

**THE EFFECTS OF MINDFULNESS AND YOGA
INTERVENTIONS ON STRESS AND EATING
BEHAVIORS AMONG UNIVERSITY STUDENTS**

A proposal by

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CHAPTER 1: REVIEW OF THE LITERATURE

Introduction

University students often face unique challenges that can impact their mental health and eating behaviors, including rigorous academic demands and the transition to independent living. These issues are increasingly prevalent, making effective interventions crucial. This review synthesizes current research on eating disorders, stress, and the efficacy of mindfulness-based meditation and yoga interventions in addressing these concerns, particularly within the college student population.

Eating disorders (EDs) are a significant concern among university students, with recent research indicating a substantial prevalence (Almoraie, 2025). A cross-sectional study in France found that nearly a quarter (24.8%) of university students screened positive for likely eating disorder cases, with bulimic eating disorders being the most common (13.3%), followed by hyperphagic (8.6%) and restrictive (2.9%) types (Tavolacci, 2020). The conceptualization of eating disorders has expanded to include conditions like Binge Eating Disorder (BED) and Avoidant/Restrictive Food Intake Disorder (ARFID) in diagnostic manuals like DSM-5 and ICD-11, with much of the clinical understanding focused on anorexia nervosa, bulimia nervosa, and BED (Hay, 2020). Several factors contribute to disordered eating attitudes among college students, including sociocultural influences like social media use and beauty ideals (Almoraie, 2025). An exploratory analysis found disordered eating attitudes to be linked with self-

esteem, body image, desired body image, and social media use in female university students (Almoraie, 2025). Body dissatisfaction is a notable issue among young adult women, influenced by exposure to thin idealized images (Zieff, 2024). Nutritional issues and problematic eating behaviors are specific concerns for university students (Almoraie, 2025). There are also disparities in ED diagnosis and treatment based on weight status, race/ethnicity, socioeconomic background, and sex among college students (Huguenin). The relationship between eating disorders and addiction to technology, such as the internet and smartphones, has also been investigated in this population (Giel, 2022). Eating disorders can also significantly affect academic performance. Students diagnosed with anorexia or bulimia who received a combination of medication and psychotherapy were found to be 1.35 to 1.49 times more likely to achieve a higher GPA compared to students without EDs (Zieff, 2024). This highlights the potential benefits of comprehensive treatment in supporting students' overall well-being and academic success (Zieff, 2024).

Consequences of Eating Disorders

The impact of eating disorders (EDs) extends across physical, psychological, and socioeconomic domains, representing a significant threat to the health of young adults (Kauffman, 2019). At a fundamental level, poor diet quality associated with these disorders leads to malnutrition or overnutrition, which significantly increases the risk of preventable chronic diseases (Almoraie, 2025).

Physical and Medical Comorbidities

Eating disorders, particularly binge eating disorder (BED), are frequently associated with obesity and metabolic syndrome, a cluster of conditions including abdominal obesity, hypertension, high blood sugar, and elevated cholesterol (Giel, 2022). These physiological changes contribute to a higher incidence of Type 2 diabetes, heart conditions, and nonalcoholic fatty liver disease (NAFLD) (Giel, 2022). Furthermore, individuals may suffer from a wide range of gastrointestinal symptoms, such as acid reflux, bloating, and abdominal pain, as well as respiratory and musculoskeletal problems. Chronic ED behaviors are also linked to an increased risk of multiple cancers, including colorectal and pancreatic cancer, and reproductive issues such as polycystic ovarian syndrome (PCOS) and infertility. In cases involving restrictive eating, such as anorexia nervosa, patients face severe consequences like amenorrhea and osteopenia; the resulting bone loss may be irreversible, leading to a lifelong increased risk of bone fractures (Giel, 2022).

Psychological Impact and Mortality

The psychological toll of eating disorders is profound, with 94% of individuals with BED meeting criteria for at least one additional psychiatric disorder (Giel, 2022). Common comorbidities include mood disorders, anxiety, PTSD, and borderline personality disorder. Maladaptive eating is often linked to problematic substance use and a general decline in psychological health (Kauffman, 2019). Most critically, eating disorders have a relatively high mortality rate compared to other psychiatric conditions (Waller, 2024). This excess mortality is driven by both physical sequelae and a high prevalence of self-harm; approximately 23% of individuals with BED have attempted suicide (Giel, 2022).

Socioeconomic and Quality of Life Outcomes

Beyond individual health, eating disorders result in significant impairments to health-related quality of life (HRQOL) and social adjustment (Giel, 2022). Students and young adults often experience moderate to high levels of psychosocial and work impairment, which translates into substantial economic costs (Giel, 2022), (Hay, 2020). These costs include years of life lost to disability and significant annual lost earnings, which often peak during a person's most productive years. Additionally, the burden on the healthcare system is intensified by increased utilization and costs (Giel, 2022). Despite these severe consequences, many individuals suffer from healthcare renunciation, avoiding treatment due to fear of clinical encounters, stigma, or feelings of shame (Huguein, 2024).

FACTORS AFFECTING EATING DISORDERS: 1. Stress . body image . family . culture

Stress is a significant contributor to the development and maintenance of poor eating habits and disordered eating behaviors among university students (Kauffman, 2021) . Entering college is a major life event that brings various stressors, such as financial strain and academic pressure (Kauffman, 2021). While some students manage stress through healthy behaviors like physical activity, others may resort to health-risk behaviors, including disordered eating (Kauffman, 2021). Specifically, negative mood can immediately trigger binge-eating episodes in individuals with Binge Eating Disorder (BED) (Giel, 2022). Stress-related overeating can lead to excessive weight gain and an increased risk of metabolic and cardiovascular diseases (Torske, 2024). Psychological distress is also linked to impaired glycemic control in individuals with type 2 diabetes, a condition that mindfulness-based interventions may help improve (Mason, 2016). A

notable individual difference factor is anxiety sensitivity, defined as the tendency to fear anxiety-related sensations (Kauffman, 2021). Studies show that college students with higher anxiety sensitivity are at a greater risk for maladaptive eating expectancies (Kauffman, 2021). This sensitivity is positively correlated with believing that eating can help manage negative emotions, alleviate boredom, and lead to a feeling of being out of control (Kauffman, 2021). These relationships hold true even when accounting for gender, race/ethnicity, and general negative affectivity (Kauffman, 2021). Emotional eating often serves as a maladaptive coping mechanism in response to psychological distress and negative self-assessments (O'Reilly, 2014). Consequently, eating disorders are frequently associated with depression, stress, and anxiety (O'Reilly, 2014). University students with eating disorders are also more likely to consult their general practitioner for stress or anxiety-related issues compared to those without eating disorders (Tavolacci, 2020). Mindfulness-based interventions have shown effectiveness in reducing stress and anxiety (Zang, 2021).

Body image plays a critical role in eating disorders, with body dissatisfaction being prevalent among university students and potentially leading to the development of eating disorders (Almoraie, 2025). For diagnoses like anorexia nervosa and bulimia nervosa, the overvaluation of weight and shape—where these concerns are of major or paramount importance to an individual's self-view—is a mandatory diagnostic criterion (Hay, 2020). While a "fear of fatness" or weight gain is no longer a mandatory criterion for anorexia nervosa in DSM-5 and ICD-11, evidence of weight prevention or loss behaviors is still required if this fear is not explicitly reported (Hay, 2020). Body image concerns can also occur in individuals with BED but are explicitly excluded from the

diagnostic criteria for Avoidant/Restrictive Food Intake Disorder (ARFID) (Hay, 2020). Issues such as weight-related teasing, overall body dissatisfaction, and restrictive dieting are identified as key risk factors for binge eating (Giel, 2022). The over-evaluation of one's weight and body shape is associated with greater functional impairment related to BED (Giel, 2022). Research indicates that negative body image predicts an increase in depressive symptoms over time, and **self-esteem** acts as a mediating factor in this relationship (Pehlivan, 2022). Low self-esteem is strongly associated with the development of a negative body image, highlighting its importance in interventions (Huguenin, 2024). Body image is conceptualized as a mental representation of the body, influenced by various factors including cognitive, biological, behavioral, sociocultural, and environmental aspects, all of which present challenges for university students (Huguenin, 2024). Furthermore, body dissatisfaction is consistently identified as a predictor of poorer treatment outcomes across all eating disorders (Hay, 2020). Interventions aimed at improving body image for university students include cognitive-behavioral approaches, media literacy, psychoeducation, physical training, and the promotion of self-esteem (Huguenin, 2024). Yoga practices are perceived to have a positive impact on body image through observed physical changes, cultivating gratitude for one's body, fostering a sense of accomplishment, increasing self-confidence, and exposing individuals to diverse body types (Neumark-Sztainer D, 2018). However, yoga can also have a negative impact through comparative critique (e.g., comparing oneself to others) and inner critique (e.g., negative self-talk) (Neumark-Sztainer D, 2018).

Family dynamics and living arrangements can influence the eating habits of university students. Low household income and living alone are specifically associated

with unhealthy eating habits among this demographic (Almoraie, 2025). Regarding the etiology of eating disorders, Binge Eating Disorder (BED) has been shown to aggregate in families, indicating a genetic component, and this familial aggregation is independent of obesity (Giel, 2022). Twin and family studies have estimated the heritability of BED to be between 0.39 and 0.57 (Giel, 2022). In terms of treatment, family-based treatment (FBT) is the leading and most effective modality of care for children and adolescents diagnosed with anorexia nervosa (Hay, 2020). This form of therapy can be delivered to the whole family or involve separate sessions for parents and the child. Family therapy has also been adapted for the treatment of bulimia nervosa (Hay, 2020). Although with weaker evidence, a modified version of CBT-E that includes brief family sessions is also an alternative to FBT (Hay, 2020).

Cultural and societal factors significantly shape eating behaviors and the prevalence of eating disorders among university students. University food environments play a substantial role, with the availability, accessibility, and affordability of healthy food options being crucial determinants of students' dietary choices and overall diet quality (Almoraie, 2025). To promote healthier eating, university food environments need restructuring, which includes increasing the availability, accessibility, affordability, and proper labeling of healthy foods, while also implementing policies to restrict unhealthy food and drink options on campus (Almoraie, 2025). Globally, the "toxic" food environment, particularly in Western countries, encourages the consumption of high-fat and high-sugar foods, contributing to the obesity epidemic (Kauffman, 2021).

Prevention efforts for eating disorders often overlap with obesity prevention strategies, advocating for universal prevention approaches that consider both eating and

weight disorders (Giel, 2022). These efforts should target societal-level factors influencing food choices and physical activity opportunities, such as food quality in cafeterias, availability of supermarkets versus fast-food restaurants, industrial food marketing, and governmental tax policies (Giel, 2022). School policies related to food and beverage availability, for example, have been shown to improve dietary behaviors (Giel, 2022).

Most research on BED has been conducted in the United States, where the disorder is found across all socioeconomic groups (Giel, 2022). However, the prevalence of BED may be higher in Black and Latino populations, as well as among sexual minorities, compared to the general population in the US (Giel, 2022). Conversely, recent immigrants in the US and Australia show a lower risk for BED, while indigenous populations have an equal or higher risk (Giel, 2022). Stigma and stereotypes associated with gender, mental health, weight, age, disability, and lack of resources can reduce the visibility of BED, highlighting that its prevention, detection, and management are not only medical but also social justice issues (Giel, 2022). Socioeconomic background is a factor influencing access to care; college students from affluent backgrounds have higher odds of perceiving a need for eating disorder treatment and receiving treatment compared to their non-affluent peers (Sonnevile, 2018). Historically, research and interventions related to body image have predominantly focused on the experiences of white, cisgender, heterosexual, and healthy women in economically developed Western cultures, which has led to the perpetuation of white norms as benchmarks for evaluating marginalized bodies (Huguenin, 2024). This underscores the need for regional diversity

in intervention methodologies that consider specific cultural and social contexts (Huguenin, 2024).

The "thin ideal" and "fear of fatness" are indeed often seen as culturally specific phenomena that significantly influence body image (Hay, 2020). For instance, among university students, a slim body is typically viewed as beautiful for women, which is part of the broader beauty standard (Huguenin, 2024). The concept of Binge Eating Disorder (BED), for example, is also deeply rooted in Western consumer culture (Giel, 2022). While a "fear of fatness" or weight gain is no longer a mandatory diagnostic criterion for anorexia nervosa in DSM-5 and ICD-11, evidence of weight prevention or loss behaviors is still required if this fear is not explicitly reported (Hay, 2020). Social media is a significant factor in perpetuating these ideals, as unrealistic beauty standards are widely popularized through these platforms.⁴ This exposure contributes to a rapid increase in disordered eating attitudes, particularly among young women (Aparicio-Martinez, 2019). Research indicates a direct relationship between body image, body concerns, body dissatisfaction, and disordered eating attitudes among college women, with social media use being a key link (Aparicio-Martinez, 2019). Interventions, including those delivered via mobile applications, acknowledge the potential for these digital platforms to influence body image, noting that messages promoting thin bodies are often propagated through social media (Huguenin, 2024). Studies have also explored the relationship between eating behavior disorders and increased internet and smartphone usage among college students (Tayhan Kartal F, 2021).

The transition to college often presents students with significant academic and social pressures, making them vulnerable to elevated stress, anxiety, and the development of maladaptive eating behaviors. These issues can profoundly impact their overall mental and physical health. Interventions incorporating mindfulness and related practices, such as yoga and mindful eating, have emerged as promising strategies to mitigate these challenges.

Theoretical Framework: Mindfulness-Based Behavior Change and the Three Gears Model

To investigate the efficacy of a meditation and yoga intervention for university students, this study applies to the Mindful Eating Learning Process Model and the "Three Gears" framework articulated by Beccia et al. (2020). This framework moves away from traditional "weight-centric" paradigms that focus on self-control and weight loss, instead adopting a weight-neutral approach centered on psychological and behavioral health.

The "Three Gears" of Behavior Change

The intervention will be structured to guide students through a temporal process of change, categorized into three distinct stages:

- **First Gear: Nonjudgmental Awareness.** Students learn to initiate a mindfulness practice by developing the ability to observe thoughts and actions previously perceived as "automatic" (Beccia, et al, 2020). In the university context, this involves an "awakening" to specific disordered eating triggers, such as academic pressure, financial strain, and social anxiety (Beccia, et al, 2020).

- **Second Gear: Recognizing Outcomes.** Participants observe the emotional and physical consequences of their eating behaviors without immediate attempts to alter them (Beccia, et al, 2020). This stage aligns with expectancy theory, as students begin to identify the learned relationship between eating and its anticipated consequence, such as the expectancy that eating manages negative affect (Kauffman, 2020).
- **Third Gear: Unforced Freedom of Choice.** The final phase represents the turning point where students learn to coexist with triggers rather than reacting to them automatically (Beccia, et al, 2020). This result is defined as "unforced freedom of choice, emerging from embodied awareness," where students utilize internal cues rather than external rules to make food and coping choices (Beccia, et al, 2020).

A central tenet of this framework is the process of "decoupling" or interrupting the automatic link between internal distressing stimuli (e.g., stress or boredom) and subsequent maladaptive eating responses. For university students, mindfulness training facilitates a shift from negative embodiment (feeling disconnected from the body) to positive embodiment, where the body is viewed as a valued aspect of self-worth (Beccia, et al, 2020).

By cultivating self-compassion, students can reframe "setbacks" as expected patterns rather than moral failings, thereby replacing entrenched shame and guilt with self-empowerment (Beccia, et al, 2020). This empowerment is theorized to increase the student's perceived capacity for resilient self-care, allowing them to navigate high-stress academic environments with a more regulated and compassionate relationship with food. Ultimately, this framework supports the study's focus on emotional eating as a

primary outcome, as it treats the behavior as a coping mechanism that can be replaced by more adaptive mindfulness-based strategies (Beccia, et al, 2020).

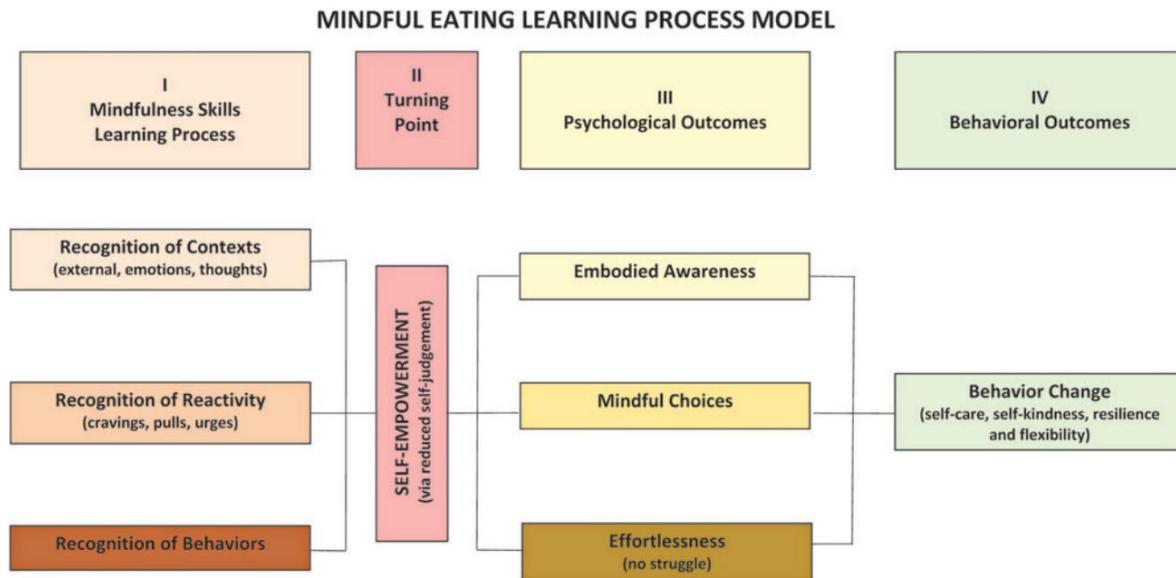


FIG. 1. Conceptual model of mindfulness-based behavior change for disordered eating. The model presents a four-phase temporal process resulting in an “unforced freedom of choice, emerging from embodied awareness.” Color images are available online.

Foundational Research on Yoga, Meditation, and Student Well-being

Yoga is an ancient practice recognized as a physical and mental activity (Tripathi MN, 2018). Modern applications of yoga often emphasize its holistic approach, viewing the individual as an integrated organism where the body and mind are not separate (Huguenin, F.M., 2024). Fundamentally, yoga integrates three key elements: controlled breathing, various physical postures or poses (asanas), and meditation techniques (Huguenin, F.M., 2024). A core component of yoga is meditation, which can be defined as a form of cognitive training designed to improve an individual's attentional and

emotional self-regulation (Álvarez-Pérez, 2022). The scientific interest in meditation has surged, leading to research aimed at understanding its psychological and neurophysiological mechanisms (Malinowski, P. (2013). There are several major types of meditative practices, including mindfulness meditation, mantra meditation (such as transcendental meditation), and compassion meditation (Álvarez-Pérez, 2022). Other specific forms include Loving-Kindness and Choiceless Awareness meditations (Lang, A. J., 2012).

Mindfulness, which has its roots in Buddhist spiritual traditions, is a central concept in many of these practices (Keng, S.-L., 2011). It is commonly defined as a quality of consciousness characterized by paying attention in a particular way: "on purpose, in the present moment, and nonjudgmentally" (Keng, S.-L., 2011). This state of awareness involves continually attending to one's moment-by-moment experiences, thoughts, and emotions with an open and accepting approach (O'Reilly, G. A., 2014). Conceptualizations of mindfulness point to two primary components:

1. Self-regulation of attention: This involves the ability to purposefully direct one's focus to the present moment, observing sensations, thoughts, and feelings as they arise without elaboration (Malinowski, P. 2013).
2. Orientation to experience: This refers to adopting an attitude of curiosity, openness, and acceptance toward one's experiences, rather than judging or trying to suppress them (Keng, S.-L., 2011). Acceptance in this context is not resignation but the ability to experience events fully without excessive preoccupation (Keng, S.-L., 2011).

Mindfulness practices are seen as potential antidotes to common forms of psychological distress, such as rumination, anxiety, worry, and fear, which often involve maladaptive tendencies to avoid or over-engage with difficult thoughts and emotions (Keng, S.-L., 2011). One of the key theoretical mechanisms through which mindfulness is thought to work is by fostering a shift in perspective known as "decentering" or "reperceiving" (Kriakous, 2020). This is the ability to observe one's thoughts and feelings as transient mental events rather than identifying with them or accepting them as accurate reflections of reality (Kriakous, 2020). This process is believed to reduce the power of habitual, unhealthy reactions to stress (Kriakous, 2020).

By cultivating this non-judgmental awareness, individuals may develop a "mindfulness-mediated stress response" (Kriakous, 2020). Instead of reacting automatically, they can apply more adaptive and effective coping strategies (Kriakous, 2020). In this way, yoga and its meditative components are thought to interrupt the stress response, which is often linked to impaired focus and high anxiety (Bernotiene, 2020). The skills cultivated through mindfulness practices enhance self-regulation by improving awareness of one's own emotional and sensory cues (O'Reilly, 2014).

Mindfulness-Based Interventions

The principles of mindfulness have been integrated into a number of formal, structured programs known as mindfulness-based interventions (MBIs) (Kriakaus, 2020). Two of the most extensively used and evaluated MBIs are Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT) (Huberty, 2019). A standard MBSR program is typically an eight-week group intervention that includes weekly sessions, a silent retreat day, and daily home practice assignments

(Kriakaus, 2020). Formal practices taught in MBSR include the body scan, sitting meditation, mindful walking, and Hatha yoga (Kriakaus, 2020). Other interventions, such as Mindfulness-Based Eating Awareness Training (MB-EAT), apply these principles specifically to address issues like binge eating by training awareness of hunger and satiety cues and promoting self-acceptance (Mason, 2016).

The research proposed herein seeks to build upon the findings of Lemay, Hoolahan, and Buchanan (2019), which evaluated the impact of a six-week yoga and meditation intervention on college students' stress, anxiety, and mindfulness skills. Their study, involving 17 participants aged 19-23, demonstrated significant reductions in stress and anxiety scores and a significant increase in total mindfulness. Notably, no students scored in the "high" category for stress or anxiety post-intervention, suggesting that a mindfulness practice, even once a week, can be beneficial for college students.

Similar to Lemay et al.'s findings, other studies have consistently shown the positive effects of meditation and mindfulness on college students' psychological health. For instance, Zieff et al. (2024) conducted a pilot study with high-stress college-based young adults, finding that both mindfulness meditation alone and in combination with aerobic exercise appeared to be feasible strategies to reduce stress, anxiety, and depression. Crowley et al. (2022) observed that college students enrolled in a semester-long meditation course experienced increased subjective happiness and mindfulness attention awareness, with greater reductions in anxiety compared to a control group. These findings underscore the potential of mindfulness practices to foster well-being and combat mental health challenges in this population.

The use of digital platforms for delivering mindfulness interventions has also shown efficacy. Huberty et al. (2019) conducted a randomized controlled trial demonstrating that an 8-week mindfulness meditation mobile app (Calm) significantly reduced perceived stress and improved mindfulness and self-compassion in stressed college students, with effects sustained at a 12-week follow-up. Zollars et al. (2019) similarly reported that a four-week mindfulness meditation intervention using the Headspace™ app enhanced mindfulness and mental well-being while decreasing perceived stress in pharmacy students. These studies highlight that mindfulness meditation can be delivered effectively through various modalities, making it accessible to a broader student population.

Yoga itself, often integrated with meditation, has also been shown to have psychophysiological effects that lead to decreased stress levels in college students. It is recognized as an ancient physical and mental activity that influences mood and stress. Beyond stress reduction, yoga practices can contribute to promoting positive body image, offering physical changes, gratitude for one's body, and a sense of accomplishment, especially in environments inclusive of diverse body shapes.

Mindful Eating and Maladaptive Eating Behaviors

Maladaptive eating behaviors, including binge eating and emotional eating, are prevalent among university students. Mindfulness-based interventions offer a unique approach to addressing these behaviors by cultivating intentional awareness of the physical, mental, and emotional aspects of eating. Mindful eating techniques typically involve guided eating meditations, discussions on present moment awareness, attending

to physical hunger and satiety cues, savoring food tastes and textures, and identifying food cravings and emotional triggers to eat.

Several systematic reviews and randomized controlled trials have supported the efficacy of mindfulness meditation in addressing disordered eating. Katterman et al. (2014), in their systematic review, found that mindfulness meditation effectively decreases binge eating and emotional eating in populations engaging in these behaviors. Similarly, a comprehensive review by O'Reilly et al. (2014) supported mindfulness-based interventions for obesity-related eating behaviors.

Studies incorporating mindful eating training, such as the Mindfulness-Based Eating Awareness Training (MB-EAT), have yielded positive results. Kristeller et al. (2013) demonstrated that MB-EAT was effective in reducing binge eating frequency and increasing hunger and satiety awareness. Furthermore, Daubenmier et al. (2016) reported that a mindfulness-based diet and exercise intervention, which included mindful eating techniques, led to increases in mindful eating and maintenance of fasting glucose levels in obese individuals, while the control group showed increased fasting glucose. This suggests that mindful eating training can help stabilize physiological health outcomes related to eating behaviors.

The neural mechanisms underlying these effects are also being explored. Mindfulness meditation training has been shown to increase mindfulness while simultaneously reducing stress- and emotional-eating tendencies as well as food cravings. These behavioral changes are accompanied by alterations in brain connectivity in regions associated with reward, emotion regulation, awareness, attention, and sensory integration. This provides a strong theoretical and empirical basis for the

integration of present moment awareness and mindful eating practices in interventions aimed at reducing maladaptive eating behaviors.

MEDITATION

Meditation is fundamentally a form of cognitive training designed to enhance attentional and emotional self-regulation (Álvarez-Pérez, 2022). It involves focusing one's attention and energy on the present moment with an attitude of acceptance and an open mindset (Aoun A, 2025). Historically, the integration of meditative techniques into Western medicine and psychology began in the 1950s and 1960s, driven by an interest among clinicians and experimental psychologists to heighten awareness and broaden consciousness (Keng, 2011). Early physiological studies observed that individuals who meditated showed persistent alpha activity and reductions in metabolic rate, as well as increases in theta waves, which are associated with lower states of arousal (Keng, 2011). Transcendental meditation, a specific concentrative technique, was linked to reductions in physiological arousal indicators, such as oxygen consumption, carbon dioxide elimination, and respiratory rate (Keng, 2011). Psychologically, meditation can lead to significant reductions in stress and anxiety among college students, and general improvements in mental health, including reduced psychological distress and depression, alongside increased well-being and self-compassion (Zieff GH, 2024). A 15-week meditation program for college students specifically showed improvements in adult ADHD scores and ego identity. Meditation also helps in coping with dysphoric mood (Kim, 2022). The benefits of meditation are supported by observed neural changes. Experienced meditators demonstrate decreased activation in the key nodes of the default mode network (DMN), specifically the medial prefrontal and posterior

cingulate cortices, which are associated with mind-wandering and unhappiness (Brewer, 2011). They also exhibit stronger functional connectivity in brain regions vital for self-monitoring and cognitive control, such as the posterior cingulate, dorsal anterior cingulate, and dorsolateral prefrontal cortices (Brewer, 2011). Furthermore, mindfulness meditation training can modulate functional connectivity between the hypothalamus, reward regions, and DMN, as well as between the insula and somatosensory areas, which are critical for emotion regulation, awareness, and sensory integration (Torske, 2024). Meditation practice enhances attentional control by improving resource allocation and strengthening sustained attention and conflict monitoring (Malinowski, 2013). Extensive meditation experience is also associated with increased cortical thickness in brain regions related to attention, interoception, and sensory processing (e.g., prefrontal cortex and right anterior insula), and greater gray matter concentration in areas active during meditation (e.g., left inferior temporal gyrus and right hippocampus) (Keng, 2011). Meditation has been explored for therapeutic benefits across various conditions, including stress-eating and food cravings (Torske, 2024), type 2 diabetes (by improving hemoglobin A1c levels) (Heo, 2023), post-traumatic stress disorder (PTSD), and insomnia (Nam, 2024).

Mindfulness is characterized as awareness and nonjudgmental acceptance of one's moment-to-moment experience (Aoun A, 2025). It acts as an antidote to common psychological distress like rumination, anxiety, worry, and fear, by countering maladaptive tendencies to avoid or over-engage with distressing thoughts and emotions (Keng, 2011). Although deeply rooted in Buddhist and spiritual traditions, the application of mindfulness to psychological health in Western contexts gained

significant traction starting in the late 1970s, notably with Jon Kabat-Zinn's work on chronic pain (Keng, 2011). Empirical studies indicate that mindfulness is linked to increased subjective well-being, reduced psychological symptoms, diminished emotional reactivity, and improved behavioral regulation (Keng, 2011). For college students, mindfulness meditation consistently reduces perceived stress and anxiety (Zieff, 2024) and enhances overall mental health (Zollars, 2019). Practicing mindfulness is associated with lower levels of rumination, thought suppression, fear of emotion, and difficulties with emotion regulation, while promoting self-compassion and life satisfaction (Huberty, 2019). It can also decrease body discomfort (Huguenin, 2024). Among college women, higher levels of mindfulness are correlated with healthy eating practices, better sleep quality, and better physical health (Huberty, 2019). The mechanisms by which mindfulness exerts its positive effects include enhancing attentional control and cognitive flexibility (Malinowski, 2013). It influences the brain's default mode network, leading to decreased mind-wandering (Brewer, 2011), and can alter functional connectivity in areas involved in emotion regulation and sensory integration (Torske, 2024). Key processes underlying mindfulness's benefits include increases in mindful awareness, "reperceiving" (or decentering), exposure to distressing experiences in a nonjudgmental way, acceptance, improved attentional control, enhanced memory functioning (e.g., reducing overgeneral autobiographical memory and buffering against working memory capacity decreases during stress), values clarification, and improved behavioral self-regulation (Keng, 2011). Mindfulness also facilitates disengagement of attention from emotional stimuli (Keng, 2011). Mindfulness practices, such as mindful eating, are utilized to adjust disordered eating patterns, including binge eating and emotional eating (Katterman, 2014). It has also shown promise in improving body

image (Huguenin, 2024) and glycemic control in individuals with type 2 diabetes (Heo, 2023).

Yoga is an ancient practice characterized by its combination of controlled breathing, meditation techniques, and physical postures or poses (Huguenin, 2024). It is recognized as both a physical and mental activity (Tripathi MN, 2018). Among college students, engaging in yoga, often in conjunction with meditation, has been shown to lead to a significant reduction in stress and anxiety levels (Weng, 2019). A six-week yoga and meditation program, for instance, resulted in decreased anxiety and stress scores and increased mindfulness skills in college students, with no participants scoring in the "high" category for stress or anxiety after the intervention (Lemay, 2019). Yoga has also been found to enhance psychological resilience, reduce symptoms of depression, improve overall mental health, and boost subjective well-being and quality of life in female college students (Huang X, 2023). Yoga's impact on body image is notable. Practitioners report positive effects, such as observed physical changes, cultivating gratitude for their bodies, a sense of accomplishment, increased self-confidence, and exposure to diverse body types (Huguenin, 2024). However, it can also lead to negative self-perceptions, including comparative critique (comparing oneself to others) and inner critique (negative self-talk) (Huguenin, 2024). Overall, it can promote a healthier relationship with one's body (Huguenin, 2024). Physiologically, yoga practice involves interrupting the stress response, which is typically associated with high blood pressure and impaired focus (Bernotiene, 2020). Specific yoga postures and longer *RR* intervals during practice may contribute to addressing stress-related health problems and benefiting the cardiovascular system (Bernotiene, 2020). Yoga-based interventions have

been explored for their potential benefits in the treatment of eating disorders (Ostermann, 2019).

MBIs

Mindfulness-based interventions (MBIs) have demonstrated positive effects across various biopsychosocial conditions, including reducing psychological symptoms, emotional reactivity, and improving subjective well-being and behavioral regulation (Zhang, 2021). A systematic review of mindfulness-based stress reduction (MBSR) programs for healthcare professionals found them effective in reducing anxiety, depression, and stress, while increasing mindfulness and self-compassion. Abbreviated MBSR programs were found to be as effective as traditional 8-week programs (Kriakous, 2020). A six-week yoga and meditation intervention significantly decreased anxiety and stress scores and increased mindfulness skills in college students, suggesting that even weekly mindfulness practice can be beneficial (Lemay, 2019). Mobile apps like Calm have been shown to significantly reduce perceived stress in college students, with effects maintained post-intervention and at follow-up (Huberty, 2019). Mantra-based meditation techniques have also demonstrated effectiveness in managing various mental health symptoms (Álvarez-Pérez, 2022). While some meditation types like self-observation of the body may impair metacognitive efficiency in specific contexts, indicating the malleable nature of metacognition, the overall impact on psychological health is positive (Schmidt C, 2019). In the context of eating behaviors and weight management, MBIs, especially mindful eating, aim to adjust disordered eating patterns by fostering awareness of physical, mental, and emotional aspects of eating (Aoun A, 2025). Mindfulness-based eating awareness training (MB-EAT) is a group intervention

for BED, designed to address emotional, behavioral, and physiological dysregulation related to food (Kristeller, 2011). It involves training in mindfulness meditation and guided practices to control responses to emotional states, make conscious food choices, develop hunger/satiety awareness, and cultivate self-acceptance (Kristeller, 2011).

Research indicates a positive impact of MBIs on binge eating disorder, weight loss, and emotional eating (Aoun A, 2025). For instance, a mindfulness-based intervention for obese adults led to increased mindful eating, which was associated with reduced sweets consumption and fasting glucose levels (Katterman, 2014). Mindfulness meditation has also been shown to modulate stress-eating and its neural correlates. Meditation interventions have also been examined for their effects on self-management in adult patients with type 2 diabetes, indicating potential positive impacts on glucose control, blood pressure, cholesterol, and obesity. Specifically, a mindfulness-based intervention for obese adults led to increased mindful eating (Mason, 2016). This increase in mindful eating was, in turn, associated with decreased eating of sweets and reduced fasting glucose levels among participants in the mindfulness group (Mason, 2016). The intervention group maintained reduced sweets consumption and stable fasting glucose levels from 6 to 12 months, whereas the control group showed increases in both during that period (Mason, 2016). Mediation analyses suggested that increases in mindful eating partially accounted for the effects of the mindfulness intervention on reducing fasting glucose (Mason, 2016). Mindful attention during eating can lead to reductions in the frequency and quantity of binge and compulsive eating episodes (Mason, 2016). Furthermore, mindful eating involves making deliberate food choices, cultivating awareness of internal hunger and satiety cues, and differentiating between physical and psychological drivers for eating (Mason, 2016).

YOGA INTERVENTIONS

A six-week yoga and meditation intervention significantly decreased college students' anxiety and stress scores while increasing their total mindfulness (Lemay, 2019). This suggests that even once-a-week mindfulness practice can reduce stress and anxiety in college students (Lemay, 2019). Studies indicate that yoga has positive effects on a psychophysiological level, leading to decreased stress levels in college students (Lemay, 2019). Mindfulness-based meditation and yoga interventions have demonstrated efficacy in mitigating perceived stress (Pehlivan, 2022). Yoga courses have been shown to enhance psychological resilience and improve depression and anxiety, thereby promoting mental health and subjective well-being in female college students (Huang X 2023). During yoga practice, individuals may interrupt the stress response, which is typically linked to high blood pressure, impaired focus, and high levels of anxiety (Bernotiene. 2020). A pilot study on high-stress college-based young adults suggested that mindfulness meditation, either alone or combined with aerobic exercise, is a feasible strategy to reduce levels of stress, anxiety, and depression (Zieff, 2024). Yoga and meditation interventions have been found to reduce stress and anxiety levels in college students, even with practices as infrequent as once per week. A six-week yoga and meditation intervention significantly decreased college students' anxiety and stress scores and increased their total mindfulness. This suggests that even a once-a-week mindfulness practice can reduce stress and anxiety in college students (Lemay, 2019). Students experienced a reduction in stress and anxiety levels after completing this program (Lemay, 2019). Furthermore, research on mindfulness meditation in college students, including a semester-long meditation course and interventions using

mobile apps, has shown significant decreases in perceived stress and anxiety, and improvements in mindfulness (Zollars, 2019). Studies also indicate that yoga itself has positive psychophysiological effects that lead to decreased stress levels in college students (Tripathi MN, 2018). Beyond mental well-being, yoga also impacts physiological systems, such as the cardiovascular system, by interrupting the stress response linked to high blood pressure and anxiety. During yoga practice, individuals can interrupt the stress response, which is typically associated with high blood pressure (BP), impaired focus, and high levels of anxiety (Bernotiene, 2020). A pilot study investigated the immediate cardiovascular effects of Hatha yoga poses on healthy women, observing changes in electrocardiogram parameters. The study suggested that practicing poses with a longer RR interval (an indicator related to heart rate variability) may aid stress-related health problems (Bernotiene, 2020). While the question of whether yoga ameliorates or aggravates eating disorders is still debated, systematic reviews are actively assessing its effectiveness and safety for individuals with eating disorders and body dissatisfaction. The discussion around whether yoga practice ameliorates or even aggravates eating disorders is currently under debate (Ostermann, 2019). Systematic reviews aim to assess the effectiveness and safety of yoga in patients with eating disorders and other individuals with disordered eating and/or body dissatisfaction (Ostermann, 2019). While the evidence on yoga's effectiveness and safety for eating disorders is limited, it can be preliminarily considered an additional treatment option in multimodal psychiatric programs (Ostermann, 2019). A mapping review specifically highlighted that the current literature aims to synthesize understanding of how yoga is implemented for individuals with eating disorders, with a focus on its feasibility, acceptability, and safety (Trethewey, 2023). This review suggests that yoga is a safe,

acceptable, and feasible transdiagnostic intervention for eating disorders (Trethewey, 2023). One study, for instance, showed that yoga demonstrated potential to promote a positive body image, with university women reporting improvements in body concerns after yoga sessions (Huguenin, 2024).

GAPS IN RESEARCH

Despite the growing body of literature examining eating behaviors, psychological distress, and the effects of mindfulness-based interventions (MBIs), several significant gaps remain in the current research, particularly within the university student population and related clinical fields. Future research must address these limitations to improve the effectiveness and generalizability of preventive and therapeutic strategies.

I. Methodological and Design Limitations

A prominent concern across multiple fields is the consistency and rigor of study designs, sample characteristics, and follow-up periods: Lack of Longitudinal and Long-Term Data: There is a crucial need for studies utilizing longer-term follow-up periods (six months or greater) to clarify the maintenance effects and sustainability of treatment benefits derived from MBIs on eating behaviors and mental health outcomes (Álvarez-Pérez, 2022). For instance, despite immediate effects, the long-term outcomes for Binge Eating Disorder (BED) and other eating disorders remain less clear (Hay, 2020). Many studies on MBIs lack appropriate comparator groups, relying instead on wait-list controls or pre-post designs (Kriakous, 2020). Future research should utilize robust controlled designs, such as Randomized Controlled Trials (RCTs), employing active control groups or comparing different psychological interventions to reliably assess

comparative efficacy (Kirakous, 2020). Research samples, especially those focused on university students and body image interventions, are frequently skewed, being predominantly focused on female, non-clinical, and/or Caucasian participants (Kaufman, 2019). This methodological flaw severely limits the generalizability of findings to diverse populations, including males, ethnic minorities, and individuals with different socioeconomic backgrounds (Kriakous, 2020). Many studies rely heavily on self-report measures for constructs like mindfulness and dietary intake, introducing the potential for social desirability or response bias (Huberty, 2019). Furthermore, even validated instruments designed to measure eating behavior may not be sensitive enough to capture the nuanced changes promoted by specific interventions, such as those related to mindful consumption of small amounts of desirable foods (e.g., sweets) (Mason, 2016).

II. Gaps in Understanding Intervention Mechanisms and Delivery

Specific questions remain regarding how and when mindfulness and behavioral therapies work best. There is limited understanding regarding the specific components of mindfulness training (e.g., the attentional or acceptance components) that contribute most directly to overall psychological and behavioral changes (Keng, 2011). Moreover, little is known about *for whom* and *under what conditions* mindfulness training is most effective, leading researchers to caution against its indiscriminate application without tailoring it to specific disorders (Keng, 2011).

There is no consensus on the optimal frequency or duration (dose-response relationship) needed for MBIs to achieve psychological benefits, especially when comparing brief sessions versus lengthy programs (Keng, 2011). While abbreviated

programs (e.g., short-term or 3-week interventions) appear effective for immediate psychological functioning outcomes like stress reduction, optimal long-term dose requires further exploration (Kriakous, 2020). There remains a considerable challenge in consistently defining, operationalizing, and quantifying mindfulness, contributing to variation in factor structure across different self-report questionnaires (Keng, 2011). This calls for further collaborative inquiry to establish a consensus on the construct and improve its measurement validity (Keng, 2011).

III. Specific Research Deficiencies in Targeted Areas

Research targeting eating disorders (EDs) and their psychological correlates requires deeper focus in several key areas. A fundamental gap is the lack of a consensus model integrating evidence contributing to the complex etiology of BED (Giel, 2022). Consequently, there is uncertainty regarding the optimal approaches for prevention, especially concerning the overlap with obesity prevention efforts and how to avoid promoting further maladaptive eating patterns (Giel, 2022). Studies must actively seek to diversify samples to include individuals based on gender, sexual orientation, gender identity, and ethnicity, which are often underrepresented but face significant eating and body concerns (O'reilly, 2014). For instance, CBT-ED interventions are sparse among gender-diverse individuals, though preliminary findings are promising (Waller, 2024). Despite clinical recognition of challenges faced by patients with eating disorders and co-occurring neurodiversity (e.g., Autism Spectrum Disorders, ADHD), there is currently limited treatment evidence supporting adaptations of core CBT-ED protocols for these groups (Waller, 2024).

Specifically regarding interventions targeting body image in university students, research identifies a scarcity of formative interventions and limited use of qualitative approaches (Huguenin, 2024). Incorporating qualitative methodologies would allow for a deeper, more holistic understanding of participants' subjective experiences during interventions (Huguenin, 2024). While studies suggest a link between high anxiety sensitivity and maladaptive eating expectancies in college students, further research is needed to empirically evaluate the effectiveness of interventions aimed at reducing these specific expectancies in non-clinical eating disorder samples to facilitate improvements in eating behaviors and weight management (Kauffman, 2019). The evidence base for the effectiveness and safety of specialized treatments like yoga for eating disorders remains limited and requires further investigation (Ostermann, 2019).

There is a critical need for collaborative inquiry to reach a general agreement on the nature and meaning of mindfulness (Keng, 2011). Researchers must clearly specify which aspects of mindfulness are being addressed in studies, as current self-report inventories vary greatly in content and factor structure (Keng, 2011). Future research needs to improve the construct validity of self-report mindfulness questionnaires and develop performance-based measures against which these self-reports can be calibrated (Keng, 2011). This will help address the unknown correspondence between self-reports and actual daily experiences of mindfulness and the inherent paradox of measuring attention lapses based on overall mindfulness levels (Keng, 2011). A deeper understanding of the underlying psychological and neurophysiological mechanisms through which meditation, mindfulness, and yoga exert their effects is essential (Keng, 2011). This includes clarifying the relative effects of different mood-regulation strategies

(e.g., mindfulness versus distraction) and how these are moderated by situational or personality factors (Keng, 2011). For MBIs, future studies should investigate how individual treatment components contribute to overall outcomes and compare the efficacy of different mindfulness teaching approaches (e.g., formal meditation versus informal exercises). While some neural changes have been observed, further research is needed to understand specific brain network changes associated with particular meditation practices (Brewer, 2011). A high priority is the development of a consensus model that integrates the current state-of-the-art evidence regarding the diverse factors contributing to the etiology of Binge Eating Disorder (BED) (Giel, 2022). This model must extend beyond individual vulnerabilities to explicitly acknowledge the significant influence of environmental factors on eating behavior and body weight regulation (Giel, 2022). The field requires more extensive research into the molecular genetics of BED, including the completion of genome-wide association studies (GWAS), which are currently in progress but not yet completed (Giel, 2022). Larger, well-characterized samples are needed to overcome limitations of small sample sizes and inconsistent replication in candidate gene studies (Giel, 2022). There is a need to clarify the optimal preventive and treatment strategies for conditions where obesity and BED overlap (Giel, 2022). This includes determining whether to simultaneously target weight loss and eating behavior, prioritize one, or adopt a "weight neutral" approach, and ensuring obesity prevention efforts do not inadvertently promote binge eating (Giel, 2022). Research needs to develop approaches for matching specific treatments to individual patient characteristics and establish evidence-based adaptations for Cognitive-Behavioral Therapy for Eating Disorders (CBT-ED) in individuals with neurodiversity (e.g., autistic spectrum disorders, ADHD)(Waller, 2024). More concrete evidence is

required for the effectiveness of interventions for Avoidant/Restrictive Food Intake Disorder (ARFID) and for improving overall outcomes in anorexia nervosa (Waller, 2024). The comparative effectiveness of CBT-ED in conjunction with or in contrast to Family-Based Treatment (FBT) and other approaches for children and young people also needs further determination (Waller, 2024). Future research must urgently diversify study samples beyond predominantly white, cisgender, heterosexual women in economically developed Western cultures (Huguenin, 2024). This includes individuals of various genders, ethnicities, sexual orientations, and gender identities to ensure generalizability (Huguenin, 2024). There is a clear need for regional diversity in intervention methodologies to account for specific cultural and social contexts, ensuring strategies are effective and sensitive to the needs of diverse populations globally (Huguenin, 2024). This includes gathering more prevalence data for BED from regions outside North America, Australia, and Europe (Giel, 2022). Specific focus is needed on applying interventions to male populations, children, and adolescents for obesity-related eating behaviors (O'Reilly, 2014). Additionally, targeted research in Black and Latino populations and sexual minorities is warranted, given potentially higher BED prevalence rates in these groups (Sonneville, 2018). A critical need exists for long-term follow-up measures in studies of mind-body practices and body image interventions to assess the enduring impact and sustainability of treatment outcomes (Keng, 2011). This will help clarify the maintenance effects of treatment. Future research should incorporate qualitative methods alongside quantitative data to provide a deeper, richer, and more holistic understanding of participants' subjective experiences, not only regarding body image and eating behaviors but also their experiences during the interventions themselves (Huguenin, 2024). This will capture the complexity and

subjectivity that purely quantitative methods may miss (Huguenin, 2024).

Standardizing outcome measures across studies for mind-body practices and eating disorders would allow for more reliable comparisons and meta-analyses (Kriakous, 2020). By addressing these research gaps, the field can move towards a more robust and comprehensive understanding of eating disorders, the precise mechanisms and efficacy of mind-body practices, and the development of more personalized, culturally sensitive, and effective interventions for diverse populations.

This study addresses critical research gaps in eating disorder literature by diversifying study samples beyond traditional demographic benchmarks, focusing on a racially and ethnically representative university population to ensure findings are more generalizable to underserved groups (Kauffman, 2021). By utilizing expectancy theory to examine how anxiety sensitivity drives maladaptive behaviors, we provide a framework for matching specific treatments to individual cognitive profiles, a primary need in personalized clinical care (Kauffman, 2021). Furthermore, our mixed-methods design combines quantitative standardized scales with qualitative focus groups, offering the deeper, richer understanding of subjective experiences required to capture the complexity of body image and stress-related eating (Huguenin, 2024). Finally, the implementation of a longitudinal follow-up assessment and home-practice logs allows for the evaluation of the enduring impact and sustainability of mindfulness and yoga interventions, directly addressing the ongoing need for maintenance data in mind-body practices (Huberty, 2019).

CH II: STUDY DESIGN

Research Questions

1. Can the mindfulness and mindful eating workshop intervention significantly reduce emotional eating in college students compared to baseline?
2. Does the workshop reduce perceived stress and increase mindfulness?
3. Will the mindfulness and mindful eating workshop intervention result in a significant reduction in perceived stress in college students compared to baseline?

Hypotheses

1. Participants will report lower emotional eating at 1 month vs baseline
2. Perceived stress will decrease and state mindfulness will increase from baseline to post-intervention and be maintained at the 1-month follow-up.
3. Increases in state mindfulness will partially mediate the effect of the intervention on emotional eating.

Research Design

The proposed study will employ a pre–post experimental design without a control group to examine changes in psychological and behavioral outcomes following a mindfulness and mindful eating intervention among college students. While this design allows for the assessment of within-person change over time, it is acknowledged that pre–post designs are vulnerable to expectancy effects, regression to the mean, and other time-related confounds. As such, causal inferences will be made cautiously. This methodology was selected due to feasibility constraints and the exploratory nature of the study, and it remains appropriate for detecting preliminary intervention-related changes and informing future controlled trials. Findings will be interpreted as evidence

of temporal associations between intervention participation and outcome changes, rather than definitive causal effects.

Sample size calculation.

Based on the previous study results by Lemay et al. (2019), a sample size of $N = 21$ is required for a power of 0.8, with $\alpha = .05$ (two-tail test).

Description of Subjects

The subjects for this study will be 20-30 college students. University students are a critical population for establishing healthy eating habits, but they are also at risk for poor eating habits due to factors like academic stress, economic conditions, and lack of nutritional information. Disordered eating habits and body dissatisfaction are prevalent among this demographic. Mindfulness-based interventions are increasingly utilized to address health concerns in this population, including issues related to body image and eating behaviors.

Recruitment: Participants will be recruited from a college campus, aiming to sample students broadly to enhance the generalizability of findings.

Eligibility Criteria: Participants should be current college students aged 18 years or older. It would be beneficial to screen for tendencies toward stress-eating or emotional eating, as mindfulness interventions have shown promise in these areas. Excluding individuals with existing formal mindfulness practice (e.g., practicing meditation or yoga for ≥ 15 minutes per day within the past 6 months) or severe clinical eating disorders could help ensure a consistent baseline and avoid confounding variables, as done in other studies.

Demographics: Demographic information such as age, gender, and academic program will be collected. It is important to note that many mindfulness intervention studies in college populations often report a higher percentage of female participants. Future research could strive for greater diversity in samples, including males and various ethnic backgrounds, to ensure broader generalizability.

Description of statistics

Intervention Protocol: Mindfulness and Mindful Eating Workshop

Table 2: Intervention Timeline, Topics and Activities

45 – Minute Intervention	Topic Covered	Activity
Lesson 1	Intro to Meditation	Guided Meditation, enjoy food afterwards
Lesson 2	Intro to Light Yin Yoga	Meditation
		Light Movement, enjoy food afterwards
Surveys	Pre and Post Surveys on Emotions	Participants submit via Email
Focus Group Interview	What do the participants think?	Discussion

Intervention Components

The core of the intervention will involve guided meditation. Mindfulness meditation aims to improve attentional and emotional self-regulation, leading to

positive psychological effects such as increased well-being and reduced emotional reactivity. Specific guided meditations may include body scan meditation and mindful sitting meditation meditation, components found in Mindfulness-Based Eating Awareness Training (MB-EAT) and MBSR programs.

The intervention will integrate light yin style movement yoga with guided meditation, a choice that aligns with existing research on the benefits of yoga and meditation for college students, including a "Yin Yoga and meditation intervention" explored by Lemay, Hoolahan, and Buchanan (2021). This inclusion is supported by evidence that yoga, as both a physical and mental activity, has been shown to improve mood and relieve stress in college students, and to positively influence body image in young adults through aspects like gratitude for one's body and enhanced self-confidence. While the specific emphasis of "Yin yoga" on longer holds and deeper stretches is not explicitly detailed in the provided sources, the broader principles of mindful yoga—which involves controlled breathing and physical postures—complement guided meditation by fostering present-moment awareness and body connection. This mindful awareness, defined as intentionally paying attention to the present moment without judgment, is a fundamental component of meditation practices designed to improve attentional and emotional self-regulation.

Introduction to Mindful Eating Behaviors

This section will introduce participants to key principles of mindful eating, which involves cultivating intentional awareness of the physical, mental, and emotional aspects of eating. This includes making deliberate food choices, recognizing interoceptive cues (physical hunger and satiety), distinguishing between physical and

psychological triggers for eating, and savoring food tastes and textures. Training may involve guided eating meditations and discussions on applying these practices, particularly for highly preferred foods like sweets, by drawing hedonic value from smaller amounts. This directly addresses the goal of improving eating behaviors and has shown to disrupt the tendency to overeat foods high in fat and sugar.

Take-Home Instructions

To support continued practice, participants will receive materials for home use, such as guided mindfulness practices (e.g., audio recordings or written instructions).

Encouraging daily meditation practice and mindful eating principles during meals and snacks is crucial for maximizing effectiveness, though adherence to home practice can vary. Participants could be provided with paper logbooks to record their engagement with these practices, similar to other studies.

The intervention is structured as a single-session, multimodal workshop combining guided contemplative practice with behavioral training elements:

3 different sections: meditation, yoga, mindful eating

1. Meditation, yoga, mindful eating introduction, and sampling after.
2. follow up work shop one week later implementing lessons from last weeks workshop.
3. follow up one month later.

Measurement and Outcomes

The core objective is to evaluate the immediate and short-term sustained effects of the combined intervention on primary psychological and behavioral outcomes in college

students. In alignment with recommendations to use brief, well-validated, and student-friendly scales, this study will pre-specify emotional eating as the primary outcome, while utilizing exploratory and mechanistic measures to track psychological shifts. The assessment will follow a streamlined schedule at baseline (T₀), immediately post-intervention (T₁), and at a one-month follow-up (T₂) to ensure low participant burden while supporting clear testing of endpoints.

Primary Outcome: Emotional Eating

The primary outcome will be assessed using the Dutch Eating Behavior Questionnaire – Emotional Eating subscale (DEBQ-E). This 13-item scale is a robust, well-validated instrument used to measure the tendency to eat in response to internal emotional states rather than physical hunger cues. In the context of university life, students often face unique stressors—such as academic pressure and financial strain—that lead to the expectancy that eating will manage negative affect or provide short-term relief from distress.

Exploratory Outcome: Binge Eating Severity

As this study involves a non-clinical sample of university students, the Binge Eating Scale (BES) will be included as an exploratory measure. The BES is a 16-item scale that reflects the severity of binge behavior and the feelings of loss of control associated with eating episodes. Given that many students may experience "loss of control eating" without meeting full clinical criteria for Binge Eating Disorder (BED), the BES serves as a sensitive indicator for subclinical pathology.

Mechanisms of Change: Mindfulness and Perceived Stress

To evaluate the proposed mechanisms through which the intervention operates, two primary scales will be used:

- **Mindfulness (FFMQ-15):** The **Five Facet Mindfulness Questionnaire (FFMQ)** is the preferred tool for assessing mindfulness skills, particularly the facets of **attention and acceptance**. These facets are central to helping students **break habitual maladaptive patterns** by fostering a non-judgmental, present-moment awareness of their internal triggers.

- **Perceived Stress (PSS-10):** The **10-item Perceived Stress Scale (PSS-10)** is a widely used and reliable tool for undergraduate samples. It measures the degree to which life situations are appraised as stressful, providing a baseline and post-intervention comparison for students managing high academic workloads.

Optional Outcome: Body Image

Given that the intervention includes **yoga**, the **Body Appreciation Scale-2 (BAS-2)** will be utilized as an optional measure. Yoga has been shown to improve **body schema** and promote **body appreciation** among college-aged women by shifting focus toward physical functionality and gratitude rather than appearance-based metrics.

Fidelity and Adherence Checks

To ensure intervention integrity, **manipulation checks** consisting of 3–4 Likert items will be administered at T1 and T2. These items will assess if participants:

1. Paid sustained attention during the workshop.
2. Practiced nonjudgmental awareness.

3. Utilized the hunger/fullness scale to distinguish between emotional arousal and physical hunger. Participants will also maintain a brief home-practice log during the one-month follow-up period to track adherence and frequency of mindfulness practice.

Measurements will be collected at three predefined time points using standardized instruments:

1. Baseline (Pre-Intervention): Measures are collected before randomization (Week 0).
2. Post-Intervention (Immediate Post-Test): Measures are collected immediately following the single workshop session (Week 0) to capture acute shifts in mood and behavioral intentions.
3. Follow-Up (Short-Term Maintenance): Measures are collected approximately one month later (Week 4 or equivalent) to determine the persistence and maintenance of effects resulting from the intervention and subsequent home practice.

Primary Outcomes (Targeting Distress and Maladaptive Behavior):

Perceived Stress: High stress is commonly reported issues in this population, and MBIs are significantly effective in their reduction.

Emotional Eating/Binge Eating: Targeted improvements in eating behaviors and attitudes, particularly emotional eating, are a central focus of mindfulness-based eating interventions.

Mindfulness: 5 facet mindfulness scale will be used, Lemay

Data Collection:

The study will involve three assessment points:

All participants will provide informed consent prior to participation, outlining the study's purpose, procedures, potential risks, and benefits. Risks include transient emotional discomfort related to food or body-focused attention and mild musculoskeletal strain. Participants may opt out of any activity. A licensed clinician will be on call during the session window (me if the time works out:)). Adverse events will be documented and reported to the IRB. All participants receive a referral sheet listing campus counseling, student health, crisis resources, and community ED specialists.

1. Baseline (Pre-intervention): Participants will complete a survey to establish baseline measurements of their eating behaviors, mindfulness levels, and potentially related psychological states such as stress and anxiety.

2. Immediate Post-Intervention: Immediately following the conclusion of the intervention workshop, participants will complete the same survey to assess any immediate changes in eating behaviors and other relevant outcomes.

3. One-Month Follow-up: Participants will complete the survey again one month after the intervention to evaluate the sustained impact of the workshop on their eating behaviors.

The intervention will be a meditation workshop led by the principle investigator, designed for 20-30 college student participants, mirroring the group-based intervention format used in Lemay et al.'s study.

While Lemay et al. conducted a six-week pilot program with once-weekly 60-minute sessions, the current study can adapt this. Mindfulness-based stress reduction

(MBSR) programs typically span 8-10 weeks with 2-2.5 hour weekly sessions, often including an all-day retreat. Other interventions for college students have ranged from brief (e.g., a few weeks or single sessions) to semester-long courses. Given the specified duration for Lemay's study, a single workshop session of appropriate length, potentially 1 hour, could be designed.

Intervention Components

The core of the intervention will involve guided meditation. Mindfulness meditation aims to improve attentional and emotional self-regulation, leading to positive psychological effects such as increased well-being and reduced emotional reactivity. Specific guided meditations may include body scan meditation, mindful sitting meditation, and loving-kindness meditation, components found in Mindfulness-Based Eating Awareness Training (MB-EAT) and MBSR programs.

The intervention will integrate light yin style movement yoga with guided meditation, a choice that aligns with existing research on the benefits of yoga and meditation for college students, including a "Yin Yoga and meditation intervention" explored by Lemay, Hoolahan, and Buchanan (2021). This inclusion is supported by evidence that yoga, as both a physical and mental activity, has been shown to improve mood and relieve stress in college students, and to positively influence body image in young adults through aspects like gratitude for one's body and enhanced self-confidence. While the specific emphasis of "Yin yoga" on longer holds and deeper stretches is not explicitly detailed in the provided sources, the broader principles of

mindful yoga—which involves controlled breathing and physical postures—complement guided meditation by fostering present-moment awareness and body connection. This mindful awareness, defined as intentionally paying attention to the present moment without judgment, is a fundamental component of meditation practices designed to improve attentional and emotional self-regulation.

Introduction to Mindful Eating Behaviors: This section will introduce participants to key principles of mindful eating, which involves cultivating intentional awareness of the physical, mental, and emotional aspects of eating. This includes making deliberate food choices, recognizing interoceptive cues (physical hunger and satiety), distinguishing between physical and psychological triggers for eating, and savoring food tastes and textures. Training may involve guided eating meditations and discussions on applying these practices, particularly for highly preferred foods like sweets, by drawing hedonic value from smaller amounts. This directly addresses the goal of improving eating behaviors and has shown to disrupt the tendency to overeat foods high in fat and sugar.

Take-Home Instructions about Mindfulness with Eating: To support continued practice, participants will receive materials for home use, such as guided mindfulness practices (e.g., audio recordings or written instructions). Encouraging daily meditation practice and mindful eating principles during meals and snacks is crucial for maximizing effectiveness, though adherence to home practice can vary. Participants could be provided with paper logbooks to record their engagement with these practices, similar to other studies.

Data Collection

After IRB approval is received [IRB Protocol number: IRB 2025-106], consent and assent forms will be distributed to the students. They will then be collected on the day of the first educational workshop. After the two lessons, the principal investigator will conduct a focus group interview with those who participated in the two lessons. The focus groups will be thirty minutes long and audio-recorded. They will be informed that the interview was recorded and stored for later use. Participants will also be informed that to protect their identity, they would need to provide a pseudonym, alternative name to go by during the interview. Any identifiable data will be removed from the transcripts to keep the participant information strictly confidential later in data analysis. Each participant will be provided with a consent form and told that they may withdraw from the study at any point.

One interview guide was developed for this study (see Table 1). The interview guide laid out what was to be addressed in the interview and the order of how the questions were asked. The interview protocol consists of 16 open-ended questions and probing questions. Additional probing questions will be asked at the discretion of the interviewer to facilitate a deeper conversation. Participants will be given a three-question survey to gather demographic information including their gender, age, and race/ethnicity at the beginning of the focus group. The survey will be collected at the end of the focus group discussion. See Table 2 below for intervention and data collection timeline and details.

Table 1: Interview Guide

- | |
|--|
| <ol style="list-style-type: none">1. Tell me how you became curious about meditation?<ol style="list-style-type: none">a. What motivates you to bring more awareness into your life? |
|--|

b. On a scale of 1-10 how comfortable do you feel with meditation?
c. What value in meditation are you hoping to gain?
2. What do you struggle with when it comes to eating behaviors, if any?
3. What motivates you to be healthy?
4. What does “Health” look like to you?
a. When you consider a healthy lifestyle, what does that mean to you?
5. How would you describe your current diet?
6. What are some things you don’t like about your current diet?
7. What is something you feel is lacking in your eating habits, if anything?
8. If you were to receive nutrition education, what would that look like?

9. What were your favorite parts of the lessons?
10. What are any ways these educations might help you in the future?
11. What effect does learning about Mindful Eating have on your relationship to food or how you think about food, if at all?
12. What do you want your eating patterns to look like or how you eat throughout the day?
13. What do you think of now when you think of mindful eating?
14. What effect does learning about Mindful Eating have on your relationship to food or how you think about food, if at all?
15. What connections do you make between nutrition and health? What comes to mind?
16. What are any other thoughts you have? Is there anything else you would like to add or share about this topic that you feel is important for me to know?

Table 2: Intervention and Data Collection Timeline

Phase	Timepoint	Activity / Intervention	Measures & Data Collection Tools	Details
Baseline	To (Week 0)	Screening & Enrollment	Quantitative: DEBQ-E (Primary), PSS-10, FFMQ-15, Preliminary Demographics	Establishes baseline levels of emotional eating, perceived stress, and mindfulness facets (Zieff, 2024)
Intervention	Weeks 1–4	Mindfulness & Yoga Workshop(s)	Fidelity: In-session manipulation checks	Workshop focuses on attentional control and

				nonjudgmental awareness.
Post-Intervention	T1 (End of Workshop)	Qualitative Focus Group	Qualitative: 16-item Interview Guide (Table 1) Quantitative: DEBQ-E, PSS-10, FFMQ-15, Manipulation Checks, 3-item Demographic Survey	Focus group uses open-ended and probing questions to explore subjective student experiences. The 3-item survey is distributed at the start and collected at the end of the group.
Maintenance	Weeks 5–8	Independent Home Practice	Adherence: Home-practice Log	Participants track the frequency and duration of mindfulness and yoga practice (Zieff, 2024)
Follow-Up	T2 (1-Month Post)	Final Assessment	Quantitative: DEBQ-E (Primary Endpoint), PSS-10, FFMQ-15, Adherence items	Evaluates the enduring impact and sustainability of the intervention on eating behaviors and mental well-being (Zieff, 2024).

Data Analysis

Focus group data will be analyzed based on the principles of thematic analysis (Braun & Clarke, 2006). Before the data will be analyzed, the audio focus group interview will be automatically transcribed with Otter.ai then analyzed by the

researcher. The audio file will be protected by a password on the personal device where the file will be saved, which will only be accessible to the researcher. The device will be secured in places which only they have access to.

Following the transcription process, the interview will be coded. Coding is the pivotal link between collecting data and developing an emergent theory to explain these data. The PI and co-PI will independently code the transcript to enhance validity and reliability. First, participants' responses undergo initial coding to generate as many ideas as possible. Next, focused coding is done where the researchers pursue a selected set of central codes throughout the dataset and categorize them into themes and/or subdomains. This focused coding involves the identification of the initial codes that were most prevalent or important, and which contribute most to the analysis. The principal investigator will independently analyze and code the transcripts to ensure accuracy and rigor.

After the focused coding phase, the PI and co-PI will meet to resolve any discrepancies and reach a consensus on the final thematic map, ensuring the qualitative findings are a reliable representation of the students' experiences. This qualitative approach is essential as it allows for a deeper and richer understanding of the complex and subjective psychosocial dynamics involved in university students' body image and eating behaviors, which numerical data alone may fail to capture. The emerging themes will be utilized to explore how participants perceive the intersection of academic stress, emotional triggers, and the effectiveness of the mindfulness and yoga intervention. Ultimately, these qualitative insights will be integrated with the quantitative results from the DEBQ-E, FFMQ-15, and PSS-10 to provide a holistic and comprehensive

assessment of the intervention's impact on maladaptive eating expectancies and overall student well-being.

RESEARCH TIMELINE

The research timeline follows a longitudinal design consisting of three primary data collection points: baseline (T₀), immediate post-intervention (T₁), and a one-month follow-up (T₂).

This structure is intended to minimize participant burden while providing a clear assessment of both immediate and sustained effects.

Phase 1: Baseline Assessment (T₀)

Before the intervention begins, participants will complete an initial survey to establish baseline benchmarks. This includes demographic information and screening to ensure eligibility. The primary quantitative measures administered at this stage include the DEBQ–Emotional Eating subscale to assess eating expectancies, the PSS-10 to measure perceived stress levels, and the FFMQ-15 to evaluate core mindfulness facets such as attention and acceptance.

Phase 2: Immediate Post-Intervention (T₁)

Following the completion of the mindfulness and yoga workshop, participants will immediately undergo a post-test (T₁). This assessment captures the immediate psychological shifts resulting from the intervention. In addition to repeating the primary outcome scales (DEBQ-E, PSS-10, and FFMQ-15), this survey includes manipulation

and fidelity checks—such as Likert items regarding nonjudgmental awareness and the use of hunger/fullness scales—to ensure the intervention was practiced as intended. For this study's mixed-methods component, the qualitative focus group will also take place at this time to capture the students' subjective experiences while they are fresh.

Phase 3: Maintenance and Independent Practice

Following the workshop, participants enter a maintenance period lasting one month. During this time, they are encouraged to engage in independent home practice of the mindfulness and yoga techniques learned. To track adherence, participants will maintain a brief home-practice log to record the frequency and duration of their exercises.

Phase 4: One-Month Follow-Up Survey (T2)

The final stage of the research timeline is the follow-up assessment (T2), conducted one month after the intervention concluded. This survey serves as the primary endpoint for the study, allowing researchers to evaluate the long-term sustainability and enduring impact of the mindfulness intervention on emotional eating and stress. This follow-up addresses a critical gap in current mind-body literature by providing data on maintenance effects over time.

LIMITATIONS

While this study is designed to provide robust insights into the impact of a mindfulness and yoga intervention on emotional eating among university students, several limitations must be acknowledged.

Sample and Selection Bias

A primary limitation is the potential for selection bias, as participants are recruited via convenience sampling and typically volunteer for the study, often in exchange for incentives such as extra credit (Kauffman, 2021). This self-selected sample may consist of students who are more motivated to change their behaviors or who are already predisposed to conceptualizing mindfulness as a valid form of self-care, which can lead to inflated effect sizes compared to the general student population (Kriakous, 2021). Furthermore, while efforts will be made to recruit a diverse sample, university-based studies frequently see an overrepresentation of female, white, and cisgender participants, which may limit the generalizability of the findings to male students, gender minorities, and diverse ethnic or racial groups (Kauffman, 2021).

Measurement and Self-Report Bias

This study relies heavily on self-report measures (DEBQ-E, FFMQ-15, PSS-10), which are susceptible to social desirability bias and response bias, where students may respond in a way they believe is favorable to the researchers (Mason, 2016). Additionally, there is the risk of shared method variance, as both the predictor and outcome variables are assessed through similar self-report formats (Kauffman, 2021). Furthermore, research suggests that mindfulness scales may be interpreted differently by individuals after they

have received mindfulness training, potentially confounding post-intervention results (Mason, 2016).

Intervention and Design Constraints

Because the intervention is a multi-component program involving both mindfulness meditation and yoga, it is difficult to isolate the "active ingredients" or determine which specific practice (attention training, nonjudgmental awareness, or physical postures) contributed most significantly to the changes in emotional eating (Keng 2011).

Additionally, while the inclusion of a one-month follow-up (T2) is a strength, it remains a relatively short window for assessing long-term sustainability compared to longer clinical studies that follow participants for six to twelve months (Hungenin,, 2024).

Sample Size and Statistical Power

As a pilot study, the sample size may be insufficiently powered to detect small but significant effects in secondary or exploratory outcomes, such as changes in binge eating severity or body appreciation (Huberty, 2019). This limitation requires that findings be interpreted with caution and primarily used as a foundation for future, larger-scale randomized controlled trials (Huguenin, 2024).

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[Women's Experiences with a Mindful Eating Program for Binge and Emotional Eating: A Qualitative Investigation into the Process of Change](#)

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