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THE EFFECTS OF A BRIEF MINDFULNESS-BASED INTERVENTION ON COLLEGE STUDENT OVEREATING

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DEPARTMENT OF HEALTH AND EXERCISE SCIENCE

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Abstract

The purpose of this study was to examine the effects of a brief 2-session mindfulness-based intervention on number of episodes of overeating in the college student population. Students were randomized into the intervention group or a waitlisted control group. Episodes of overeating during the previous week were assessed at pre-test, post-test, and 30-day follow-up. Qualitative questions were asked of the intervention group at 30-day follow-up. Results of a Repeated Measures ANOVA showed significant decrease in overeating at 30-day follow-up ($p=0.29$), but no significant difference between the groups ($p=.961$). A total of seventeen themes were found for the results of the three qualitative questions.

Keywords: mindfulness-based intervention, overeating, college students

Chapter 1: Introduction

What is mindfulness?

Mindfulness is defined as the awareness that comes from purposefully and non-judgmentally staying in present moment awareness (Kabat-Zinn, 1996). In defining mindfulness, there are five common components that have been used in previous literature. These five common components can be summarized as attention and awareness, present-centeredness, external events, cultivation, and ethical-mindedness (Nilsson & Kazemi, 2016). Focus of attention refers to a person's ability to sit in quiet focus of attention without ruminating. Awareness refers to self-awareness and ability to monitor internal states as a response to external stimuli. Present-centeredness refers to staying rooted in the present experience (i.e. not getting lost in thoughts of future or past). External events refers to recognizing and detaching from external stimuli. Cultivation is considered an increase in self-awareness over time due to practice. Lastly, ethical-mindedness highlights an increase in personal ethics.

Mindfulness is cultivated through formal practice (during meditation) as well as informal practice (in daily living). Specific meditations act to increase mindfulness levels and allow individuals to approach daily life in a more *mindful* manner. The meditations include, but are not limited to, body scan meditation, walking meditation, sitting meditation, and a gentle and guided yoga practice (Santorelli, 2014). These meditations instruct that individuals take designated time *to be* in awareness, whether through paying attention to the physical body, simply sitting, or walking. Additionally, informal mindful practices include breath awareness, awareness of pleasant and unpleasant events, and purposefully maintaining present-moment awareness during

routines (such as brushing teeth, walking the dog, or driving to work) (Santorelli, 2014). These practices aim to root the individual in present experience, rather than being controlled by wandering thoughts and feelings.

Mindfulness-Based Interventions

The standard protocol for mindfulness-based intervention (MBI) programs are eight weekly sessions of 2-3 hours and include a 7.5-hour all-day silent retreat. The program includes the formal and informal mindfulness practices mentioned above, daily homework assignments, and group dialogue. Though the above is a brief description of a standard program as outlined by pioneer researchers in the field (Kabat-Zinn, 1996; Santorelli, 2014), the majority of studies do not strictly adhere to this standard. Variations exist in length of programs and in which formal and informal exercises are included or excluded. Some studies even include additional educational components not related to mindfulness (for example, a study that is targeting weight loss may include weekly educational materials about diet and exercise in addition to the mindfulness component).

Previous literature in mindfulness interventions

Mindfulness-based interventions (MBIs) have shown a change in a variety of health behaviors and mental health outcomes (Baer et. al., 2006; Daubenmier, 2011; Kristeller et. al., 1999; Miller et. al., 2012; Timmerman et. al., 2012). Furthermore, studies applying an MBI show an increase in self-control and sleep quality, and a decrease in cigarettes smoked and binge drinking (Canby et al., 2014; Greeson et al., 2014; Bowen & Marlatt, 2009; Mermelstein & Garske, 2015). Additionally, studies show a significant decrease in depression, anxiety, and stress following an MBI (Lynch

et al., 2011). By using the principles detailed above to guide their programs, researchers have had a constructive impact on health behavior change. Obesity-related eating behaviors, such as overeating, can also benefit from the application of mindfulness-based interventions.

Eating behaviors

One factor contributing to the fast-growing obesity epidemic in the U.S. is overeating. Overeating is characterized by food consumption greater than the normal portion size for a given period of time (i.e. 2 hours) by an individual. However, most MBI programs focused on problematic eating behaviors target more extreme forms of overeating, such as binge eating, and do so in populations diagnosed with eating disorders, such as Binge Eating Disorder (BED).

Studies using MBIs have alleviated overeating symptoms. In studies involving obese subjects, overeating has been shown to decrease significantly (Baer et al., 2006), and significant decreases have been sustained at follow-up (Dalen et al., 2010). Additionally, overeating has significantly decreased in obese populations with coexisting Binge Eating Disorder and Substance Use Disorder (Courbasson et al., 2011). One research study reported that 34.9% of undergraduate participants report an episode of overeating at least one time in the past month (Kelly-Weeder et al., 2014). In this way, a mindfulness-based intervention can be an advantageous tool in working to reduce episodes of overeating in a college student population.

Gaps in the Literature

Even with these successes, there are gaps in previous literature. The majority of mindfulness-based studies on eating behavior have high attrition rates, with rates as

high as 19% (Timmerman et al., 2012) and 23.7% (Courbasson et al., 2016). Additionally, the majority of studies fail to address follow-up past the immediate post-intervention time point. This is an important factor for practical intervention behavior change, as behavior change consistency is a more important indicator of success, and as health promotion practitioners want to see lasting change.

Furthermore, many interventions are lengthy, ranging anywhere from 6 weeks (Dalen et al., 2010) to 16 weeks (Courbasson et al., 2016). Though these studies do show beneficial impact on behavior change, this long time commitment puts a high demand on participants. Though significant behavior changes have occurred for participants of MBIs lasting 6, 8, 10, and even 16 weeks long, researchers have seen a change in eating behaviors following an increase in mindfulness with just a one hour intervention (Jacobs et. al., 2013). Though this study had several limitations and included a small sample size, it does present findings that suggest benefits of brief interventions. Can a brief 2-session mindfulness-based intervention have an immediate and lasting effects on college student eating behavior? The purpose of this study is to examine the effects of a brief 2-session mindfulness-based intervention on number of episodes of overeating in the college student population.

Research Questions

1. Will a brief 2-session mindfulness-based intervention show significant reduction in number of episodes of overeating within the past 7 days at post-test?
2. Will a brief 2-session mindfulness-based intervention show significant reduction in number of episodes of overeating during the past 7 days when assessed at 30-days post-intervention?

Null Hypotheses

1. H_{01}= There will be no significant change in number of episodes of overeating during past 7 days when assessed at post-test.
2. H_{02}= There will be no significant change in number of episodes of overeating during the past 7 days when assessed at 30-days follow-up.

Research/Alternate Hypotheses

1. H_{R1}= There will be a significant reduction in number of episodes of overeating during the past 7 days when assessed at post-test.
2. H_{R2}= There will be a significant reduction in number of episodes of overeating during the past 7 days when assessed at 30-days follow-up.

Significance of the Study

It will be important not only to test whether episodes of overeating decrease directly after a 2-session intervention, but also, to test whether episodes of overeating sustain a decrease in the long-term. If a brief 2-session MBI can show a significant decrease in overeating for college students *and* show lasting behavior change, it would account for less burden for follow-up, and be a better use of public health resources in terms of time and money. MBIs are easy and low-cost programs and could be an easily sustainable program for practical use on college campuses.

Delimitations of the Study

1. Undergraduate students at the University of Oklahoma, ages 18-25.
2. Sample size of 60.
3. Intervention will be delivered in a group setting.
4. Data collection will occur during a spring university semester.

5. Intervention will be mindfulness-based.
6. Quasi-experimental design with intervention component and no control or comparison group.
7. Pre- and post- test assessment with a 30-day follow-up.
8. Outcome measure is episodes of overeating (in the past 7 days).
9. Process evaluations will include compliance with the program.

Limitations of the Study

1. The sampling method will be limited to those who respond to a mass email, poster hangings, or social media posts and as such, the sample will be limited to those who are attracted to program.
2. There will be no control or comparison group.
3. Uncontrolled variables will include but are not limited to: stress levels, course load, dietary habits, and exercise habits.

Assumptions of the Study

1. Participants will answer self-report survey questions honestly.
2. Participants are representative of the undergraduate student body.
3. Researcher is sufficiently skilled to deliver the intervention.

Operational definitions

1. **Mindfulness** is defined as the awareness that comes from purposefully and non-judgmentally staying in present moment awareness (Kabat-Zinn, 1996). In defining mindfulness, there are five common components across studies, listed as terms attention and awareness, present-centeredness, external events, cultivation, and ethical-mindedness (Nilsson & Kazemi, 2016). Attention and awareness is the

ability to focus one's attention. Present-centeredness refers to staying in the present moment experience. External Events refers to recognizing and detaching from external stimuli, as opposed to using external events to base one's self-concept. Cultivate refers to an increase in self-awareness over time due to practice. Ethical-mindedness highlights using the principles of mindfulness in personal ethics and relationships.

2. **Overeating** is characterized by food consumption greater than the normal portion size for the given period of time (i.e. 2 hours) by an individual.
3. **Mindfulness-Based Intervention** refers to any interventions that teach tools which harness the principles of mindfulness, such as meditation, mindful eating, gentle yoga, etc. (Kabat-Zinn, 1996; Nilsson & Kazemi, 2016).

Chapter 2: Literature Review

The Health Problem

Obesity is related to many chronic diseases and a poor quality of life. In Oklahoma alone 33% of the adult population was reported as obese in 2014 and 35.2% of adults were reported as overweight (Center for Disease Control, 2015). The most significant increase in overweight and obesity status occur in the college age group between 18-29 years old (7.1% to 12.1%) (Racette et al., 2005; Mokdad et al., 1999). Furthermore, those who become obese in young adult/adolescent status are more likely to maintain obesity into adulthood (Desai et al., 2008).

One factor that contributes to the obesity epidemic is obesity-related eating behaviors. Obesity related eating behaviors include many different types of problematic eating behaviors (O'reilly et al., 2015). One such behavior is overeating (Ackard et al., 2015).

Existing literature indicates that otherwise healthy populations of college students are especially at risk for overeating, and therefore, require preventive interventions. Reports state that anywhere from 35%-49% of undergraduates report an occurrence of overeating at least one time in a period of 30 days (Kelly-Weeder et al., 2014; Katzman et al., 1984). Sixty percent of college students experience high or very high stress levels (Whichianson et al., 2009), and it is a widely acknowledged fact that eating regardless of internal hunger and satiety cues can be one way of coping with stress (Torres et al., 2007). Young adulthood is a developmental period where adult health behavior patterns are established (Arnett, 2004). Young adults are learning and solidifying their stress coping behaviors and as such, intervening at this time may be especially significant for

the future of their eating behavior, and potentially the future of their weight status and overall health (Desai et al., 2008). Additionally, it is known that as stress increases, so too does obesity related eating behavior, which includes overeating (Torres et al., 2007). Thus, it is crucial to intervene on the eating behaviors of healthy college students in order to prevent overeating, and thus eventual obesity and chronic illnesses related to obesity in the future.

Defining Eating Behaviors

Obesity-related eating behaviors include many different types of problematic eating. Many times, these eating behavior terms are erroneously used interchangeably. However, the eating behavior of interest for the present study must be clearly defined. This study will use the term "overeating" as the behavior of interest. The recurring theme in definitions of overeating is the idea of consuming more food than what is considered normal. In this way, this study will use the term overeating to refer to the overconsumption of food while not considering internal states of satiety. Overeating has been defined as consuming more in a two hour period than someone normally would (Boutelle et al., 2011; Ackard et al., 2003).

Defining Mindfulness

Previous research defines mindfulness as the awareness that comes from purposefully and non-judgmentally staying in present moment awareness (Kabat-Zinn, 1996). In their thematic analysis of 308 articles, researchers found 33 definitions of mindfulness across a range of disciplines and found five common components: attention and awareness, present-centeredness, external events, cultivation, and ethical-

mindedness (Nilsson & Kazemi, 2016). This is the framework that will be used to define the word mindfulness for this study.

Table 1: Five Common Components of "Mindfulness"

Five Common Components	Definition	Example
Attention and Awareness	This principle is seen when a person sits in quiet meditation, focusing attention without ruminating. This, in turn, increases awareness, which is the person's self-awareness and ability to monitor inside states as responses to external stimuli.	Ability to reflect on one's inner affect/state of emotions after a frustrating car accident. Ability to draw into and stay rooted in inner state despite constant dealings with insurance agents, paperwork, and other party involved, and other various goings-on of the outer world.
Present-centeredness	This term refers to a person staying rooted in the present experience.	In the middle of a heated argument with a parent, one is called away to work. This concept in action would be the ability of the person to stay present with driving to and

		being at work, rather than ruminating on the argument.
External Events	These are the outer occurrences of life which can draw into our inner experiences.	Being able to recognize that having a fight with a partner is normal and not reflective of self-worth. The negative feelings are a result of the fight, not a permanent inner state. Ability to separate from negative affect, and not be controlled by it.
Cultivation	One who habitually practices mindfulness eventually cultivates someone's character and self-concept.	After practicing mindfulness for six months, one has an established daily mindfulness practice, and as a result, a better idea of passions, hobbies, and desires for the future, and
Ethical-Mindedness	This principle highlights carrying a mindfulness	After running into a dispute with a co-worker, having cultivated a mindfulness practice, one would

	practice to social circumstances.	find a proactive solution rather than react from their *own* anger.

Mindfulness-Based Interventions

The two most common interventions in mindfulness research are programs called Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT). The MBSR program is an 8-week program which touches on various identified topics including: body scan meditation, gentle hatha yoga, sitting meditation, walking meditation, awareness of pleasant and unpleasant events, breath awareness, and awareness of routine activities. (Kabat-Zinn, 1996).

Body scan meditation refers to a meditation uses the deep breathing, and focusing the attention on each body part (feet, ankles, shins, etc.) from bottom-to-top to relax each part individually. Gentle hatha yoga, or relaxation yoga, describes a brief sequence that can adapt to the needs of each student in order to maximally relax them. Poses may include, but are not limited to: mountain foundation, cat/cow, supine spinal twists, chair, locust, bridge, pigeon, and corpse pose. Sitting meditation is a simple meditation wherein the participant sits on a comfortable cushion or chair and directs one's attention to each physical sensation of the experience of sitting. Walking meditation uses deep breathing as well, but teaches to keep participants awareness firmly rooted to their feet as they walk along a path; from when the heel connects with the ground to the ball of the foot, the attention follows the flow of each step.

Awareness of pleasant vs. unpleasant experiences teaches that when one catches oneself in an unpleasant or pleasant experience (and as a result, ruminating on feeling

unhappy or overjoyed) to kindly redirect the attention to the objectiveness of the present experience. Breath awareness simply teaches participants to redirect one's attention to the experience of inhaling vs. exhaling as opposed to keeping one's attention on thoughts or feelings. Lastly, awareness of routine activities is a practice which aids in establishing a firm mindfulness mindset by keeping one's attention rooted to the present experience through activities like brushing one's teeth, washing the dishes, or driving to school/work instead of letting our attention be on past/future events, thoughts, or feelings.

MBCT is also an 8-week protocol and uses the same philosophy and tools, but in a language meant to target and heal depression and associated symptoms (Segal et al. 2002). Whereas a leader of an MBSR program would guide a breath meditation by saying "breathe and release any tension, stress, or anxiety," a leader of an MBCT program would say "breathe and release any feelings of sadness or pain." In this way, the programs mirror each other, yet focus all aspects on either releasing stress (MBSR) or releasing depression (MBCT).

Worth noting is that many studies employing mindfulness protocols take aspects of an MBSR or MBCT program, and not the whole program in its entirety. That is, many researchers are not necessarily trained in MBSR or MBCT, but list their qualifications and experience with mindfulness practices in order to confirm that they are familiar with program pillars and can apply them appropriately. For example, an intervention may apply body scan meditation and mindful eating, but not other aspects of the program.

Mindfulness in Research

Mindfulness in research is applied to many health behaviors and chronic conditions. Interventions that aim to reduce overeating include interventions working with samples of overweight/obese individuals and interventions working with samples with diagnosed eating disorders.

The literature includes studies which apply MBIs in overweight/obesity. Mindfulness-based interventions have significantly reduced both eating due to negative affect/external cues *and* episodes of overeating in overweight/obese populations (Albert et al., 2012). Additional studies are consistent with these results (Alberts et al., 2010; Daubenmier et al., 2011). One study even found a significant average weight loss of 4kg in obese individuals (Dalen et al., 2010). These results indicate that overeating has been significantly reduced in overweight or obese samples following a mindfulness-based intervention.

MBIs have also been applied to individuals with clinically diagnosed eating disorders. Across all studies, episodes of overeating significantly decreased (Baer et al., 2006; Courbasson et al., 2011; Kristeller et al., 1999; Leahey et al., 2008). These results were consistent in a sample with coexisting Binge Eating Disorder and Substance Use Disorder (Courbasson et al., 2011). One study even reported significant weight reduction due to changes in eating behavior (Leahey et al., 2008). These results further indicate that overeating has been significantly reduced in samples with Binge Eating Disorder following a mindfulness-based intervention.

Research studies that apply MBIs for overeating behavior in healthy samples show data in support of the above findings. One study applied an MBI to a sample of 50

healthy participants found a significant reduction in overeating (Smith et al., 2008). Furthermore, in a healthy sample of college students, elevated mindfulness was correlated with less occurrences of overeating (Roberts & Danoff-Burg, 2010). Present research indicates that the same mindfulness-based interventions will have a significant impact on overeating in healthy college students.

In summary, MBIs have significantly reduced overeating (an identified problematic eating behavior) in samples with overweight/obese status as well as those with Binge Eating Disorder. One study has shown similar results in a sample of healthy adults. Based on this previous literature, one would deduce that MBIs can significantly reduce overeating in healthy college students. However, overeating behavior in healthy samples of college students has yet to be studied.

Overeating in Otherwise Healthy College Students

Research indicates that studies which intervene on college student eating behavior do so by measuring "disordered eating," a general term blanketing behaviors common among all eating disorders (i.e. excessive exercising, purging, binging, etc.) (Franko et al., 2005; Kass et al., 2013). Research studies that focus solely on overeating behavior in healthy college students are typically ones which only work to examine relationships between overeating and an associated risk factor (i.e. stress and overeating in a college student sample) (Katzman et. al., 1984; Striegel-Moore et. al., 1988; Roberts & Danoff-Burg, 2010; Kelly-Weeder et. al., 2014). The body of literature indicates that intervention research is lacking in studying overeating in healthy college students.

Mindfulness in Research with College Students

Preliminary studies show that the higher the level of mindfulness, the higher the quality of life. In samples which rate high levels of mindfulness, overeating, stress, days missed from school/work due to illness, number of cigarettes smoked, and risky sexual behavior are lower and sleep quality, perception of one's own health, physical activity, and enjoyment of activity are higher (Roberts & Danoff-Burg, 2010). However, these results are not as meaningful as those which show the effects of an intervention.

Studies show that college students are responsive to mindfulness-based interventions (MBIs). MBIs improve mental health measures as well as participation in certain health behaviors. MBIs have significantly reduced both stress and anxiety for college students (Call et al., 2013; Cohen & Miller, 2009, Yamada & Victor, 2012). Additionally, MBIs help to significantly increase self-control (Canby et al., 2014), sleep quality, and self-compassion (Greeson et al., 2014). Students enrolled in a MBI program significantly reduce number of cigarettes smoked compared to those in a control group (Bowen & Marlatt, 2009). Similarly, college students participating in an MBI have significantly reduced episodes of binge drinking and negative consequences due to drinking in college students (Mermelstein & Garske, 2015). In this way, MBIs significantly improve quality of life and health status of healthy college student samples due to changes in mental health and participation in certain health behaviors.

Conclusion

This review of literature focused on mindfulness and overeating. After discussing why overeating is a health issue of interest for healthy college students, mindfulness-based interventions (MBIs) were discussed in context. It was determined that MBIs

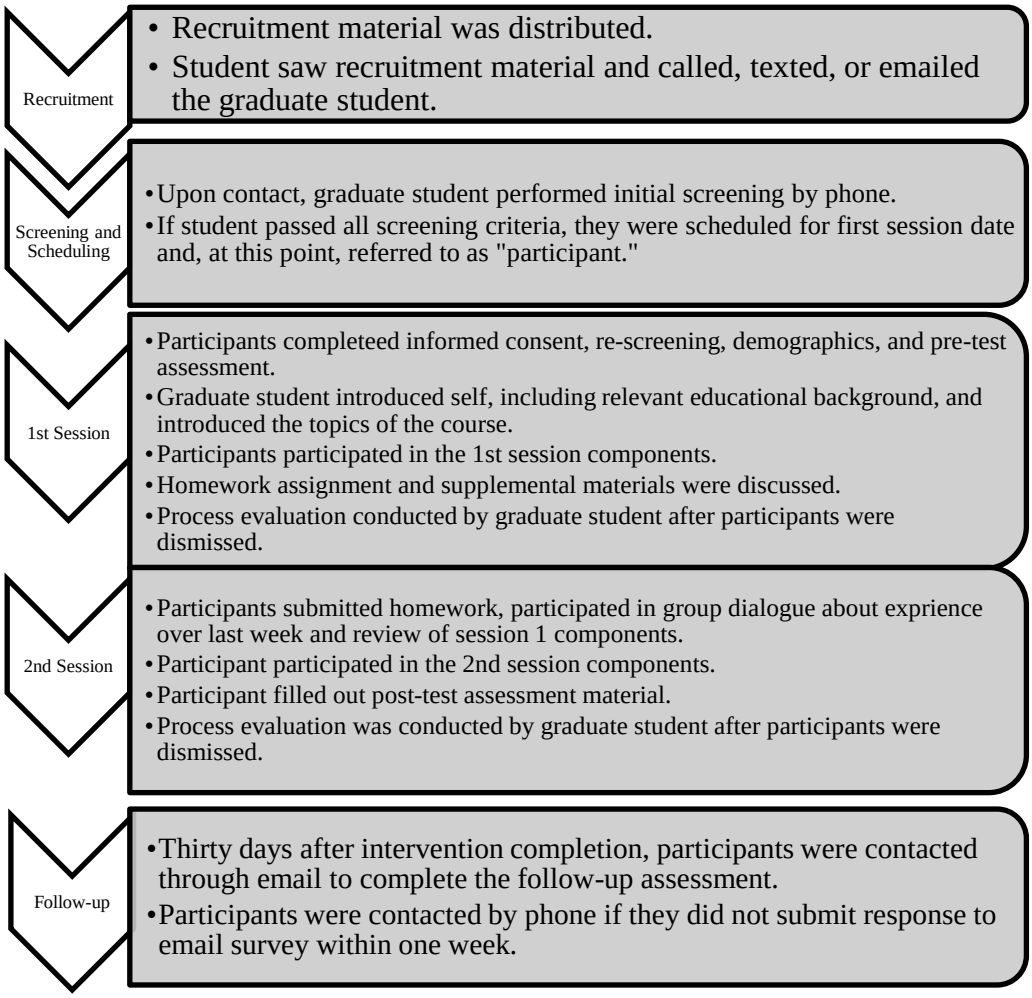
have significantly reduced overeating in obese/overweight samples, Binge Eating Disordered samples, as well as healthy samples. However, there are gaps in this literature. Specifically, gaps exist in intervention studies for reducing overeating in healthy college students. Mindfulness-based interventions that target overeating behavior show high attrition rates, which create difficulty in interpreting results. Intervention studies which do target overeating in college students do so only in obese or clinical populations. MBIs have shown significant changes for college student populations. Specifically, MBIs have significantly reduced college student stress/anxiety and improved health behaviors. It will be especially important to apply MBIs to a healthy college student sample in order to determine the effects on overeating.

Chapter 3: Methodology

Process for Participation

When a student became interested in participating in the intervention through recruitment materials, they had the option to call, text, or email the graduate student to sign up for a session (See Figure 1). Upon this initial contact, the graduate student conducted a basic initial screening over a phone call.

Figure 1: Process for Participation



Recruitment

Recruitment to the study occurred through several strategies. First, the graduate student employed the university's mass email. The University of Oklahoma has a mass emailing server (OU Mass Mail, or OUMM) which reaches every student automatically. All students who subscribe to the university's mass emailing service were given the opportunity to participate in the research at this time. There was an underlying assumption that few students unsubscribe from these emails. Furthermore, those who do unsubscribe are heterogenous (there is not one unifying factor among them that would then eliminate a sub population). This email contained a brief description, including inclusion/exclusion criteria, the purpose of the study, investigator contact information, and participant rights. This email was sent out three times during the data collection process. Furthermore, the investigators received IRB approval from the University of Central Oklahoma to send a mass email to their students and their mass email feature was employed two times.

Recruitment also occurred posting flyers. These posters contained the same information as the mass email: the inclusion/exclusion criteria, intervention highlights, time commitment, and investigator contact information. These posters were hung at campus buildings of both universities such as the library, the student union, the fitness center, dormitories, and other various departmental buildings. These posters were also hung at off-campus locations that are near both campuses. Furthermore, smaller versions of this poster were produced (4 to a page size), and these were distributed to the cars parked at student parking lot at OU. This technique was employed only one time.

Furthermore, recruitment occurred in classrooms. A student from the research team visited undergraduate classes (permission was granted in advance). When recruiting in classrooms, the same information was detailed: the inclusion/exclusion criteria, intervention highlights, time commitment, and investigator contact information.

Lastly, recruitment occurred in certain student organizational groups, such as sororities, fraternities, clubs, and organizations. In order to control for confounding information, student groups highlighting meditation, mindfulness, or yoga were avoided. The same script was used as that for classroom recruitment, detailing: the inclusion/exclusion criteria, intervention highlights, time commitment, and investigator contact information. In these settings, a sign-up sheet was sent around for interested parties and those organizations were contacted the following day.

Recruitment for this study also occurred at the University of Central Oklahoma. Researchers applied to the UCO IRB by sending materials and approval from the original institution of approval (the University of Oklahoma). Once materials were reviewed, investigators received approval for the following methods of recruitment: mass email to university student body, posting flyers on campus, verbal recruitment in classrooms. The mass email was sent two times, once at the end of the spring semester and one time during summer intersession. Flyers were posted at the frequented buildings on campus, as well as establishments adjacent to campus. Professors and teaching assistants were contacted to visit classrooms and recruit verbally.

The Oklahoma State University IRB approved recruitment for study based on original institution (OU) IRB approval. Flyers were posted at off and on campus

hotspots. The graduate student recruited verbally in classrooms where professor permission was granted.

This study used G*Power to run a power analysis for the minimum required sample size. The test family was set to F-tests in order to select ANOVA: Repeated measures, within factors, with the type of power analysis at A priori. As there is a control group, the number of groups was defined as two. Additionally, because there are three time points of comparison (pre-test, post-test, and follow-up) the number of measurements was set to 3. The confidence interval was kept at 95% and alpha was set to 0.05. When calculated, the minimum required total sample size was defined as 44.

Inclusion and Exclusion Criteria

The sample included undergraduate university students between the ages of 18-25. Students were excluded from the study if they had an eating disorder and/or had past experience with mindfulness practice. The screening process is discussed below.

Pre-screening and re-screening questions

Because it was important to ensure that participants met inclusion criteria, undergraduates were screened upon initial contact for: current enrollment as a full time student, age between 18-25, no/limited experience with mindfulness practices, and no presence of an eating disorder [see Appendix B for Screening Questions].

The majority of previous literature does not exclude participants based on mindfulness experience. However, one study excluded participants who had any previous experience with mindfulness whatsoever (Daubenmier et al., 2011) and another study eliminated participants who had a regular meditation practice (Kristeller et al., 2013). According to one study, even just one hour of formal mindfulness

components can effect mindfulness (Jacobs et al., 2013). As such, and due to the possibility of past experience confounding present study results, interested parties who had 1 hour or more of formal mindfulness experience were excluded from the study. Formal mindfulness practices included body scan meditation, gentle hatha yoga, sitting meditation, walking meditation, or mindful eating (Santorelli, 2014). Exclusion criteria did not include informal practices or mindfulness education, such as attending a lecture about meditation, mindfulness, or the benefits of mindfulness/meditation. Students were not excluded if they had any other type of meditation experience.

Screening occurred by defining parameters of exclusion criteria and asking about relevant experience, stating, "Formal mindfulness experience is defined as participating in greater than 1 hour of body scan meditation, yoga, sitting meditation, walking meditation, or mindful eating (either in a group or alone). Given this information, do you have mindfulness experience?" If student answered "yes" to this question, an explanation of the experience was requested. If explanation of experience included greater than 1 hour of above detailed formal mindfulness practices, student was excluded and not told what criteria they did not meet. However, if explanation of experience included only educational components, informal practices, other practices, or less than 1 hour of formal practices then student was included.

Because this study aimed to assess overeating behavior for otherwise healthy college students, it could be a confounding variable and a threat to validity if any participants had an eating disorder (Baer et al., 2006). Eating disorders were defined by this study using the DSM-V, the current Diagnostic and Statistical Manual of Mental Disorders (American Psychological Association, 2013). Eating disorders are defined as

persistent disturbances in eating behavior that result in altered consumption or absorption of food and significantly impair physical health or psychosocial functioning (American Psychological Association, 2013).

The screening protocol assessed the presence of an eating disorder *directly* by asking whether the student had ever been diagnosed with an eating disorder. Additionally, the screening protocol also *indirectly* assessed for an eating disorder by asking about abnormalities in eating behavior and eating patterns using the SCOFF questionnaire. The SCOFF questionnaire has been widely adopted in screening for eating disorders by researchers and has been validated in diverse samples including general adults as well as college students (Hill et al., 2000). If students answered "yes" to two or more questions on the SCOFF questionnaire (questions 6-10) they were excluded from participating in the study.

Both the screening at initial contact and re-screening at session 1 included the questions below:

1) Are you a full-time or part-time student?

2) How old are you?

3) Mindfulness experience is defined as participating in greater than 1 hour of body scan meditation, yoga, sitting meditation, walking meditation, or mindful eating (either in a group or alone). Given this information, do you have mindfulness experience?

4) If so, can you please explain your experiences (including any of the above experiences or any additional experience not listed)? [Only ask aloud if "yes" to question 4].

5) Have you ever been diagnosed by a health professional with any kind of eating disorder? (For example, Bulimia Nervosa, Anorexia Nervosa, or Binge Eating Disorder)?

6) Do you make yourself sick because you feel uncomfortably full?

7) Do you worry that you have lost control over how much you eat?

8) Have you recently lost more than 14 lb in a 3-month period?

9) Do you believe yourself to be fat when others say you are too thin?

10) Would you say that food dominates your life?

If the student met inclusion criteria at the initial screening stage, they were scheduled for their first session. If the student did not meet the criteria at this stage, they were politely thanked for their interest and time and informed that they did not meet the criteria to participate in the present study, and were not told which criteria they did not meet.

A written re-screening was conducted upon arrival at the first session. The re-screening questionnaire included the same questions as the initial screening. When the participants arrived at the first session, they were asked to fill out the screening questionnaire. The graduate student collected the form and looked over it to ensure participant met the criteria to participate. If participant met criteria, the informed consent, demographics, and baseline assessment material were provided and the student was asked to fill those forms out. If the student did not meet the criteria, they were thanked and politely informed they did not meet criteria and asked to leave but not told which criteria they did not meet.

If SCOFF criteria was not met, the student was politely informed that they did not meet the criteria, not told which criteria they did not meet, and not scheduled for a session. Additionally, they were given a list of resources for receiving help in eating disorder recovery and information [see Appendix A for list of resources]. These students were contacted by phone one week later (listed on re-screening questionnaire for graduate student's records) to follow-up.

If a participant arrived at the first session with a friend that had not contacted the graduate student or research team, they were screened along with other participants. The screening material was given and they were asked to fill it out. If student met criteria, they continued on to filling out baseline assessments and participating in the intervention components. If the student did not meet criteria, they were thanked and politely informed they did not meet criteria, not told which criteria they did not meet, and asked to leave. Additionally, if the criteria that is not met was based on the SCOFF questionnaire, the graduate student provided the same list of eating disorder resources so that the student could seek help. The graduate student contacted them one week later to follow-up with use of these resources.

Control Group and Randomization

The present study included a waitlisted control group. The same screening protocol was employed for every interested student that contacted the researcher. The sample size was determined to be 60 students for the intervention and 30 for the control group. For this reason, every 3rd student who passed screening measures was selected into the waitlisted control group. Researchers attempted to maintain the randomization as best as possible. However, because the present study was a group intervention, there were

times that required exception in order to avoid cross-contamination. If a participant came to a session with a friend, those friends were permitted to be in the intervention (as long as they passed screening). Additionally, students were placed into the intervention group if they knew about an on-going session (i.e. if they had a friend or classmate scheduled in the intervention) in order to avoid cross-contamination. Lastly, if groups of students were interested in participating in the intervention *together* (i.e. a sorority), they were permitted to do so, and then half the amount of that group of students would be placed into the waitlist control following their sign up (i.e. if 10 students were interested to participate together, the next 5 students outside of that group who contacted the researcher would be placed on the waitlist to account for 1/3 randomization into the control).

When a student was identified as a waitlisted student, the researcher would arrange a time and place to meet this student where they would sign appropriate paperwork including: informed consent, re-screening, demographics, and baseline measures. Seven days later they were emailed a post-test measure. Thirty days after that, they were emailed a survey link for a follow-up measure. The control group only answered the quantitative questioning at post-test and follow-up. After the follow-up measure was completed, these students were offered a spot in the intervention group.

Description of Intervention Components

Previous literature indicates that mindfulness-based interventions (MBIs) for changing eating behavior are based on a mindfulness-based stress reduction (MBSR) program. Standard protocol for an MBSR includes the following components: formal mindfulness practices (body scan meditation, gentle hatha yoga, sitting meditation,

walking meditation), informal mindfulness practices (awareness of pleasant and unpleasant events, breath awareness, and awareness of routine activities), daily home practice (homework), and group discussion about successes and failures in using these tools (Santorelli et al., 2014). These components served as the core foundational educational requirements for the present study. Additionally, studies that target a change in eating behavior include an additional component of formal practice called "mindful eating" (Miller et al., 2012; Kristeller et al., 2013; Dalen et al., 2010; Baer et al., 2006). Mindful eating as a lone component of an intervention has led to significant decreases in impulsive food choices, which indicates an increase in self-control and a general improvement in eating behavior (Hendrickson & Rasmussen, 2016). Due to the success that the mindful eating training has had, the mindful eating component was included in the present study.

While a longer MBI could be beneficial by allowing participants the time to become comfortable with the new material, the time commitment required for the course makes it difficult for participants with time constraints, such as college students, to complete the course. MBI studies have often cited high attrition rates (Moore, 2008), going as high as 38.7%, 23.7%, or 21.9% dropout (Kristeller et al., 2013; Courbasson et al., 2011; Smith et. al., 2008). Participants, both completers and dropouts, have reported that the time commitment involved in a standard MBSR program was a significant barrier to completion (Moore, 2008).

Though a typical 8-week standard program allocates roughly 2.5 hours per session, allocating 45 minutes for teaching each component, in studying a condensed MBI, it was found that mindfulness levels have a significant increase when just 10 minutes are

allocated for each component (Moore, 2008). The study reporting those results occurred over a 14-session period (Moore, 2008). However, literature suggests that MBIs with just 1 session have shown significant increases in mindfulness (Jacobs et al., 2013) and marginally significant decrease in portion size consumption (Cavanagh et al., 2014). Additionally, MBIs not designed for changing eating behaviors have significantly reduced anxiety and stress while significantly increasing sleep quality and mindfulness in 3-4 weekly sessions (Call et al., 2014; Greeson et al., 2014). This indicates that MBIs ranging from 1-4 sessions yield similar results as MBIs with 6-16 sessions. Additionally, it is important to note that relatively few studies have tested the efficacy of MBIs of varying durations of practice and sessions, and it has been recommended to do so (Shapiro et al., 2005; Moore, 2008). For the above reasons, a 2 session intervention was chosen to feature brief 10-minute practices of the components outlined above.

Intervention

Previous literature of MBIs indicates that sessions are held in a group setting (Kabat-Zinn, 1996). According to the original standards of an MBSR protocol, groups are to include 15-40 participants (Santorelli, et al., 2014). However, more updated research has found increases in mindfulness and decreases in overeating behavior with as few as 7-12 participants (Leahey et al., 2008; Dalen et al., 2010; Baer et al., 2006). Furthermore, qualitative literature establishes that the group setting is important insofar as participants can share their experiences and relate to others who are like them (MacKenzie et al., 2007). In order to establish that purpose and to keep present

circumstances similar to previous literature, the present study defined a 5 person minimum in each session.

On the day before the first session, subjects were contacted by text in order to remind them of the session date, time, and location. The text reminder was repeated on the morning of the session as well. This reminder process was repeated for the second session in order to ensure maximal attendance at both sessions.

At the first session, participants were asked to fill out a re-screening protocol. If they pass the criteria, they were asked to sign an informed consent and fill out baseline assessments (demographics and assessment tool). Then, they were led through all the first session's components. Lastly the homework assignments and supplemental information were discussed and distributed. As per the standards of original MBSR programs, sessions are held weekly (Santorelli et al., 2014). While there is no scientific basis for determining why sessions are held weekly, as it is not stated by the original researcher, this protocol is repeated in the majority of research studies that employ the MBSR foundation with multiple sessions (MacKenzie et al., 2006; Bergen-Cico et al., 2013; Call et al., 2014). Additionally, this protocol is repeated in the majority of MBI research studies designed specifically for overeating behaviors, even those which are not bound by 8 sessions (Courbasson et al., 2011; Leahey et al., 2008; Timmerman et al., 2012). As this has proven to be an effective tactic, which maintains consistency of scheduling availability for participants, the same protocol was used in the present intervention. The participants returned for the second session 7 days after the first session.

After the participants were led through the second session, which included a group discussion about experience with home practice over the past week (success and failures), instructor-led review of session 1 components, and second session components, they were asked to fill out post-test assessment measures. Afterwards, they were dismissed. All participants were contacted 30 days after their second session for follow-up assessments.

Process evaluations were completed after every session. Session components checklists (See Tables 1 and 2) were printed and labeled according to date and time. When the session was completed, the graduate student placed a check mark on each component to record if any components were omitted for any reason. These checklists were kept in a file to be referenced upon program completion [see Appendix E & F for checklists].

Session 1

After a brief re-screening and filling out of baseline assessment, the graduate student introduced the session with greetings. During this time, the graduate student's qualifications and program topics were introduced. Then, the graduate student led participants through the selected program components.

The authors of the original MBSR practice do not outline a required order of intervention components (Santorelli, 2014). Furthermore, the majority of mindfulness-based studies do not specify the order in which they teach the components (Miller et al., 2012; Daubenmier et al., 2011; Smith et al., 2008; Rosenzweig et al., 2007). However, these studies all maintain an increase in mindfulness, which indicates that as long as participants receive teachings on each of the core program components (body scan,

gentle hatha yoga, sitting meditation, walking meditation, awareness of pleasant/unpleasant events, of breath, and of routine activities) the order in which the components are taught is unrelated to program success.

The present study introduced the first half of the eight components (the first two formal practices and the first informal practice) according to the original authors (Santorelli 2014): body scan, gentle hatha yoga, awareness of pleasant and unpleasant events, and the added mindful eating component in the first session (see Table 2). It was important that the participants learn about mindful eating in the first session so that they were able to practice this skill throughout the week. The second session included the second half of the program components: sitting meditation, walking meditation, breath awareness, and deliberate awareness of routine activities.

In both sessions, each of the components were introduced, discussed, and then practiced. In this way, students gained a thorough understanding of the teachings. The exception was awareness of pleasant/unpleasant events and awareness of routine activities – these could only be taught and discussed, to be practiced on one's own throughout the day.

If a participant arrived late, just before the body-scan meditation, they were permitted to stay for the duration of the session. They were asked to sign the informed consent and were re-screened outside of the room, and if criteria was met then they were asked to fill out baseline assessments and then permitted to join the group. However, if a participant was late and missed program components, they were asked to reschedule for a different session. Furthermore, data from participants who left before the last component was complete was not included in data analysis. Participants were

required to have been present for all program components in order to include their data in analysis. Participants who were not present for all of the first session components, and therefore excluded from the data, were still permitted to attend the second session if they so choose. No data from participants was excluded for this reason.

Only one participant did not received all program components due to a rescheduling issue. One student originating in Group 4 (exchange of order for yoga & breath awareness components; see: process evaluation in Appendix E & F) required a rescheduling of 2nd Session, and joined Group 6 at their 2nd Session, which was held 4 days later than the student's original 2nd Session. Group 6's 2nd Session was held as normal (no exchange of order for yoga & breath awareness components), and so the student did not receive the Yoga component that they missed at Session 1. However, this participant had access to the Yoga component via the YouTube channel for supplemental information, and as such, their data was included in the final analysis.

Table 2: Components & Duration of 1st Session

Components for 1st class	**Time**
Basic re-screening	5 minutes
Baseline assessments and informed consent	10 minutes
Greetings	15 minutes
Introduce topic: body scan	5 minutes
Body scan practice	10 minutes
Introduce topic: gentle hatha yoga	5 minutes
Gentle Hatha Yoga practice	10 minutes
Introduce topic: mindful eating	5 minutes
Mindful eating practice	10 minutes
Introduce topic: awareness of pleasant/unpleasant events	10 minutes
Homework discussion	10 minutes
Farewell	5 minutes
Total Time	**1 hour, 40 minutes**

Homework and supplemental material

In order to maintain integrity to the MBSR standard protocol, a homework component was included (Santorelli et al, 2014). The purpose of this homework was to solidify and develop the new skills that participants were taught during the course of the sessions (Santorelli et al., 2014). However, as opposed to the 45 minutes suggested in a

MBSR program, the daily home practice for the present study was to engage in at least 10 minutes/day of the mindfulness components that were taught during the sessions to better fit with participants' time constraints (Moore, 2008).

Participants reported on what components they practice at home each day, and for how many total minutes they practice [see Appendix G for assignment page]. Homework engagement was logged by the participant on the physical document that was provided to them at the first session. The subject was to bring the homework assignment sheet to the second session detailing what they practiced, for how long, and on which days. The graduate student has an excel spreadsheet with each of the participants coded number corresponding to 6 slots, one for each day. The graduate student filled in the number of minutes of practice for each day. As the paper reports were submitted to the graduate student, she recorded this information into the excel document and kept the paper reports in a locked filing cabinet. The graduate student brought blank homework sheets with her to the second sessions in the case that a student did not bring their homework sheet with them. They had an opportunity to report on the previous week's practice retrospectively.

Based upon previous studies, this study's goal for gathering the homework reports was to determine whether practice or lack of practice had an effect on the outcome variable, and also to determine whether students were able to maintain a mindfulness practice outside of the intervention. Previous literature does not indicate that there is a viable way to check on the honesty of the self-report for homework assignments. Some of the past interventions did not have a homework report measure, rather opting to have group discussions with participants about experiences with the home-practice

(Daubenmier et al., 2011; Timmerman et al., 2012; Smith et al., 2008). Studies that did ask for home-practice reporting do not discuss methods for checking honesty of self-report (Kristeller et al., 2013; Alberts et al., 2010; Alberts et al., 2012; Rosenzweig et al., 2007).

In order to support a daily home-practice for participants, supplemental materials were offered by way of video-based practices. Previous literature suggests that participants are better acclimated to new information when take-home material is distributed after initial contact (Smith et al., 2000; Wilson et al., 2010; Boggs et al., 2014). One source specifically indicates that there are no differences between print-based material and video-based material, but that both support better recall in information disseminated (Wilson et al., 2010). The graduate student filmed herself teaching each program component. In total, there were 6 videos: one for each of the practical components (body scan, yoga, mindful eating, sitting meditation, walking meditation, and breath awareness). The two awareness exercises that are unable to be practiced in the session were not filmed.

This material was uploaded to YouTube. The YouTube account was set to private, so that videos could only to be viewed by those who are given the link. It is possible to see how many views a video receives on YouTube, but it is not possible to see who the views are coming from. In this way, viewing of supplemental material was not able to be checked for integrity, but an overall check could occur (i.e. there was a total of 15 views). Checking the total views can indicate whether supplemental material was helpful or irrelevant for program participants.

In the one week between sessions, students could only practice the skills that they were taught, and for this reason the videos were split into two YouTube playlists. The YouTube playlist with videos covering only the first session components were provided to students at the end of session 1, and the YouTube channel containing the remainder of the videos was provided at the end of session 2. In this way, over the 30-day follow-up period, students had access to videos covering all intervention components.

Students who did not complete homework nor used the supplemental materials were still included in the data. However, the homework compliance was examined after data was analyzed to determine if compliance had any correlation with the outcome measure.

Session 2

The second session occurred 7 days after the first (i.e. if first session was on a Saturday at 3, the next meeting took place the following Saturday at 3). In this meeting, homework was submitted, and then the participants engaged in a group dialogue about successes and failures in regards to mindfulness practice or lack thereof from previous week. This dialogue was facilitated by the graduate student by asking, “What were some of the successes from the home-practices this week?” and “What were some challenges you faced with the home-practices throughout this week?”

After this, there was a brief graduate-student led review, lasting 10 minutes, of the components which were covered in the first session. After the review, the graduate student instructed the remaining components: sitting meditation, walking meditation, breath awareness, and deliberate awareness of routine activities. Because components are only covered in depth one time each in a typical MBSR program, the material from

the first session was not covered again (Santorelli, 2014). After all components were covered, the participants completed post-test assessments and were dismissed.

Note that students who were unable to attend their scheduled second meeting were given the opportunity to attend a different second session. If they got sick or had an emergency so that they were unable to attend, they contacted the graduate student to inform her and they were re-scheduled for a different second session. This session needed to be made up within the following 2 weeks in order for data to be included. Participants who rescheduled or dropped out are discussed in the results.

Table 3: Components & Duration of 2nd Session

Components for 2nd Class	**Time**
Homework Submission	10 minutes
Group dialogue	10-20 minutes
Instructor-led review of session 1 components	10 minutes
Sitting meditation discussion	5 minutes
Sitting meditation practice	10 minutes
Walking meditation discussion	5 minutes
Walking meditation practice	10 minutes
Breath awareness discussion	5 minutes
Breath awareness practice	10 minutes
Deliberate awareness of routine activities discussion	10 minutes
Post-test assessments	10 minutes
Farewell	
Total Time	**1 hour, 45 minutes**

Follow-up

Though many programs report an increase in mindfulness and a decrease in overeating behavior at post-test, they fail to address lasting success with a follow-up assessment. Many studies done on mindfulness for eating behaviors fail to include a follow-up at all (Alberts et al., 2010; Baer et al., 2006; Courbasson et al., 2011; Leahey

et al., 2008; Smith et al., 2008; Timmerman et al., 2012). Studies that do have a follow-up assessment have reported a maintained increase of mindfulness at 3-month follow-up and a significant decrease in over eating at 1-month follow-up (Dalen et al., 2010; Kristeller et al., 2013). This led to the second research question, "will a brief 2-session mindfulness-based intervention show significant reductions in number of episodes of overeating when assessed at 30 day follow-up?"

In order to answer this question, follow-up assessments were conducted at 30 days post-intervention. Email addresses gathered at the initial meeting were contacted on the 30th day, and an online link to a survey was sent to the participants. A reminder was sent out 3 days later by email to prompt participants to fill out the online assessment, if they had not done it by then. Participants were given one week to fill this assessment out. If they had not done so, on the 37th day they were contacted with a phone call and, if they answered, a phone interview was conducted at this time. If the participant did not answer, they were called two days later. In order for the follow-up data to have been included in analysis, it must have been submitted within two weeks of the initial contact for follow-up.

Identifying Information

Informed consent forms were stored in a locked in one folder all together in the primary investigator's office filing cabinet. Contact information was necessary in the present study so that investigators could contact subjects for second session reminders and for follow-up assessments.

During the study, the digital identifying information was placed in one word document. This information included a name, phone number, and a school email

address. In this document, each subject's contact information was assigned an associated a code. Any physical forms that were filled out with the identifying information were locked away in the same filing cabinet in the Primary Investigator's office. If and when subjects were contacted via text message, the phone number was saved in the Investigator's cell phone with the associated code number and not with a name or email.

Only the graduate student and primary investigator had access to the document, contact information, and raw data. Following the study, contact information was shredded. From that point, results were coded to a number and excluded any identifying information.

Demographic Analysis

The demographic information of the participants was analyzed in the aim that the demographics of the sample for the present study were representative of the defined population (undergraduate students ages 18-25 in Norman, OK). Obtaining this information was necessary in order to ensure the representativeness of the sample. The following information was gathered for demographics: age, year in school, student major, gender identity, ethnicity, and parental education [see Appendix C for demographic survey].

The results of the demographics were compared to the demographics at the University of Oklahoma and the demographics of college students nation-wide. In this way, the results from the present study were only generalized to the appropriate populations.

Quantitative Assessment

Because this study was interested in the effects of a mindfulness-based intervention (MBI) on overeating behavior patterns, the quantitative questioning assessed the episodes of overeating before and after the intervention. In this study, overeating was defined as consuming more in a two hour period than a normal person would (Boutelle et al., 2011; Ackard et al., 2003). However, the majority of assessment tools isolate *binge eating* as the behavior of interest, which has a clinical definition of, over a 3-month period, repeatedly losing control over the overeating behavior. In order to avoid assessing clinical "binge eating," but rather appropriately assess "overeating" in a non-clinical sample, the current study adapted the term's definition into a question such that it read: "Over the past 7 days, how many times have you eaten more in a two hour period than a normal person would?"

Additionally, the quantitative values for minutes of daily practice were analyzed. The homework assignments submitted at post-test determined an average minutes of practice per day per student. The protocol for determining the average of minutes of practice per day per student at the follow-up time point was as such: the graduate student texted the participants every 7 days after the 2nd session for 4 weeks, so as to fill in the averages of daily practice during the 30-day follow-up period. The texts asked them to estimate the average number of minutes of practice per day they participated in during that week. These estimations were submitted as the average minutes of practice per day during the 30-day follow-up period. With this data, the graduate student was able to report on whether participants continued a mindfulness practice after the

intervention is completed, and in this way, feasibility and sustainability of the program could be quantified and determined.

Quantitative Data Analysis

SPSS was the data analysis software used for the quantitative data analysis. In order to check for changes in episodes of overeating, the present study compared means across data at 3 time-points from the same sample through SPSS. A Repeated Measures ANOVA test (within factors) for 2 groups was run to compare the intervention and control groups to each other. A 95% confidence interval and an alpha of 0.05 were set as parameters.

The data from participants contained the number of overeating episodes over the past week for each participant at three time points: pre-test, post-test, and 30-day follow-up. The number of overeating episodes for each time point was averaged for each of the two groups (intervention and control). For each group, the post-test and follow-up means were compared to the pre-test mean to test for significant changes. Furthermore, the intervention group means were compared against the control group means. In this way, the graduate student determined if there was a significant change in the overeating episodes before the intervention (pre-test), the overeating episodes after the intervention (post-test), and the overeating episodes 30 days after the intervention (follow-up). In this way, the graduate student determined both immediate changes to eating behavior as well as sustained changes to eating behavior.

When analyzing the homework compliance means, there were four participants who did not provide answers when asked about average amount of mindfulness practice during the previous week. For these students, a conservative approach was to assume

that a non-response was equal to 0 minutes of practice during that week. This method need only be applied for four students, with code numbers 9, 10, 32, and 33.

Assumptions of statistical testing

All statistical testing was considered under the assumption that the data conforms to a normal distribution. This was confirmed before moving forward with the testing, and was controlled for if normal distribution is not found.

Qualitative Assessment

Very few studies on mindfulness-based interventions for eating behavior include a qualitative data analysis. One source states that studies could benefit from employing a mixed-method approach by pairing quantitative measures with qualitative questioning (Pidgeon et al., 2013).

Because the current study aimed to determine the extent of the effects that mindfulness can have on overeating behavior, qualitative questions aimed to determine this effect. Three qualitative studies have asked participants a variation on the question, "What effects, if any, have you noticed since joining the MBSR program?" (Mackenzie et al., 2006; Shapiro et al., 2005; Cohen-Katz et al., 2005). In order to adapt for the present study's purposes and changes in eating behavior, the question for this study asked, "Have you noticed any effects to your eating behavior as a result of the mindfulness-based program? Tell me about those effects."

This study also had a responsibility to determine the relevance and sustainability of this intervention and the skills learned for the daily lives of a college student population. Participants of the study were asked about their daily experience with the mindfulness practices in order to understand the feasibility of continuing a practice after intervention

conclusion. Therefore, the question was asked, “Have you been able to apply the skills you learned during the program to your daily life? Tell me about those experiences.”

Lastly, in order to allow participants to provide any additional feedback not prompted by the researchers, the question was asked, “Is there any additional information you would like to share with me about your experience with mindfulness and changing your eating habits?”

Qualitative questions were only asked at the 30-day follow-up assessment.

Qualitative Data Analysis

The qualitative data results were exported to a word document (one document for each of the three questions). The graduate student read through the texts in order to become familiar with the data. Next, the preliminary codes were selected and the graduate student counted how many participants expressed each code. In this way, the final codes were determined. Following final theme selection, the graduate student selected representative quotes. All work was reviewed and approved by the primary investigator.

Chapter 4: Results

Introduction

Chapter four provides the results of this investigation. Quantitative analysis was performed with SPSS data analysis software. Repeated measures ANOVA tests were performed to determine the changes on eating behavior before, immediately after, and 30 days after the mindfulness-based intervention; and to compare those changes to that of a control group. Qualitative data was analyzed by the research team consisting of the primary investigator and the graduate student. Qualitative data was analyzed manually.

Participant Characteristics

At onset of study, the total sample size was n=94, with n=63 in the intervention group and n=31 in the control group. Demographic information at Pre-test, Post-test, and 30-Day Follow-Up (Time1, Time2, and Time3, respectively) for the Intervention Group is shown in Table 4 below.

At pre-test, participants were primarily Caucasian participants (66.7%) and female (82.5). This pattern remained constant in spite of attrition. By the 30-day follow-up, 72.7% of participants were Caucasian and 84.1% were female.

The age distribution of participants was fairly evenly distributed. Most participants were between the ages of 19-21 (61.8% of students). Eleven of the remaining of participants were 18 years old (17.5%) with the remaining thirteen participants between 22-24 years old. By the 30-day follow-up, 19-22 year olds were the majority of dropouts. Dropouts from each age as such: six 19 year olds, five 20 year olds, three 21 year olds, three 22 year olds dropped out. At the end of the study, 10 students were 18

years old and 10 students were 21, with 7-8 participants at 19 and 20 years old and 4-5 participants at 22 and 23 years old.

At the beginning of the study, participants were evenly distributed across year in school from freshman through senior years in university ranking reporting respectively at 20.6%, 25.4%, 25.4%, and 28.6%. By the end, the percentages were distributed as 25%, 22.7%, 20.5%, and 31.8% respectively.

The majority of students had educated parents. More than half had parents with a bachelor's degree or higher (57% mother, 57% father). Though attrition occurred rather evenly, attrition was higher in those with less educated mothers, and evenly according to father's education. At the end of the study 65.9% of participants had mothers with a Bachelor's degree or higher, and 52.3% had fathers with a Bachelor's degree or higher.

Participants reported on their majors, and each major was categorized into College at the university. As this study included participants from two universities, Colleges were classified according to how the university classified the major. Most participants belonged to the College of Arts of Sciences (60.3%), and the remainder of students were scattered evenly across the other Colleges at university. 6.3% of participants (4) were undecided in their majors, and 1.6% of participants had a Double Major (1). By the end of the study, these percentages were approximately the same. 63.6% of participants belonged to the College of Arts and Sciences, with a few students belonging to other colleges, and both Double Majored students dropped out. 2 students were Undecided.

Furthermore, most participants were University of Oklahoma students (77.8%), but some were students at another Central Oklahoma university with IRB approval (22.2%).

However, attrition occurred disproportionately by University grouping. Eight of the participants who were lost to attrition belonged to another university, and nine of the participants who were lost to attrition belonged to the University of Oklahoma. By the end of the study, 86.4% of participants were students at the University of Oklahoma and 13.6% of participants were students at another university. Proportionally, a higher rate of students from other universities dropped out of the program.

Table 4: Demographics of Intervention Group

		Pre-test (n=63)	*Post-test (n=46)*	*30day FU (n=44)*
Age				
	18	11 (17.5%)	10 (21.7%)	10 (22.7%)
	19	13 (20.6%)	7 (15.2%)	7 (15.9%)
	20	13 (20.6%)	9 (19.6%)	8 (18.2%)
	21	13 (20.6%)	10 (21.7%)	10 (22.7%)
	22	8 (12.7%)	6 (13.0%)	5 (11.4%)
	23	4 (6.3%)	4 (8.7%)	4 (9.1%)
	24	1 (1.6%)	0 (0%)	0 (0%)
Gender				
	Female	52 (82.5%)	38 (82.6%)	37 (84.1%)
	Male	11 (17.5%)	8 (17.4%)	7 (15.9%)
Year in School				
	Freshman	13 (20.6%)	11 (23.9%)	11 (25.0%)
	Sophomore	16 (25.4%)	10 (21.7%)	10 (22.7%)
	Junior	16 (25.4%)	10 (21.7%)	9 (20.5%)

	Senior	18 (28.6%)	15 (32.6%)	14 (31.8%)
Ethnicity				
	Caucasian	42 (66.7%)	33 (71.7%)	32 (72.7%)
	Asian/Pacific Islander	4 (6.3%)	2 (4.3%)	1 (2.3%)
	Hispanic	4 (6.3%)	1 (2.2%)	1 (2.3%)
	Mixed Race/Multi-Racial	2 (3.2%)	2 (4.3%)	2 (4.5%)
	Black/African-American	2 (3.2%)	1 (2.2%)	1 (2.3%)
	Other	9 (14.3%)	7 (15.2%)	7 (15.9%)
Mother's Education				
	Less than high school completion	2 (3.2%)	0 (0%)	0 (0%)
	High school completion	5 (7.9%)	4 (8.7%)	4 (9.1%)
	Some College	16 (25.4%)	11 (23.9%)	10 (22.7%)
	Associate's degree	4 (6.3%)	2 (4.3%)	1 (2.3%)

	Bachelor's degree	23 (36.5%)	19 (41.3%)	19 (43.2%)
	Graduate degree	13 (20.6%)	10 (21.7%)	10 (22.7%)
Father's Education				
	Less than high school completion	2 (3.2%)	0 (0%)	0 (0%)
	High school completion	7 (11.1%)	6 (13%)	6 (13.6%)
	Some College	13 (20.6%)	12 (26.1%)	12 (27.3%)
	Associate's degree	5 (7.9%)	3 (6.5%)	3 (6.8%)
	Bachelor's degree	24 (38.1%)	16 (34.8%)	14 (31.8%)
	Graduate degree	12 (19.0%)	9 (19.6%)	9 (20.5%)
College of				
	Allied Health	1 (1.6%)	1 (2.2%)	1
	Architecture	1 (1.6%)	1 (2.2%)	1
	Arts and Sciences	38 (60.3%)	30 (65.2%)	28 (63.6%)

	Atmospheric & Geographic Sciences	1 (1.6%)	1 (2.2%)	1 (2.3%)
	Business	2 (3.2%)	2 (4.3%)	2 (4.5%)
	Education	1 (1.6%)	0 (0%)	0 (0%)
	Engineering	3 (4.8%)	1 (2.2%)	1 (2.3%)
	Fine Arts	4 (6.3%)	4 (8.7%)	4 (9.1%)
	International Studies	2 (3.2%)	0 (0%)	0 (0%)
	Journalism & Mass Communications	4 (6.3%)	3 (6.5%)	3 (6.8%)
	Liberal Studies	1 (1.6%)	1 (2.2%)	1 (2.3%)
	Double Major	1 (1.6%)	0 (0%)	0 (0%)
	Undecided	4 (6.3%)	2 (4.3%)	2 (4.5%)
University				
	University of Oklahoma	49 (77.8%)	40 (87.0%)	38 (86.4%)
	Other University	14 (22.2%)	6 (13.0%)	6 (13.6%)

Control Group Characteristics

The waitlisted control group had 31 members at the onset of study, and 22 who completed the waitlist period. Characteristics of those in the waitlisted control group were similar to the intervention group, though distributions of dropouts across gender and ethnicity are different. At program onset, age distributions were evenly distributed

with the majority of participants being 21-22 years old (16 participants, 58.6%). Dropouts by the end of the study were such that the majority of students were of the following ages: 27.2% of students were either 18 & 19 years old and 50.0% of students were either 21-22 years old.

Interestingly, distributions of males and females were more evenly distributed in the control group. At program onset the sample size was 61.3% female and by the end of the study, the sample was 63.6% female.

Year in school was similarly evenly distributed, though there were more seniors than of the other three school years (38.7%). Dropout rates were fairly even such that percentages did not drastically differ by the end of the study. The control group sample was primarily Caucasian, 51.6% and 59.1% at pre-test and follow-up respectively. The slight percentage increase due to dropouts may indicate that more minorities dropped out during the waitlist period (9 dropouts total, 3 were Caucasian and 6 were minorities). Similar to the intervention group, the majority of those in the sample came from families with mothers who had bachelor's degree or higher (61.3%) and fathers with the same (71.0%). Dropouts did not change the distribution in a significant way. Furthermore, the distribution across College of study has the majority of students in the control group belonging to the College of Arts of Sciences (58.1% at pre-test and 63.6% at the end of the study).

One difference between the control group and the intervention group is the distribution according to University. Of the students in the control group, eight participants (25.8%) studied at a different University, and 6 of these students dropped

out. At the end of the study 9.1% (2 students) were from another university, while 20 (90.9%) of students were from the University of Oklahoma.

Table 5: Demographics of Control Group

		Time1 *(n=31)*	*Time2* *(n=25)*	*Time3* *(n=22)*
Age				
	18	4 (12.9%)	3 (12.0%)	3 (13.6%)
	19	5 (16.1%)	3 (12.0%)	3 (13.6%)
	20	3 (9.7%)	3 (12.0%)	2 (9.1%)
	21	8 (25.8%)	7 (28.0%)	6 (27.3%)
	22	8 (25.8%)	6 (24.0%)	5 (22.7%)
	23	2 (6.5%)	2 (8.0%)	2 (9.1%)
	24	1 (3.2%)	1 (4.0%)	1 (4.5%)
Gender				
	Female	19 (61.3%)	16 (64.0%)	14 (63.6%)
	Male	12 (38.7%)	9 (36.0%)	8 (36.4%)
Year in School				
	Freshman	6 (19.4%)	5 (20.0%)	5 (22.7%)
	Sophomore	6 (19.4%)	5 (20.0%)	3 (13.6%)
	Junior	7 (22.6%)	6 (24.0%)	6 (27.3%)
	Senior	12 (38.7%)	9 (36.0%)	8 (36.4%)

Ethnicity				
	Caucasian	16 (51.6%)	13 (52.0%)	13 (59.1%)
	Asian/Pacific Islander	2 (6.5%)	2 (8.0%)	2 (9.1%)
	Hispanic	2 (6.5%)	1 (4.0%)	0 (0.0%)
	Mixed Race/Multi-Racial	5 (16.1%)	4 (16.0%)	2 (9.1%)
	Black/African-American	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Other	6 (19.4%)	5 (20.0%)	5 (22.7%)
Mother's Education				
	Less than high school completion	1 (3.2%)	0 (0.0%)	0 (0.0%)
	High school completion	5 (16.1%)	5 (20.0%)	5 (22.7%)
	Some College	3 (9.7%)	2 (8.0%)	1 (4.5%)
	Associate's degree	3 (9.7%)	2 (8.0%)	

	Bachelor's degree	12 (38.7%)	11 (44.0%)	10 (45.5%)
	Graduate degree	7 (22.6%)	5 (20.0%)	4 (18.2%)
Father's Education				
	Less than high school completion	2 (6.5%)	1 (4.0%)	1 (4.5%)
	High school completion	2 (6.5%)	2 (8.0%)	2 (9.1%)
	Some College	4 (12.9%)	3 (12.0%)	3 (13.6%)
	Associate's degree	1 (3.2%)	0 (0.0%)	0 (0.0%)
	Bachelor's degree	10 (32.3%)	9 (36.0%)	7 (31.8%)
	Graduate degree	12 (38.7%)	10 (40.0%)	9 (40.9%)
College of				
	Allied Health	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Architecture	1 (3.2%)	1 (4.0%)	1 (4.5%)

	Arts and Sciences	18 (58.1%)	15 (60.0%)	14 (63.6%)
	Atmospheric & Geographic Sciences	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Business	4 (12.9%)	4 (16.0%)	3 (13.6%)
	Education	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Engineering	4 (12.9%)	1 (4.0%)	1 (4.5%)
	Fine Arts	1 (3.2%)	1 (4.0%)	1 (4.5%)
	International Studies	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Journalism & Mass Communications	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Liberal Studies	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Double Major	2 (6.5%)	2 (8.0%)	1 (4.5%)
	Undecided	1 (3.2%)	1 (4.0%)	1 (4.5%)
University				
	University of Oklahoma	23 (74.2%)	22 (88.0%)	20 (90.9%)
	Other University	8 (25.8%)	3 (12.0%)	2 (9.1%)

Group Characteristics

There were 15 intervention groups that participated in this study. The smallest group began with 2 participants and the largest group began with 9 participants. For the number of participants at pre-test, the mean and median are as follows: mean= 4 and median=4. For the number of participants at post-test, the mean and median are as follows: mean=3 and median=3. For two groups, none of the participants returned for 2nd session, and thus did not complete post-test measures (both groups had 3 participants at pre-test). In total, 6 groups were comprised of friends who signed up to participate in the study together & 9 groups were comprised of lone students interested in the study who did not know each other beforehand. Some groups rescheduled the 2nd session (post-test) later than the original date: groups 3, 9, and 13 rescheduled 1 day late and group 10 rescheduled 6 days late.

Table 6: Participants in each Group at Session 1, Session 2, and Follow-Up

Group	1st session	2nd session	30 day follow-up
1	3	3	3
2	5	4	3
3	5	4	4
4	4	2	2
5	3	0	0
6	9	10	10
7	4	4	4
8	4	3	3
9	6	3	3
10	3	2	2
11	6	4	4
12	3	3	2
13	3	2	2
14	2	2	2
15	3	0	0
Total	**63**	**46**	**44**

Attrition

At onset of study, the total sample size was n=94, with n=63 in the intervention group and n=31 in the control group. At the end of the study, total sample size for the study was n=66, with n=44 in the intervention group and n=22 in the control group.

This study had an overall attrition rate of 26.6% (refer to Table 7). The control group had 9 dropouts leading to an attrition rate of 29.0%. The intervention group had 19 dropouts leading to an attrition rate of 30.1%. However, it is significant to note that for this intervention, data collection occurred between March and August of 2017. Of the 37 participants that began the intervention during the spring semester, 8 dropped out creating an attrition rate of 21%. Of the 26 participants that began the intervention during the summer semester, 11 dropped out creating an attrition rate of 42.3%. In this way, attrition was higher once the summer semester began.

Table 7: Attrition

	Pre-test	**Post-test**	**30 day follow-up**	**Drop Out**	**Attrition**
Control	n=31	n=25	n=22	n=9	29.0%
Intervention	n=63	n=46	n=44	n=19	30.2%
Total	n=94	n=71	n=66	n=25	26.6%

Students who needed to reschedule

Between the first and second sessions, many students had illness, family emergency, or conflicting work schedules. In some of these cases, the whole group would reschedule to accommodate. Typically, the group as a whole would reschedule if it was a small group or if the group knew each other and wanted to reschedule together. Group rescheduling of the second session was discussed under group characteristics. As a reminder, two groups were unable to reschedule their second session (one due to weather and one due to conflicting work schedules) leading to 6 participants not coming

to second session within the two week window. All other groups who rescheduled were able to do so within a two-week window.

Students who did not come for the second session were as follows: 9 students had an unplanned schedule conflict for their second session, and did not reschedule. Of the remaining participants, 1 had an unplanned schedule conflict for their second session; this participant rescheduled (Session 1 with Group 4 and Session 2 with Group 6). Lastly, 2 students did not respond to second session reminders or follow-up texts, and did not show up to scheduled second session and did not indicate a desire to reschedule. Considering both group and individual rescheduling, the total number of student lost to rescheduling was 17.

Homework compliance

Homework compliance is defined as the following: participants were asked to practice any of the mindfulness activities that were taught during the intervention for at least 10 minutes every day between sessions 1-2, and throughout the 30-day follow-up period. Between sessions 1-2, participants were given a "homework" resource sheet that allowed them to track the minutes of practice for each day between sessions. These values were averaged, and can be found above in Table 3. The values started at 9.76 minutes/day in Week 0 to 7.29 minutes/day in Week 4. The lowest value was reported during Week 2 at 6.52 average minutes/day.

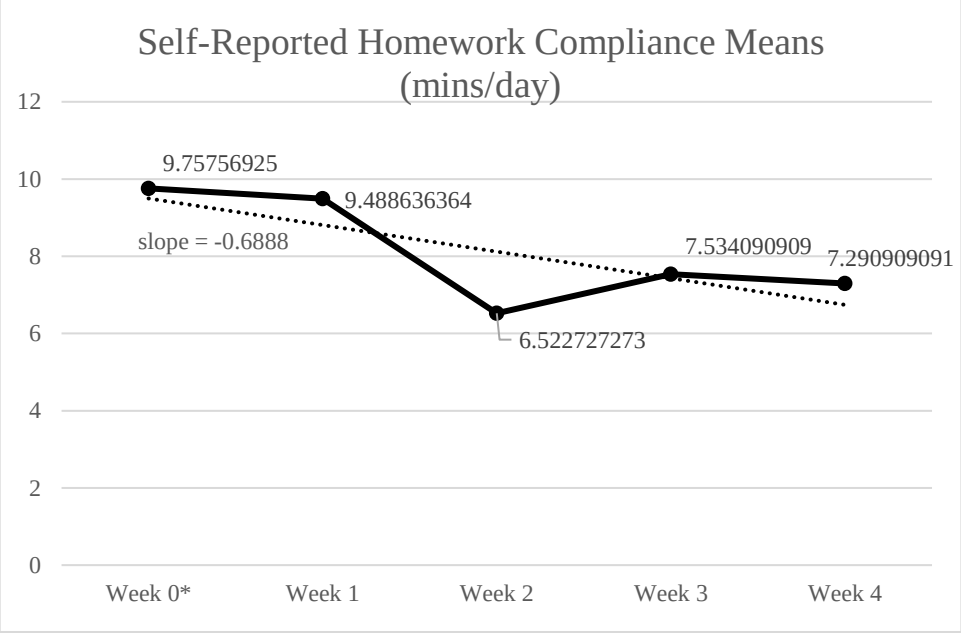
Table 8: Self-reported Minutes of Homework Practice: Means (minutes of practice/day)

	Week 0*	Week 1	Week 2	Week 3	Week 4
Intervention group	9.7576	9.4886	6.5227	7.5341	7.2909
**Week 0=week between Session 1&2*					

During the week of the intervention, participants engaged in an average of 9.76 minutes of self-practice per day. Furthermore, participants were texted every week during the 30 day follow-up period (4 times total) to ask them to estimate their average practice for each day during that week. The values for reported practice of each week post-intervention were averaged, and can be found in Table 3. The values for the first week following the intervention were similar (9.49 minutes of self-practice per day), though this value dropped over the following few weeks: 6.52, 7.53, and 7.29 average minutes of practice per day. Though this was a drop in minutes of daily practice, the difference between daily practice during Week 0 and daily practice during Week 4 is 2.2 minutes per day.

These values can be found below in Figure 2, which shows the slope of the values over the 5-week period.

Figure 2: Self-reported average number of minutes practiced per day.



**Week 0 indicates the week between Sessions 1&2*

Supplemental Materials

After the first session, participants were provided with a link to the supplemental material videos. The link was texted by the end of the day of their first session to the mobile phone number which they provided on incoming paperwork. In this way, all participants had access to the YouTube channel on their mobile phones. During the group discussion at the beginning of Session 2, the graduate student informally asked participants how often, if at all, participants used the YouTube channel as supplemental material. In every group, either all or all-but-one students said they forgot to use it, or that they didn't feel that they needed or wanted to use the material.

The total YouTube usage views for each video, though not a perfect measure, can be used as a rough estimate for how often participants used the videos. Note: The YouTube videos were set to non-discoverable but public, so that people with the link could find the video but that the videos wouldn't come up in a search. In this way, it is highly unlikely that those outside of the intervention group had access to the videos. YouTube views for each video can be found in Table 9. The Body Scan Meditation video had 15 views, which means it is highly likely that ¼ of participants viewed that meditation at least once. The Mindful Eating video had 5 views. The Gentle Hatha Yoga and the Mindful Walking videos had 2 views. The Sitting Meditation and Breath awareness videos had 0 views.

Table 9: Total Views of Supplemental Videos

Video	Views
Body Scan Meditation	15
Gentle Hatha Yoga	2
Mindful Eating	5
Sitting Meditation	0
Mindful Walking	2
Breath Awareness	0

Process Evaluations

Process evaluations were conducted after each session. The graduate student placed a check mark on the table for each program component to ensure its completion. If the section was not completed, an X was placed under that section and an explanation was included. For the 15 process evaluations, 14 process evaluations reported normal completion with only check marks. The only group that deviated in component completion was Group 4. At Group 4's first session, the yoga component was not practiced due to an injury that the graduate student sustained and could not teach the yoga section appropriately on that date. Instead, the graduate student taught the breath awareness component at Session 1. For this group, Session 1 included: body scan meditation, breath awareness, mindful eating, and awareness of pleasant vs. unpleasant experience; Session 2 included: sitting meditation, walking meditation, yoga, and awareness of daily events. In this way, the students in this group received all program components. The only deviation for this group was the exchange of order for the breath awareness and yoga components.

Only one participant was affected by this. This participant originated in Group 4, but had to reschedule Session 2 into Group 6. Therefore, this student received the

following components at Session 1: body scan meditation, breath awareness, mindful eating, and awareness of pleasant vs. unpleasant experience; at Session 2 they received: sitting meditation, walking meditation, breath awareness, and awareness of routine activities. This participant received breath awareness twice, and never received the yoga component. However, the graduate student taught the yoga component to the participant privately, and the participant had access to the video materials as well. An exception was made to include this participant's data.

30-Day follow-up

Of the 46 participants who completed both sessions, 44 participants answered the 30-day follow-up questionnaire. All participants answered the follow-up survey via Qualtrics survey platform, and as such, no qualitative answers needed to be transcribed. All data received through Qualtrics has a date of submission noted. All dates were checked against the participant code & date of 30-day follow-up. Data had to be submitted within 14 days of initial contact in order for it to be considered during analysis. One participant submitted follow-up data 16 days after initial contact, and an exception was made to include data. All other data was submitted within 14 days of initial contact.

Quantitative Analysis

For the quantitative data analysis, the independent variable is the mindfulness-based intervention, the dependent variable is episodes of overeating within the past 7 days. One group (n=44) got the intervention condition and one group (n=22) was considered the control group. The control group got no intervention, and were waitlisted. Results from the Repeated Measures ANOVA for 2 groups within and

between subjects are below; all 66 subjects were included. Note: the assumptions for this test are the Levene's test of equality of error variances, which determines homogeneity of variance, and the Box's test of equality of covariance matrices, which determines homogeneity of inter-correlations.

The Levene's test indicates whether study results violate the assumption of homogeneity of variance. If the alpha value is > 0.05, then the assumption is met. If the alpha value is < 0.05 then the assumption is violated. The values indicate here at Time1, Time2, and Time3 are 0.184, 0.234, and 0.867 respectively. This indicates that the assumption is met. See Table 10.

Table 10: Levene's Test of Equality of Error Variances

Levene's Test of Equality of Error Variances[a]				
	F	df1	df2	Sig.
Pre-test	1.800	1	64	.184
Post-test	1.445	1	64	.234
Follow-Up	.028	1	64	.867

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Design: Intercept + Group
Within Subjects Design: Time

The Box's test determines whether the assumption of homogeneity of inter-correlations is met or not (see Table 11). Homogeneity indicates that for each of the levels for between subjects variables the pattern of inter-correlations among the levels of the within subjects variable is the same. Because this test is highly sensitive, if alpha is greater than .001, the assumption is met (Tabachnick & Fidell, 2013). If the alpha

value is < .001 then the assumption is violated. The alpha value for the current study (.009) is > .001, which indicates that the assumption is met.

Table 11: Box's Test of Equality of Covariance Matrices

Box's Test of Equality of Covariance Matrices[a]	
Box's M	18.294
F	2.865
df1	6
df2	11572.847
Sig.	.009

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.
a. Design: Intercept + Group
Within Subjects Design: Time

Once it was verified that the assumptions for the ANOVA testing were met, the self-reported data for episodes of overeating was averaged and analyzed. Table 12 shows the raw data table of averages for both groups at all three time points. Overall, the data for both groups shows a decrease in overeating episodes between Time1, Time2, and Time3. The control group had a higher starting average than the intervention group.

Table 12: Self-reported Average Episodes of Overeating

	Time1 (Pre-test)	Time2 (Post-test)	Time3 (Follow-Up)
Intervention Group (n=44)	2.13	1.47	1.41
Control Group (n=22)	2.40	1.80	1.80

Figure 3 shows a graph of the self-report data. The pattern for the intervention group and control group seem to follow each other closely, and perhaps change in the same values. Below multivariate tests are completed and analyzed to determine if there is a statistically significant decrease.

Figure 3: Self-reported average episodes of overeating at Time1, Time2, and Time3

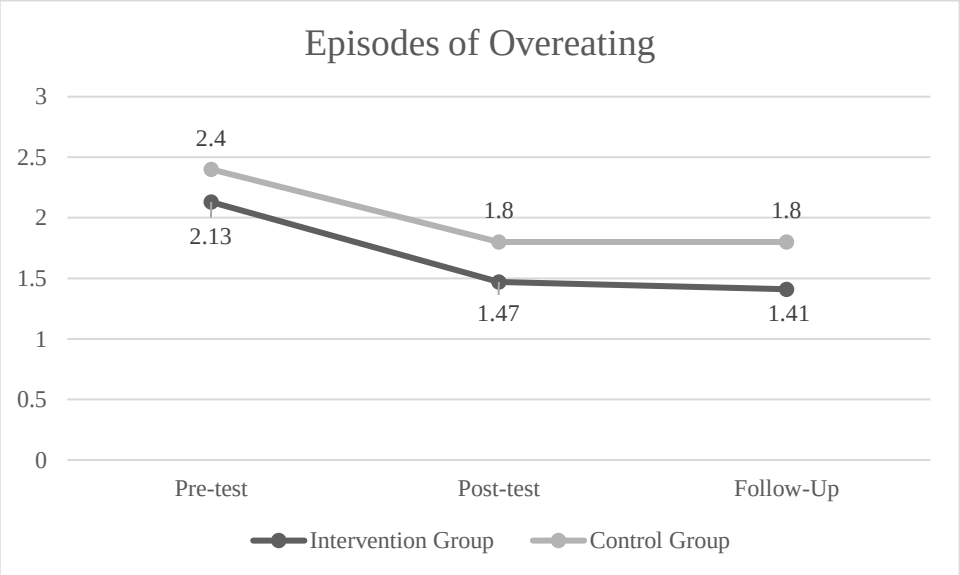


Table 13 (see below) shows the test of interaction effects between time and group. The significance value is 0 .961, which is higher than .05, thus the interaction effect is not statistically significant. This means that there is not a significant change between the groups between the three time points. Because there is not a significant interaction

between time and group, main effects were analyzed accordingly. The main effect for time alone (the changes between Time1, Time2, and Time3) were analyzed. There was a significant change between the three time points of the study (p=.029). The effect size of this result can be indicated by the Partial Eta Squared. The value given here is .107. Using the Cohen guidelines, .06-.14 is a medium effect size and as such the same can be determined for the current findings.

Table 13: : Multivariate Tests

Effect		Time				Time * Group				
		Pillai's Trace	Wilks' Lambda	Hotelling's Trace	Roy's Largest Root	Pillai's Trace	Wilks' Lambda	Hotelling's Trace	Roy's Largest Root
Multivariate Tests[a]	Value	.107	.893	.119	.119	.001	.999	.001	.001
	F	3.762[b]	**3.762[b]**	3.762[b]	3.762[b]	.040[b]	.040[b]	.040[b]	.040[b]
	Hypothesis df	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000
	Error df	63.000	63.000	63.000	63.000	63.000	63.000	63.000	63.000
	Sig.	.029	**.029**	.029	.029	.961	.961	.961	.961
	Partial Eta Squared	.107	.107	.107	.107	.001	.001	.001	.001

a. Design: Intercept + Group Within Subjects Design: Time

b. Exact statistic

When testing for between-groups effects (see Table 14), the difference between the intervention and control groups is not statistically significant (p=0.395). The Partial Eta Squared reflects this by indicating a small effect size (0.011).

Table 14: Tests of Between-Subjects Effects

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	589.114	1	589.114	92.505	.000	.591
Group	4.669	1	4.669	.733	.395	.011
Error	407.580	64	6.368			

Though there was not a statistically significant difference between the two groups, because there was a significant main effect for time, there was a statistically significant difference in number of reported episodes of overeating between the time points (see Table 15). The alpha value for changes between Time1 and Time2 is 0.82, the alpha value for changes between Time2 and Time3 is 1.00, and the alpha value for changes between Time1 and Time3 is 0.28. That indicates that there was a significant decrease in overeating in the 37-day time period between Time1 and Time3. It is of significance to add that this decrease in overeating is not significantly different between the two groups. This means that both the intervention and control conditions reported a significance decrease in overeating between Time1 and Time3.

Table 15: Pairwise Comparisons

Pairwise Comparisons						
Measure: MEASURE_1						
		Mean Difference			95% Confidence Interval for Difference[b]	
(I) Time	(J) Time	(I-J)	Std. Error	Sig.[b]	Lower Bound	Upper Bound
1	2	.591	.261	.082	-.052	1.234
	3	.653*	.243	**.028**	.055	1.252
2	1	-.591	.261	.082	-1.234	.052
	3	.063	.210	1.000	-.454	.579
3	1	-.653*	.243	.028	-1.252	-.055
	2	-.063	.210	1.000	-.579	.454
Based on estimated marginal means						
*. The mean difference is significant at the .05 level.						
b. Adjustment for multiple comparisons: Bonferroni.						

Qualitative Analysis

Following quantitative data analysis, qualitative analysis was completed. As all qualitative data was recorded on Qualtrics survey platform, all results were already in digital text form. There were three questions asked. The questions were as follows, "Have you noticed any effects to your eating behavior as a result of the mindfulness-based program? If so, write about those effects," "Have you been able to apply the skills you learned during the program to your daily life? If so, write about those experiences," and finally, "Is there any additional information you would like to share about your experience with mindfulness and changing your eating habits?" Once the answers from each participant were compiled into their respective documents, the graduate student read through the responses, created themes, counted how many responses fell into each theme, and then chose representative quotes. Once this process was complete, the

primary investigator read through the responses as well as the graduate student analysis. In this way, themes and quotes were created and selected.

Themes, number of responses who fell into that theme, and representative quotes can be found in Table 16 below. For the first question regarding changes to eating behavior as a result of the mindfulness-based program, four major themes were found, four participants stated that there were no noticeable changes, and one participant did not respond to the question. Of the 44 respondents, 26 showed some indication of increased consciousness or awareness about eating behaviors in general; in other words, these students felt a change in the way they perceive and experience their eating behaviors. This includes snacking, overeating, emotional or stress eating, or even unhealthy eating. Half of the respondents (22) indicated a change in eating behavior. Changes included reducing overeating, eating more slowly, regulating more appropriate portion sizes, eating healthier foods, and stopping when full. Note: again, all responses were self-reported qualitative data so there is no way to quantify what "healthier food" means to each respondent who answered in this way. About a quarter of respondents (10) reported feeling a higher sense of control about eating. Responses reported a control over eating behaviors, such as overeating and snacking, as well as over what they are eating. Lastly, 6 respondents indicated being more aware of sensory information and tasting their food while eating.

For question 2 regarding applying the skills learned during the intervention in daily life, seven themes were identified, one respondent indicated no changes, and one respondent did not respond to the question. Many participants (29) identified a certain practice that they felt is good for their mental health, to better regulate their sleep

schedule, for use before a workout– all of these responses were categorized into the theme of using a specific practice for general wellness. Of the 44 respondents, 14 identified a specific practice or practices for stress management or relaxation purposes (including anxiety management). Additionally, 14 respondents indicated that the practices helped gain a sense of emotion regulation or heightened internal awareness throughout daily life; many students identified this by stating an increase of "being present." Of the 44 students, 10 elaborated upon the changes to their eating behaviors, sometimes indicating a specific practice that helps with regulation. Likewise, 10 students indicated a specific practice briefly leading up to, during, or after a time of needs. Students reported using the practices for "stress" or "overwhelm" or specific events like teaching, and those were labeled as "times of need." Lastly, 9 students reported incorporating one or multiple practices into their routines, such as waking up in the mornings or falling asleep as night.

The third question, asking if there was any additional information that respondent would like to provide, was answered by 29 participants. For the responses, six themes were identified. The most common theme was identified in 13 respondents, and was that these practices were helpful for daily living and overall health, as well as for other health behaviors. Of all respondents, 9 participants simply thanked the researcher for the opportunity. Additionally, 8 participants indicated a heightened awareness in daily living and 8 participants reiterated a heightened awareness specific to eating behaviors. Lastly, 4 participants indicated experiencing a life-long change during the program or because of the tools, and the same amount of participants indicated a strong belief that the program would be beneficial for others and for other health behaviors.

Table 16: Qualitative Results

Theme	# of participants	Representative Quotes
Question 1: Have you noticed any effects to your eating behavior as a result of the mindfulness-based program? If so, write about those effects.(no response = 1)		
Increased consciousness/awareness about eating behaviors	26	I enjoy food more because I take the time to think about it. (Participant #3) I'm more aware of what I eat and how I eat it. (#6)
Changing unhealthy eating behavior(s), including: reduced overeating, eating more slowly, better regulation of portion sizes, eating healthier foods, and stopping when full	22	I have been able to stop myself from eating when I'm bored. When I eat slower, I am able to realize when I'm no longer hungry / craving and therefore I don't overeat (#11) I eat much slower now, which I feel often leads to me eating less as well (# 55).

		When I find myself eating out of boredom I am better able to pause and realize this which helps me stop the behavior. I also have been better able to eat fruit instead of chocolate. (# 24).
Feeling sense of control about eating (eating behaviors and what they are eating)	10	I have noticed that when I 'make a conscious effort, I am able to really control what I'm eating. (# 39)
Tasting food and being aware of sensory information while eating	6	I've noticed that when I engage in mindful eating techniques, such as thinking about the food's texture, smell, taste, etc., I eat less (# 8)

No noticeable changes	4	I don't feel like this program has significantly changed my eating habits. (# 317)
*Four participants indicated that there were no noticeable changes. **One participant did not respond to the question.		
Question 2: Have you been able to apply the skills you learned during the program to your daily life? If so, write about those experiences (no response = 1)		
Using the practices briefly before/during/after time of need	10	When I get heated or stressed out it helps to remember to take a few deep breaths. (# 19) I have applied the breathing exercises in my times of stress and when I am overwhelmed and try to follow the method of breathing with the lungs vs. the stomach. (# 7)

Using [SPECIFIC PRACTICE] to help fall asleep	5	I sometimes meditate to help me fall asleep (# 12)
Changes related to eating behavior or eating awareness	10	For me, taking 5-10 minutes before eating a meal, especially when eating alone, has really helped me to assess how hungry I really am, which helps me not get too much food on my plate. (# 55) Yes, I make sure I'm eating because I'm hungry, not because I'm bored or using it as a coping mechanism. (# 37). Yes, definitely!! I am always under a lot of pressure/stress and used to eat a lot to combat the stress. Over the years, I have been able to

		stop a lot of my emotional eating but I would still struggle and have my moments. This program has helped me finally completely overcome my occasional stress eating episodes and just stressful situations in general. The meditative breathing is a life saver for me. It helps me stop being overwhelmed by whatever situation I'm in and instead put everything in perspective and really calms me down. (# 5)
Adding [SPECIFIC PRACTICE] to end or beginning of day routine	9	I've found it easiest to incorporate things like the body scan at the end of the day before I go to bed. (# 23).

		I like doing the mindful eating practice in the morning while I'm eating breakfast before I start the day. I also like yoga before bed. (# 4).
Stress management/relaxation (including anxiety)	14	I try to apply the mindfulness techniques in my daily life largely in reaction to stress or frustration. (# 53).
Using [SPECIFIC PRACTICE] for general wellness upkeep	29	Yes! I make more of an effort to take time out of my day to have a few moments of mindfulness (# 17) I usually start my workouts with the yoga we were taught (# 26).

		The breathing and simple meditation techniques have been helpful. (# 38)
Emotion regulation or internal awareness/being present in daily life	14	Yes, the mindfulness skills are very useful in grounding myself on a daily basis- I definitely took advantage of the calming meditation exercises during finals week. (# 13). I evaluate my experiences a lot now and thing about how I'm feeling during and how I feel after. (# 33).
No noticeable changes:	1	
*One respondent indicated that there were no noticeable changes. **One respondent did not respond to the question.		
Question 3: Is there any additional information you would like to share about your experience with mindfulness and changing your eating habits?		

(blank response = 15)		
Thanking researcher for new skills	9	I would like to thank you so much for having this program available for college students. This has helped me in ways beyond just eating. For over a year, I have been struggling to beat my alcohol and drug addiction and I have found it extremely hard to find alternative ways to calm myself down without going back to past habits. I would always find myself overeating as a result of withdrawals and this would make me further depressed because of a resulting negative body image. Your program has introduced me to methods that I will for

		sure use for the rest of my life. Thank you so so much. (# 5)
Increased consciousness about eating behavior	8	It has made my food taste different as I am leaving it in my mouth longer which I found to be pretty crazy! (# 303).
Helpful for daily living/overall wellness/other health behaviors	13	It's been very helpful for my daily life and it's definitely been helpful to realize and remind myself that I need to calm down in my life and to slow down and enjoy time to myself. (# 46).

More conscious and/or more aware in daily living	8	I like the using mindfulness techniques in everyday life because it makes me more aware of my surroundings. I feel that simply being more aware of everything has made me more conscious with the decisions I make, so I am more selective of what types of food I eat and how much I eat. Rather than binging on junk food and feeling uncomfortably full and sluggish, I've noticed that mindful eating has helped me shift toward healthier options. I also am able to stop eating when I am full much sooner because I am aware of how full I am getting. (# 8)

		I'm really glad I did this. It provided me an outlet to deal with my stress that was something other then food. Once I realized I was in control of my habits and to take things day by day, it makes me excited to take on the next day. I knew I had control, and I felt confident enough to join a work out program. During the day I eat well, work out, and then at the end of the day I meditate on my day. I think mindful meditation would be beneficial for a lot of people. (# 40).
Life changing or life-long lessons	4	I wish this was something that everyone was exposed to and practiced. It can really

		change a person's way of life. (# 6).
Program could be beneficial to others/everyone	4	It makes food taste better and life just overall better to be very intentional and slow down. This is something that people should learn in PE or health class or from counselors if they are having a rough time. It is very effective and lifechanging (# 16).
No noticeable changes:	0	

Summary of results

The following conclusion will include a summary on homework compliance, supplemental material usage, quantitative analysis, and qualitative analysis. Over the 5 weeks that students were asked to practice at least 10 minutes/day at home, the average daily practice went from 9.76 minutes in Week 0 to 7.29 minutes in Week 4. Most students did not use the supplemental materials provided to them via YouTube, though the Body Scan video got 15 views. For the outcome measure of episodes of overeating,

significant difference was not found between the control group and the intervention group. However, a significant change was found between Time1 and Time3, which indicated that there was an overall long term decrease in overeating from initial pre-test to the 30-day follow-up. The qualitative analysis provided multiple themes for the three questions that were asked of the intervention group at 30-day follow-up. The most common themes included: an increase in awareness about eating behaviors, changing unhealthy eating behaviors, using the skills learned for general wellness, using skills for stress management, and using skills for emotion regulation and present-ness.

Chapter 5: Discussion

Introduction

This chapter will include an overview and discussion surrounding the implications of the present study's results. Quantitative and qualitative results will be discussed in their overall contexts. This chapter will conclude with implications for future research and future practice.

The main research question addressed in this study asked, "Are 2 sessions of mindfulness-based materials enough to change overeating?" Based on the results from the quantitative analysis, the answer is most likely not. This may be due to habit formation, and more specifically, how long it takes to establish a new habit. One study indicates that it takes a ***minimum*** of 18 days to establish a new habit; this number can go up to 254 days in some people (Lally et al., 2010), and another source states 66 days is the average time it takes to create a new habit (Gardner et al., 2012). These researchers indicate that habit formation occurs as a result of repeating one simple specific action during a specific and pre-determined contextual cue (Gardner et al., 2012). For example, instead of asking students to "decrease overeating," it may be more constructive to ask students to "participate in 5 minutes of mindful eating/mindfulness every day before lunch and dinner." That may solidify and create the habit to increase awareness about eating motivation and to stop eating when they are full, which would eventually lead to a decrease in overeating.

Notable research has been done on habit formation and different modes of decision making: one process that is "fast" and one that is "slow" (Kahneman, 2011). This is similar to labeling these two methods as "non-reflective" and "reflective" modes of

decision making (Marteau et al., 2012). Fast, or non-reflective, decisions are those which are automatic processes. Slow, or reflective, decisions are those during which one takes time to think about, process, and make a conscious choice. Overeating, or any automatic and addictive behavior, is considered a "fast" and "non-reflective" decision processing (Marteau et al., 2012), especially when overeating is used as a stress coping mechanism. Employing a mindfulness-based intervention for overeating will lead to an increase of awareness (or consciousness) regarding overeating behavior. Awareness (or consciousness) could cause the decision-making process regarding this behavior to become a "slow" or "reflective" decision-making process.

Though the present intervention did not have a significant effect on participant eating behavior, there was a sustained decrease in overeating at 30 days follow-up. Many studies do not test changes at a follow-up time period (Alberts et al., 2012; Courbasson et al., 2011; Daubenmier et al., 2011; Leahey et al., 2008; Smith et al., 2008; Timmerman et al., 2012). As such, future research should include a follow-up measure to determine if change over time is significant. This will determine if mindfulness-based interventions effect long-term changes. Since there was no significant difference between the control and intervention groups, change at follow-up was likely due to the awareness about the eating behavior, not the intervention itself.

The present study compared an intervention group to a control group. While the present study did not show a significant change, the control group showed how important it is to have a true experimental design in order to verify results. In the present study, though a significant decrease in overeating was found, no significant difference occurred between groups, and therefore the intervention had no significant

effect on overeating behavior. Many other mindfulness-based interventions for overeating behavior show significant change in intervention groups without having a control group to which to compare (Baer et al., 2013; Courbasson et al., 2016; Dalen et al., 2010). As such, there exists the possibility that in these cases, researchers may be reporting a significant intervention effect where significant effects do not exist. Based on the results of the present study, future research should aim to have a control group in order to determine true significant changes.

During analysis of qualitative results, the most common theme overall was a heightened awareness about eating behavior (including, but not limited to, awareness about eating behavior). Research indicates that there are two methods to motivating behaviors, reflective and non-reflective (Marteau et. al., 2012). Reflective behaviors are those which one reflects upon motivations and acts in awareness, and is typically the process that is targeted by health promotion methods (Marteau et al., 2012). Increasing awareness about eating behavior could potentially be a first step to changing behavior in the long-term. In fact, results for the present study indicated a long-term significant decrease in overeating at 30-day, but no significant decrease in overeating at immediate post-test. These results may have been due to the changes in awareness.

In addition to heightened awareness about eating behavior, another common theme that participants identified was using the practices as a general wellness tool, the most notable of which was for stress and anxiety management. This is not unexpected as the original program was created and employed as a stress reduction program (Santorelli, 2014). As such, mindfulness-based interventions be beneficial for a variety

of behaviors, including, but not limited to, smoking cessation (Bowen et al., 2009), anxiety and stress (Call et al., 2013), and sleep quality (Carlton et al., 2005.

Implications for Research: Lessons learned

Attrition

The current attrition, 26.6%, is higher compared to the values reported in previous research. The present study assessed two types of attrition, attrition between Session 1 and Session 2, and attrition between Session 2 and the online 30-day follow-up. The present study began with 63 participants in the intervention group; 46 participants came to Session 2, and 44 participants responded to the online 30-day follow-up measure. As such, if participants finished the in-person intervention components, they were very likely to respond to the follow-up measure. This could be related to the follow-up protocol, which included texting participants once per week for four weeks after Session 2 to assess homework compliance, as well as sending a text message reminder to participate in the follow-up on the 28th day. Future research could benefit from the same or similar follow-up procedures of employing text message and weekly check-ins in order to increase retention.

Previous mindfulness-based interventions on overeating behavior cite attrition values in the range of to 19% (Timmerman et al., 2012) and 23.7% (Courbasson et al. 2016). Studies that discuss attrition typically do so by reporting number of participants who enrolled in the program, and number of participants who completed all measures (Courbasson et al., 2016; Miller et al., 2012; Smith et al., 2008). Few studies discuss at which points during the intervention participants drop out (Daubenmier et al., 2011; Kristeller et al., 2013). Furthermore, many mindfulness-based interventions do not

report on attrition. It was thought that a shorter intervention would have lesser attrition due to the lessened time required to be present for the intervention. However, the studies cited above have intervention lengths of 6 and 16 weeks, respectively. Though this was a short mindfulness-based program, the attrition was not different from longer studies which indicates that shorter mindfulness-based programs do not lead to less dropout. However, it is important to note that the attrition for the present study was lower during the spring semester than in the summer, (21% & 42.3% respectively). This may indicate that the university semester schedule is conducive to maintaining appointments rather than canceling them. As such, future research on mindfulness-based interventions for eating behaviors in college students should limit their intervention to take place during school semesters.

Because most of the attrition for the present study occurred between Session 1 to Session 2, which would have required participants to come back in-person, future research could try a fully online mindfulness-based intervention. In order to maintain quality teaching, researchers could video-record program materials, and include a discussion board so that participants don't lose any aspects of the program. Reports on attrition following an online-based intervention vary extensively depending on sample size, study design, and health behavior. For one study testing adherence to an online program promoting self-care in chronic illness patients, attrition was 21% (Wantland et al., 2004), which is comparable to those of previous literature. However, because no fully online-based interventions for mindfulness on eating behavior have been tested thus far, it is recommended that future research explore them in order to determine the changes to attrition and subsequent changes in eating behavior.

Homework compliance

For the present study, participants were asked to participate in at least 10 minutes daily of at-home practice between sessions, and for four weeks following the intervention. Perhaps surprisingly, the participants of this study participated in the at-home practice for the duration of the four weeks following the intervention. Many mindfulness-based programs do not evaluate homework compliance. Those who do typically do so by asking participants about home practice during the following meeting (Alberts et al., 2010; Rosenzweig et al., 2007); very few assess homework compliance with self-report logs (Daubenmier et al., 2011). Because participation in program components is an important variable on changing health behavior, the present study evaluated daily homework compliance by weekly inquiry. However, the method used to assess homework compliance in this study was a limitation. Self-report leaves room for error. Recommendations for future research are to try new methods for evaluating homework compliance, such as video-voice. Video intervention/prevention assessment (VIA) is a long-established method wherein participants show researchers their experience through video (Patashnick & Rich, 2005). It has proven effective for assessment of participant experiences, but it can be helpful in ensuring completion of compliance without relying on self-report. In this context of the present study, researchers could have asked that participants record a video of themselves and text or email it in each time they practice.

Another topic to explore for homework compliance is that of habit formation. In order to encourage participants to solidify the habit of practicing the mindfulness skills for 10 minutes daily, it may be constructive to frame the home-practice as, repeating

one simple specific action during a specific and pre-determined contextual cue (Gardner et al., 2012). For example, instead of asking each student to "meditate for 10 minutes every day," it may be more constructive to have each student choose their own personal goal, such as, "when I get home from school, I will practice the body scan meditation for 10 minutes." Future researchers could include 10 minutes at the end of the first session to ask each student to choose, and write into statements, their own context cue (location/time), meditation, and time that would lead to a sum total of 10 minutes of practice each day (i.e. 5 minutes at morning and night would be acceptable as well, so they could create multiple statements). If future studies employ this methodology, researchers should make copies of the statements from each participant, and employ the video-voice technique discussed above in order to assess homework completion of each participant, or lack thereof.

Supplemental materials

The present study texted the link to the YouTube playlists for each session's supplemental videos to participant's mobile phone numbers. Most participants did not use the videos, and the videos did not receive very many views. Previous literature on support materials and memory indicate that supplemental materials can be an important part of remembering intervention components (Wilson et al., 2010). One alternative strategy that may increase use is asking participants to pull up the link onto their phones before leaving the room. This may create a sense of familiarization with participants that would encourage them to use the playlists on their own. Another method that may be more helpful is using the supplemental videos to lead the intervention. In the context

of a mindfulness-based intervention, future researchers could use videos in the place of themselves in order to lead the meditations during the in-person sessions.

Sample Size

The issue of sample size is necessary to discuss in the overall discussion of results. Many mindfulness-based studies for overeating behavior have very limited sample sizes. For example, some studies have a sample size of 7 (Leahey et al., 2008), 10 (Dalen et al., 2010; Baer et al., 2005), 11 (Rosenzweig et al., 2007), 19 (Alberts et al., 2010). The present study appears to be one of the few that mentions a power analysis. Though studies with a small sample size are helpful in guiding methodology and providing preliminary findings, future studies that conduct statistical testing must be adequately powered. Furthermore, in order to account for attrition, mindfulness-based interventions must over-enroll their program so that the study is still adequately powered at the final assessment.

Testing Effect

The lack of a significant intervention effect could be a result of testing effect (also referred to as pre-test sensitization), meaning that overeating behavior decreases simply by drawing awareness to it (for example, by asking about eating behavior) (Braver & Braver, 1988). In order to account for this effect and possibly reduce it, it is recommended to employ a Solomon four-group experimental design in future research experiments (Braver & Braver, 1988). In the Solomon design, half of the control & intervention groups are pre-tested and the other half are not pre-tested. By doing this, future researchers could know if overeating is a behavior that is significantly impacted by the testing effect.

Participant Assessments

Upon arriving at the second session, many participants were no longer assessing themselves the same way as during the first session. The intervention alone causes a heighten awareness about eating behaviors such that many students reported more episodes of overeating at the second session. In order to combat this effect, it is recommended that future researchers employ a different method of assessing participants. In one study, researchers assessed objective and subjective binges; objective binges were assessed using the Eating Disorder Examination and subjective binges were asked with one question from the researchers to the participants. Objective binges defined the same way as the present study defined overeating, and subjective binges are considered an amount of food that is seen by the participant as excessive (Baer et al., 2005). Since both binges are assessed, even if participants may think or feel that they are binging more during the intervention, results would show the effect on true binging behavior (Baer et al., 2005). In the context of the present study, participants would be assessed with two questions, one for assessing each type of binging, at pre-test, post-test, and follow-up. Future researchers should be careful to measure both subjective and objective binges.

Intervention Design

Researchers state that habits are created within a range of 18-254 days (Lally et al., 2010), and more specifically that habit formation occurs in an average of 66 days (Gardner et al., 2012). The current design occurred over 7 days, and all homework compliance was self-reported. Given the information on habit research, future researchers should ensure that participants are assessed for participation in meditation

behavior for about 66 days (the average time it takes to form a habit). It is recommended for future research that study designs have a 66 day-long intervention with a pre-test and post-test. If future researchers have shorter interventions, then it is recommended to have a follow-up period that would account for the full 66 days, including periodic assessments of at-home practice compliance.

Practitioner Training

The subject of practitioner training is one that is rarely discussed within mindfulness research, though it is important to do so in order to engage this topic (Dimidjian & Segal, 2015). The practitioner for the current study is a Registered Yoga Teacher and has experience teaching meditation, as well as attended mindfulness meditation classes before. Additionally, she trained at the Mindfulness Center in Bethesda, MD.

Implications for Practice

First, it is recommended that mindfulness-based programs are held for 66 days, so that participants have an opportunity to form the practices into habits (Dardner et al., 2012). Additionally, it is recommended to teach or assign shorter individual practices (i.e. 10 minutes daily at home) in order to maintain the participation in new skills.

Mindfulness techniques are very low-cost and low-resource programs. They can be used not only for eating behaviors, but also for other health outcomes. With the low cost, resource, and risk involved with this type of program as well as the health benefits, it is recommended to introduce these programs into schools, including K-12 as well as universities, churches, and state or city health departments. Those who receive this

program's components and skills could go on to use them in the future for other health behaviors and outcomes.

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Appendix A: Resources for Students with Undiagnosed Eating Disorder

Goddard Health Center, Norman Campus
Monday through Friday: 9:00 am - 4:30 pm
No Appointment Necessary
http://www.ou.edu/healthservices.html
Main line: 405-325-4611
To make an appointment: 405-325-4441

Goddard Counseling Center:
For more information or to make an appointment, call: 405-325-2911

Decco – Eating Disorder Counseling Specialists
1225 W Main St #102
Norman, OK 73069
405-292-1000

National Eating Disorders helpline
1-800-931-2237

Websites to visit:
http://www.nationaleatingdisorders.org/recovery
http://www.nationaleatingdisorders.org/find-help-support
http://okeatingdisorders.org/
http://www.eatingdisordersanonymous.org/

Appendix B: Screening Tool

Brief Mindfulness Based Intervention on Eating Behavior in Healthy College Students Screening Questions

Thank you for your interest in participating in our study! We appreciate your attendance. We must ask you the following questions to ensure eligibility for the study. We would greatly appreciate if you would answer the following questions honestly.

1) Are you a full-time or part-time student? _____
   If "full-time," then eligible

2) How old are you? _____
   If 18 <= interested party <= 25, then eligible

3) Mindfulness experience is defined as participating in greater than 1 hour of body scan meditation, yoga, sitting meditation, walking meditation, or mindful eating (either in a group or alone). Given this information, do you have mindfulness experience?

   YES or NO

   If "no," then eligible

4) If so, can you please explain your experiences (including any of the above experience or additional experiences not listed.) [Only ask aloud at initial screening if "yes" to question 3].
   _____
   _____

   If answer includes <1 hour of formal practices listed above OR informal practices OR educational components, then eligible
   If answer includes >1 hour of formal practices listed above, then not eligible

5) Have you ever been diagnosed by a health professional with any kind of eating disorder? (For example, Bulimia Nervosa, Anorexia Nervosa, or Binge Eating Disorder)?

   YES or NO
   If "no," then eligible

6) Do you make yourself sick because you feel uncomfortably full?
   YES or NO

7) Do you worry that you have lost control over how much you eat?

YES or NO

8) Have you recently lost more than 14 lb in a 3-month period?
YES or NO

9) Do you believe yourself to be fat when others say you are too thin?
YES or NO

10) Would you say that food dominates your life?
YES or NO

If "yes" answers to questions 6-10 are 2 or fewer, then eligible

11) Participating in this research study will require attending two class-like sessions, each about one hour and forty five minutes. These sessions will cover mindfulness-based topics including formal meditations and informal mindfulness practices. All topics will be introduced and then practiced. You will be asked to participate in a daily self-practice of about 10 minutes during the week between the two sessions. Is this something you wish to commit to? If so, the following dates are available to schedule:
_____

12) May we text and/or email you? _____
If yes,
What number can we text? _____
What email address can we email? _____

Thank you for agreeing to participate in our study. We look forward to seeing you at the first session!

Name: _____ Signature: _____

Additional Contact Information:

Laili Boozary, B.S.
405-706-2015
laili.boozary@ou.edu

Dr. Marshall Cheney, Ph.D.
405-325-6322
marshall@ou.edu

Appendix C: Demographic Survey

1. What is your age?
   - 18 or 19
   - 20 or 21
   - 22 or 23
   - 24 or 25
   - over 25

2. What year in school are you?
   - Freshman
   - Sophomore
   - Junior
   - Senior

3. What is your gender identity?

   - Male
   - Female
   - Other

4. What is your major?

5. What is your ethnicity?
   - Caucasian
   - Asian/Pacific Islander
   - Hispanic
   - Mixed Race/Multi-Racial
   - Black/African-American
   - Other (please specify)
6. What is the highest level of education your mother received?

   - Less than high school completion
   - High school completion
   - Some College
   - Associate's Degree
   - Bachelor's Degree
   - Graduate Degree

7. What is the highest level of education your father received?

   - Less than high school completion
   - High school completion
   - Some College
   - Associate's Degree
   - Bachelor's Degree
   - Graduate Degree

Appendix D: Assessment Tool

Pre-test Assessment:

1. Over the past 7 days, how many times have you eaten more in a two hour period than a normal person would?

Post-test Assessment:

1. Over the past 7 days, how many times have you eaten more in a two hour period than a normal person would?

Every week for 3 weeks, post-intervention:

1. Hi there, this is Laili again! Would you please estimate the average number of minutes of mindfulness practice per day you have participated in during the last 7 days?
2. [Upon response]: Thank you so much!

On the 4th week:

1. Hi there, this is Laili again! Would you please estimate the average number of minutes of mindfulness practice per day you have participated in during the last 7 days?
2. [Upon response]: Thank you so much! I will be emailing you in a couple of days to follow-up with just a couple of questions that should take about 5-10 minutes of your time. I appreciate your time!

30 Day Follow-Up Assessment:

1. Over the past 7 days, how many times have you eaten more in a two hour period than a normal person would?

2. Have you noticed any effects to your eating behavior as a result of the mindfulness-based program? Tell me about those effects.
3. Have you been able to apply the skills you learned during the program to your daily life? Tell me about those experiences.
4. Is there any additional information you would like to share with me about your experience with mindfulness and changing your eating habits?

Appendix E: Process Evaluation Checklist - Session 1

Date: _____ Time: _____ Location _____

Components for 1st class	**Time**	**Completion: y or n**
Basic re-screening	5 minutes	
Baseline assessments and informed consent	10 minutes	
Greetings	15 minutes	
Introduce topic: body scan	5 minutes	
Body scan practice	10 minutes	
Introduce topic: gentle hatha yoga	5 minutes	
Gentle Hatha Yoga practice	10 minutes	
Introduce topic: mindful eating	5 minutes	
Mindful eating practice	10 minutes	
Introduce topic: awareness of pleasant/unpleasant events	10 minutes	
Homework discussion	10 minutes	
Farewell	5 minutes	
Total Time	**1 hour, 40 minutes**	

Appendix F: Process Evaluation Checklist - Session 2

Date: _____ Time: _____ Location _____

Components for 2nd class	**Time**	**Completion: y or n**
Homework submission	10 minutes	
Group dialogue about experience with home-practice	10-20 minutes	
Instructor-led review of session 1 components	10 minutes	
Sitting meditation discussion	5 minutes	
Sitting meditation practice	10 minutes	
Walking meditation discussion	5 minutes	
Walking meditation practice	10 minutes	
Breath awareness discussion	5 minutes	
Breath awareness practice	10 minutes	
Deliberate awareness of routine activities discussion	10 minutes	
Post-test assessments	10 minutes	
Farewell		
Total Time	**1 hour, 45 minutes**	

Appendix G: Homework Assignment

As per the intervention you are currently participating in, you have been asked to practice the skills you have learned for 10 minutes each day at home. The things you can practice as home that will be considered "home practice" are any of the skills that you learned during the intervention: body scan, walking meditation, mindful eating, breath awareness, or deliberate awareness of routine activities. This practice can be done based on your memory of what we cover in class, or based on the supplemental information disseminated through the YouTube page that is given to you. On the sheet below, please report on your participation on the days between your first and second sessions:

Day 1: Date _____

- Please indicate the total number of minutes of your practice for today: _____

- If more than 0 minutes, what did you practice? Circle all that apply:

  BODY SCAN GENTLE HATHA YOGA MINDFUL EATING

  AWARENESS OF PLEASANT AND UNPLEASANT EVENTS

Day 2: Date _____

- Please indicate the total number of minutes of your practice for today: _____

- If more than 0 minutes, what did you practice? Circle all that apply:

  BODY SCAN GENTLE HATHA YOGA MINDFUL EATING

  AWARENESS OF PLEASANT AND UNPLEASANT EVENTS

Day 3: Date _____

- Please indicate the total number of minutes of your practice for today: _____

- If more than 0 minutes, what did you practice? Circle all that apply:

BODY SCAN GENTLE HATHA YOGA MINDFUL EATING

AWARENESS OF PLEASANT AND UNPLEASANT EVENTS

Day 4: Date _____

- Please indicate the total number of minutes of your practice for today: _____

- If more than 0 minutes, what did you practice? Circle all that apply:

  BODY SCAN GENTLE HATHA YOGA MINDFUL EATING

  AWARENESS OF PLEASANT AND UNPLEASANT EVENTS

Day 5: Date _____

- Please indicate the total number of minutes of your practice for today: _____

- If more than 0 minutes, what did you practice? Circle all that apply:

  BODY SCAN GENTLE HATHA YOGA MINDFUL EATING

  AWARENESS OF PLEASANT AND UNPLEASANT EVENTS

Day 6: Date _____

- Please indicate the total number of minutes of your practice for today: _____

- If more than 0 minutes, what did you practice? Circle all that apply:

  BODY SCAN GENTLE HATHA YOGA MINDFUL EATING

  AWARENESS OF PLEASANT AND UNPLEASANT EVENTS