in mindfulness impacts working memory capacity (mediator). Next, in another study, working memory capacity needs to be manipulated and its impact on emotion regulation measured (Iacobucci, 2008).

Research is currently lacking regarding the therapeutic dose of mindfulness-based interventions for different populations, health conditions and ages, especially with nursing students. Future interventional research with nursing students also needs to determine what is the therapeutic “dose” of a modified mindfulness based intervention specifically for nursing students. Future interventional studies should also compare nursing students who have low working memory capacity versus those with high working memory capacity and determine if this influences emotion regulation strategies. Additionally, what type of nursing student (low versus high levels of dispositional mindfulness) would benefit more from mindfulness-based intervention?

This study examined the relationship between dispositional mindfulness and emotion regulation and whether working memory capacity mediates this effect. However, examining rival or alternative hypotheses is also warranted. For example, working memory capacity may mediate the effect of mindfulness and emotion regulation when nursing students are actively deploying reappraisal or suppression in an emotionally demanding experiment.
Methodologically, researchers should consider examining the relationship between the latent variables (i.e., mindfulness) and the observed variables (i.e., MAAS) to strengthen construct validity. Confirmatory factor analysis would be the superior method over path analysis to evaluate the study’s theoretical model and determine the fit of the model to the data (goodness of fit statistical index) (Iacobucci, 2008). Further investigation would elucidate and determine if there was a problem with the theoretical propositions or a problem with the measurements (Munro, 2001).

Conclusions

This analysis examined the relationships between mindfulness, working memory capacity and emotion regulation in a pre-licensure nursing student sample at a southeastern Georgia university. The analysis also assessed if working memory capacity mediated the effect of mindfulness on emotion regulation and if there were differences between cohort levels related to these variables.

Even though the results indicated that there was no mediational effect, the results did suggest a weak relationship between dispositional mindfulness and emotion regulation (reappraisal) as well as a weak relationship between dispositional mindfulness and working memory capacity. The results also brought to light the existence of a significant difference in mindfulness between nursing student cohort levels. The first semester students reported the highest score of mindfulness and the last semester students reported the lowest score of mindfulness, and there was a downward trend from first to last semester.

Despite the cited limitations, the present results highlight the significant role that mindfulness can play in the use of reappraisal as an emotion regulation strategy as well as
influencing working memory capacity in nursing students. This study is the first one to examine dispositional mindfulness, emotion regulation and working memory capacity of nursing students at different education levels.

These findings have implications for nurse educators in helping nursing students to be successful while currently in nursing school and also in preparing them to be successful as they transition into their nursing profession. Managing emotional and cognitive demands appears to be a crucial component of their profession; however there is a lack of evidence in best educational practices to teach nursing students how to manage these demands within nursing. The present study serves as foundational groundwork for understanding how nursing students regulate their emotions, with the ultimate goal of developing interventions to support nursing students in meeting the emotional and cognitive challenges they will encounter as a nurse.
REFERENCES


Ljótsson, B., Hedman, E., Andersson, E., Hesser, H., Lindfors, P., Hursti, T., Rydh, S.,


APPENDIX A

Mindful Attention Awareness Scale

Day-to-Day Experiences
Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost Always</td>
<td>Very Frequently</td>
<td>Somewhat Frequently</td>
<td>Somewhat Infrequently</td>
<td>Very Infrequently</td>
<td>Almost Never</td>
</tr>
</tbody>
</table>

1. I could be experiencing some emotion and not be conscious of it until some time later. 1 2 3 4 5 6
2. I break or spill things because of carelessness, not paying attention, or thinking of something else. 1 2 3 4 5 6
3. I find it difficult to stay focused on what’s happening in the present. 1 2 3 4 5 6
4. I tend to walk quickly to get where I’m going without paying attention to what I experience along the way. 1 2 3 4 5 6
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention. 1 2 3 4 5 6
6. I forget a person’s name almost as soon as I’ve been told it for the first time. 1 2 3 4 5 6
7. It seems I am “running on automatic,” without much awareness of what I’m doing. 1 2 3 4 5 6
8. I rush through activities without being really attentive to them. 1 2 3 4 5 6
9. I get so focused on the goal I want to achieve that I lose touch with what I’m doing right now to get there. 1 2 3 4 5 6
10. I do jobs or tasks automatically, without being aware of what I’m doing. 1 2 3 4 5 6
11. I find myself listening to someone with one ear, doing something else at the same time. 1 2 3 4 5 6
12. I drive places on ‘automatic pilot’ and then wonder why I went there. 1 2 3 4 5 6
13. I find myself preoccupied with the future or the past. 1 2 3 4 5 6
14. I find myself doing things without paying attention. 1 2 3 4 5 6
15. I snack without being aware that I’m eating. 1 2 3 4 5 6
APPENDIX B
Emotion Regulation Questionnaire

Instructions:

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspect of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item please answer using the following scale:

1-----------------2-----------------3-----------------4-----------------5-----------------6-----------------

strongly disagree neutral strongly agree

1. ________ When I want to feel more positive emotion (such as joy or amusement), I change what I’m thinking about.
2. ________ I keep my emotions to myself.
3. ________ When I want to feel less negative emotion (such as sadness or anger), I change what I’m thinking about.
4. ________ When I am feeling positive emotions, I am careful not to express them.
5. ________ When I’m faced with a stressful situation, I make myself think about it in a way that helps me stay calm.
6. ________ I control my emotions by not expressing them.
7. ________ When I want to feel more positive emotion, I change the way I’m thinking about the situation.
8. ________ I control my emotions by changing the way I think about the situation I’m in.
9. ________ When I am feeling negative emotions, I make sure not to express them.
10. ________ When I want to feel less negative emotion, I change the way I’m thinking about the situation.
APPENDIX C

Demographic Data Form

ID Number ________

Instructions:

Please answer the following questions about yourself:

A. What is your age? ______

B. What is your gender?

___1. Female
___2. Male

C. What level or class are you currently in as a student?
___1. Junior II
___2. Senior I
___3. Senior II

D. What is your marital status?

___1. Married If Married, # of years: ______
___2. Divorced
___3. Separated
___4. Widowed
___5. Single (never been married)

E. What is your race?

___1. African-American
___2. Asian
___3. Caucasian
___4. Hispanic/Latino
___4. Native American
___5. Pacific Islander
___6. Other: ______________________
F. Is English your first language?
   ___1. Yes
   ___2. No

G. Ages of children living at home?
   ___1. None
   ___2. 0 to 5 years of age
   ___3. 6 to 12 years of age
   ___4. 13 to 18 years of age
   ___5. 19 to 25 years of age

H. Are you employed? (mark all that apply)
   ___1. No
   ___2. Full-time (40 hours or >)
   ___2. Part-time
      If working part-time, how many hours per week?
      1-4 hours ______
      5-8 hours ______
      9-12 hours ______
      13-16 hours ______
      17-20 hours ______
      21-24 hours ______
      25-28 hours ______
      29-32 hours ______
      33-36 hours ______
      37-39 hours ______

I. What is the highest level of education you have completed?
   ___1. Graduate; professional training with degree
   ___2. Undergraduate (4 year degree)
   ___3. Associate degree (2 year degree)
   ___4. Partial college (at least one year but without degree)
   ___5. High school graduate
   ___6. Partial high school (completion of 10th grade or more)
   ___7. Junior high school (completion of 7th, 8th, or 9th grade)
   ___8. Less than 7 years of formal education
J. What is your family structure?

___1. Live alone
___2. Live with spouse/partner
___3. Live with spouse/partner and children
___4. Live with parents
___5. Live with children
___6. Live with unrelated friends
___7. Other: __________________________________________________

K. Previous experience with any of the following mind-body modalities (check all that apply)

___1. Meditation
___2. Yoga
___3. Qi-gong
___4. Praying
___5. Labyrinth
___6. Acupuncture
___7. Herbal medications
___8. Chanting
___9. Other: _____________________________________________

L. Have you consistently practiced any of the above mind-body modalities during the last 6 months?

___1. Yes If yes, which ones?
________________________________________________________

___2. No
APPENDIX D

Georgia Southern University IRB Approval

Georgia Southern University
Office of Research Services & Sponsored Programs
Institutional Review Board (IRB)

Phone: 912-478-0843
Fax: 912-478-0719

Veazey Hall 2021
P.O. Box 8005
Statesboro, GA 30460

To: Dr. Christy Dubert
Natalie Williams

CC: Charles E. Patterson
Vice President for Research and Dean of the Graduate College

From: Office of Research Services and Sponsored Programs
Administrative Support Office for Research Oversight Committees
(IACUC/IBC/IRB)

Initial Approval Date: 03/21/12
Expiration Date: 12/30/12
Subject: Status of Application for Approval to Utilize Human Subjects in Research

After a review of your proposed research project numbered H12372 and titled "A Mindfulness Model of Emotion Regulation in Nursing Students: Working Memory Capacity as a Regulatory Mechanism," it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable. You are authorized to enroll up to a maximum of 200 subjects.

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research.

If at the end of this approval period there have been no changes to the research protocol; you may request an extension of the approval period. Total project approval on this application may not exceed 36 months. If additional time is required, a new application may be submitted for continuing work. In the interim, please provide the IRB with any information concerning any significant adverse event, whether or not it is believed to be related to the study, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator prior to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a Research Study Termination form to notify the IRB Coordinator, so your file may be closed.

Sincerely,

Eleanor Haynes
Compliance Officer
APPENDIX E

Georgia Health Sciences University
Reciprocal Agreement

INSTITUTIONAL REVIEW BOARD (IRB) AUTHORIZATION AGREEMENT

Name of Institution or Organization Providing IRB Review ("Reviewing Institution"): Georgia Southern University; IRB Registration #: 00004564; Federalwide Assurance (FWA) #00008095.

Name of Institution Relying on the Designated IRB ("Deferring Institution"): Georgia Health Sciences University; IRB Registration #: 00000150; Federalwide Assurance (FWA) #00002533.

The Officials signing below agree that Deferring Institution may rely on Reviewing Institution’s IRB for review and continuing oversight of the human subjects research protocol described below that is occurring at Reviewing Institution. This agreement is limited to the following specific protocol(s) being conducted on Reviewing Institution’s premises and is not applicable to any protocols being conducted by Deferring Institution:

Study Title (hereinafter the “Study”): A Mindfulness Model of Emotion Regulation in Nursing Students: Working Memory Capacity as a Regulatory Mechanism (GSU H12372, exp 12/30/12)

Name of Individual Investigator: Christy Dubert, PhD(c), RN

Individual Investigator’s Institutional/Organizational Affiliation: Employee of Georgia Southern University

Sponsor or Funding Agency: None

The review performed by the Reviewing Institution will meet the human subject protection requirements of Deferring Institution’s OHRP-approved FWA. Both Reviewing Institution and Deferring Institution shall abide by applicable state, federal and local requirements and each Institution remains responsible for ensuring compliance with its own IRB’s determinations and with the terms of its OHRP-approved FWA. Reviewing Institution will follow written procedures for reporting its findings and actions to appropriate officials at Deferring Institution. Relevant minutes of IRB meetings will be made available to Deferring Institution upon request. Reviewing Institution’s IRB will promptly and immediately forward to the Deferring Institution any information regarding safety, adverse events, or other relevant data. Deferring Institution’s IRB will provide to Reviewing Institution any relevant correspondence between itself and the granting agency or the federal OHRP. Communications and notices shall be directed to the following addresses and phone numbers:

Deferring Institution:

Either party may change the point of contact by providing written notice to the other party.

This Authorization Agreement is effective on the date executed by both parties below and shall remain effective throughout the approval period of the specific IRB protocol. At expiration, termination, withdrawal, suspension, or other closure of that protocol, this Authorization Agreement shall end. Either party may terminate this Agreement with or without cause by providing notice to the other party, which termination shall be effective 90 days after receipt of such notice.

This document must be kept on file by both parties and provided to the Office for Human Research Protections upon request.
The Individual Investigator is responsible for submitting the following documents to Deferring Institution: the approved protocol; any amendments; the current approved informed consent; Reviewing Institution's approval of the Study and all continuing review approvals as issued; and any decisions made by Reviewing Institution regarding the Study.

Signature of Signatory Official (Reviewing Institution):

By: [Signature]
Print Full Name: Charles E. Patterson
Institutional Title: Vice President for Research and Economic Development, Dean, Jack N. Averitt College of Graduate Studies
Date: 4/27/12

Signature of Signatory Official (Deferring Institution):

By: [Signature]
Print Full Name: Anthony J. Mulloy, Ph.D., D.O.
Institutional Title: Sr. Associate Vice President for Clinical Research Administration
Date: 5/2/12
APPENDIX F

Consent Letter

Consent and Authorization to be a Research Participant

Title: A Mindfulness Model of Emotion Regulation in Nursing Students: Working memory capacity as a Regulatory Mechanism

Principal Investigator:
Christy Dubert, PhD(c), RN: Principal Investigator

Introduction/Purpose: You are being invited to participate in a research study examining the relationship between nursing student’s memory/attention, emotions and coping with everyday life. You have received this invitation because you a nursing student in a pre-licensure baccalaureate nursing program. This research is part of my PhD dissertation at Georgia Health Sciences University (formerly Medical College of Georgia).

Participation/Duration/Time Required: Once written consent is given, you will be asked to complete three very brief questionnaires about demographics, emotions and coping with everyday life. These questionnaires may take you 10-15 minutes to complete. Following the questionnaires, you will complete a computerized memory/attention test which may take you 20-25 minutes to complete.

Discomforts and Risks: We do not anticipate that participation in this study will pose physical or psychological risks beyond what you encounter in everyday life. However, if you are uncomfortable answering a particular question, you are free to refuse to answer the question, and you are free to quit the study at any time.

Benefits: Beyond payment for your participation it is unlikely that you will directly benefit from participation in this study. However, the knowledge gained from this study may contribute to understanding factors that affect how nursing students cope with everyday life in nursing school. Results from this study will be useful for future development of programs to assist nursing students coping with nursing school and help improve the transition into nursing school and clinical practice. The results of this study may be published and/or presented at conferences without naming you as a subject. The data will be reported in aggregate form so individual answers will not be identifiable.

Statement of Confidentiality: Participant numbers will be used to record your data, and these numbers will be made available only to those researchers directly involved with this study, thereby ensuring strict confidentiality. The data from your session will only be released to those individuals who are directly involved in the research and only using your participant number. Student work will be labeled only with coded numbers. No student names will be associated with any piece or collection of work. A list of names and corresponding subject code numbers will be locked in a secured place.
• Junior I nursing students: The primary investigator will arrange to have the data collected by an independent third party (Graduate Research Assistant), so that the primary investigator does not know who participated and does not have access to consent forms until grades have been assigned and entered.

• Junior II, Senior I and Senior II nursing students: The primary investigator or a Graduate Research Assistant will collect the data. No information about participation or information collected will be shared with anyone who is not directly involved in the research study.

Right to Ask Questions: Participants have the right to ask questions and have those questions answered. If you have any questions about this study please contact the primary investigator or faculty advisor’s named below. If you have any questions regarding the research or questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-7758 or 0843.

Compensation: Other than the cost of time involved in the interviews, there are no additional costs to you for taking part in this study. Upon completion and receipt of the questionnaire and memory/attention test, you will receive a Georgia Southern University Thumb Drive as financial compensation to participate in the study. Thumb drive (4G size) is valued at $20.00.

Voluntary Participation: Your participation in this study is completely VOLUNTARY and you have the right to refuse to be in this study. You may end your participation at any time. You may quit by contacting the primary investigator, whose phone number is 912-663-5357. You do not have to answer any question that you do not want to answer.

Penalty: There is no penalty to you for deciding not to participate in the study and you may decide at any time that you do not want to participate further and may withdraw without penalty or retribution. If you withdraw from the study, however, you will not receive compensation.

You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date below. By signing below, you freely and voluntarily choose to participate in this research study and confirm that you have read or had this document read to you.

You will be given a copy of this informed consent form to keep for your records. Data collected will be kept in a secure area for not less than 7 years from date of completion per Board of Regents retention policy. This project has been reviewed and approved by the Georgia Southern University Institutional Review Board under tracking number H12372.

Title of Project: A Mindfulness Model of Emotion Regulation in Nursing Students: Working memory capacity as a Regulatory Mechanism
Principal Investigator:

Christy Dubert, PhD(c), RN
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912-663-5357 (cell)
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PO Box 8041
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Statesboro, GA
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llocker@georgiasouthern.edu

I acknowledge that I have received a copy of all three pages of this informed consent form in its entirety.

____________________________________  ________________
Participant Signature                  Date

I, the undersigned, verify that the above informed consent procedure has been followed.

____________________________________  ________________
Investigator Signature                 Date
APPENDIX G

Recruitment Brochure
To sign up, first log into MyGeorgiaSouthern.edu, click on a new tab and enter:

http://tinyurl.com/DubertCalendar

Click on appropriate class level time slot. Click Save.

For more information:

Christy Dubert, PhD(c), RN
Nursing Instructor
(912)663-5357
christycarr@georgiasouthern.edu

Skylar Jewell, Master of Kinesiology Student
Graduate Research Assistant
sj02313@georgiasouthern.edu

STUDY LOCATION
Directions to the Georgia Southern University School of Nursing Research Center: The GSU School of Nursing Research Center is located on the second floor of the Chemistry/School of Nursing Building, behind the elevator, in Room 2004D, opposite side of the School of Nursing Administration Offices.

HAC File # H12372
Human Assurance Committee approved research advertisement
Approval valid

from 3/21/12 to 12/30/12

Mindfulness Model of Emotion Regulation in Nursing Students: Working Memory Capacity as a Regulatory Mechanism

Purpose
Study the relationships between nursing student’s memory/attention, emotions and coping with everyday life

Seeking Participants!!
All pre-licensure baccalaureate nursing students

For PhD requirements at:

Georgia Health Sciences University
QUESTIONS ABOUT THE STUDY

What will I do as a participant?
- Complete three very brief questionnaires about demographics, emotions and coping with everyday life.
- Complete a computerized memory/attention test.

How long will this take?
- Approximately 40-50 minutes.

Will I be compensated for participating?
- Yes! Upon completion and receipt of the questionnaire and memory/attention test, you will receive a Georgia Southern University Flash Drive (4G size) valued at $20.00.

Are there any risks to participating in this study?
- We do not anticipate that participating in this study will pose physical or psychological risks beyond what you encounter in everyday life.
- However, if you are uncomfortable answering a particular question, you are free to refuse to answer the question.

What are the benefits for participating in this study?
- Beyond payment for your participation it is unlikely that you will directly benefit from participation in this study.
- However, the knowledge gained from this study may contribute to understanding factors that affect how nursing students cope with everyday life in nursing school.

Is participation voluntary?
- Yes! Your participation in this study is completely VOLUNTARY and you have the right to refuse to be in this study.

Is there any penalty for not participating?
- No! There is no penalty to you for deciding not to participate in the study.

Will information be kept confidential?
- Yes! The data from your session will only be released to those individuals who are directly involved in the research.
  - **Junior I nursing students:**
    - An independent third party (Graduate Research Assistant) will collect the data.
    - The primary investigator will not know who participated and will not have access to consent forms until Fall Semester grades have been assigned and entered.
  - **Junior II, Senior I and Senior II nursing students:**
    - The primary investigator or a Graduate Research Assistant will collect the data.
    - No information about participation or information collected will be shared with anyone who is not directly involved in the research study.

How do I sign up?
First log into MyGeorgiaSouthern.edu,
click on a new tab and enter:
http://tinyurl.com/DubertCalendar
Click on an appropriate class level time slot. Click Save.
APPENDIX H

Recruitment Flier
Nursing Research

A Mindfulness Model of Emotion Regulation in Nursing Students:
Working memory capacity as a Regulatory Mechanism

Seeking Participants:
- Pre-licensure baccalaureate nursing students

Study Purpose:
- Study the relationship between nursing student’s memory/attention, emotions and coping with everyday life.
- This research is part of the Primary Investigator’s PhD Dissertation at Georgia Health Sciences University (formerly Medical College of Georgia).

Participation/Duration/Time Required:
- Complete three very brief questionnaires about demographics, emotions and coping with everyday life. These questionnaires will take 10-15 minutes to complete.
- Following the questionnaires, participants will complete a computerized memory/attention test which will take 20-25 minutes.

Compensation:
- Upon completion and receipt of the questionnaire and memory/attention test, you will receive a Georgia Southern University Flash Drive (4G size) valued at $20.00

Benefits:
- Knowledge gained from this study may contribute to understanding factors that affect how nursing students cope with everyday life in nursing school.
- Results from this study will be useful for future development of programs to assist nursing students coping with nursing school and help improve the transition into nursing school and clinical practice.

Principal Investigator: Christy Dubert, PhD(c), RN christycarr@georgiasouthern.edu, 912-663-5357
Sub-Investigator: Skylar Jewell, Masters of Kinesiology Student, sj02313@georgiasouthern.edu

How do I sign up?
- First log into MyGeorgiaSouthern.edu, click on a new tab and enter: http://tinyurl.com/DubertCalendar Click on an appropriate class level time slot. Click Save