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LEVEL OF MINDFULNESS IN PERSONS WITH ANOREXIA NERVOSA ENTERING
RESIDENTIAL TREATMENT AND THE RELATIONSHIP WITH EATING DISORDER
SYMPTOMOLOGY AND CLINICAL INDICATORS OF HEALTH

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MINDFULNESS AND ANOREXIA NERVOSA

Abstract

Level of Mindfulness in Persons with Anorexia Nervosa Entering Residential Treatment and the Relationship with Eating Disorder Symptomology and Clinical Indicators of Health

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BACKGROUND: Anorexia nervosa (AN) is a psychiatric disorder associated with extensive medical and psychological comorbidities and limited treatment options. Mindfulness may enhance physical and psychological wellness but research on its usefulness in AN is limited. Foundational research is needed in this field to enhance the science and support the continued use of such practices. **PURPOSE:** The purpose of this study was to determine to what extent levels of mindfulness correlate with eating disorder symptomology and other clinical indicators of health in persons with AN entering residential treatment. Furthermore, this study assessed for unique variance in eating disorder symptomology that is accounted for by mindfulness and other clinical indicators of health. **METHODS:** A cross-sectional and descriptive study was conducted. Sixty female, individuals diagnosed with AN were recruited to complete a confidential, web-based, 87-question survey upon admission to a residential treatment facility in the Greater Boston area. Additional data from the participants' charts were also collected. Data were analyzed using simple linear regression and stepwise multiple regression in SPSS. **RESULTS:** Mindfulness was significantly, inversely correlated with eating disorder symptoms. This relationship appeared to be particularly strong among individuals with AN, and particularly AN BP compared to

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individuals with OSFED AA. Among the entire sample, mindfulness significantly and inversely predicted shape concern and weight concern but not eating concern or restraint. When considering clinical indicators of health and certain demographic variables, mindfulness did not contribute any unique variance in eating disorder symptoms based on stepwise regression. Only anxiety and pain significantly predicted eating disorder symptoms among this sample. **CONCLUSIONS:** Level of mindfulness may be related to eating disorder symptomology in acute AN. Future research should explore this pattern over time and across different levels of care and determine what, if any, impact baseline levels of mindfulness and change over time have on eating disorder outcomes. Additional research should examine the mechanisms of actions of mindfulness and variance between subtypes of AN. The role of pain and anxiety on eating disorder symptomology and mediating or moderating effects of mindfulness should also be studied.

Keywords: anorexia nervosa, mindfulness, eating disorders, clinical indicators of health, residential treatment

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Level of Mindfulness in Persons with Anorexia Nervosa Entering Residential Treatment and the Relationship with Eating Disorder Symptomology and Clinical Indicators of Health

Chapter 1

This chapter provides an overview of the problem of anorexia nervosa (AN), as it relates to mindfulness in individuals with this disorder during residential treatment. The significance of the problem is outlined. The aim of this study was to assess baseline mindfulness in persons with AN entering residential treatment and to examine if there was a relationship between eating disorder symptomology and other clinical indicators of health. Specific research questions, underlying assumptions and pertinent terminology are described.

Statement of the Problem

Anorexia nervosa (AN) is a psychiatric disorder that affects an individual's cognitive, emotional and physical functioning and is associated with extensive medical and psychological comorbidities. *The Diagnostic Statistical Manual of Mental Disorders, 5th edition (DSM-5)* defines AN as occurring in individuals exhibiting an extreme fear of weight gain who have a body mass index lower than what would typically be expected given their age, height and developmental stage (American Psychiatric Association [APA], 2013). AN can be classified by level of severity and is categorized as either restricting type or binge-purge type (APA, 2013). AN is a chronic and deadly disorder with the highest mortality rate of all mental illnesses (Papadopoulos, Ekbom, Brandt, & Ekselius, 2009). Eating disorders, including AN, are costly illnesses with a combined financial burden based on disability

adjusted life years that is greater than that of anxiety and depression combined (Bailey et al., 2014). Disproportionate compared to the general public, adolescents and young adults make up about 40% of cases of AN (Smink, van Hoeken, & Hoek, 2012) though similar to adults, they experience a high rate of comorbidity, functional impairment and suicidality (Papadopoulos et al., 2009; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). There are no pharmacological treatments for AN approved by the Food and Drug Administration (FDA) (Mitchell, Roerig, & Steffen, 2013). Existing non-pharmacological based psychotherapies show mediocre results with approximately 40% of patients achieving recovery, while the rest remain partially or acutely ill or die (Herpertz et al., 2011). Although many individuals are treated in outpatient settings, more severe cases require higher levels of care, such as inpatient or residential treatment (Wolfe, Dunne & Kells, 2016).

Mindfulness is one novel, therapeutic approach to enhance physical and psychological wellness that has been increasingly studied. However, research on its usefulness in AN is limited. Brown and Ryan (2003) explain that mindfulness is commonly defined as “the state of being attentive to and aware of what is taking place in the present” (p. 822). They describe mindfulness as a characteristic that varies from person to person due to an individual’s unique propensity to be aware and sustain attention and because various factors heighten or dull mindfulness (Brown & Ryan, 2003). In a number of other psychiatric and medical conditions, mindfulness has been successfully utilized for its positive physical and psychological health benefits. This enhanced wellbeing may be related to neurological and psychological consequences of mindfulness, such as the regulation of limbic system and sympathetic nervous system activity and increased

executive functioning in the brain, promoting mental flexibility and emotional stability (Bauer-Wu, 2010). Mindfulness has been utilized in a range of conditions to increase insight, motivation, promote self-worth and efficacy, interrupt habitual behaviors (Greeson et al., 2015; Reynolds, Keough, & O'Connor, 2015; Tabak, Horan, & Green, 2015) and promote nonjudgmental awareness of sensations, feelings and experiences (Bauer-Wu, 2010). Many of these characteristics, necessary for wellness, are diminished in individuals with AN. Lack of insight and motivation, low self-efficacy and self-esteem related to body image disturbances (Zanetti, Santonastaso, Sgaravatti, Degortes, & Favaro, 2013), ruminative and rigid thoughts and behaviors (Cowdrey & Park, 2012) and fear of emotions, experiences and sensations (Merwin et al., 2011) are common among persons with AN. Based on preliminary data, Merwin and colleagues (2011) propose a model in which mindfulness could address a number of clinical characteristics of AN (e.g. poor insight, emotional reactivity, disconnectedness from self and others, rigidity, lack of sensory awareness and avoidance of emotion and experience).

Despite the theoretical usefulness, there is limited research looking at mindfulness in persons with AN and even less focusing on individuals in acute settings, such as inpatient or residential treatment settings. In one descriptive study, higher levels of mindfulness were associated with lower levels of some eating disorder symptomology in persons with an eating disorder in residential treatment (Butryn et al., 2013). Another descriptive study noted significant relationships between symptomology and mindfulness in outpatients with an eating disorder (Lattimore et al., 2017). However, neither study explored this relationship specifically in individuals with a diagnosis of AN separate from other eating disorders. Two studies suggest the usefulness of single episode or multimodal mindfulness

based interventions and a decrease in some eating disorder symptomology in hospitalized patients with AN during treatment (Hartmann, Thomas, Greenberg, Rosenfield, & Wilhelm, 2015; Morgan, Lazarova, Schelhase, & Saeideh, 2014). Overall, however, very little research examining mindfulness and AN symptomology in individuals in acute settings has been completed.

Across a broad range of clinical samples outside of AN, mindfulness has been shown to be cost effective (Kuyken et al., 2015; Lengacher et al., 2015), safe (Cole et al., 2015) highly accepted and feasible (Cole et al., 2015; Johns et al., 2015). More robust research is needed to assess the level of mindfulness in persons with AN entering residential treatment and to determine the potential relationship with eating disorder symptomology and other clinical indicators of health that may also be related. Research of this nature will increase understanding of AN and mindfulness, has the potential to enhance existing therapies and will serve as a necessary foundation for the continued development of new, safe and cost effective mindfulness based interventions for persons with AN.

Significance

This study assessing the level of mindfulness in persons with AN entering residential care and the relationship with eating disorder symptomology and clinical indicators of health is critically important given that AN has the highest mortality rate of all major mental illnesses with few evidence-based treatments. This research generated new knowledge on the level of mindfulness in person with AN requiring acute treatment when risk of morbidity and mortality is greatest. Additionally, this study better informs treatment and validates ongoing creation and research of evidenced-based, safe and cost effective interventions for individuals with AN, for whom limited options currently exist.

Knowledge on levels of mindfulness in persons with AN entering residential treatment is necessary to advance science and clinical care. Mindfulness practices are being increasingly utilized in healthcare due to the numerous health promoting consequences of such exercises and therapeutic effects during illness. Mindfulness appears to have neurobiological and psychological benefits in a variety of groups, including clinical and non-clinical samples. While some of these relationships (e.g. increased mindfulness and; decreased chronic pain; greater relapse prevention for individuals with depression) are well established (Russel & Siegmund, 2016), mindfulness in persons with AN and the usefulness of mindfulness in this population has not been thoroughly explored (Dunne, 2018). Results from the existing, small, heterogeneous body of knowledge on mindfulness in AN are mixed. Mindful based therapies appear to have overall positive outcomes, while brief interventions may be useful although not necessarily more so than distraction strategies (Dunne, 2018). Some persons with AN report that practicing mindfulness is challenging, but beneficial (Cowdrey, Roberts & Park, 2013; Morgan et al., 2014).

Due to the complexity of the concept of mindfulness and the scarcity and often exploratory or pilot nature of the existing data, additional descriptive and correlational studies were needed to understand the relationship between mindfulness, eating disorder symptoms and clinical indicators of health and advance the field. To the best of this author's knowledge this is the first study to examine the level of mindfulness in person with AN entering residential treatment and the relationship to eating disorder symptomology and clinical indicators of health. This investigation served to generate new knowledge that is necessary for providing the best care to individuals with AN.

Understanding mindfulness as it relates to individuals with AN is a necessary building block for future research and interventions.

Knowledge of the level of mindfulness and its relationship to eating disorder symptomology in persons with AN during residential treatment provides support for ongoing creation and research of novel, safe, cost effective and more targeted evidenced-based interventions. Despite extensive research outside of the field of mindfulness, AN remains a complex condition with little consensus on most effective treatment options, relatively low remission rates, and high disability and mortality rates. AN has a lifetime prevalence rate of approximately 1% in females (Hudson, Hiripi, Pope, & Kessler, 2007). While prevalence rate in the general population may appear low, among adolescent and young adult females it is nearly double that of the overall population (1.7%) (Smink, van Hoeken, Oldehinkel, & Hoek, 2014). AN has the highest mortality rate of all mental illnesses (Papadopoulos et al., 2009) and there is evidence that the death rate is frequently underestimated (Arcelus, Mitchell, Wales, & Nielsen, 2011). Suicide accounts for 1 in 5 of these deaths (Arcelus et al., 2011). Medical complications related to AN, such as cardiac arrest, also make up a significant portion of deaths (Westmoreland, Krantz, & Mehler, 2015). Co-occurring psychiatric disorders, such as depression (Ulfvebrand, Birgegård, Norring, Högdahl, & von Hausswolff-Juhlin, 2015) and anxiety (Cederlöf et al., 2015; Kaye, Bulik, Thornton, Barbarich, & Masters, 2004) are common and contribute to acuity of illness and difficulties treating persons with AN.

Treatment occurs in a variety of settings, with higher levels of care being reserved for the most acute cases (Wolfe, Dunne, & Kells, 2016). Currently, evidence based treatment modalities are not uniformly implemented. Lack of time and resources have

been cited as the primary reasons the most recent clinical advances are not integrated into practice (Bailey et al., 2014). Family based therapy is the most commonly researched treatment approach for individuals 25 years old or younger with AN (Bailey et al., 2014). In a meta-analysis, some results supported the use of family based therapy over treatment as usual for short-term recovery, although there were no significant differences when compared to educational or psychological interventions (Fisher, Hetrick, & Rushford, 2010). Cognitive behavioral therapy, interpersonal therapy and a number of other approaches have been studied with some positive results in participants with AN (Bailey et al., 2014).

There are no Federal Drug Administration (FDA) approved drugs for the treatment of AN. Antipsychotics followed by selective serotonin reuptake inhibitors (SSRI) are the most frequently investigated medications in the treatment of AN (Bailey et al., 2014). There is limited preliminary data to suggest that olanzapine significantly enhances body mass index (BMI) and some psychological symptoms compared to placebo (McElroy, Guerdjikova, Mori, & Keck, 2015). However, this data comes from a small number of trials and has not been replicated across studies (McElroy et al., 2015). While SSRIs or tricyclic antidepressants may target concurrent anxiety or depression, they do not appear to have an impact on weight or AN symptomology (McElroy et al., 2015).

Taken together, there may not be one single approach that works across the full spectrum of AN. For this reason, mediating or moderating factors, such as mindfulness and other clinical indicators of health that target the specific characteristics of AN limiting receptivity to treatment might be useful. Better interventions are necessary to adequately care for individuals with AN. This research on mindfulness in individuals with AN in

residential treatment serves as a foundation for novel, evidence based interventions that are safe, cost-effective and therefore more accessible to individuals or increase receptivity to existing treatment. This research, in line with what is already known about mindfulness, using such strategies in treatment could lead to concomitant neurological and psychological benefits for persons with AN.

Purpose of the study

The purpose of this study was to determine to what extent levels of mindfulness correlate with eating disorder symptomology and other clinical indicators of health in patients with AN entering residential treatment. Furthermore, this study assessed for unique variance in the outcome variable of eating disorder symptomology that is accounted for by mindfulness and other clinical indicators of health.

Aims and Research Questions

The primary goal of this study was to determine the extent to which level of baseline mindfulness is associated with eating disorder symptomology and other clinical indicators of health in patients with AN entering residential treatment. A secondary aim of this study was to explore the extent to which the outcome variable of eating disorder symptomology is accounted for by mindfulness and clinical indicators of health. The following research questions were investigated:

1. What is the relationship between level of mindfulness and eating disorder symptoms in individuals with AN entering residential treatment?

It was hypothesized that higher levels of mindfulness will be associated with lower levels of eating disorder symptomology in individuals with AN entering residential treatment.

2. What is the unique variance in the outcome variable of eating disorder symptomology accounted for by the independent variable of mindfulness separate from other clinical indicators of health (e.g. RAND-36 scores, PHQ-4 scores and certain demographic variables)?

It was hypothesized that mindfulness will account for some of the unique variance in eating disorder symptomology in individuals with AN entering residential treatment and share variance with certain clinical indicators of health, anxiety and/or depression or certain demographic variables.

Definition of Terms

Anorexia Nervosa: A disorder in which individuals have a body mass index lower than what would typically be expected given their age, height and developmental stage, and/or significant weight loss, as well as an extreme fear of weight gain which can be categorized into either restricting type or binge-purge type with further classifications based on severity level (APA, 2013). Severity of illness ranges from mild to extreme and reflects an individual's body mass index (BMI), clinical symptoms and functional impairment (APA, 2013).

Body Mass Index (BMI): A measure of an individual's weight to height ratio (e.g. weight in kilograms divided by the square of height in meters; kg/m^2), which is a reliable indicator of underweight or overweight status for age, weight and height. In general, mild severity of AN is indicated when $\text{BMI} \geq 17 \text{ kg}/\text{m}^2$ and extreme severity of AN is diagnosed when $\text{BMI} < 15 \text{ kg}/\text{m}^2$ (APA, 2013). The *Diagnostic and Statistical Manual (DSM) for Mental Disorders 5* states that an adult with a BMI of $17 - 18.5 \text{ kg}/\text{m}^2$ or even above $18.5 \text{ kg}/\text{m}^2$ may still be considered underweight based on clinical history and other psychological

information. Therefore, in this study, consistent with the DSM 5, a diagnosis of AN is not restricted by an individual's BMI but will be determined in a clinical interview by a licensed professional.

Eating Disorder Symptomology: Specific eating pathologies (e.g. restraint, eating concern, shape concern and psychopathology) that can be measured and vary in range and severity. In this dissertation, the Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn & Beglin, 2008), a widely used, self-report measure for range and severity of eating disorder pathology will be used to assess AN symptomology. AN has some unique and some shared symptoms with other eating disorders. Duration of illness and co-occurring psychiatric illnesses will also be considered in this dissertation as markers of health status.

Mindfulness: An enhanced (e.g. undivided, open and receptive) attention, awareness, acceptance and non-reactivity (e.g. non-judgmental stance) toward the present moment or immediate experience (Brown & Ryan, 2003; Chadwick, Hember, Symes, Peters, Kuipers & Dagnan, 2008; Feldman, Hayes, Kumar, Greeson & Laurenceau, 2007). In this dissertation, the Cognitive Affective Mindfulness Scale - Revised (CAMS-R) (Feldman et al., 2007) will be used to assess level of mindfulness.

Attention: "A process of focusing conscious awareness, providing heightened sensitivity to a limited range of experience" (Weston, 1999 in Brown & Ryan, 2003, p. 822). Mindful attention is undivided and intentional.

Awareness: "The background radar of consciousness, continually monitoring the inner and outer environment. One may be aware of stimuli without them being at the

center of attention” (Brown & Ryan, 2003, p. 822); Mindful awareness is open and unbiased.

Acceptance: The undivided, open and unbiased quality that underlies mindful attention and awareness. Specifically, as it related to accepting difficult thoughts or images and oneself versus judging cognitions and self” (Chadwick et al., 2008, p. 452) or non-judgment (Feldman et al., 2007).

Present Focus: “An orientation [of one’s attention and awareness] to... immediate experience” (Feldman et al., 2007, p. 178).

Consciousness: “Encompasses both awareness and attention” and is distinguishable from other modes of mental processing (e.g. cognition, motives and emotions) (Brown & Ryan, 2003)

Clinical Indicators of Health: Any number of factors that contribute to an individual’s well-being. Some indicators of health appear to influence level of mindfulness. In this dissertation the MOS 36-Item Short-Form Health Survey (RAND-36) (Ware & Sherbourne, 1992) will be used to measure clinical indicators of health. The RAND-36 includes the eight health concepts of physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions and a single item for perceived change in health. The duration of time spent in treatment might be influential on health and be related to mindfulness as some therapies utilize its principles and will be used as an additional clinical indicator of health in this study.

Symptoms of Anxiety and Depression as Clinical Indicators of Health: Two additional clinical indicators of health are symptoms of anxiety and depression, which are

common in individuals with AN. Symptoms and severity of anxiety and depression are separate from a diagnosis of anxiety or depression, which may also be present in individuals with AN. Symptoms of anxiety and depression will be measured using the Patient Health Questionnaire-4 (Kroenke, Spitzer, Williams & Löwe, 2009) which is a validated, ultra-brief screening scale tool to assess level of these variables.

Residential treatment: An acute level of care (medical or psychiatric) in which clients reside for a varying duration of time while receiving specialized care. Generally, residential treatment is for clients with less acute needs compared with inpatient treatment. Residential treatment for eating disorders occurs on a psychiatric unit (this unit is typically in an apartment or home-like setting) dedicated to the care of eating disorders and comorbid conditions after medical and psychiatric stabilization.

Assumptions

1. “Individuals differ in their propensity or willingness to be aware and to sustain attention to what is occurring in the present” (Brown & Ryan, 2003, p. 822).
2. The capacity to be mindful “varies within persons, because it can be sharpened or dulled by a variety of factors” (Brown & Ryan, 2003, p. 822).
3. Levels of mindfulness change through various forms of practice and training.
4. Mindfulness is influenced by a number of clinical indicators of health.
5. Individuals with AN have the capacity for being mindful.
6. Mindfulness is feasible, safe and acceptable to persons with AN.
7. Physical and mental wellbeing, including weight restoration, enhanced coping skills and cognitive restructuring are treatment goals for persons with AN

Chapter 2

Review of the Literature

This chapter provides a framework for mindfulness, as described by Brown and Ryan (2003) and elaborated on by Feldman and colleagues (2007). Furthermore, the concepts of attention, awareness, acceptance and present focus as they are related to mindfulness are examined. Next, background information on anorexia nervosa (AN) and mindfulness is described. In conclusion, relevant findings from a review of the scientific literature previously published by this author on mindfulness and AN are summarized.

Theoretical Framework: Mindfulness

In order to effectively study the role of mindfulness in AN, it is imperative to first establish a theoretical framework and to understand its underlying concepts. The framework for this study is Brown and Ryan's (2003) concept of mindfulness as, "an enhanced attention to and awareness of current experience or present reality" (p. 822). Brown and Ryan's (2003) framework of mindfulness is unique compared to other frameworks of mindfulness because it combines Buddhist literature as well as psychological, clinical and research theories (Brown, West, Loverich, & Biegel, 2011). It is one of the most common frameworks of mindfulness and has been used extensively in medical and psychiatric clinical and research settings.

Brown and Ryan's (2003) framework was selected for this study because it may be useful for persons with AN since attention and awareness are characteristically lacking in individuals with this disorder. Particularly, Merwin and colleagues (2011) propose a model in which individuals with AN are unable to attend to the present and avoid becoming aware of sensory or emotional cues due to fear of harm (e.g. social rejection) and a demand for

certainty (e.g. rigidity around food). For example, rigid dietary rules and hypervigilance or ruminations about weight and shape may inhibit attention to current experiences.

Furthermore, in person with AN, psychological inflexibility, or a lack of flexibility towards difficult thoughts, feelings or bodily sensations, may promote disconnectedness from awareness of the present, thus enhancing perceived control and reducing fear but ultimately perpetuating the disorder (Merwin et al., 2011). Namely, Merwin and colleagues (2011) note that this pattern of a lack of attention and awareness likely lessens behavioral flexibility and adaptive learning.

Mindfulness is “the state of being attentive to and aware of what is taking place in the present” (Brown & Ryan, 2003, p. 882). It is a characteristic that varies between individuals and is influenced by numerous factors, which can either heighten or dull mindfulness (Brown & Ryan, 2003). The key concepts that make up the framework of mindfulness are attention and awareness. Attention is “a process of focusing conscious awareness, providing heightened sensitivity to a limited range of experience” (Brown & Ryan, 2003; Weston, 1999). Awareness is “the background radar of consciousness, continually monitoring the inner and outer environment” (Brown & Ryan, 2003; Weston, 1999). Awareness can be central or peripheral. Brown and Ryan (2003) emphasize that attention and awareness in mindfulness are characteristically “undivided” (p. 823) “open or receptive” (p. 822). This undivided, open or receptive quality, or acceptance of the present moment, is also a key concept underlying mindfulness. Specifically, in addition to awareness and attention as described in Brown and Ryan’s (2003) model, Feldman and colleagues (2007) describe acceptance or non-judgment and present focus as other major themes of mindfulness. Non-judgment can be defined as “accepting difficult thoughts or

images and oneself versus judging cognitions and self” (Chadwick et al., 2008, p. 452).

Brown and Ryan (2003) note that mindfulness is not ruminative or past or future focused, which is consistent with the assertion that present focus means “an orientation to... immediate experience” (Feldman et al., 2007, p. 178). Consciousness underlies both attention and awareness and is described as a mode of mental processing, distinguished from other modes of processing: cognition, motives and emotions. Humans can be conscious of thoughts, motives, emotions and sensory and perceptual stimuli and together these mental processes allow humans to function.

Mindfulness has its roots in Buddhist philosophy. In Buddhist literature, mindfulness is an essential part of the “Eightfold Path,” a key component of Buddha’s teaching, and a means for Buddhists to attain liberation from suffering (Goldstein & Kornfield, 1987). Brown and Ryan’s (2003) assertion that mindfulness is dynamically influenced by various factors is consistent with Buddhist philosophy, which also conceptualizes it as a fluid characteristic. Mindfulness can be cultivated through attention to and awareness of “physical, emotional, sensory, and other mental states, as well as the ideas and views one entertains” (Mitchell & Jacoby, 2014, p. 81). In the same way that Brown and Ryan (2003) highlight the need for “open, undivided observation of what is occurring” (p. 823) and “receptive awareness” (p. 822), Buddhist literature discusses intentional effort (attention) and a nonjudgmental, open awareness. In Buddhism, effort is an intentional decision to engage in mindful practice or be attentive to the present (Goldstein & Kornfield, 1987). This effort, or attention, is characteristically undivided, but can be fleeting or sustained (Goldstein & Kornfield, 1987), contributing to the variable nature of mindfulness. Nonjudgmental and open awareness is also necessary for

mindfulness and influences the magnitude of this concept in individuals. David W. Chapell describes the role of awareness in mindfulness:

“The Buddha’s teachings emphasized that misery is created by ourselves and that we need to become aware of the way emotions arise based on how we interpret what is happening to us. Calming ourselves and noticing the interpretations we are giving to events and what expectations are thus being frustrated give a certain distance from our misery and empower us. New and more positive interpretations and emotional responses arise by noticing alternative interpretations and responses. Just by taking time out to notice, our emotions and alternative interpretations become a constant source of relief and positive thinking.” (Mitchell & Jacoby, 2014, p. 24).

Across traditional Buddhist and Western definitions of mindfulness, attention (intentional effort) and awareness (nonjudgmental, open awareness) are the concepts that underlie mindfulness. Attention and awareness are independent, but interrelated concepts and together determine an individual’s level of mindfulness. Acceptance of and non-reactivity toward the present moment (e.g. undivided attention, open and receptive awareness) are inherent qualities of mindfulness as well.

Synthesized Review of the Literature

The following section provides background information on AN and mindfulness.

Anorexia Nervosa

Anorexia nervosa is a psychiatric disorder characterized by a marked low weight for age, gender and developmental phase coupled with a distorted body perception and fear of “becoming fat” (American Psychiatric Association [APA], 2013). Diagnostic criteria for AN

outline specifications for restricting or binge-purge subtypes (APA, 2013). Compared to previous editions, the *Diagnostic and Statistical Manual (DSM) for Mental Disorders 5* no longer includes amenorrhea or specific low weight thresholds (e.g. below 85% ideal body weight) as distinguishing characteristics of AN (APA, 2013). New criteria permits more sensitive diagnosis of men, women who have maintained regular menses or who experience oligomenorrhea and individuals with severe weight loss for age, developmental stage, height and gender that does not yet place them below 85% IBW.

Prevalence. Across several large studies, the lifetime prevalence rate of AN in women was 0.9% (Smink et al., 2012). Rates are highest among adolescent and young-adult females with prevalence estimates at 1.7% (Smink et al., 2014). Lifetime prevalence rates of AN, including cases both detected and undetected by the health care system, were as high as 4.2% in a Finnish twin study (Keski-Rahkonen et al., 2007). In males the lifetime prevalence rate of AN is 0.3% (Hudson et al., 2007; Swanson et al., 2011). Interestingly, one recent study of approximately 10,000 adolescents, found no differences between sexes in lifetime prevalence rates of AN (Swanson et al., 2011). Since men may place more emphasis on shape and muscularity and less on drive for thinness, certain instrumentation for measuring eating pathology (e.g. questions asking about desire for thinness) may not be sensitive to the clinical presentation of AN in males (Shu et al., 2015). Presentation of AN in males shares many characteristics with females, however adult men may be more likely to exercise and boys vomit less frequently than their female counterparts (Swanson et al., 2011). Differences in prevalence rates between studies may be related to these types of issues. There are no differences in prevalence rates for AN between ethnic groups in males or females (Marques et al., 2011).

Etiology. The etiology of AN is multifaceted and likely related to an array of interactions between biological, psychological and social factors. It is generally agreed upon that while no one predictor is known to cause AN, a number of factors contribute to the risk for developing an eating disorder.

Biological factors. Anorexia nervosa is highly hereditary with first-degree relative of individuals with AN 11 times more likely to develop the disorder themselves (Trace, Baker, Penas-Lledo, & Bulik, 2013). In a literature review on genetics of eating disorders, Trace and colleagues found heritability estimates for AN ranging from 28-74% (2013). There is currently no known gene variant to explain AN, and while research is ongoing, like other complex traits, AN cannot likely be attributed to one sequence (Trace et al., 2013). Rather, it is likely influenced by multiple interactions or additive effects (Trace et al., 2013).

Neurotransmitters, such as serotonin and dopamine, may play a role in AN (Culbert, Racine, & Klump, 2015). Serotonin is hypothesized to influence mood, anxiety and even satiety. Since serotonin is altered in different ways in individuals with restricting type compared to binge purge type, differences in clinical presentations of AN might be partially related to these abnormalities (Kaye, Wierenga, Bailer, Simmons, & Bischoff-Grethe, 2013). Dopamine plays a role in executive functioning and reward or motivation pathways (e.g. related to food intake) and appears to have increased binding, even in those recovered from AN (Kaye et al., 2013). Leptin, an anorexigenic hormone, has been implicated in the underlying pathophysiology of eating disorders as well. Studies suggest that serum leptin levels are low in persons with AN, though they may experience an up-regulation of receptors (Ehrlich et al., 2012; Zepf et al., 2012).

Psychological factors. Certain psychological factors have also been implicated as increasing the risk of developing AN. In a recent review, Culbert and colleagues synthesized that certain aspects of personality (e.g. negative emotionality, perfectionism) and lack of neurocognitive flexibility contribute to AN presentation (2015). Individuals with AN often display low self esteem, rigidity, obsessiveness, difficulties regulating emotions and have limited insight. However, though these clinical characteristics may be associated with AN, they do not cause it. Similarly, many persons with AN have co-occurring mood related symptoms, such as negative affect or anxiety. Merwin and colleagues (2011) discuss a theoretical framework in which psychological inflexibility, “an inability to behave flexibly in the presence of difficult thoughts, feelings, and bodily sensations” (p. 63) is linked with AN. They propose that mindfulness targets this and associated characteristics, such as rigidity, fear and nonacceptance of emotions and physical sensations (Merwin et al., 2011).

Parental and family factors, such as attachment patterns, communication styles and pressure may play a role in development of eating disorders. For example, compared to parents with the opposite features, high levels of maternal dependence or paternal independence from a female child were more frequently associated with AN (Amianto, Ercole, Marzola, Abbate-Daga, & Fassino, 2015). Although there is often an underlying genetic risk, certain parental characteristics such as rigidity, negative affect or anxiety may become learned behaviors for individuals with AN.

Social factors. Societal pressure and idealization of thinness are other factors that have been linked with AN (Culbert et al., 2015). Increased media exposure, cultural standards of beauty and internalization of this “thinness ideal” may contribute to development and prognosis of AN (Culbert et al., 2015). The landmark study by Becker and

colleagues (2002) exemplifies the relationship between societal pressures and AN. Becker et al. (2002) examined the impact of exposure to television on adolescent females in Fiji when it initially occurred in 1995 and again 3 years later in 1998. This was the first time that exposure to television in a naive population and eating attitudes had been documented. The Eating Attitudes Test (EAT-26) (Garner Olmsted, Bohr, & Garfinkel, 1982), a validated, non-diagnostic indicator of severity of symptoms and beliefs associated with eating disorders, was used to assess eating pathology. EAT-26 scores and self-induced vomiting for weight loss both significantly increased over time from 12.7 to 29.2% and 0 to 11.3% respectively (Becker, Burwell, Gilman, Herzog, & Hamburg, 2002). While this study is not generalizable due to the specificity of the sample and situation, it exemplifies the role of societal factors on disordered eating behaviors and self-esteem related to body image.

Medical comorbidities. Medical complications are common and can affect every body system. Sudden cardiac arrest and other medical complications account for a large portion of deaths in individuals with AN (Westmoreland, Krantz, & Mehler, 2016). Further, gastrointestinal problems, decreased bone density and osteoporosis, neurologic changes, dermatologic issues and endocrine dysfunction are experienced (Westmoreland et al., 2016). Medical sequelae are related to severe malnutrition, weight loss and compensatory behaviors such as in binge-purge type AN (Westmoreland et al., 2016). Compared to persons with bulimia nervosa and unspecified feeding and eating disorders, adolescents and young adults with AN were more medically compromised and were more likely to be hospitalized (Hergenroeder, Wiemann, Henges, & Dave, 2015).

Psychiatric comorbidities. Anorexia nervosa is associated with a number of psychiatric comorbidities including anxiety and mood disorders, personality disorders and

self-harming behaviors, including suicide. Anxiety disorders are especially pervasive, particularly obsessive-compulsive disorder affecting 40% of persons with AN (Cederlöf et al., 2015). This relationship is especially pronounced in males with obsessive-compulsive disorder, who are 37 times more likely to developing AN than males without obsessive-compulsive disorder (Cederlöf et al., 2015). Major depressive disorder and other mood disorders are seen in about a third of individuals with AN (Ulfvebrand et al., 2015). In patients with AN, Cluster C personality disorders (e.g. obsessive-compulsive personality disorder) occur most frequently (Reas, Rø, Karterud, Hummelen, & Pedersen, 2013). Substance abuse is a concurrent concern seen in about 20% of persons with AN and is particularly associated with binge-purge behaviors (Root et al., 2010). Self-injurious behavior (Muehlenkamp, Claes, Smits, Peat, & Vandereycken, 2011) and suicide occur at rates much higher than in the general population (Papadopoulos et al., 2009). The rate of suicide is shocking and accounts for 20-30% of deaths in individuals with AN (Papadopoulos et al., 2009). Sexual abuse and other highly stressful or traumatic events might increase the probability of developing AN (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004). However, a recent meta-analysis found that the link between childhood abuse and AN is inconsistent and studies may be biased, in contrast to the association that was noted for other eating disorders (e.g. BN, BED) (Caslini et al., 2016). In general, psychiatric or medical comorbidity is associated with worse outcomes and death (Papadopoulos et al., 2009; Westmoreland et al., 2016).

Prognosis. Overall, the prognosis for AN is poor. In a retrospective study of individuals previously hospitalized, Errichiello and colleagues found that only 34% of adults with AN had achieved full clinical recovery after an average of 5.5 years post

treatment (2015). Similar results were found among patients aged 15-25 years old via a retrospective chart review conducted by Hergenroeder and colleagues (2015). They determined that 31% and 48% of individuals achieved full and partial recovery respectively at completion of their last inpatient or outpatient visit (Hergenroeder et al., 2015). The slightly more promising results in young adults and adolescents may be due to the fact that these individuals had an average duration of illness of only 14 months (Hergenroeder et al., 2015). The APA Practice Guidelines for the Treatment of Eating Disorders (2012) notes that there are multiple, complex factors that account for recovery and that these include self-acceptance, determination and spirituality.

Morbidity and mortality. Anorexia nervosa has the highest mortality rate of all mental illnesses (Papadopoulos et al., 2009), despite the fact that the death toll is frequently underestimated (Arcelus et al., 2011). For those living with the disease, AN causes significant disability across adolescents and adults (Bailey et al., 2014; Swanson et al., 2011; Papadopoulos et al., 2009). When AN becomes chronic, it longitudinally and negatively impacts individuals, their families and caregivers. Compared to anxiety and depression, eating disorders have a greater combined financial burden based on disability adjusted life years (Bailey et al., 2014).

Current Treatment

Due to the multitude and complexity of factors contributing to, confounding and perpetuating AN, treatment is difficult. There are no FDA approved medications used to treat AN. Treatment can generally be broken down into preventative strategies, acute treatment interventions and relapse prevention. Prevention efforts generally promote eating disorder knowledge, but may not reduce risk of developing an eating disorder and

have not been tracked over time (Bailey et al., 2014). The focus of this dissertation is related to acute treatment of AN, specifically at an inpatient residential level of care. Family based therapy (FBT) and cognitive behavioral therapy (CBT) are generally considered to be the gold standards of care for individuals with eating disorders, including AN (Brauhardt, de Zwaan, & Hilbert, 2014; Lock, 2015). Tactics to reduce the risk of relapse focus on the maintenance of the improvements made by individuals with AN (Bailey et al., 2014). Relapse prevention should occur as part of acute treatment planning. Pharmacological strategies and specific acute, psychotherapeutic treatments are discussed here.

Pharmacology. There are no medications that are approved by the FDA for the treatment of AN. Medications may be indicated to treat symptoms or co occurring psychiatric or mood disorders, although the low weight of many individuals with AN may make them more prone to side effects (Wolfe, Dunne, & Kells, 2016). There are very few controlled studies assessing medication use in AN and those that have been done often involve smaller than ideal cohorts (McElroy, Guerdjikova, Mori, & Keck, 2015; Mitchell, Roerig, & Steffen, 2013). Selective serotonin reuptake inhibitors (SSRI) and antipsychotic medications are the most commonly studied drug treatments for AN. Overall, SSRIs may serve to treat co occurring mood symptoms, but, across inpatient and maintenance phases of treatment, do not appear to be effective in reducing symptoms of AN, promoting weight gain or preventing relapse (McElroy et al., 2015; Mitchell et al., 2013). Antipsychotics, particularly olanzapine, have been studied with mixed results. In a meta-analysis, some studies showed that olanzapine was associated with greater weight gain or reduction in psychological symptoms compared to placebo (McElroy et al., 2015). The preliminary evidence suggests that olanzapine might be an effective short-term treatment for AN but

research is extremely limited (McElroy et al., 2015). Marzola and colleagues (2015) conducted a retrospective chart review and determined that olanzapine or aripiprazole might be beneficial when used to augment SSRIs. However, the study design presents significant limitations and more research is needed. Other drug therapies such as dronabinol, alprazolam and hormonal agents have been studied but there is not currently sufficient evidence to draw conclusions (McElroy et al., 2015).

Acute psychotherapy. Individuals diagnosed with AN require acute treatment. Acute treatment usually involves an eclectic mix of therapies. CBT appears at least as effective as other psychotherapies and has been studied extensively (Brauhardt et al., 2014; Lock, 2015). CBT is a standard of care and in practice it is often coupled with other therapeutic techniques. Family based therapy is strongly recommended for adolescents and young adults (APA, 2012).

Family based therapy. FBT is the most commonly researched treatment approach for adolescent and young adults with AN and has been demonstrated to be effective in up to 50% of adolescent participants (Bailey et al., 2014; Lock, 2015). This effectiveness appears to be specific to younger adolescents during the early part of their illness (Bailey et al., 2014). FBT is recommended by the APA for treating adolescents with AN. However, research has been limited to relatively small sample sizes and tends to neglect data on this form of therapy in adults (Bailey et al., 2014). This may be related to difficulties, such as time and resources associated with engaging family members in treatment. In a meta-analysis, some results supported the use of FBT over treatment as usual for short-term recovery, although there were no significant differences when compared to educational or psychological interventions (Fisher, Hetrick, & Rushford, 2010).

Cognitive behavioral therapy. For adults with AN, CBT is the most commonly studied treatment approach. It is useful in adolescents as well, though not the most effective intervention when compared with FBT (Lock, 2015). CBT, especially individual CBT, appears to be beneficial, although the effectiveness is not always statistically greater than other forms of therapy (Brauhardt et al., 2014). CBT is particularly recommended for individuals with BN, although it promotes recovery in persons with AN through identification of disordered ways of thinking and behavioral alternatives to improve coping (Murphy, Straebl, Cooper, & Fairburn, 2010). CBT targets the cognitive features of AN, such as overvaluation of shape and weight, low self-esteem and ruminative patterns such as body checking behaviors (Murphy et al., 2010). In inpatient, residential and partial hospitalization programs, cognitive and behavioral treatments have been shown to be more effective than medication alone (APA, 2006).

Other therapies. Other therapies, such as dialectical behavioral therapy (DBT), acceptance and commitment therapy (ACT), motivational interviewing, interpersonal therapy and exposure therapy are also used to treat AN. In practice, the vast majority of treatment facilities and providers utilize an eclectic mix of therapies to provide patients with a range of coping strategies (APA, 2012). Adjunct therapies such as narrative therapy, art therapy or bibliotherapy are also used. Aspects of mindfulness are often built into specific therapies, such as deep breathing and improving unbiased awareness in DBT or accepting and observing in ACT. Mindfulness practices may also be utilized in addition to other therapeutic modalities. Common mindfulness practices that individuals with AN engage in during treatment are meditation, yoga and body scanning practices. Preliminary

evidence suggests that mindfulness training might be useful for individuals with eating disorders (APA, 2012), but limited research specific to AN has been conducted.

In addition to medications and psychotherapy, individuals in acute treatment for AN require nutrition therapy and weight gain or maintenance. Oftentimes, intensive nutritional repletion requires inpatient hospitalization. Nasogastric formula feedings are recommended for individuals with AN who are significantly underweight and refuse to eat (APA, 2012). Higher calorie initial feedings resulted in faster weight gain and shorter hospital stays (APA, 2012). Rate of weight gain appears to be consistent between individuals with AN who are admitted to an inpatient treatment setting on a voluntary or involuntary basis (APA, 2006).

Inpatient and residential treatment. Inpatient treatment occurs for individuals who are medically compromised (e.g. severely underweight) or experiencing significant psychiatric comorbidities (APA 2012; Wolfe et al., 2016). For individuals not experiencing acute medical or psychiatric issues, first-line inpatient treatment does not appear advantageous over outpatient level of care (APA, 2012). Due to the paucity of research and variations across treatment centers, careful consideration of physical, psychological, behavioral and social factors is recommended when determining an appropriate level of care for individuals with AN (APA, 2012).

When warranted, inpatient treatment may occur on a medical, psychiatric or specialized eating disorder unit. A specialized, inpatient, residential facility may also be an appropriate level of care for those who are acutely ill. Residential facilities are inpatient centers that provide high levels of care to individuals with acute AN who have been medically stabilized but are experiencing significant psychiatric disturbance. Residential

facilities are generally settings that are more similar to a home or apartment compared to an inpatient hospital unit. Individuals with AN in residential facilities usually have a longer average length of stay compared to those on acute hospital units. Residential eating disorder units promote gradual increases in independence for individuals with AN while they remain in a high level of inpatient care. Individuals receiving a higher level of care, including inpatient or residential treatment, receive tailored medication psychotherapeutic and nutritional interventions. The ideal length of stay for inpatient or residential treatment has not been well documented. In general, adolescents who receive inpatient, residential or partial hospitalization treatment have better outcomes longitudinally compared with adults (APA, 2006).

Barriers to treatment. The number one predictor of good prognosis is early symptom change (Brauhardt et al., 2014; Westmoreland et al., 2016) indicating that early diagnosis and interventions are imperative for positive outcomes. However, such necessary treatment is oftentimes not occurring. Individuals with eating disorders, including AN, and the providers working with them have long struggled to access or provide adequate, meaningful care within a complex healthcare system. Reasons for inadequate treatment are varied, but lack of personal and provider awareness, stigma, environmental factors and problems related to accessing care have been implicated (Bendat, 2014; Mechanic, 2012). Sometimes cost, geographical location and insurance related level of care issues play a role in accessibility of acute treatment for individuals with AN.

Mindfulness

Mindfulness translates literally to “fullness of mind” (Goldstein & Kornfield, 1987, p. 161). Brown and Ryan define mindfulness as “the state of being attentive to and aware of

what is taking place in the present” (2003, p. 882). Kabat-Zinn, the founder of Mindfulness Based Stress Reduction and leader in the field defines mindfulness as, “paying attention in a particular way; on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994, p. 4). Bauer-Wu, a nurse researcher focusing on the impact of mindfulness in oncology patients, explains that, “mindfulness involves intentionally bringing awareness to present moment experience with an attitude of openness and curiosity” (Bauer-Wu, 2010). Makransky, a professor of Buddhist theology and a Tibetan Buddhist lama presents mindfulness as vivid attention to the five aggregates: forms (body and physical senses), consciousness (sensory awareness), perceptions (distinguishing and naming things), feeling tones (positive, negative or neutral associations) and thought formations (chains of thoughts or emotions) (2007). Mitchell and Jacoby (2014) state that, “what is essential to mindfulness in all cases is a bare and non prejudiced awareness that gives one a clear picture of one’s dependently arisen mental, emotional, and physical processes and states occurring in the present moment” (p. 57). Across these and other definitions of mindfulness two main themes emerge: one, mindfulness is purposeful attention and two, it is unbiased, present awareness. Attention and awareness are intentional and practiced with openness.

Origin. Mindfulness is often attributed to its Buddhist roots, but forms of mindfulness are practiced in almost all world religions, including Hinduism, Judaism, Christianity and Islam (Grecucci, Pappaianni, Siugzdaite, Theuninck, & Job, 2015). In Buddhism, mindfulness is an essential part of the Eightfold Path. The Eightfold Path is a description of the process for attaining liberation from suffering. This path includes right understanding, aim, speech, action, livelihood, effort, mindfulness and concentration

(Goldstein & Kornfield, 1987, p. 235). However, mindfulness need not be associated with any particular philosophical or religious tradition and can be practiced independently of these platforms. Western societies have been increasingly adopting mindfulness techniques and in recent years, scientific research has demonstrated the effectiveness of this practice in many physiological and psychological conditions (Grecucci et al., 2015).

Mindfulness and Wellness. Humans have a natural propensity for being mindful (attention and awareness as part of consciousness) and it varies between individuals as well as within individuals through training (Brown et al., 2011). Enhanced mindfulness has beneficial effects for a number of medical problems and psychiatric disorders. Kabat-Zinn has been researching and documenting the positive physical and psychological outcomes of mindfulness, particularly for individuals with chronic pain, since at least 1990 (Brown & Ryan, 2003). More recently, studies examining the underlying neurobiology of mindfulness have shown positive changes in brain structures (e.g. insula and amygdala which may be involved in AN) and neurotransmitters (e.g. dehydroepiandrosterone, a natural steroid assisting in immune functioning) (Brown et al., 2011; Grecucci et al., 2015). Mindfulness is thought to be useful because it disengages people from unhealthy behavior, habits and automatic or ruminative thoughts (Brown & Ryan, 2003). Therefore, individuals have enhanced judgment and can better regulate behavior, which promotes psychological well-being (Brown & Ryan, 2003).

Physical wellness. Mindfulness has been effective at managing or reducing the symptoms associated with many medical conditions, including chronic pain, fibromyalgia, physical stress and some symptoms related to cancer (Osman, Lamis, Bagge, Freedenthal, & Barnes, 2015; Chiesa & Serretti, 2010). One form of mindfulness training, mindfulness

based stress reduction, appears to be particularly useful for individuals with chronic pain (Chiesa & Serretti, 2010). In studies involving people with cancer, mood swings and stress related to the diagnosis were significantly reduced in individuals who completed mindfulness-based interventions compared to controls (Grecucci et al., 2015). Significant reductions in blood pressure were seen following Zen meditation (Chiesa & Serretti 2010). Mindfulness appears to improve general physical well-being in healthy controls as well. In a meta-analysis of mindfulness based interventions in primary care settings, those in the experimental groups saw a greater improvement in general health and quality of life compared to controls (Demarzo et al., 2015).

Neurobiological wellness. Multiple reviews of the neurocognitive and neurobiological mechanisms of mindfulness have summarized the literature demonstrating that such practices activate certain structures in the brain that regulate attention, emotion and awareness (Chiesa & Serretti, 2010; Grecucci et al., 2015). As more research is being done on mindfulness, studies focused on the neurological processes that precede, occur during and/or following meditative practices have emerged. Overall, more research is needed, but there is mounting evidence that mindfulness enhances adaptive neurological processes (Chiesa & Serretti, 2010; Grecucci et al., 2015). Electroencephalographic studies revealed that during Zen meditation alpha, and, in more experienced practitioners, theta activity are increased indicating a state of being present, but relaxed (Chiesa & Serretti, 2010). Neuroimaging studies have shown increased activation in brain regions modulating attention and positive affect (Grecucci et al., 2015). Specifically, the dorsal medial prefrontal cortex and the anterior cingulate cortex are more activated in experienced meditators, possibly contributing to an individual's ability to sustain attention despite

intense emotions or memories that may otherwise interfere with thought processing (Grecucci et al., 2015; Chiesa & Surrenti, 2010). Persons who had short term (e.g. 11 hour mind-body training) and long term experience with meditation had enhanced functioning of the anterior cingulate cortex, specifically increased white matter in structures surrounding this part of the brain or increased thickness, respectively (Grecucci et al., 2015). Additionally, the insula, involved in body awareness, proprioception and viscerosomatic reactions, appears more active and thicker in individuals who had mindfulness based training (Grecucci et al., 2015). The insula plays a role in self interpretation of social, moral and sensory (e.g. hunger) cues and thus, although not yet fully understood, has been implicated in the understanding and treatment of conditions such as anxiety, addiction and eating disorders (Blakeslee, 2007).

Psychological wellness. In addition to physical and neurological benefits, the effects of mindfulness in mental disorders and mental well-being have been examined. In general, those with psychiatric illnesses appear to have lower baseline levels of mindfulness compared to healthy controls. However, mood and anxiety disorders, psychosis, obsessive compulsive disorder (OCD), trauma related conditions and substance use disorders are among the psychiatric illnesses that appear to benefit from mindfulness-based interventions (Banks, Newman, & Saleem, 2015; Bluett, Homan, Morrison, Levin, & Twohig, 2014; Grecucci et al., 2015; Greeson et al., 2015; Osman et al., 2015; Sarris, Camfield, & Berk, 2012; Tabak, Horan, & Green, 2015). Overall, mindfulness appears to be useful at reducing symptoms associated with psychiatric illnesses or as an adjunct to treatment as usual.

Mindfulness is inversely related to symptoms of depression in nonclinical (Jermann et al., 2009) and clinical samples (Chiesa & Serretti, 2010; Demarzo et al., 2015). In a meta-analysis, improvements in depressive symptoms were noted following mindfulness-based interventions in individuals in primary care (Demarzo et al., 2015). In a randomized control trial of persons with treatment resistant depression, those who received an 8-week mindfulness-based intervention had greater reductions in depression scores (36.6 vs. 25.3%, $p = .01$) and generally higher responses to treatment (22.4 vs. 13.9%, $p = .15$) compared to those who received treatment as usual (Eisendrath et al., 2016). However, these individuals did not experience any significant reductions in remission rates compared to the control group. A review of mindfulness in individuals with bipolar disorder concluded that such therapies were generally useful for improving depressive and anxiety symptoms associated with the condition (Salcedo et al., 2016).

Higher levels of mindfulness also appear to be related to lower levels of anxiety symptoms (Bluett et al., 2014; Spijkerman, Pots, & Bohlmeijer, 2016). In a study examining the role of mindfulness-based training in emotion regulation and attention, individuals with generalized anxiety disorder and co-occurring depressive symptoms had a statistically significant reduction in symptom severity ($p = .001$), functional impairment ($p = .001$) and greater improvements in quality of life ($p = .001 - .01$) across clinician assessments and self reported measures (Mennin, Fresco, Ritter, & Heimberg, 2015). However, in another study comparing mindfulness based therapy to treatment as usual in individuals with anxiety and comorbid psychiatric disorders, Sundquist and colleagues (2015) found no statistical differences between groups on any of their measures and that both interventions were equally useful.

Although initial theories about mindfulness in OCD cautioned that it might increase obsessive or ruminative thoughts or behaviors, research has generally shown the opposite. In fact, research demonstrated a 92.7% reduction in frequency of compulsions and a 68% reduction in features of OCD after eight sessions of therapy that involved facets of mindfulness (Twohig, Hayes, & Masuda, 2006). Another study noted similar results in a smaller sample with a 74% reduction in compulsions and a 40% increase in psychological inflexibility (Armstrong, Morrison, & Twohig, 2013). In a review of complimentary medicine, Sarris and colleagues (2012) found that meditation and yoga have been useful in treating OCD, but that more research is needed to draw conclusions. Interestingly, Jermann and colleagues (2009) found that rumination levels were not significantly associated with mindfulness contradictory to the significant inverse relationship previously noted by Brown and Ryan (2003) and more research is needed. Mindfulness based therapies may be useful at reversing habitual behavior in individuals with trichotillomania and skin picking disorders (Bluett et al., 2014).

In persons with schizophrenia, higher levels of certain facets of mindfulness were associated with greater levels of motivation ($p < .05$) and better emotion regulation ($p < .05$) (Tabak et al., 2015). While this study did not demonstrate decreases in mood symptoms associated with schizophrenia (Tabak et al., 2015), Johns and colleagues (2016) found the opposite. In their study, Johns et al. (2015) found a significant improvement in mood ($p = .001$) and functioning ($p = .004$) in participants following therapy that included mindfulness based training. Both studies concluded that individuals with psychosis were accepting of mindfulness-based interventions and that these types of interventions,

particularly ACT, were feasible and useful with this population (Johns et al., 2015; Tabak et al., 2015).

Overall, mindfulness appears to be useful in individuals with PTSD or trauma related disorders (Banks et al., 2015). However, compared to other mental illness, the research on PTSD appears the most mixed regarding its efficacy. Since mindfulness may lead to adverse effects, such as depersonalization or derealization, individuals with PTSD should begin mindful training with experienced practitioners for increased monitoring and support (Banks et al., 2015). Alternatively, mindfulness based interventions that have been modified (e.g. practicing body scans with eyes open) to accommodate persons with PTSD should be used (Banks et al., 2015). At least one study found no significant differences in PTSD symptoms between experimental and control groups (Kearney McDermott, Malte, Martinez, & Simpson, 2013) while others found significant reductions among participants in the former cohort (Banks et al., 2015; Kim et al., 2013; Omid, Mohammadkhani, Mohammadi, & Zargar, 2013). Specifically, mindfulness was associated with decreased rates of depression in firefighters (Banks et al., 2015) and veterans (Omid et al., 2013) with PTSD. Additionally, decreases in perceived stress and avoidance were noted across studies (Banks et al., 2015).

Greater mindfulness appears to be associated with reductions in substance use (Chiesa & Serretti, 2014; Lee, An, Levin, & Twohig, 2015). Compared to treatment as usual, such as cognitive therapy or 12-step therapy, mindfulness based interventions resulted in greater decreases in the consumption of alcohol, illicit stimulants, cigarettes and opiates (Chiesa & Serretti, 2014) and lower rates of drug and alcohol use at 12-month follow up (Bowen et al., 2014).

Overall, in individuals with psychiatric illness it appears that mindfulness based interventions are feasible and useful. Across randomized control trials in primary care settings, individual's level of overall mental health improved statistically more than controls (Demarzo et al., 2015) In clinical populations, mindfulness appears to reduce symptom frequency and severity. A number of these symptoms are characteristics of multiple psychiatric disorders, including eating disorders such as AN (e.g. anxiety, depression, rumination, emotional inflexibility). These characteristics and other markers of psychological well-being are useful targets when treating individuals with AN. For example, individuals with higher levels of mindfulness can better regulate attention and behavior (Brown et al., 2011). These individuals consistently score higher on decision making tasks and exhibit better judgment (Brown et al., 2011). Additionally, individuals with higher levels of mindfulness are less susceptible to stress, report lower levels of anxiety and are better at resolving conflict (Brown et al., 2011).

Mindfulness and Food Intake. Concerns related to food intake and disordered eating (e.g. health problems, impaired mental functioning) overlap with many of the physical, neurobiological or psychological characteristics that mindfulness appears to target. Mindful eating, one specific means of engaging in mindfulness, is being studied. Mindfulness is also being utilized to improve the physical and mental health of individuals who are overweight or obese. Furthermore, data has been collected on the inverse relationship between mindfulness and disordered eating behaviors and may be suggestive of trends among individuals with eating disorders.

Mindful eating. Mindful eating is the act of giving undivided attention to the process of food intake (Cheung & Hanh, 2010). Buddhists have long practiced mindfully engaging in

daily activities, including eating, as a form of practice (Cheung & Hanh, 2010). Mindful eating has gained traction in popular culture and there have been numerous books and articles published on the topic. Despite this, limited research has explored the processes underlying mindful eating. Arch and colleagues (2016) conducted multiple randomized control trials assessing differences in the level of enjoyment of food, desire to continue eating and calorie consumption over time between mindfulness, distraction control and non-instruction control groups in a non-clinical college sample. They found that individuals randomized to the mindfulness group experienced a higher level of enjoyment of chocolate ($p = .01$) and raisins ($p = .07$) (Arch et al., 2016). A higher desire to continue tasting the food (chocolate, $p = .002$ and raisins, $p < .01$) across the time it took to consume five chocolate or raisins compared to the distraction or non-intervention control groups was also observed (Arch et al., 2016).

Arch and colleagues (2016) wanted to further assess if, in association with this increased enjoyment of and desire to consume more food, mindful eating was associated with higher caloric intake over time in the experimental group compared to the controls. They hypothesized, based on theory and previous research, and demonstrated that the relationship between mindful eating and caloric consumption was in fact significantly lower in the experimental group compared to controls (Arch et al., 2016). The group randomized to mindful eating consumed fewer overall calories ($p = .04$) and fewer salty and fatty foods ($p < .05$ and $p = .02$, respectively) compared to controls (Arch et al., 2016). Individuals in the mindfulness group experienced initial spikes in enjoyment and desire during this experiment that tapered off over time, possibly explaining the overall lower consumption of calories. Interestingly, this relationship did not persist during the “free

eating” part of the study when participants were not given any instructions. Arch and colleagues (2016) study was the first to explore the potential reasons why mindful eating may serve to reduce caloric consumption and subsequently reduce weight and provides useful support for the studies assessing mindful eating in obesity and weight loss.

Obesity and weight loss. Reed and colleagues (2016) hypothesize that mindfulness could relate to obesity because it helps people to “carefully [notice] the affective and cognitive determinants of the urge to eat, to recognize and prevent eating that was not based on hunger, to recognize factors that support or impede healthy nutrition and to recognize the sensations of hunger and fullness” (p. 5). Using Walker and Avant’s (2011) theory for concept analyses, Reed and colleagues (2016) propose that mindfulness is one facet of eating self-regulation. Eating self-regulation in turn could promote weight loss or prevent further weight gain in overweight and obese individuals and be a useful tool for clinicians (Reed et al., 2016). Although this concept analysis (Reed et al., 2016) multiple systematic reviews (Olson & Emery, 2015; O’Reilly, Cook, Spruijt-Metz, & Black, 2014) and a meta-analysis (Rogers, Ferrari, Mosely, Lang, & Brennan 2017) have examined the role of mindfulness based interventions in addressing obesity, far fewer articles look specifically at mindful eating in this population. There is not enough scientific research to draw conclusions about mindful eating in individuals who are overweight or obese. However, in general, mindfulness based interventions appear to be useful for promoting weight loss and improving psychological health (e.g. anxiety and depression) in individuals who are overweight or obese (Rogers et al., 2017).

Disordered eating. Many studies explore the relationship between mindfulness and eating related pathology in non-clinical samples. For example, in a group of participants

with disordered eating, there were significant decreases in external eating ($p = .03$), emotional eating ($p = .03$), body image concern ($p < .01$), dichotomous thinking ($p = .03$) and food cravings ($p = .02$) compared to controls following an 8 week mindfulness based intervention (Alberts, Thewissen, & Raes, 2012). However, there were no changes in restrained eating (Alberts et al., 2012). In another study of 276 undergraduate women, higher scores on multiple facets of mindfulness (acting with awareness, nonreactivity and non judgment) were associated with lower EAT-26 (Garner et al., 1982) scores ($p < .05$, $p < .01$ and $p < .05$, respectively) (Lavender et al., 2011). Oddly, the describing facet of mindfulness was positively associated with EAT-26 scores ($p < .01$) and there was no significant relationship with observing (Lavender et al., 2011). While these studies are useful, more data need to be collected in clinical populations.

Mindfulness and Eating Disorders

Mindfulness based interventions, inclusive of mindful eating, have not been thoroughly explored in individuals with eating disorders. The most research has been done examining mindfulness in binge eating disorder (BED) although given the nature of this eating disorder compared to others, like BN and AN, it is unlikely that results are entirely generalizable. Across eating disorders, there appears to be growing evidence for the possible usefulness of mindfulness, but more research is needed.

Mindfulness and Binge Eating Disorder. Mindfulness based interventions, including mindful eating have been identified as potentially useful for individuals with BED. Individuals with BED are at a unique risk compared to restrictive eating disorders for being overweight or obese and mindfulness based interventions appear to decrease frequency of binge eating episodes (Godfrey, Gallo, & Afari, 2015; Katterman, Kleinman, Hood, Nackers,

& Corsica, 2014) and emotional eating (Katterman et al., 2014). Interestingly, unlike the significant weight reduction seen in individuals who are overweight or obese, the effect of mindfulness based interventions on weight loss in individuals with BED were mixed across studies (Katterman et al., 2014). In an integrated review of the literature, Godsey (2013) reported that yoga, in particular, may have positive effects on well-being for individuals binge eating disorders or disordered eating (e.g. binge eating episodes), but that there is not sufficient evidence to indicate that yoga alone can treat eating disorders. Some of the specific outcomes of mindfulness in BED (e.g. decreased binge episodes) may not be useful for restrictive eating disorders.

One particular form of therapy that has been developed to treat BED is Mindfulness Based Eating Attitudes Training (MB-EAT) (Kristeller & Wolever, 2010). MB-EAT is a 10-session program that focuses on meditation, mindful eating, self-awareness and self-acceptance. Participants learn mindfulness based activities to improve attention and awareness, such as breathing meditation. Mindful eating exercises serve to increase awareness of physical sensations of hunger and satiety, food choices and increased enjoyment of even small or normal portions of food. MB-EAT also focuses on improved awareness and acceptance of self through emotion regulation and self care. Namely, individuals are encouraged to maintain an open and non-judgmental attitude towards themselves, their physical and emotional states and their experiences. In studies, MB-EAT groups had a reduction in binge eating symptoms greater than wait list controls but similar to the group assigned to psychoeducation (Kristeller & Wolever, 2010). The MB-EAT group had higher levels of internalized change, however, and amount of meditation practice predicted increased weight loss and self-regulation (Kristeller & Wolever, 2010).

Mindfulness and Bulimia Nervosa and Other Specified and Unspecified Eating Disorders. It has been theorized that eating disorders are related to a lack of emotion regulation and/or distress tolerance (Lavender, Gratz, & Tull, 2011). These types of theories have underscored research aiming to show that mindfulness (e.g. unbiased attention and awareness), as a method for improving emotion regulation and distress tolerance, may be useful in treating eating disorders such as BN (Lavender et al., 2011). A qualitative, phenomenological study assessed an 8 week mindfulness based intervention in six female individuals with BN and described a lived experience that mirrors these theories (Proulx, 2008). Individuals in the study initially described a sense of self that was disconnected and thus experienced extreme, dysregulated feelings and subsequent out of control behavior and coping strategies (Proulx, 2008). Over time, in the mindfulness based program, the participants talked about making connections with both the self and others. Specifically, at the end of the study they described an altered self concept that was aware, open and more authentic (Proulx, 2008).

A review of mindfulness in eating disorders found that when used as part of another therapy, such as ACT or DBT, mindfulness was beneficial in persons with BN (Wanden-Berghe, Sanz-Valero, & Wanden-Berghe, 2010). A few studies conducted after this review was published, included individuals with BN, and although they did not compare outcomes between specific eating disorder diagnoses, reported positive outcomes associated with mindfulness (Butryn et al., 2013; Elices et al., 2017; Lattimore et al., 2017; Soler et al., 2013). However, Lattimore and colleagues (2017) found that drive for thinness but not bulimia was associated with dispositional mindfulness ($p < .01$).

Mindfulness and Anorexia Nervosa. There is a small, heterogeneous body of literature on mindfulness in AN (Dunne, 2018). Of 10 articles that examined mindfulness in person with AN, four were exploratory/pilot studies (Cowdrey, Stewart, Roberts, & Park, 2013; Hepworth, 2011; Morgan, Lazarova, Schelhase, & Saeidi, 2014; Solar et al., 2013), three were cross-sectional and descriptive in nature (Butryn et al., 2013; Cowdrey & Park, 2012; Lattimore et al., 2017) and three papers looked at brief mindfulness interventions using an experimental (Hartmann, Thomas, Greenburg, Rosenfield, & Wilhelm, 2015) or quasi-experimental design (Elices et al., 2017; Marek, Ben-Porath, Federici, Wisniewski, & Warren, 2013). Two studies included small qualitative sub-sections (Cowdrey et al., 2013; Morgan et al., 2014). An integrated review of these studies noted that there is a paucity of research on mindfulness in AN and that data consists of varying levels of evidence, sample sizes, methods and outcomes (Dunne, 2018).

More quantitative and qualitative research is needed in this emerging field. Particularly, Dunne (2018) suggests that descriptive and correlational studies in persons with AN are needed for a more robust understanding of the potential usefulness of mindfulness in this population. This is imperative because five of these 10 studies which included participants with AN did not analyze the data from this group separate from other eating disorders. Determining the extent that levels of mindfulness correlate with eating disorder symptomology and other clinical indicators of health in patients with AN entering residential treatment generated new knowledge, filling in this gap, and supports evidenced based treatment in the field. Furthermore, by assessing for unique variance accounted for by predictor variables (e.g. mindfulness and clinical indicators of health) on eating disorder symptomology this research supports ongoing development and research of mindfulness

based therapies in the treatment of AN. It will be imperative that future research progresses with a clear definition of mindfulness and valid and reliable measurement scales (Dunne, 2018). Furthermore, research should build off evidenced based theoretical frameworks.

Summary

Although research on mindfulness in eating disorders is a growing field, there is a clear lack of data specifically on mindfulness in AN. Research was needed to describe levels of mindfulness in individuals with acute AN (e.g. entering residential treatment) and examine the relationship with eating disorder symptomology. Specifically, in line with theoretical frameworks, correlations between mindfulness, eating disorder symptomology and clinical indicators of health were assessed. The role of mindfulness on eating disorder symptomology was considered along with other variables (e.g. clinical indicators of health, depression, anxiety).

Chapter 3

Methodology

This chapter provides an overview of the design, sample, setting and procedures in the study. The data collection methods, including data obtained from participant's medical records and the measurement tools that were used in a survey to assess the variables of interest are discussed. Information on the protection of human subjects is detailed. Information regarding data analysis, including sample size needed is provided. In conclusion, ethical considerations, limitations, timeline for completion of study and plans for IRB approval at BC and other institutions are discussed.

Study Design

This quantitative dissertation used a survey method and cross-sectional, descriptive study design to assess the relationship between mindfulness and eating disorder symptomology in individuals with AN entering residential treatment. A regression model was used to assess for the unique variance in eating disorder symptomology that is accounted for by mindfulness and then to assess clinical indicators of health that may also be involved in this relationship.

Subjects

The study sample was a convenience sample including adult, female individuals entering residential treatment at a facility in the Greater Boston area. These individuals will met the *Diagnostic and Statistical Manual (DSM) for Mental Disorders 5* (APA, 2013) criteria for AN. Consistent with the DSM 5 (APA, 2013), AN is not determined strictly by an individual's BMI. Namely, the DSM 5 states "an adult with a BMI between 17.0 and 18.5 kg/m², or even above 18.5 kg/m², might be considered to have a significantly low

weight if clinical history or other physiological information supports this judgment” (APA, 2013, online version under “Feeding and Eating Disorders – Anorexia Nervosa”). The diagnosis was made via unstructured clinical interview by a licensed psychiatrist, psychologist, nurse practitioner or social worker.

Participants met the following inclusion criteria: 1) be entering residential level of care 2) have a DSM-V diagnosis of AN, though not limited to a specific BMI 3) be female or gender identify as female, which is a requirement of admission to the facility 4) be 18 years of age or older and 5) have access to a device that can access to the internet (or be willing to use a device provided by the PI for the duration of the survey) and 6) have the ability to complete a 90-question online survey. See Table 1 for AN diagnostic criteria.

The purpose of this study was to examine adult, female-gendered individuals with AN. Therefore, individuals were excluded if: 1) they did not meet DSM-V criteria for a diagnosis of AN, 2) were under the age of 18 years old, 3) were cisgender males, and therefore not permitted to be admitted to the facility, 4) were cognitively impaired and cannot complete the survey. In the event that a participant was readmitted to treatment during the recruitment phase, they were only be eligible to participate once.

Table 1

DSM-V Criteria for Anorexia Nervosa

-
- A. Restriction of energy intake relative to requirements, leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health. Significantly low weight is defined as a weight that is less than minimally normal, or for children and adolescents, less than minimally expected
 - B. Intense fear of gaining weight or becoming fat, or persistent behavior that interferes with weight gain, even though at a significantly low weight
 - C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight
-

Specify:

- A. Restricting type: During the last 3 months, the individual has not engaged in recurrent episodes of binge eating or purging behavior (i.e. self induced vomiting or the misuse of laxative, diuretics or enemas). This subtype describes presentations in which weight loss is accomplished primarily through dieting, fasting, and/or excessive exercise
 - B. Binge-eating/purging type: During the last 3 months, the individual has engaged in recurrent episodes of binge eating or purging behavior (i.e. self induced vomiting or the misuse of laxatives, diuretics or enemas)
-

Severity:

- Mild: BMI ≥ 17 kg/m²
 - Moderate: BMI 16-16.99 kg/m²
 - Severe: BMI 15-15.99 kg/m²
 - Extreme: BMI <15 kg/m²
-

Note: From American Psychiatric Association (APA) 2013, *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*, p. 338-339. Copyright 2013 by APA. Reprinted with permission.

Setting

This study included individuals recruited from a residential eating disorder treatment facility in the Greater Boston area. The treatment facility has a total of 36 residential beds, 24 of which are designated for adult women. The primary goals of the residential level of care are stabilization of eating disorder symptoms, weight restoration and monitoring, and initial or continued cognitive, behavioral and other forms of therapy to

address abnormal eating behaviors and attitudes. Individuals are expected to be medically and psychiatrically stable when admitted to the residential units. This is evidenced by successful discharge from a higher level of care, such as an inpatient hospital unit or emergency room, or by physical examination from a primary care provider. In all cases, basic lab work and an electrocardiogram indicating medical stability are required.

The study setting was a voluntary, residential, eating disorder treatment program that provides group therapy, nutrition counseling, medication management and non-acute medical care (as needed) to patients. Individual case management is provided. Family therapy is provided when indicated. The individuals in treatment reside at this facility, but as they progress in their treatment they may have passes to spend time off of the property. Passes are generally granted when group programs are not in session. Clinical support staff is available 24 hours a day 7 days per week.

Procedure

Participant Recruitment

Upon admission to the residential eating disorder program, all adult women were asked to complete a form indicating if they are open to being contacted about this research. See Appendix A. Individuals were diagnosed using an unstructured clinical interview based on *DSM 5* criteria (APA, 2013) by a licensed psychiatrist, psychologist, nurse practitioner or social worker and those meeting criteria for AN were screened for eligibility. Interested and eligible individuals were contacted by the principal investigator (PI) and given more detailed risk and benefit information about the study and asked for their informed consent including access to selected information from their chart. Individuals were assigned a number then be given a link to the survey. Individuals were asked to input their number

into the survey link to begin. The survey link included an electronic consent form, instructions for completion of the survey and information related to voluntary participation and drop out. The survey responses were confidential. Specifically, a list of participants first name and last two letters of their last name and unique identifying number for the survey was kept in a locked cabinet in a locked room during the study. At the conclusions of the study, the survey responses from all participants were de-identified and this confidential information was destroyed.

All participants were asked to complete the survey online consisting of 87 questions that will take approximately 30 minutes. After completion of the survey, individuals were given a complimentary 1-month subscription to the Headspace mindfulness mobile application and a \$5.00 CVS gift-card for their participation.

Data Collection Methods

This section provides information about the data that were collected from participant's charts as well as details on the survey that individuals in the study will be asked to complete. Study data were collected and managed using REDCap electronic data capture tools hosted at Boston College. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources (Harris et al., 2009).

The survey included the following questions or measures: demographic information, the Cognitive Affective Mindfulness Scale - Revised (Feldman, et al., 2007) and

the Eating Disorder Examination – Questionnaire (EDE-Q) (Fairburn & Beglin, 2008). The 36-Item Short Form Survey (RAND-36) (Ware & Sherbourne, 1992) will be used to measure clinical indicators of health. The Patient Health Questionnaire – 4 (PHQ-4) (Kroenke, Spitzer, Williams & Löwe, 2009), a very brief screening scale for depression and anxiety, was be administered. The survey was reviewed by three experts and revised as needed. The revised survey instrument was piloted with a convenience sample of 5 individuals on hand-held tablets, phones or computer electronic devices and revised as indicated. After the survey was reviewed by the panel of experts and piloted it will be administered to individuals participating in the study.

Chart-Abstraction. A limited amount of information was obtained from participant's official hospital records. The following information was gathered from participant's charts: diagnosis, including AN type and severity specifiers, other co-occurring *DSM 5* (APA, 2013) psychiatric disorders (e.g. mood and anxiety disorders which may influence level of mindfulness), year of birth and BMI at admission.

Demographic Information. Individuals were asked to complete basic demographic information as part of the survey. Demographic information included age, race, education level, duration of illness (measured in years and months from "date of diagnosis or onset" until present), time in treatment (measured as "number of years and months in therapy" either continuous or summed and rounding up to the nearest whole year) and an open-ended question about engagement in mindfulness based activities. Demographic information was placed at the end of the survey due to the possible effects of dropout fatigue. The open-ended question about prior exposure to mindfulness was also placed at the end so as to reduce any possible influence on questionnaires.

Cognitive Affective Mindfulness Scale - Revised. The independent variable, mindfulness, was measured using the CAMS-R (Feldman et al., 2007). The CAMS-R assesses dispositional mindfulness in lay terms by assessing four components: one's ability to regulate attention, present or immediate experience of one's orientation, awareness of one's experiences and an accepting and non judgmental attitude (Feldman et al., 2007). These facets are interrelated but not independent and are not reported as separate scores (Feldman et al., 2007). The CAMS-R consists of 12 questions and a 4-point Likert scale ranging from 1 (rarely/ not at all) to 4 (almost always) in which 3 questions are reverse scored (Feldman et al., 2007). Scores range from 4 to 48 and higher scores indicate greater levels of mindfulness.

The CAMS-R scale measures mindfulness without specialized language based on a broad, but clearly defined definition of mindfulness and therefore may be useful in diverse samples including clinical populations (Feldman et al., 2007), such as psychiatric disorders like AN, making this scale an appropriate measurement tool. The CAMS-R has an acceptable Cronbach's alpha of .74 to .77 across samples and good internal validity for total score (Feldman et al., 2007). The CAMS-R was significantly ($p < .001$) correlated with the Mindful Attention and Awareness Scale (MAAS) (Brown & Ryan, 2003) and other measures of mindfulness (Feldman et al., 2007). The MAAS is the most widely used measure of mindfulness and has generally positive psychometric ratings (Park, Reilly-Spong, & Gross, 2013). However, the MAAS does not measure the additional facets of mindfulness of acceptance and present focus, like the CAMS-R does (Feldman et al., 2007). Additionally, the MAAS contains questions pertaining to food intake, which may skew the data in individuals with AN. Overall, the CAMS-R may be useful for measuring mindfulness and

individual differences (Feldman et al., 2007), such as emotional regulation, indicators of health or specific behaviors. See Appendix B for the CAMS-R.

Eating Disorders Examination Questionnaire. The EDE-Q (Fairburn & Beglin, 2008) was used to assess eating disorder symptomology. The EDE-Q is a self-report measure that is based on the semi-structured Eating Disorder Examination (EDE) interview (Cooper & Fairburn, 1987). The EDE-Q consists of 28 questions measuring core eating disorder psychopathology occurring in the last 28 days. The EDE-Q contains four subscales of Restraint, Eating Concern, Shape Concern and Weight Concern (Peterson & Mitchell, 2005). The EDE-Q utilizes a Likert scale ranging from 0 to 6 to indicate the frequency of days out of the past 4 weeks (28 days) that a particular behavior or thought occurs. In this forced-choice scale, 0 indicates “no days,” 1 indicates a frequency of 1-5 days, 2 is 6-12 days, 3 is 13-15 days, 4 is 16-22, 5 is 23-27 days and 6 indicates “every day.” Scores for each subscale and the total score are based on averages and all range from 0-6 (e.g. sum of each question divided by number of questions for subscales; sum of subscales divided by number of subscales for “global” score). Scores can be calculated when half or more of the questions in a particular subscale have been completed and when more than half (e.g. 3 or 4) of the subscales yield a score. Higher scores are indicative of greater eating disorder pathology and a score of 4 or higher indicates a clinical range (Mond, Hay, Rodgers, & Owen, 2006).

The EDE is considered the “gold standard” measurement of eating disorder pathology (APA, 2013). The EDE-Q has good internal consistency and test-retest reliability (Luce & Crowther, 1999). Acceptable Cronbach’s alpha scores for the global score ($\alpha = .90$) and subscales (Restraint $\alpha = .70$ to $.85$, Eating Concern $\alpha = .73$ to $.93$, Shape Concern $\alpha = .83$

to .89 and Weight Concern $\alpha = .72$ to .81) were found across studies (Luce & Crowther, 1999; Peterson et al., 2007). Normative data is available for the EDE-Q and, specifically, is available for woman in certain age brackets and for larger samples of adult woman (e.g. 18 to 42 years old, mean age = 30.26 years) (Mond et al., 2006). Mean scores and standard deviations, noted in parenthesis, in adult women are as follows: Restraint = 1.30 (1.40), Eating Concern = 0.76 (1.06), Weight Concern = 1.79 (1.51), Shape Concern = 2.23 (1.65) and global = 1.52 (1.25) (Mond et al., 2006). Linear trends were noted for the global score and across all subscales (Mond et al., 2006). See Appendix C for the EDE-Q.

MOS 36-Item Short-Form Heath Survey. To measure clinical health indicators, the RAND-36 (Ware & Sherbourne, 1992) was used. This survey was developed for use in clinical practice, research and health policy among other arenas. The RAND-36 assesses health status from the “patient’s point of view” (Ware & Sherbourne, 1992). The RAND-36 is a validated questionnaire assessing health in 8 domains: 1) physical functioning, 2) role limitation due to physical functioning, 3) bodily pain, 4) general health perceptions, 5) energy, 6) social functioning, 7) role limitations due to emotional problems and 8) mental health. Each of the scales has a variable number of questions. A scoring manual is available (Ware et al., 1993) and will be utilized. Generally, item responses are summed (after select items are reverse scores) and scores are linearly transformed to a 0 to 100 scale (McHorney, Ware, Lu, & Sherbourne, 1994). Scoring is norm based (Peterson & Mitchell, 2005). Higher scores indicate more favorable health status.

Persons with eating disorders report psychosocial, functional and health impairment. Peterson and Mitchell (2005) suggest that it may be informative to use questionnaires that assess health and quality of life in persons with eating disorders,

including AN. Certain clinical indicators of health may be related to eating disorder symptomology and/or levels of mindfulness. The RAND-36 has been widely used in psychiatric research (Peterson & Mitchell, 2005). The RAND-36 has good internal reliability and appears to accurately measure health across samples. A study assessing 3,445 individuals in 24 diverse subgroups (e.g. race, education levels, history of cardiac arrest, depressive symptoms, etc.) found reliability across all scales in all groups (McHorney et al., 1994). Overall, Cronbach's alphas all fell between 0.78 and 0.93 indicating good internal consistency (McHorney et al., 1994). The scales are negatively skewed, since more respondents on average score more positively, except for the social functioning scale, which is moderately skewed (McHorney et al., 1994). See Appendix D for the RAND-36.

Patient Health Questionnaire 4. Anxiety disorders (Cederlöf et al., 2015) and depressive disorders (Ulfvebrand et al., 2015) are the most commonly seen co-occurring psychiatric conditions in individuals with AN. An even larger number of persons with AN will experience some signs of these illnesses, even in the absence of a formal diagnosis, and it is important to assess for the severity of such symptoms. As previously noted, anxiety and depression appear to be inversely related to level of mindfulness and are also clinical indicators of health, specifically mental health. Therefore, the PHQ-4 (Kroenke et al., 2009), an ultra brief, reliable and validated screening scale was used in this dissertation to assess severity of symptoms of anxiety and depression. A composite score can be used. The PHQ-4 is comprised of the first 2 questions from the Generalized Anxiety Disorder (GAD-7) (Spitzer, Kroenke, Williams, & Löwe, 2006) and the Patient Health Questionnaire – 9 (PHQ-9) (Kroenke, Spitzer, & Williams, 2001). This 4-question tool (2 items assessing anxiety and 2 items assessing depression) uses a Likert scale ranging from 0 (“not at all”) to 3

("nearly every day"). Separate anxiety and depression scores range from 0 to 6, with higher values indicating more severe symptoms and a cutpoint of ≥ 3 per scale indicating likely diagnosis of depression or anxiety (Kroenke et al., 2009; Kroenke, Spitzer, Williams & Löwe, 2010). Composite PHQ-4 scores can be continuous (0-12) or categorized such that 0-2 = normal, 3-5 = mild, 6-8 = moderate and 9-12 = severe (Kroenke et al., 2009).

The PHQ-4 has good sensitivity, specificity and construct and factorial validity (Kroenke et al., 2009; Kroenke et al., 2010). An average of 84% of the variance in anxiety or depression scores on the parent scales were explained by the subset of questions on the PHQ-4 (Kroenke et al., 2009). The Cronbach's alpha for all scales (e.g. anxiety $\alpha = .82$, depression $\alpha = .81$ or composite $\alpha = .85$) was >0.80 , indicating good internal reliability (Kroenke et al., 2009). There is a strong relationship between increasing severity of symptoms and self-reported disability days (Kroenke et al., 2009). Anxiety, depression and composite scores on the PHQ-4 are significantly and negatively correlated to an earlier version of the RAND-36, a validated 20-question survey that also assessed health. Namely, as levels of severity of anxiety, depression or both increase clinical indicators of health decrease (Kroenke et al., 2009). This relationship is notably highest for mental health. Normative composite values according to 2,149 randomly selected participants from 15 primary care sites in 13 different states are available and the mean PHQ-4 score was 2.5 (out of 12) with a standard deviation of 2.8. See Appendix E for the PHQ-4.

Protection of Human Subjects

Prior to beginning this study, approval was obtained via letter of support from the residential treatment facility in the Greater Boston area, which is the setting for this study. Individuals first consented to being contacted about research and then completed informed

consent in order to participate in this dissertation research. Informed consent included all information about the risks and benefits of participating in the study as well as a statement about voluntary termination at any point. Consent included agreeing to complete an online survey and to provide the PI with confidential access to certain information from their medical records for the duration of data collection only. The consent form detailed information about contacting the PI and the PI's dissertation advisor at Boston College and the Boston College IRB should the participants have any questions or concerns. See appendix F.

In order for the PI to access participant's information and link it with survey data, a hard-copy list of individual's first names and the last 2 letters of their last names (e.g. JANE DO) was kept in a composition notebook. Each participant was assigned a unique identifying number. The notebook remained in a locked box in a locked office during the data collection phase of this dissertation. Hereby, all of the individual's information was kept completely confidential. After the study completion, names and assigned numbers were destroyed. Chart abstracted and survey data was labeled using numbers only. Apart from the double-locked, hard copy list of first names and abbreviated last names of participants, other data, including those abstracted from participant's charts and survey responses were stored using only the individual's unique identifying number. This ensured participant's privacy.

Data Analyses

The survey and chart abstracted data from the was downloaded from REDCap (Harris et al., 2009) into the Statistical Package for Social Sciences (IBM SPSS®, 2015). Data was analyzed using SPSS® version 23 software. The extent of missing data was assessed.

Respondents with less than 10% missing data were included in the analysis as submitted. Respondents with greater than 10% missing data were excluded. The exception would have been in the case that the number of participants who completed and almost completed their surveys does not meet the target sample size to provide adequate power. In this case, multiple imputation would have been used to estimate missing data to form a larger sample. Respondents with the lowest percentages of missing data would have been included until an adequate sample size was achieved. Descriptive statistics of mean and standard deviation, frequencies and range of scores were computed for demographic variables and all major variables. Cronbach's alpha internal consistency reliability estimates were calculated for each major variable (CAMS-R, EDE-Q, RAND-36 and PHQ-4). These variables of interest were evaluated for normality. Histograms were created to demonstrate the normal distributions of the variables. For the dependent variable and subscales that appeared skewed, normality of the residuals was tested and data were examined for homoscedasticity and linearity, when necessary.

Testing the Research Hypotheses

Research question 1. What is the relationship between level of mindfulness and eating disorder symptoms in individuals with AN entering residential treatment?

H1. It was hypothesized that higher levels of mindfulness will be associated with lower levels of eating disorder symptomology in individuals with AN entering residential treatment.

In order to understand the relationship between the independent variable of mindfulness (actual CAMS-R scores) and the dependent variable of eating disorder symptoms (actual EDE-Q scores) a scatterplot of CAMS-R and EDE-Q scores was created to

visually assess data. Pearson's correlation coefficients (r) and coefficients of determination (R^2) were calculated to examine associations between the CAMS-R and global EDE-Q scores and the CAMS-R and each subscale of the EDE-Q. This provided estimates of magnitude and direction of the relationships. Regression coefficient's indicated how much the dependent variable (CAMS-R scores) changes as the independent variable (EDE-Q scores) changes. A regression model was fit to predict EDE-Q scores (outcome variable) from the CAMS-R scores (predictor variable). Analyses were one-tailed and directional. A relationship between the variables was indicated at a significance level of .05.

Research question 2. What is the unique variance in the outcome variable of eating disorder symptomology accounted for by the independent variables of mindfulness separate from other clinical indicators of health (e.g. RAND-36 scores, PHQ-4 scores and certain demographic variables)?

H2. It was hypothesized that mindfulness will account for some of the unique variance in eating disorder symptomology in individuals with AN entering residential treatment and share variance with certain clinical indicators of health, anxiety and/or depression, or certain demographic variables.

Multicollinearity. First, multicollinearity was assessed. This was done by assuring that none of the independent variables had a correlation above 0.7, and therefore assuming that multicollinearity was not occurring. Multicollinearity between CAMS-R, RAND-36, PHQ-4 subscale scores and certain demographic variables was determined by looking at a correlation matrix of these variables and assessing variance inflation factor (VIF). In cases where the tolerance statistic ($1/VIF$) is below 0.2 and none of the VIFs are higher than 5, multicollinearity exists and additional statistical analysis may be necessary (Field, 2009).

Relationships between variables. Pearson's correlation coefficients were again reviewed, this time for all variables (e.g. global scores, subscales, demographic variables) to provide estimates of magnitude and direction of the relationships. Demographic variables accounted for were duration of illness and length of time in therapy. The RAND-36, PHQ-4 and these aforementioned demographic variables were all continuous.

Stepwise regression. In order to assess for the unique variance accounted for by CAMS-R scores, separate from the effect of possible confounding, known predictor variables of clinical indicators of health (e.g. RAND-36), depression and anxiety (PHQ-4) and certain demographic information on eating disorder symptomology, multiple regression was used. Specifically, stepwise regression will be completed to answer research question 2. This method uses mathematical criteria (e.g. selecting predictor variables with the highest correlation with the outcome) when entering variables. Change statistics (R^2 and F) were evaluated based on a significance level of .05. Variables that did not result in significant ($p \leq .05$) change changes were excluded.

A final regression model was created. Specific information about each predictor variable on the outcome variable was determined from the unstandardized and standardized regression coefficients (e.g. direction and strength of associations). The unstandardized coefficient equation was used for the raw data and the standardized coefficient equation was used to make comparisons across the different variables, despite the differences in measurement tools. Next, the importance of each variable to the model was determined. The part correlations will be used determine the unique contribution of each variable in the model.

Displaying and Discussing Data

The results are presented in tables or, if applicable, utilizing other visual representations. The tables highlight statistically significant results and serve to address each research question. A discussion provides interpretation of the results. Namely, the discussion explores the findings in the context of theory, practice and other research. Implications for practice and future research were discussed. This information is provided in Chapter 4, the results section.

Sample Size

Multiple power analyses were conducted and their estimated sample sizes are presented in Table 2. For these analysis, multiple regression models with 10, 5, and 0 covariates were examined. Due to a lack of preliminary data, an assumption was made that there was an error standard deviation equal to 1. Thus effect sizes are in standard deviation units (Cohen effect sizes). Effect sizes of 0.25, 0.40, and 0.50 were used. The significance level is 0.05 and the VIF is 1.50 for 5 covariates and 1.75 for 10 covariates. The power analysis calculations were conducted to determine the number of participants required to meet a significance level of 0.05. The power is set at 0.80. The standard deviation among the predictors is set at one. Based on the power analyses, a sample size of 57 participants was needed, assuming there are 5 covariates, to achieve an effect size of 0.50 at a significance level of 0.05 and power of 0.80. Therefore, a target of $N = 57$ participants was sought.

Table 2
Power Analyses

Effect Size	Number of Covariates	Significance	Power	Sample Size
0.25	0 VIF = 0	0.05	0.80	128
0.40	0	0.05	0.80	51
0.50	0	0.05	0.80	33
0.25	5	0.05	0.80	225
0.40	5	0.05	0.80	88
0.50	5	0.05	0.80	57
0.25	10	0.05	0.80	230
0.40	10	0.05	0.80	93
0.50	10	0.05	0.80	62

Anticipated Ethical Issues

A few anticipated ethical issues were considered. The participant's information was kept confidential. Data was de-identified using unique numeric codes, as previously described (see protection of human subjects). To ensure privacy, only CITI trained individuals who are part of the dissertation committee had access to data files. Additionally, choice and autonomy of persons enrolled in this research were prioritized and to advocate for individual's ongoing consent, participants could withdraw from the study at any time without penalty. Individuals were not compensated for participation beyond what was reasonable given the time and energy they put forth by being in the study. Other than participant time and energy to complete the survey, there were minimal risks or discomfort associated with participating in the survey. There may have been unknown risks.

Limitations

The cross-sectional, descriptive design was non-experimental and although it serves to describe the relationships that may be present between variables, it does not establish

causality. The survey method also presents a limitation since the data is mostly self-report. As previously discussed in the data collections methods section, although each survey instrument is reliable and valid, all have specific limitations and the CAMS-R in particular has not yet been used in persons with AN. Correlational designs examining the relationships between variables, require large sample sizes and this could have presented a limitation given that the site only has 24 adult residential beds. Given the geographical location of this research and convenience sample, the demographics were expected to be homogeneous.

Chapter 4

Results

This chapter discusses the results of the data analysis. First, an overview of the demographic information of the sample will be provided. This will include personal and clinical characteristics. Next, results related to the research questions will be described. In conclusion, the findings will be summarized.

Characteristics of the Sample

The total sample size was $n = 60$, however 1 response included more than 10% missing data and was deleted, leaving a sample size of $N = 59$. Additional missing data was minimal and all variables had at least 98.3% complete responses. Therefore, no variables contained less than 58 responses.

Personal Characteristics

All participants were adults between 18 and 59 years old. The mean age was 25.71 (SD = 8.75) years old. All participants were female (98.3%) or transfemale (1.7%) and identified as female (98.3%) or nonbinary (1.7%). The group was predominantly white ($n = 45$, 76.3%). Asians made up 15.3% ($n = 9$) and Hispanics accounted for 6.8% ($n = 4$) of the sample. One individual (1.7%) elected not to report racial identify. In terms of education, 40.7% of participants completed a bachelor's degree (33.9%) or higher (master's degree = 5.1%, terminal degree = 1.7%). About twenty five percent ($n = 15$) of individuals had completed some college, 25.4% ($n = 15$) finished high school and 5.1% ($n = 3$) achieved an education level of 11th grade or less. Two people (3.4%) reported attending vocational or technical school.

Clinical Characteristics

All participants were entering residential eating disorder treatment. The sample consisted of 29 individuals with AN, restrictive type (AN R) (49.2%), 13 persons with AN, binge-purge type (AN BP) (22.0%) and 17 people with other specified feeding and eating disorder, atypical anorexia (OSFED AA) (28.8%). The average BMI for the overall sample was 18.4 kg/m² (SD = 4.4 kg/m²) with a range between 13.6 and 38.7 kg/m². As would be expected, the average BMI varied between groups and was 15.7 kg/m², 17.5 kg/m² and 23.7 kg/m² for the AN R group, the AN BP group and the OSFED AA group, respectively. Individuals reported that, on average, their eating disorder was first diagnosed at 15.6 years old. The mean time since diagnosis was 10.1 years and individuals reported spending an average of 3.4 years, in therapy, including all levels of treatment. Of note, the mode for length of time in treatment was 0 months, indicating that there were a number of individuals in treatment for the first time. Co-occurring DSM 5 diagnoses, included anxiety disorders (42.4%, $n = 25$), depressive disorders (30.5%, $n = 18$), trauma and stress related disorders (22.0%, $n = 13$), substance related and addictive disorders (10.2%, $n = 6$) and others. About 30% ($n = 17$) of participants had no other psychiatric diagnosis. See table 3 for co-occurring psychiatric diagnoses.

Table 3

<i>Co-occurring DSM-V Diagnoses</i>	
Diagnosis	Percent ($N = 59$)
No other Psychiatric Diagnosis	28.8%
Anxiety Disorders	42.4%
Depressive Disorders	30.5%,
Trauma and Stressor-Related Disorders	22.0%
Substance Related and Addictive Disorders	10.2%
Bipolar and Related Disorders	6.8%
Schizophrenia Spectrum and other Psychotic Disorders	3.4%
Personality Disorders	3.4%
Neurodevelopmental Disorders	1.7%
Obsessive-Compulsive and Related Disorders	1.7%

Note: total does not equal 100% due to individuals with multiple co-occurring disorders

Participants were asked to described in an open ended format their prior experience with mindfulness. About 8.5% of participants ($n = 5$) left this question blank. Another 8.5% ($n = 5$) indicated they had no past experience with mindfulness. The vast majority ($n = 49$) of people had tried some form of mindfulness, with at least a third ($n = 18$) of individuals having done so in therapy prior to entering residential treatment. The most common types of mindfulness reported included yoga ($n = 27$) or “meditation” ($n = 28$) which individuals sometimes specified as “guided” ($n = 7$). Other reported styles of meditation included “breathing” ($n = 2$), “walking” ($n = 2$) and “grounding” ($n = 1$). Participants reported having tried these and/or other mindfulness techniques (e.g. prayer, journaling, music, sports, etc.) at a frequency ranging from one time during therapy to having a daily practice.

Results Related to Research Questions

For reference, the dependent variable EDE-Q scores range from 0-6, with higher scores indicating more eating disorder symptoms. The independent variable of mindfulness was measured using the CAMS-R, with scores ranging from 0-48 and higher scores indicating greater levels of mindfulness. The RAND-36 measured clinical indicators of health and all subscales range from 0-100, with higher scores indicating better health states. Anxiety and depression were assessed using the PHQ-4, with subscales ranging from 0-6 and total score ranging from 0-12. On the PHQ-4, higher scores indicate greater levels of anxiety and/or depression.

To answer the research questions, descriptive statistics, including mean and standard deviations were computed for all of the variables. Additionally, Cronbach’s alpha was assessed. (Table 4).

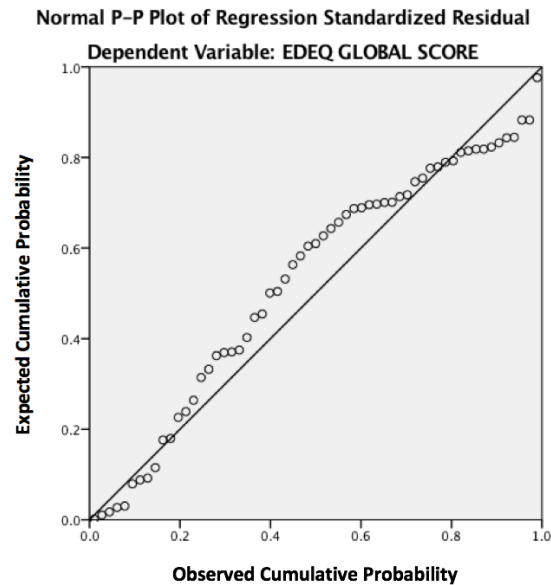
Table 4

<i>Descriptive Statistics and Cronbach's Alpha of Variables</i>			
Variable	Mean (Standard Deviation)	Cronbach's Alpha	N
<u>Dependent Variable</u>			
EDE-Q Global	4.45 (1.26)	.923	59
Shape Concern	4.83 (1.38)		59
Weight Concern	4.54 (1.59)		59
Restraint	4.26 (1.67)		58
Eating Concern	4.12 (1.28)		58
<u>Independent Variables</u>			
CAMS-R	24.17 (5.33)	-	59
RAND-36	-	.539	-
Physical Functioning	72.63 (27.34)		59
Pain	56.57 (29.93)		59
General Health	55.93 (10.19)		59
Energy/Fatigue	51.86 (13.55)		59
Emotional Wellbeing	49.79 (11.84)		59
Health Change	43.22 (30.38)		59
Role Limitations due to Physical Health	32.20 (38.30)		59
Social Functioning	25.00 (26.57)		59
Role Limit due to Emotional Problems	19.21 (32.28)		59
PHQ-4 Total	8.17 (3.40)	.889	58
Anxiety	4.40 (1.85)		58
Depression	3.81 (1.96)		59

Particular attention was paid to the dependent variable of eating disorder symptoms, since regression assumes a normal distribution. Histograms of the dependent variable (EDE-Q scores) and each of the four subscales were examined to determine normalcy.

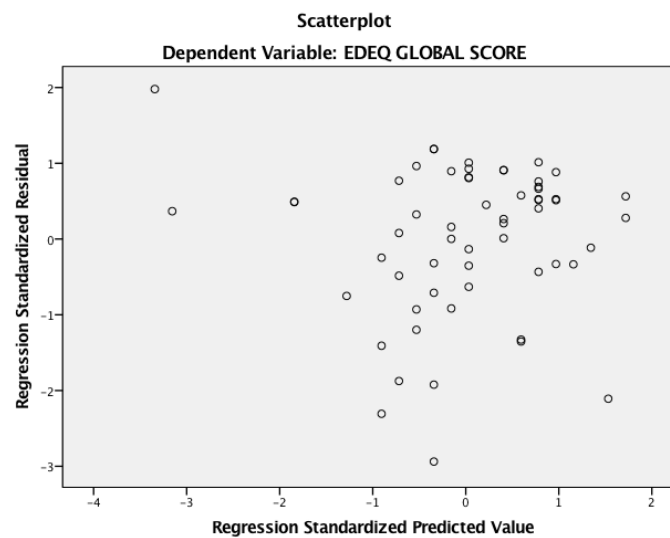
Since the distribution of EDE-Q scores appeared to be negatively skewed, the normality of the residuals was tested using a predicted probability (P-P) plot looking at the predicted and residual values. See Figure 3.

Figure 1. P-P plot of predicted and residual values of dependent variable, EDE-Q Global Score



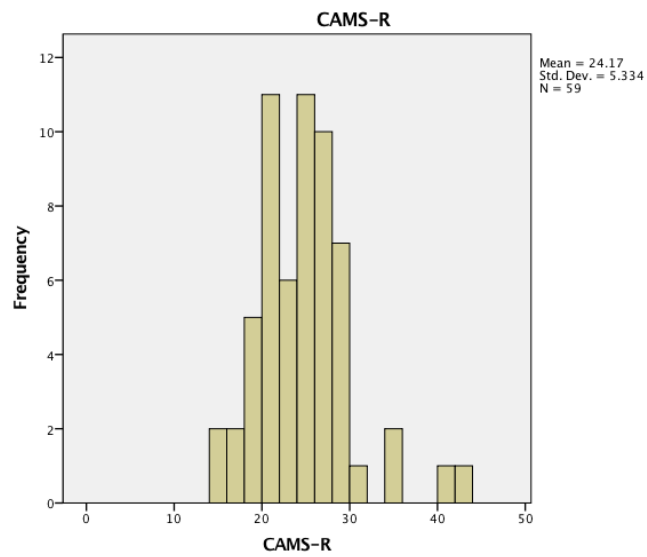
The scores were also assessed for homoscedasticity using a scatterplot. (Figure 2).

Figure 2. Scatterplot of predicted and residual values of dependent variable, EDE-Q Global Score



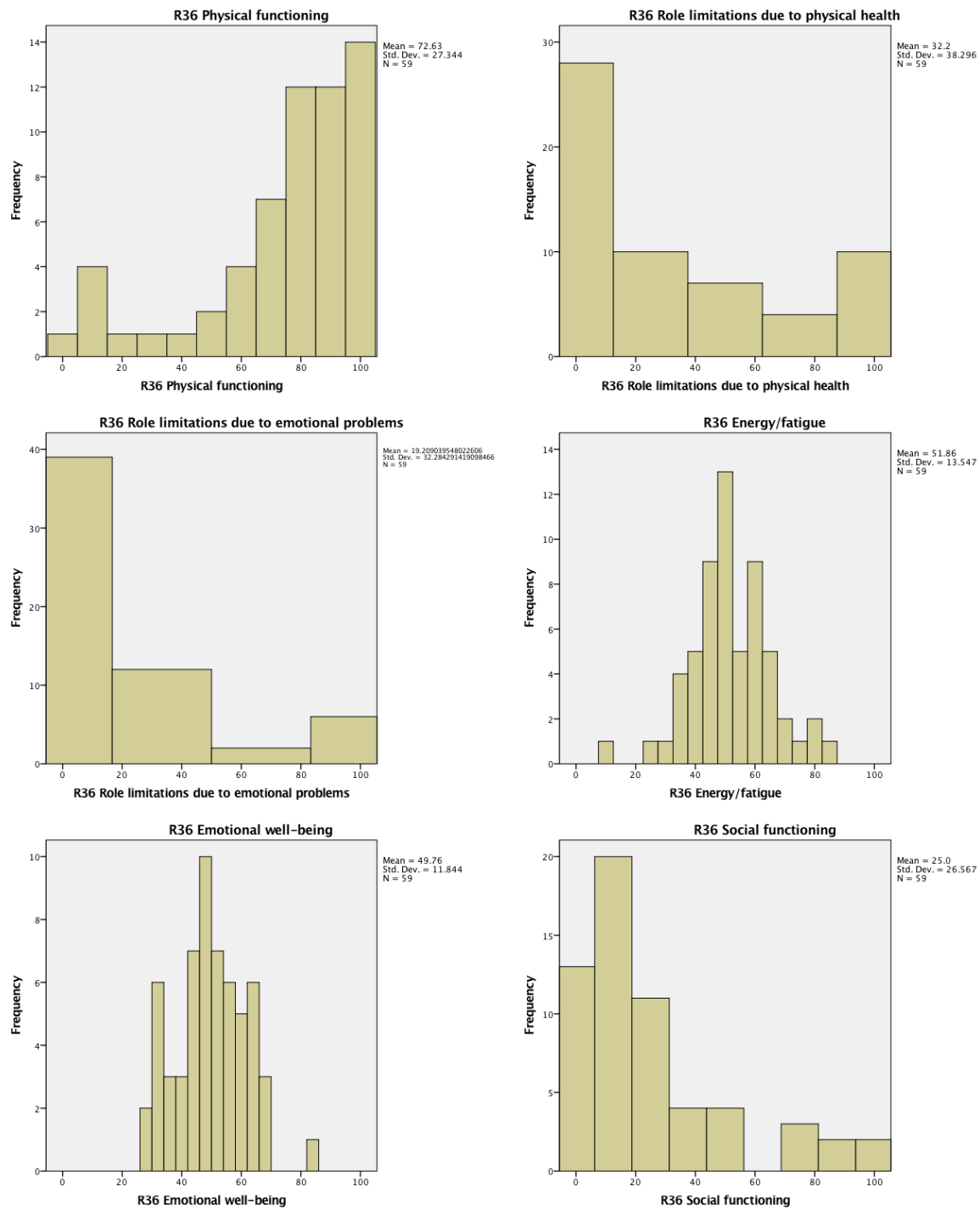
Since the residuals are normally distributed and homoscedastic, linearity did not need to be assessed. Histograms of all other variables of interest were also created. See Figures 5 and 6.

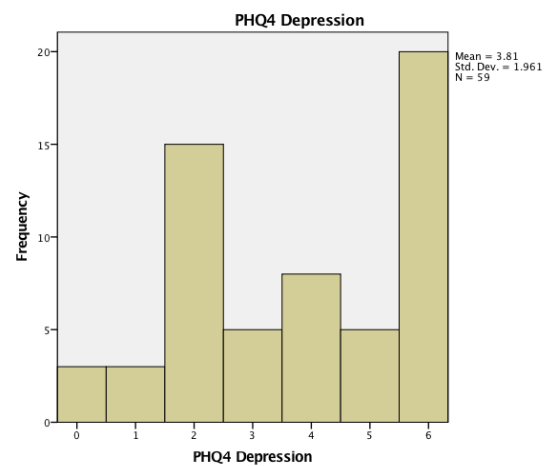
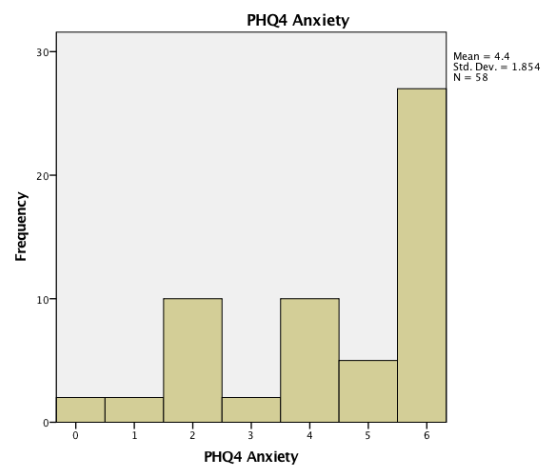
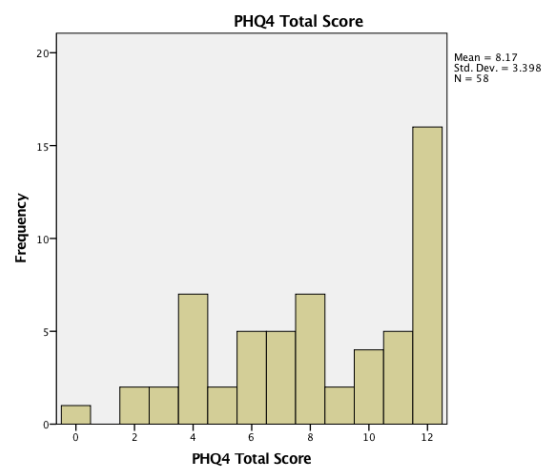
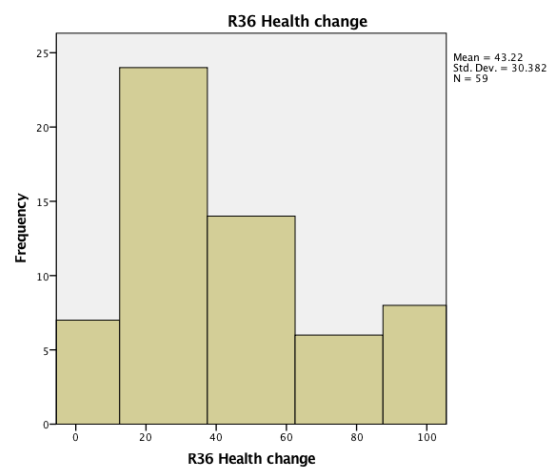
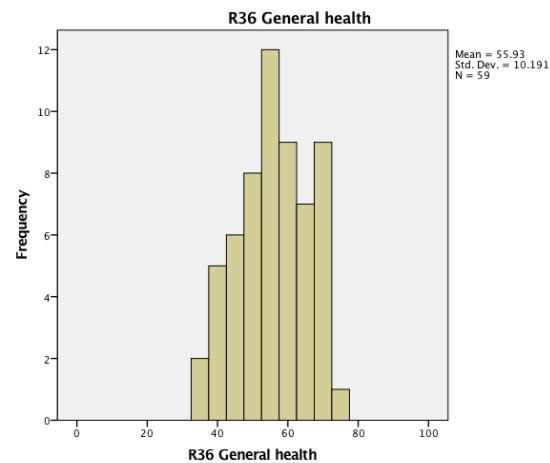
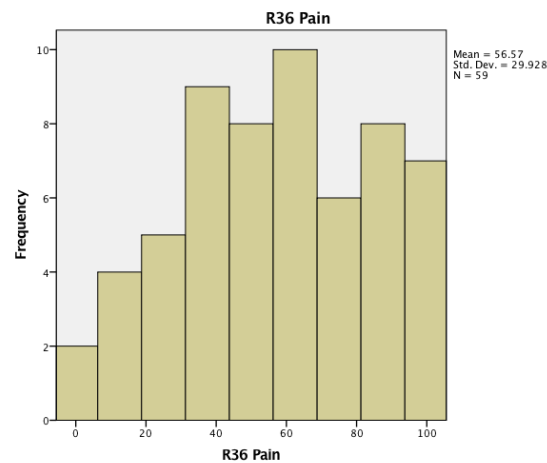
Figure 3. Histograms of independent variable, CAMS-R



Of note, the personal and clinical characteristics of age, race, education level and BMI did not predict CAMS-R scores.

Figure 4. Histograms of clinical indicators of health, RAND-36 and PHQ-4

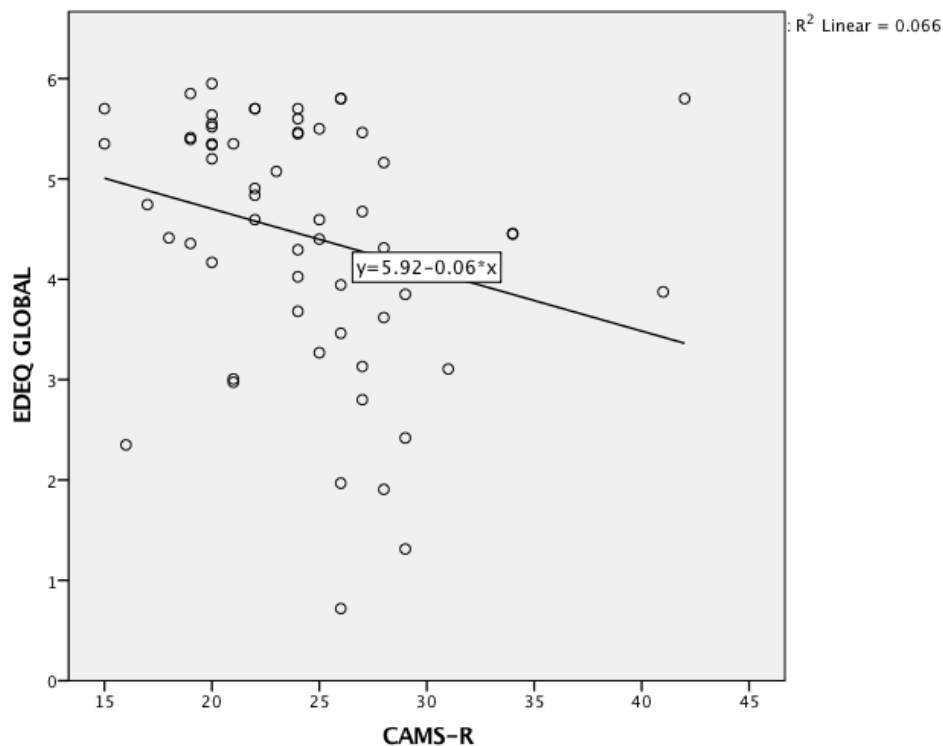




Relationship between Mindfulness and Eating Disorder Symptoms (Question 1)

To answer research question 1, “What is the relationship between level of mindfulness and eating disorder symptoms in individuals with AN entering residential treatment?” a scatterplot of the dependent variable of eating disorder symptoms and the independent variable of mindfulness was created. (Figure 5).

Figure 5. Scatterplot of EDE-Q global scores and CAMS-R scores



There was a significant relationship ($p = .049$) between mindfulness (CAMS-R) and eating disorder symptoms (EDE-Q). Pearson’s correlation coefficient (r) was $-.257$ and coefficients of determination (R^2) was $.066$. This indicates that there is a negative, small to moderate association and as an individual’s CAMS-R score decreases, EDE-Q scores increase. In other words, in general, as level of mindfulness decreases, the severity of eating disorder symptoms increases. The unstandardized regression model equation is depicted in Figure 5

and is $y = 5.92 - .06x$. Therefore, the precise relationship between the variables is that for each unstandardized unit increase EDE-Q score, there is a negative -0.06 unstandardized unit decreased in CAMS-R score. Interestingly, when looking only at the group of individuals with AN ($n = 41$), including both subtypes, the relationship was more strongly significant ($p = .019$, $r = -.360$). No relationship was observed for the group of persons with OSFED AA exclusively ($n = 16$, $p = .707$, $r = -.099$). Concerning the relationship between mindfulness and eating disorder symptoms among the AN R ($n = 28$, $p = .307$, $r = -.196$) and AN BP ($n = 12$) groups separately, only the latter remained significantly correlated ($p = .003$, $r = -.760$). Bonferroni corrections were applied in both cases and did not change the outcomes.

The relationship between mindfulness and each of the four EDE-Q subscales was also examined among the entire sample. There was a significant inverse relationship between mindfulness and the EDE-Q subscales of shape concern ($p = .023$) and weight concern ($p = .047$) but not with restraint and eating concern. Pearson's correlation coefficients (r) and significance (p) are listed in Table 5.

Table 5

Relationship between CAMS-R and EDE-Q subscales

EDE-Q subscale	Pearson's correlation coefficient (r)	P value	N
Shape Concern	-.296	.023*	59
Weight Concern	-.260	.047*	59
Eating Concern	-.221	.095	58
Restraint	-.124	.352	58

* significant at $p < .05$

Unique Variance of Mindfulness on Eating Disorder Symptoms (Question 2)

The second research question asked, "What is the unique variance in the outcome variable of eating disorder symptomology accounted for by the independent variable of mindfulness separate from other clinical indicators of health (e.g. RAND-36 scores, PHQ-4

scores and certain demographic variables)?” Duration of illness and length of time in therapy were considered. Multicollinearity among the predictor variables, duration of illness and length of time in therapy, was ruled out by examination of the variance inflation factor (VIF). Multicollinearity was determined by a VIF > 5 and tolerance statistic < .2. Forced entry multiple regression was used in order to initially examine all variables. Note that PHQ-4 Total score was not considered as a separate predictor variable, since the subscales (PHQ-4 Anxiety and PHQ-4 Depression) were included. All variables were negative for multicollinearity. Pearson’s correlation coefficients (r) and significance (p values) were reviewed at the same time for all variables in the model. VIF, tolerance statistics, r and p values are listed in Table 6.

Table 6

Correlations with EDE-Q Global (one-tailed)				
Independent Variables	VIF	1/VIF	r	P value
CAMS-R	1.976	.506	-.243	.341
RAND-36				
Physical Functioning	1.678	.596	.015	.754
Pain	2.945	.340	-.441	.122
General Health	1.704	.587	-.317	.258
Energy/Fatigue	1.477	.677	.336	.323
Emotional Wellbeing	2.024	.494	.441	.247
Health Change	1.528	.654	-.317	.349
Role Limitations due to Physical Health	2.594	.385	-.217	.816
Social Functioning	2.447	.409	-.324	.644
Role Limit due to Emotional Problems	2.634	.380	-.188	.448
PHQ-4 Total	-	-	-	-
Anxiety ^a	2.022	.495	.537	.015
Depression	3.076	.325	.383	.660
Duration of Illness	2.440	.410	.145	.540
Duration of time in therapy	2.099	.476	.021	.717

^a $n = 58$

Next stepwise regression was used to determine the best fit model and the unique variance of mindfulness, the other predictor variables, duration of illness and length of time in therapy on eating disorder symptoms. Stepwise regression resulted in a final model for

explaining EDE-Q scores that was significantly predicted by anxiety (PHQ-4 Anxiety) score and pain (R36 Pain) score only ($p = .001$, $r = .606$, $R^2 = .367$, adjusted $R^2 = .344$, Standard error of estimate = 1.0276, $SS = 33.662$, $F = 15.939$). Mindfulness did not account for unique variance in the model. In the final model, in general, as anxiety increased and pain decreased, EDE-Q scores increased. There was a moderate, positive relationship between anxiety and EDE-Q scores and a smaller, negative relationship between pain and EDE-Q scores. The regression model equation is $y = .440x_{\text{anxiety}} - 2.97x_{\text{pain}}$. This standardized coefficient equation indicates that for every standardized unit increase in EDE-Q score, anxiety increased by .440 standardized units and pain decreased by -.297 standardized units. The unstandardized coefficients are .301 for anxiety and -.013 for pain with a constant of 3.824. The part correlations, which determine the unique contribution of each variable in the model, are .463 for anxiety and -.333 for pain.

The model summary is listed in table 7.

Table 7

Stepwise linear regression of EDE-Q scores with predictor variables					
Variables	B	SE (B)	β	t	P value
Anxiety	.301	.078	.440	3.873	.001
Pain	-.013	.005	-.297	-2.618	.011

$R^2 = .367$; adjusted $R^2 = .344$; Standard error of estimate = 1.0276; $SS = 33.662$

Summary

The results of this study sought to answer two research questions, (1) What is the relationship between level of mindfulness and eating disorder symptoms in individuals with AN entering residential treatment? (2) What is the unique variance in the outcome variable of eating disorder symptomology accounted for by the independent variable of mindfulness separate from other clinical indicators of health (e.g. RAND-36 scores, PHQ-4 scores and certain demographic variables)?

For question 1, mindfulness was significantly, inversely correlated with eating disorder symptoms. The relationship was small to moderate. So, in general, as level of mindfulness decreased, the severity of eating disorder symptoms increased. This relationship appears to be particularly strong among individuals with AN, and particularly AN BP compared to individuals with OSFED AA. Specifically, when the relationship between CAMS-R and EDE-Q scores was analyzed by eating disorder subtype (e.g. AN R, AN BP and OSFED AA), significance was only found in the group of individuals with AN BP. Among the entire sample, mindfulness significantly and inversely predicted shape concern and weight concern but not eating concern or restraint. For question 2, when considering clinical indicators of health and certain demographic variables, mindfulness did not contribute any unique variance in eating disorder symptoms based on stepwise regression. Only anxiety and pain significantly predicted eating disorder symptoms among this sample.

Chapter 5

Conclusion

The purpose of this study was 1) To determine the relationship between level of mindfulness and eating disorder symptoms in individuals with anorexia nervosa (AN) entering residential treatment and 2) To determine the unique variance in the outcome variable of eating disorder symptomology accounted for by the independent variable of mindfulness separate from other clinical indicators of health (e.g. anxiety, depression, general health, pain, physical and emotional functioning, demographic variables, etc.). Based on the results of this study it was determined that mindfulness was significantly, inversely correlated with eating disorder symptoms ($p = .049$, $r = -.257$). In general, as level of mindfulness decreased, the severity of eating disorder symptoms increased. When examining individuals with AN compared to individuals with OSFED AA, the relationship remained significant only in the group consisting of those with AN. Further breakdown of eating disorder subtypes revealed that the relationship between mindfulness and eating disorder symptoms was only significant in individuals with AN (AN R and AN BP types) ($p = .019$) and AN BP ($p = .003$) and not significant for the AN R and OSFED groups.

To the best of this researcher's knowledge, this was the first study to examine level of mindfulness and eating disorder symptoms in a sample of individuals with AN entering residential treatment and the relationship with clinical indicators of health. This study was novel because the sample consisted only of individuals with AN and Atypical AN (OSFED AA), which has not previously been studied. This research uniquely examined differences between AN compared to OSFED AA and subtypes of AN (e.g. AN R and AN BP).

Additionally, this study accounted for the role of clinical indicators of health on eating

disorder symptoms. Furthermore, the Cognitive Affective Mindfulness Scale - Revised (CAMS-R) (Feldman et al., 2007), which may be particularly useful for individuals with psychiatric disorders, has never been used in a sample of individuals with eating disorders.

This chapter contains a discussion of the results of this dissertation. Limitations will be addressed and implications for practice, education, research, and policy will be reported on.

Demographics

The study consisted of female individuals who were predominantly non-Hispanic white (76.3%), which is representative of national data on the demographics of adults with AN (Udo & Grilo, 2018). The sample had a slightly lower percentage of Hispanic individuals (7% versus 13%) and slightly higher percentage of Asian individuals (15% compared to 6% identifying as “other” ethnicity) compared to national data (Udo & Grilo, 2018). The relatively young average age of the sample (25.71 years old) was aligned with the earlier age of onset in AN compared to other eating disorders and disproportionately high number of young adults with AN (Hudson, et al., 2007; Udo & Grilo, 2018). Similar to adult national averages, the majority of individuals with AN in this sample had completed some college (Udo & Grilo, 2018).

The breakdown between subtypes of AN matched reports from large epidemiological studies (Favaro, Ferrara, & Santonastaso, 2003). As expected, the average BMI between the subgroups was lowest for those with AN R and greatest for those with OSFED AA. The mean age of onset and length of time with illness in the sample was similar to the national average of 19 years old and an 11-year duration of episode (Udo & Grilo, 2018). Co-occurring psychiatric diagnoses among participants paralleled reports of the

high prevalence of anxiety disorders (Cederlöf et al., 2015; Hudson, et al., 2007), depressive and other mood disorders (Hudson, et al., 2007; Ulfvebrand et al., 2015), comorbidity with abuse and traumatic events (Jacobi, et al., 2004) and substance use (Root et al., 2010). The number of individuals in the study without a co-occurring DSM 5 (APA, 2013) disorder also aligns with national data, suggesting that persons with AN are less likely to have comorbid psychiatric conditions, compared to those with other eating disorders (Hudson, et al., 2007).

Little is known about prior exposure to mindfulness in individuals with AN. Data suggests that mindfulness may be useful for individuals with binge eating disorder (Godfrey et al., 2015; Katterman et al., 2014) and a number of other conditions such as anxiety (Bluett et al., 2014; Spijkerman et al., 2016) and pain (Hilton et al., 2017). It is therefore not surprising that the majority of participants in this study had tried mindfulness techniques at some point in the past. However, it is difficult to compare this finding to other samples.

Relationship between Mindfulness and Eating Disorder Symptoms (Question 1)

The data indicated that there was a significant relationship between level of mindfulness, measured by the CAMS-R, and eating disorder symptoms in individuals with anorexia nervosa, including atypical anorexia nervosa, such that as level of mindfulness decreased, the severity of eating disorder symptoms increased. This is consistent with findings in non-clinical samples (Alberts et al., 2012; Lavender et al., 2011), groups of people with mixed types of eating disorders, including those entering residential treatment and persons with a self-reported history of AN (Dunne, 2018). In these groups, higher levels of mindfulness were associated with lower levels of disordered eating. Unlike prior

research, this was the first study, to the best of this author's knowledge, to examine the relationship between mindfulness and eating disorder symptoms in a sample of individuals with acute AN.

Mindfulness and EDE-Q Subscales

Along with global EDE-Q scores, higher levels of mindfulness significantly predicted lower levels of eating disorder symptomology on the EDE-Q subscales of shape concern and weight concern. Neither of the other existing, descriptive studies, examining mindfulness in persons with mixed types of eating disorders (Butryn et al., 2013) or a history of AN (Cowdrey & Park, 2012) and using the EDE-Q, reported on the relationship between subscales and level of mindfulness. However, Cowdrey and Park (2012) noted a link between more brooding (or "...comparing the current situation... focused on control on eating, weight and shape with some other ideal") (p. 101), lower levels of mindfulness and more eating disorder symptoms. Butryn and colleagues (2013) reported that greater acceptance or non-judgment, which may be similar to less or no brooding (e.g. not comparing a current situation, and therefore not focused on shape and weight concern) predicted lower EDE-Q scores. This dissertation data supports mindfulness interventions targeted at reducing shape and weight concern as potentially beneficial in persons with AN.

Mindfulness did not predict eating concern or restraint in this sample. The relationships between these variables is unclear, especially since other data in individuals with AN does not exist. Theories around mindfulness, weight loss and restriction suggest that the former may facilitate self-control and self-regulation, leading individuals to successfully limit caloric intake and increase expenditure while also tolerating associated discomfort (e.g. hunger, muscle soreness from exercise, etc.) (Arch et al., 2016; Olson &

Emery, 2015). These consequences of mindfulness may be detrimental to individuals with AN. Unlike shape and weight concern, eating concern or restraint may not be useful targets of mindfulness for persons with AN. Additionally, more research is needed since there may be problems with the construct or measurement of mindfulness (e.g. scale, self-report, etc.) as it relates to these variables of eating concern and restraint.

Mindfulness and Subtypes of Anorexia Nervosa

This study determined that the inverse relationship between mindfulness and eating disorder symptoms appeared particularly strong among individuals with AN, particularly AN BP, compared to individuals with OSFED AA. When the sample was divided by AN compared to OSFED AA, mindfulness and eating disorder symptoms were significantly, inversely correlated in only the former group. When analyzed by eating disorder subtype (e.g. AN R, AN BP and OSFED AA), the correlation was significant only in the group of individuals with AN BP. This is a novel finding; however, it may be related to a study in a group of individuals with mixed types of eating disorders, indicating that lower levels of mindfulness were correlated with higher levels of drive for thinness and impulsivity (Lattimore et al., 2017). Although additional research is needed, it could be hypothesized that the clinical features of AN BP (e.g. drive for thinness and impulsivity) may be particularly related to low levels of mindfulness, compared to the other subtypes of AN.

Unique Variance of Mindfulness on Eating Disorder Symptoms (Question 2)

Using stepwise regression, it was determined that mindfulness did not contribute any unique variance in eating disorder symptoms when considering clinical indicators of health and demographic variables of duration of illness and time in therapy. Only anxiety,

measured by the Patient Health Questionnaire 4 (PHQ-4) (Kroenke et al., 2009) and pain, measured by the MOS 36-Item Short Form Health Survey (RAND-36) (Ware & Sherbourne, 1992), significantly predicted eating disorder symptoms among this sample. Anxiety was assessed by asking participants if, over the last 2 weeks they had been bothered by, “Feeling nervous, anxious or on edge” or “Not being able to stop or control worrying” (Kroenke et al., 2009). Pain was assessed by the following questions 1) How much bodily pain have you been in during the last 4 weeks? And 2) During the past 4 weeks, how much did pain interfere with your normal work? (Ware & Sherbourne, 1992).

Anxiety

It is not surprising that high levels of anxiety predicted increased eating disordered behaviors in the sample. Fear of weight gain or becoming “fat” is part of the criteria of anorexia nervosa (APA, 2013) which may lead to high ratings for feeling nervous or anxious. Additionally, obsessive compulsive tendencies are also observed in individuals with AN (APA, 2013). When participants reported on their lack of ability to stop or control worrying, it may have been related to co-occurring obsessions or compulsions, either related or unrelated to food. In addition, out of psychiatric disorders, anxiety disorders have the highest rates of comorbidity among persons with eating disorders (Cederlöf et al., 2015; Wolfe et al., 2016). Taken together, it makes sense given existing data, that anxiety significantly predicted eating disorder symptoms in the sample of persons with AN entering residential treatment. Although mindfulness did not predict eating disorder symptoms in this model, research supports the usefulness of such interventions to reduce or manage anxiety symptoms (Bluett et al., 2014; Hofmann, Sawyer, Witt, & Oh, 2010; Spijkerman et al., 2016). Targeting anxiety in individuals with AN through mindfulness

based interventions may reduce eating disorder symptoms. Additionally, since anxiety symptoms may precede the development of eating disorders (Schaumberg et al., 2018), mindfulness based interventions in childhood have potential as preventive techniques as well.

Pain

In this study, lower levels of pain predicted higher levels of eating disorder symptoms. This is a somewhat unexpected finding because of the number of problems associated with pain that are common in AN, such as low bone mineral density and osteoporosis, gastrointestinal problems, muscle fatigue due to over exercise (Wild et al., 2016) and psychosomatic symptoms (Abbate-Daga et al., 2013). However, it is important to consider that for some people, symptoms of AN may serve to mitigate pain. This may be especially true for gastrointestinal pain, which is common during acute eating disorder treatment, such as in residential programs, where this data was collected. For example, when a person experiences physical or psychosomatic gastrointestinal pain, they engage in disordered eating behaviors (e.g. restriction, purging) and the pain is reduced. On the other hand, when someone does not engage in eating disordered behaviors, they experience high levels of pain. Furthermore, about 40% of adolescents reported gastrointestinal pain preceding their eating disorder (Sim, Lebow, Weiss, Harrison & Bruce, 2017), supporting the idea that symptoms of AN may serve to manage such problems.

Another explanation for this finding could be linked to reduced perceptions of pain among people with AN. Bär and colleagues (2015) suggest aberrant pain processing in individuals with AN related to reduced gray matter volume and lack of activation after painful thermal stimuli in the right and left posterior cingulate cortex of persons with this

illness. Yamamotova and colleagues (2017) found that higher levels of body dissatisfaction in persons with AN was positively correlated to higher thermal pain threshold latency (specifically, more time with finger on a heater before noticing pain). This may suggest a lack of present-moment, bodily awareness in persons with AN. Overall, there is limited information about the relationship, and especially the directionality of the relationship, between pain and eating disorder symptoms and more research is needed. Mindfulness techniques have been well-established for reducing and managing pain (Hilton et al., 2017; Veehof, Trompetter, Bohlmeijer, & Schreurs, 2016). If eating disorder symptoms are being used to mitigate pain, or if people with this illness have aberrant pain processing, mindfulness techniques focused on pain management and present-moment awareness may promote recovery in this population.

Limitations

There are a number of limitations that should be considered. First, the cross-sectional, descriptive design was non-experimental and cannot establish causality. Second, a convenience sample was used and inferences about the findings may not be generalizable. The sample was homogeneous in ethnicity and was comprised entirely of individuals who were female or transfemale. Although the mostly white race of the participants in the study matched national data, it's likely that ethnic minority groups are underrepresented in clinical samples of individuals with mental health conditions due to lower service utilization (Merikangas et al., 2011). Next, diagnostic information, although assessed by trained clinicians, was based on unstructured interviews and may have varied between different providers. In addition, respondents self-reported the majority of survey data and individuals may under or over-reported on certain measures.

Measuring mindfulness as a construct has presented challenges in the field due to the wide range of definitions. Although the CAMS-R (Feldman et al., 2007) has been validated in groups of people with various mental illnesses, this is the first study to use it in a group of people with AN. Therefore, it's possible that some associations, or lack thereof, are related to unknown problems with this measurement tool. Lastly, the Cronbach's Alpha for the RAND-36 (Ware & Sherbourne, 1992) was low ($\alpha = .539$). This tool was not designed to assess quality of life in people with eating disorders, but has been widely used in research in clinical populations, including in individuals with AN (Peterson & Mitchell, 2005). In a meta-analysis of studies using the RAND-36 in individuals with AN, it was noted that people consistently reported normal levels of physical functioning and pain, but significantly lower levels of other physical and all mental health components of the scale (Winkler et al., 2014). Winkler and colleagues (2014) suggest that the lack of consistency may be related to the disconnect between an individuals' assessment of their own functioning and wellness compared with their actual health status. This is likely particularly evident in this sample of people with AN who were entering residential treatment and subsequently, may have impacted the Cronbach's Alpha of the RAND 36. One specific example is that participants reported a high level of physical functioning but also a high level of role limitations due to problems with physical functioning.

Implications for Nursing Practice

This study presents evidence that mindfulness predicts eating disorder symptoms in individuals with acute AN. Nurses and others working with persons with AN should be aware of this relationship and provide education, time and resources for individuals in their care to engage in mindfulness practices. Manualized interventions that increase

baseline level of mindfulness, rather than eating concern or restraint, may be most beneficial to individuals with AN BP. Many treatment centers already utilize mindfulness based therapies and this dissertation supports the ongoing use of such interventions. Often, individuals with AN are treated for co-occurring psychiatric or medical conditions, but not specifically for an eating disorder (Swanson et al., 2011), so nurses at all levels of care and in a variety of fields should encourage practices to enhance mindfulness.

Anxiety and pain are likely closely related to eating disorder symptoms in persons with AN. Since previous research supports the use of mindfulness to manage anxiety (Bluett et al., 2014; Hofmann et al., 2010; Spijkerman et al., 2016) and pain (Hilton et al., 2017; Veehof et al., 2016), these are other areas where nurses can support clients use of such practices. Nurses should counsel clients about targeting the frequently co-occurring symptoms of anxiety and pain through mindfulness practices. Specifically, mindfulness may be a highly effective first-line therapy for anxiety or pain, prior or concurrent to medication use. Despite mounting evidence for the efficacy of mindfulness, providers should always use sound clinical judgment and proceed with caution in this emerging field, keeping in mind possible negative consequences (e.g. panic, insomnia) (Lindahl, Fisher, Cooper, Rosen, & Britton, 2017) of these practices.

Implications for Research

More rigorous and experimental studies are needed to further this research. A next step is to assess the level of mindfulness and eating disorder symptoms across a continuum of care and throughout treatment, at multiple times. This will help determine the role that changing levels of mindfulness has on eating disorder symptoms, or that baseline level of mindfulness has on outcomes for persons with AN. Additionally, data on

the mechanism of action of mindfulness in persons with AN is necessary. This research could be expanded to include other types of eating disorders as well, since there is a high frequency of cross-over between different types of eating disorders (Peat et al., 2009). Research should progress using a clear and unified definition of mindfulness and careful attention should be paid to measurement tools. Studies using clinician assessments and objective measures of mindfulness, should be completed, since individuals with AN may lack insight about the severity of their symptoms (APA, 2013) making self-report measures potentially challenging.

Another next step will be to research the use of mindfulness based interventions on eating disorder symptoms in persons with AN. Research on interventions that promote higher baseline levels of mindfulness or that target specific symptoms is warranted. Persons with AN BP may find these types of interventions most efficacious, since this dissertation found the strongest relationship between level of mindfulness and eating disorder symptoms in this subtype. It is unclear why this relationship exists, but certain characteristics such as high levels of impulsivity (Lattimore et al., 2017) or anxiety (Schaumberg et al., 2018) may play a role. Individuals with anxiety, vomiting behavior (Zerwas et al., 2013) and AN BP tend to have worse outcomes compared to those with AN R (Peat, Mitchell, Hoek & Wonderlich, 2009). Therefore, research examining the role of mindfulness to target impulsivity, vomiting or other clinical characteristics in persons with AN BP may be extremely useful. Additionally, impulsivity is commonly reported among individuals with substance use disorders (Kozak et al., 2018) and owing to the high comorbidity of these conditions with eating disorders (Root et al., 2010), research could also explore the role of mindfulness in persons with dual diagnoses.

One potential intervention is technology assisted meditation, since these types of tools may be more easily accessible, especially during moments of impulsivity, more widely used and could lessen stigma associated with seeking help for eating disordered behaviors. Another possible intervention is insight-focused meditation to target emotions and physical sensations associated with impulsive behaviors, such as vomiting, or other purging behaviors, and bingeing. Insight-focused meditation may also be useful in increasing present-moment bodily awareness (e.g. pain, hunger) in persons with AN. Attention must be paid to the possible negative consequences of mindfulness specific to persons with AN in such research. Intervention studies could be experimental or quasi experimental. Eventually, randomized control trials will be needed to validate the use of specific mindfulness based interventions in large samples of persons with eating disorders.

Anxiety and pain and their role on eating disorder symptoms are also important variables to continue to research. Since mindfulness has been shown to reduce levels of anxiety (Bluett et al., 2014; Hofmann et al., 2010; Spijkerman et al., 2016) and manage pain (Hilton et al., 2017; Veehof et al., 2016) across diverse samples, it will be important to examine this relationship further in persons with AN and other eating disorders. Since anxiety predicted worse outcomes in persons with AN (Zerwas et al., 2013), mindfulness interventions that reduce this co-occurring symptom should be researched. Interventions that target pain and especially perception of pain, which may be problematic for persons with AN (Bär et al., 2015; Yamamotova et al., 2017), will also be important to research. Both anxiety and pain are sometimes treated using pharmacological methods with high risks for dependence, abuse and physical side effects, including withdrawal upon cessation. Mindfulness may provide a safer, alternative treatment option for persons with AN

experiencing anxiety, pain or both. Research is therefore needed to further elucidate the relationship between these variables and test mindfulness based interventions targeting anxiety and pain.

Implications for Education

This study was the first to examine baseline levels of mindfulness and eating disorder symptoms in a sample of individuals with acute AN. Since higher levels of mindfulness were correlated with lower levels of eating disorder symptoms, these findings should be disseminated to persons working with individuals with AN, such as those on inpatient units and in residential or intensive day-treatment programs. Many individuals exhibit subthreshold eating disordered behavior but still experience clinically significant distress (Swanson et al., 2011). Hence, expanding educational efforts to include individuals working with clients in primary care, pediatrics, family care or women's health settings may also be beneficial. Additional education efforts to the larger community, such as mental health treatment centers, pain or gastrointestinal clinics and schools are also warranted. It will be imperative to educate policy makers and insurers on the potential benefits of mindfulness for persons with AN in order to ensure appropriate care is received and that reimbursement needs are met.

Implications for Policy

This dissertation will help inform stakeholders, such as policy makers, insurance companies and private or government funding bodies about the relationship between mindfulness and eating disorder symptoms. Given the link between mindfulness and eating disorder symptoms and the role of anxiety and pain, policy should focus on ensuring that individuals with AN have access to effective care. Access includes availability of providers

with knowledge about mindfulness and related practices and insurance reimbursement for care. Furthermore, since subclinical eating disorders are common (Swanson et al., 2011), this dissertation together with other research, could contribute to policies regarding the use of mindfulness in schools or community settings to potentially prevent AN.

Policy related to pain is another specific area where this research may be useful. The National Institutes of Health, National Center for Complimentary and Integrative Health (NCCIH) is seeking to fund research focused on mechanisms of pain and pain management (NCCIH, 2017) in order to promote a better understanding, more effective treatment and evidenced-based policies related to this topic. Since pain predicted eating disorder behaviors in persons with AN and previous research supports the use of mindfulness to manage pain (Hilton et al., 2017; Veehof et al., 2016), NCCIH funding could be used to further explore this relationship and both the mechanisms underlying pain in persons with AN and mindfulness based interventions to manage it.

Summary

To the best of this researcher's knowledge, this was the first study to examine levels of mindfulness and eating disorder symptoms in a sample of individuals with acute AN. This dissertation found a significant, inverse, relationship between these variables, such that, as level of mindfulness decreased, the severity of eating disorder symptoms increased. The data suggest that this relationship appears to be strongest among individuals with AN BP compared to individuals with AA R or OSFED AA. Mindfulness significantly predicted lower levels of shape concern and weight concern, but did not predict eating concern or restraint. Mindfulness did not contribute to any unique variance in eating disorder symptoms in a stepwise regression model that accounted for clinical indicators of health,

duration of illness and length of time in therapy. In this model, anxiety and pain significantly predicted eating disorder symptoms among the sample. The results of this dissertation improve nursing knowledge and practice. Further research is needed, focusing on level of mindfulness throughout a continuum of eating disorder care and examining specific interventions (e.g. technology assisted meditation, insight-focused meditation, interventions targeting anxiety and pain management) in persons with AN and associated medical and mental illnesses. The results of this dissertation and future research should be disseminated in order to educate clinicians, community members and stakeholders and promote high quality, evidenced-based policies.

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Appendix A: Release of Information for Research Participation

Opportunity for Research Participation

With our commitment to providing high quality care, Cambridge Eating Disorder Center (CEDC) aims to contribute to the scientific advancement of understanding and treating eating disorders. As such, CEDC has formed an alliance with Boston College William F. Connell School of Nursing and Julie Dunne, nurse practitioner, to conduct research on mindfulness and eating disorders using an online survey that will take approximately 30 minutes to complete. All responses will be confidential.

Please complete this form to indicate your interest in learning more about your eligibility to participate in this research. Should you have any questions, comments, or concerns, please let the RC supervisor know.

Please check one of the following:

☐ Yes, I would like to find out if I qualify to participate in this research study. I authorize CEDC to release my first name and last initial and my eating disorder diagnosis information to the Boston College research representative. I understand that I may be contacted by the research representative if I am eligible to participate in this survey. I understand that I am under no obligation to participate and I can rescind at any time. I also understand that participation is separate from treatment and should not impact treatment in any way.

☐ No, I am not interested in learning about this research and do not wish myself to be contacted. I understand that my decision has no impact on treatment in any way.

Statement of Consent:

I have read (or have had read to me) the contents of this form. I authorize use of my deidentified health information as outlined in this form. I have been encouraged to ask questions. I have received answers to my questions. I give my consent to receive further information and to be contacted by Julie Dunne, Nurse practitioner.

This authorization will expire on the date the research study ends.

Patient Name:

Patient's Signature:

Date:

Appendix B: Cognitive Affective Mindfulness Scale - Revised (CAMS-R)

Instructions: People have a variety of ways of relating to their thoughts and feelings. For each of the items below, rate how much each of these ways applies to *you*.

- _____ 1. It is easy for me to concentrate on what I am doing.
- _____ 2. I am preoccupied by the future.
- _____ 3. I can tolerate emotional pain.
- _____ 4. I can accept things I cannot change.
- _____ 5. I can usually describe how I feel at the moment in considerable detail.
- _____ 6. I am easily distracted.
- _____ 7. I am preoccupied by the past.
- _____ 8. It's easy for me to keep track of my thoughts and feelings.
- _____ 9. I try to notice my thoughts without judging them.
- _____ 10. I am able to accept the thoughts and feelings I have.
- _____ 11. I am able to focus on the present moment.
- _____ 12. I am able to pay close attention to one thing for a long period of time.

Scoring: Items 2, 6, and 7 are reverse-scored. After appropriate reversals, sum values for items 1 - 12. Higher values reflect greater mindful qualities.

Appendix C: Eating Disorder Examination Questionnaire (EDE-Q)

The EDE-Q asks questions regarding eating behaviors and associated thoughts and feelings over the past 28 days. The tool provides a global score, and four sub-scores for restraint, eating concern, shape concern and weight concern.

Please see original source for complete tool.

Appendix D: MOS 36-Item Short-Form Health Survey (RAND-36)

The RAND-36 asks questions about perception of health in eight domains (physical functioning, role limitation due to physical functioning, bodily pain, general health perceptions, energy, social functioning, role limitations due to emotional problems and mental health).

Please see original source for complete tool.

Appendix E: Patient Health Questionnaire 4 (PHQ-4)

PHQ-4				
Over the <u>last 2 weeks</u> , how often have you been bothered by the following problems? (Use "✓" to indicate your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Little interest or pleasure in doing things	0	1	2	3
4. Feeling down, depressed, or hopeless	0	1	2	3

(For office coding: Total Score T___ = ___ + ___ + ___)

Developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues, with an educational grant from Pfizer Inc. No permission required to reproduce, translate, display or distribute

Appendix F: Study Consent Form

Subject's Initials____

Boston College William F. Connell School of Nursing
Informed Consent to be in study titled "Level of Mindfulness in Persons with Anorexia Nervosa Entering Residential Treatment and the Relationship with Eating Disorder Symptomology and Clinical Indicators of Health"

Researcher: Julie P. Dunne
Adult Consent Form

Introduction:

You are being asked to be in a research study exploring levels of mindfulness and health. You were selected to be in the study because you are an adult individual entering residential treatment at the Cambridge Eating Disorder Center and you have a diagnosis of anorexia nervosa or an unspecified feeding and eating disorder, such as atypical anorexia nervosa

Please read this form. Ask any questions that you may have before you agree to be in the study.

Purpose of the study:

The purpose of this study is to investigate possible relationships between mindfulness, eating disorder symptoms and clinical indicators of health. The total number of people in this study is expected to be about 60.

What will happen in the study:

If you agree to be in this study, we would ask you to complete an online survey consisting of 87 questions about mindfulness, your health and eating habits. We expect that the survey will take 30 minutes to complete. You will be given access to a private meeting room on the first floor of the Cambridge Eating Disorder Center to complete the study between 5pm and 9pm, except during dinnertime, on the day you sign this consent form. If you prefer, you may choose to complete the survey during another free period of time on the unit or on a different day. You may use your own electronic device or you may borrow an iPad provided by the investigator to complete the survey. The investigator will collect information on your diagnoses, year of birth and BMI on admission from your health record only after you consent to participating in the study. If you chose not to participate, this information will not be accessed.

Risks and discomforts of being in the study:

Your time and energy are necessary to complete the survey. There are minimal risks or discomfort associated with participating in the survey. However, some of the survey questions, such as questions about eating disorder symptoms, mental health and general health may be uncomfortable or difficult to answer. This study may include risks that are unknown at this time.

The PI will be available during the time you complete the survey if you have any questions or experience any discomfort. Support staff are also available on the CEDC residential units 24 hours a day. To protect your privacy, all study data will be stored in a locked office and none of your survey responses or data will be stored with your name or any other identifying information.

Benefits of being in the study:

Participation is not expected to directly benefit you, but you may feel gratified knowing that you helped further scholarly work in this research area.

Payments:

You will receive the following as compensation for completing the study: (1) a code for a free 1-month subscription to a mindfulness phone application (\$10 value) and (2) a \$5 CVS gift card.

Costs:

There is no cost to you to be in this research study.

Confidentiality:

The records of this study will be kept private. In any sort of report we may publish, we will not include any information that will make it possible to identify you. Research records will be kept in a locked file. All electronic information and information collected from your chart will be coded with a number and secured using a password-protected file. Mainly just the researchers will have access to information; however, please note that a few other key people may also have access. These might include the Institutional Review Board at Boston College

and internal Boston College auditors who may review the research records.

Choosing to be in the study and choosing to quit the study:

Choosing to be in this study is voluntary. If you choose not to be in this study, it will not affect your current or future relations with the University. Your decision will not affect your treatment or your relationship with anyone at CEDC.

You are free to quit at any time, for whatever reason. There is no penalty or loss of benefits for not taking part or for quitting. During the research process, you will be notified of any new findings from the research that may make you decide that you want to stop being in the study.

You may revoke authorization of your consent to share your de-identified health information at any time by notifying the Principal Investigator, Julie P. Dunne at julie.dunne@bc.edu or by phone at 617-552-6442. If you do revoke your authorization, any information previously disclosed cannot be withdrawn. Once de-identified information is disclosed in accordance with this authorization, it may be re-disclosed and the information, although completely de-identified, may no longer be protected by federal regulations.

Getting Dismissed from the study:

The researcher may dismiss you from the study at any time for the following reasons: (1) it is in your best interests (e.g. distress has resulted), (2) you have failed to comply with the study rules, or (3) the study sponsor decides to end the study.

Contacts and Questions:

The researcher conducting this study is: Julie P. Dunne MS, PMHNP-BC. For questions, more information concerning this research or if you believe you may have suffered a research related injury you may contact her by email at julie.dunne@bc.edu or by phone at 617-552-6442. This research is being supervised by Dr. Judith Shindul-Rothschild, PhD, RN. She can be reached by email at judith.shindul-rothschild@bc.edu or by phone at 617-552-4270. If you have any questions about your rights as a person in this research study, you may contact: Director, Office for Research Protections, Boston College at irb@bc.edu or (617) 552-4778.

You will be given a copy of this form to keep for your records and future reference.

Statement of Consent:

I have read (or have had read to me) the contents of this consent form. I authorize use of my de-identified health information as outlined in this consent form. I have been encouraged to ask questions. I have received answers to my questions. I give my consent to be in this study. I have received (or will receive) a copy of this form.

This authorization will expire on the date the research study ends.

Signatures/Dates

Study Participant (Print Name):

Date:

Participant or Legal Representative Signature:

Date: