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The Impacts of Learning 2 Breathe on Rumination

A Dissertation Presented to the Faculty of the Department of Psychology

West Chester University

West Chester, Pennsylvania

In Partial Fulfillment of the Requirements for the

Degree of

Doctor of Psychology in Clinical Psychology

By

Adessa R. Flack

April, 2022

Abstract

The present study examined the impact of Learning2Breathe (L2B), a mindfulness-based stress reduction program developed for use with adolescents on rumination. The program was applied to rumination in college-age men and women. Our experiment utilized a quasi-experimental design. The sample consisted of 50 undergraduate students that were placed in either the experimental or control group. Data was collected pretest and posttest through a variety of measures including the Rumination Reflection Questionnaire (RRQ) which consisted of a rumination and reflection subscale, and the Mindfulness Attention Awareness Scale (MAAS). A two-way mixed ANOVA design was used to analyze data. There was no statistically significant interaction on the Reflection subscale of the RRQ or on the Rumination subscale of the RRQ. We also failed to find a statistically significant interaction on the MAAS. Possible limitations to this study include lack of robust data due to restrictions imposed by COVID-19, lack of randomized selection, and two outliers included in the analyses: one in the MAAS experimental group, and one in the MAAS control group.

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Introduction

As of 2016, the Bureau of Labor Statistics reported that 69.7 percent of students who graduated high school in 2016 were enrolled in college; 71.9 percent of young women who graduated high school enrolled in college, and 67.4 percent of young men who graduated high school enrolled in college (66.2 percent of high school graduates enrolled in college in 2019). Although many students find this an exciting time of life, researchers have noted significant psychological distress as they make the transition. In comparison to other years, freshmen endorse higher levels of ongoing and chronic stress suggesting that the adjustment to college poses unique challenges (Dvořáková, Kishida, Elavsky, Broderick, Agrusti & Greenberg, 2017).

Adjustment is defined as a situational state which results from the interaction between the student's individual characteristics, the quality of support by teachers and peers, and transitions including changes in networks of friends (Larose, Duchesne, Litalien, Denault, Boivin, 2018). Previous longitudinal studies of situational adjustment during the college transition have demonstrated conflicting results. Fromme et al. (2008) found that adjustment declines between senior year in high school and the first year of college. In contrast, Hechanova-Alampay et al. (2002) found improved situational adjustment over the same period. It is important to note that these studies often differ in the type of adjustment being evaluated (emotional vs. academic adjustment), the geographical region of the high school (rural vs. urban), and a host of other factors including coping strategies, sex, self-esteem, and residential status (Fromme et al., 2008). More recent literature, such as Fennie and colleagues (2020) suggested that students found the transition to higher education both challenging and intimidating, resulting in psychological distress. In an international survey of 14,000 students across 19 universities in 8 different countries, 35% of students met diagnostic criteria for at least one mental health condition

(Sheldon et al., 2021). Furthermore, university students report higher levels of depression than the 12.9% prevalence rate reported in the general population (Sheldon et al., 2021). As one can see, mental health is a particular concern for college students.

Besser and Zeigler-Hill (2012) note that first year university students face multiple stressors, including new academic demands, having to adapt to a new environment and modes of instruction, receiving less individual support from instructors, competition for grades, greater time management constraints. First year university students also deal with social and coping stressors, such as fitting into new social circles, and needing to engage in self-regulation to develop both academic and social skills. This extra stress has been linked to changes in feelings of self-worth and psychological distress which is proportionately higher in first year students as compared to the general population (Besser and Zeigler-Hill, 2012). In sum, although the transition to college is an exciting time of life for many students, researchers have noted that a significant number of them experience psychological distress as they make the transition.

Psychological distress experienced by young adults transitioning to college represents an immense health concern, and can impact social, academic, and personal development. Research suggests that more than 50% of university students report symptoms of depression shortly after beginning their studies (Furr, Westefeld, McConnel & Jenkins, 2001). Recent research has linked stress and ruminative response style; therefore, rumination may be a mediating factor between psychological distress and stress (Nolen-Hoeksema & Morrow, 1991). Ruminative response style has been described as a series of thoughts and behaviors in which an individual is focused on his or her emotions while being unable to engage in distracting activities that may alleviate the symptoms (Nolen-Hoeksema & Morrow, 1991). Individuals who ruminate in response to a stressor tend to maintain a depressive behavior, therefore rumination can lead to a

variety of negative psychological and physical health problems such as anxiety, headaches, muscle tension, and digestive issues (Nolen-Hoeksema & Morrow, 1991). Since rumination may be an issue for young adults transitioning to college, it is important to study ways to decrease rumination to improve overall adjustment and outcomes.

What is rumination?

Rumination involves repetitively and passively focusing on symptoms of distress and on the possible causes and consequences of these symptoms (Johnson & Whisman, 2013) as well as the tendency to engage in perseverative non-constructive thought and negative self-reflection on past and present problems and feelings (Nolen-Hoeksema & Morrow, 1991). Ruminative thoughts vary in content depending on the individual and situation. Individuals who experience depression, for example, may repetitively cycle through thoughts relating to an external event, such as the demise of a romantic relationship or a loss of a job. Some examples of ruminative thoughts that may be experienced by an individual who recently underwent a romantic breakup may include “It’s all my fault. I’m all alone. I’ll always be alone. I’ll never find love again.”

It is imperative to differentiate rumination from similar concepts, such as obsessive thinking. Obsessive thinking is the phenomenon of unwanted, anxiety-provoking thoughts that repetitively intrude on consciousness (Harrington & Blankenship, 2002). Rumination is also different from the concept of obsessions, which is defined as persistent ideas, thoughts, impulses, or images that are experienced as intrusive and inappropriate, and that cause marked anxiety or distress (Harrington & Blankenship, 2002). Rumination can also cause negative thoughts; however, this is because of the ruminative response style which is a series of thoughts and behaviors in which the individual is focusing on his or her emotions and unable to focus on distracting activities that may alleviate symptoms (Nolen-Hoeksema, 1991). The concept of rumination also differs from worry. Harrington and Blankenship (2002) propose a continuum to differentiate concepts, with worry being on the mild end, obsessive thinking on the severe end, and rumination falling somewhere in the middle.

Treynor et al. (2003) identified two new factors of rumination to explore in research: Brooding and Reflection. Brooding involves dwelling on difficulties with a specific focus on negative content, patterns that result in overgeneralization of thoughts, impairment of problem-solving abilities, and exacerbation of depressive symptoms (Treynor et al., 2003; Watkins, 2004). Nolen-Hoeksema (2000) suggest that brooding may be an embodiment of maladaptive rumination and is, in fact, a risk factor for mental and cognitive difficulties due to the perseverative, judgmental focus on the past. Longitudinal studies have shown that brooding is correlated with reduced effectiveness of psychotherapy and medication, and the presence of brooding predicts the onset and maintenance of mental health disorders, such as anxiety and depression (Nolen-Hoeksema et al., 2008).

Reflection, on the other hand, involves addressing and coping with problems in a non-judgmental way, which may result in improved problem-solving abilities and reduced negative mental health symptoms (Treynor et al., 2003). Although reflection has been traditionally viewed as a positive process, recent research has linked reflection to suicidal ideation in a community sample (Miranda and Nolen-Hoeksema, 2007). Since ruminative response towards situations and stressors maintains depressive behaviors, this may shed light on the diathesis-stress pathway to explain the relationship between rumination and distress (Morrison & O'Conner, 2005). Nolen-Hoesema and Morrow (1991), for example, found that rumination predicted depression over a 9-week period in a student population.

Both brooding and reflection are components of rumination or characteristics that often coincide with rumination. In research conducted by Hoff and Muehlenkamp (2009) looking at non-suicidal self-injurious behaviors, it was found that undergraduate students who self-injured scored significantly higher on a brooding and ruminative reflection measure. This seems to

suggest that ruminative reflection and brooding may increase the vulnerability for self-injurious behaviors by amplifying depressed mood and acting as a maladaptive coping skill (Hoff & Muehlenkamp, 2009). Hoff and Muehlenkamp (2009) discuss how one ruminates may be more pertinent than what exactly one ruminates about. Regardless, although beyond the scope of this paper, brooding and reflection are two focal areas in the rumination literature that need to be further studied to understand the complex relationship between the two characteristics and their impact on rumination.

Rumination has been linked to many negative outcomes, including impaired cognitive processing. Wisco & Nolen-Hoeksema (2008) conducted a study with dysphoric adults who were instructed to ruminate during a series of tasks. It was found that those who were told to ruminate displayed inhibition impairments on the Stroop task (Philippot & Brutoux, 2008) as well as poorer short-term problem-solving and impaired concentration (Lyubomirsky, Kasri, & Zehm, 2003). It is important to note that poorer short-term problem-solving and impaired concentration did not appear in non-dysphoric participants or when dysphoric participants were instructed to engage in distraction techniques instead of ruminative thoughts (Wisco & Nolen-Hoeksema, 2008). Further, Connolly et al., (2013) found that rumination has also been linked to difficulties in attentional switching and mental flexibility.

One theory as to why rumination has detrimental effects on executive functions is that certain processes, such as attentional switching and inhibition, are particularly cognitively demanding and thus cannot be performed effectively if rumination is occurring simultaneously (Connolly et al., 2013). This theory, also known as resource allocation theory, helps explain why individuals who ruminate tend to have difficulties with attention and focus; that is, negative thoughts such as those encompassed by rumination deplete cognitive abilities that would

otherwise be allocated towards task-relevant processes (Connolly et al., 2013; Gotlib & Joormann, 2010).

Connolly and colleagues (2013) conducted a meta-analysis evaluating rumination studies with adolescent participants. Although research is limited, several prospective studies have linked rumination and depression in adolescence to lower levels of effortful control, which they defined as an aspect of temperament encompassing overall self-regulatory and attention abilities (Connolly et al., 2013). Hilt, Armstrong, & Essex (2012) note that lower levels of effortful control may predict greater rumination and that higher effortful control may serve as a protective factor against negative mood and depressive symptoms, although Connolly et al., (2013) found null results in their meta-analysis. Interestingly, findings in studies of effortful control in adolescence suggest that the direction of the relationship between cognitive abilities and rumination may be opposite of the above proposed allocation hypothesis, therefore a need for additional longitudinal studies has been identified (Connolly et al., 2013).

In addition to impairment to cognitive processes, rumination prone individuals tend to host a variety of other interpersonal problems, including lower self-esteem, reduced ego-identity development, heightened identity-related distress, and increased suicidal ideation (Poon & Wong, 2018). Poon and Wong (2018) highlight how rumination can be both a personality trait and can also be influenced by situational factors. Those who have ruminative personality-types tend to have a slew of negative outcomes in many aspects of their lives (Poon & Wong, 2018).

Rumination is known to exacerbate negative thinking styles and negative mood, impaired coping, judgement, and problem-solving, and lead to more negative perseverative thoughts about the past, present, and future (Nolen-Hoeksema et al., 2008). Rumination is also positively correlated with anxiety, pessimism, depression, worry, anger, shame, aggression, and difficulty

forgiving (Cimsir, 2019). Research has shown that those who engage in rumination during times of stress and bereavement have higher reported levels of depressive scores (Nolen-Hoeksema & Morrow, 1991) in addition to poorer sleep quality (Guastella & Moulds, 2007) and overall health outcomes (Sansone & Sansone, 2012). Lyubomirsky, Layous, Chancellor, & Nelson (2015) also note that rumination is linked to substance abuse and eating disorders in addition to mood disorders.

Having a ruminative response style is a risk factor for bulimic symptoms including overeating and purging through vomiting or the use of laxatives (Lyubomirsky, Layous, Chancellor, & Nelson, 2015). Nolen-Hoeksema et al., (2007) report that evidence exists for emotional cascades in which rumination enhances the negative affect, which underlies the drive to binge eat in some individuals.

Furthermore, Nolen-Hoeksema (2005) suggested that individuals may turn to substance use to mitigate the negative moods brought about by overthinking. Additional risk factors include those with a biological predisposition to find substance use rewarding, and those who have been modeled this behavior. Nolen-Hoeksema and Harrell (2002) also note that in the presence of moderators, such as environmental stressors, rumination is associated with more alcohol and drug use. This is particularly important to note as college students are at increased risk of developing a substance use disorder or an eating disorder (Sheldon et al., 2021).

In addition, a study of college students showed that rumination mediated the relationships between loneliness and depressed mood and between loneliness and sleep quality (Zawadzki et al., 2013). There are several other studies, on the other hand, that suggest rumination is an independent predictor of sleep quality, despite controlling for other aspects of negative mood including anxiety, anger, and depression (Nolen-Hoeksema et al., 2008).

In a study by Slavish & Graham-Engeland (2015) which utilized a sample of 368 healthy college students, 29% of participants' scores on the Center for Epidemiological Studies-Depression Scale were indicative of clinical depression, and 87% of participants' scores on the total Pittsburgh Sleep Quality Index indicated poor overall sleep quality. This suggests that even in a population of healthy college students, several individuals appeared to suffer from depressed mood, and a large number suffered from impaired sleep. This phenomenon may be explained by the perseverative cognition hypothesis (Brosschot et al., 2006) in which rumination extends the reach of psychological stress to health and appears to be one of the underlying mechanisms by which depressed mood can sustain the physiological activation that impairs sleep quality.

Interestingly, there have been several studies to suggest gender differences in rumination. Johnson & Whisman (2013) conducted a large meta-analysis of research regarding gender differences and rumination. Their literature review on gender differences and rumination looked at 57 different studies and 59 separate samples (Johnson & Whisman, 2013). They found that most studies used the Repetitive Thought Questionnaire (RTQ; McEvoy, Mahoney & Moulds, 2010) or the Rumination subscale of the Rumination-Reflection Scale (RRQ; Trapnell & Campbell, 1999) to collect data (Johnson & Whisman, 2013). Results of the meta-analysis for rumination indicated a small but significant effect size across studies, indicating that women ruminate more than men (Johnson & Whisman, 2013).

Although the exact cause of the observed gender differences in rumination is unknown, it has been suggested that girls may begin ruminating more than boys in early adolescence (i.e. 13-15), and this may be due to an interaction of biological pubescent factors coupled with an increase in stressful life events and more passive coping approaches (Nolen-Hoeksema, 1994). Mezulis, Abramson & Hyde. (2002) also reports that women have a higher risk of rumination,

specifically in interpersonal relationships, body image, and achievement. Nolen-Hoeksema's (1991) response-style theory, which suggests that women show a greater frequency, longer duration, and greater recurrence of depressed mood is due to rumination. Nolen-Hoeksema (1991) suggests that women may have more self-focused ruminations than men when depressed. In the literature, a Turkish study evaluated psychological symptoms and rumination with the mediating role of gender in a group of 866 adolescents ages 14-24 (Baker & Bugay, 2011). The results of this study showed that ruminative tendency did differ between boys and girls; girls ruminated more than boys, however, no significant differences were found when factoring in age (Baker & Bugay, 2011).

Beyond gender differences, it remains to be decided what causes rumination. Michl, McLaughlin, Shepherd, & Nolen-Hoeksema (2013) propose that one may increase in the engagement of rumination due to events of stress, or social and environmental circumstances which require psychological and physiological adaptation over time by the organism (Monroe, 2008). Monroe (2008) suggests that the stress process involves a dynamic interaction between the individual and the environment over time in response to external challenges, one's perceptions of said challenges, and the coping resources utilized following social and environmental challenges. Michl and colleagues (2013) explore several models that may explain the complex relationship between stress and rumination, notably the control theories (Carver & Scheier, 1981; Martin & Tesser, 1996). The control theories postulate that negative events create discrepancies between goals and the individual's current state, and this leads to rumination focused on how to reduce the discrepancies (Carver & Scheier, 1981). If rumination leads to the resolution of the discrepancy, the rumination process will cease, however, if a resolution is not reached, rumination will persist (Carver & Scheier, 1981). When applying this model to chronic

stressors or uncontrollable stressors, rumination may increase as resolution will not be achieved (Carver & Sheier, 1981).

Michl and colleagues (2013) conducted a study evaluating the role of self-reported stressful life events and the relationship to rumination and depression, as well as variations in rumination and depressive symptoms based on gender. The sample utilized 1,567 adolescents ($n = 545$ boys, $n = 520$ girls) from grades 6-8, who were given the Life Events Scale for Children (Coddington, 1972), the Children's Response Styles Questionnaire (CRSQ; Abela, Brozina & Haigh, 2002), the Children's Depression Inventory (CDI; Kovacs, 1992), the Multidimensional Anxiety Scale for Children (MASC; March, Parker, Sullivan, Stallings, & Conners, 1997) and in-person interviews at baseline and one year later. Results showed that self-reported exposure to stressful life events was marginally associated with depressive symptoms and anxiety symptoms. Additionally, self-reported exposure to stressful life events was associated with rumination (Michl and colleagues, 2013). Interestingly, no gender differences were observed in the mediating role of rumination in the association between self-reported stressful life events and depressive symptoms (Michl and colleagues, 2013).

In addition to the control theory, an explanation for these findings is that stress may induce rumination by decreasing one's self-regulation, or the capacity to engage in self-control over one's behavior (Michl, McLaughlin, Shepherd, & Nolen-Hoeksema, 2013). With limited self-regulation capacities, impairment in individual ability to problem-solve or engage in active coping only increases the likelihood of engagement in rumination. Furthermore, stressful life events may increase attention to negative thoughts and feelings, which in turn will heighten memory for previous negative events, lead to negative expectations of the future, and activate existing negative self-schemas (Scher et al., 2005).

Another possibility is that exposure to interpersonal stressors, such as social rejection, activates brain regions which are centrally involved in self-reflection and emotion regulation, including regions involved in emotional awareness (Eisenberg, Liberman & Williams, 2003). Interpersonal stressors may also direct attention towards salient environmental cues and monitoring conflict, which heightens attention to social and environmental changes associated with a negative life event, goal discrepancies associated with the changes, and attention to one's emotional state (Michl and colleagues, 2013).

Impacts of rumination in college students

College students face a complex array of psychosocial stressors. Although the aims of college are to enhance young adults' intellectual abilities while preparing them for successful adulthood, there are disproportionately large numbers of mental health concerns, sleep issues, and excessive drinking which emerge during the transition from high school to college (Dvořáková, Kishida, Elavsky, Broderick, Agrusti & Greenberg, 2017). According to the Center for Collegiate Mental Health, stress and anxiety are among the top reasons college students seek out mental health services (Dark-Freudman, Jones & Terry, 2019). Freshmen report higher levels of ongoing chronic stress, which is linked to poor coping strategies, unhealthy relationships, and deteriorating academic performance (Dvořáková et al., 2017). Developmentally, young adults, including college students, whose emotion regulation skills are not as well developed as older adults, may be at particular risk for negative health outcomes caused by rumination (Slavish & Graham-Engeland, 2015).

Connolly et al. (2013) highlight the importance of the adolescent and young adult developmental period, specifically within the context of the maturation of the prefrontal cortex and executive functioning abilities. Executive functioning domains have been found to have unique developmental trajectories, yet the few studies that exist utilizing an adolescent and young adult demographic demonstrate that development occurs rapidly in some domains during this critical developmental period (Connolly et al., 2013).

As previously mentioned, there are many negative effects of rumination. The most notable is that rumination is highly linked to depressive symptoms, as it enhances the effects of depressed mood on thinking, impairs effective problem solving, interferes with instrumental

behavior and causes avoidance of the use of social support (Nolen-Hoeksema, Wisco & Lyubomirsky, 2008). Further, individuals who engage in rumination over time tend to have more severe symptoms that frequently evolve into episodes of major depression (Nolen-Hoeksema, Wisco & Lyubomirsky, 2008). Lastly, rumination can prolong current depressive episodes (Nolen-Hoeksema, Wisco & Lyubomirsky, 2008). Rumination is deeply related to depression, and research also demonstrates a relationship between rumination and anxiety as well.

In a study evaluating the relationship between rumination, social networking site use, and the relatively new concept of “fear of missing out” among college students, it was found that rumination was linked to problematic use of other technologies including smartphones, with rumination being the mediator between anxiety and depression (Dempsey, O’ Brien, Tihamiyu & Elhai, 2019). Specifically, rumination was linked to problematic Facebook use, with the proposed theory behind this relationship being college student’s rumination about relationships offline drives excessive social networking use to relieve the rumination and improve mood (Demsey, O’Brien, Tihamiyu & Elhai, 2019). It is important to note that rumination and depression are also linked to suicidal ideation.

Rumination can induce automatic cognitive processes, such as anxious self-preoccupation, which includes cognition of self-doubt (Smith, Ingram, & Brehm, 1983). Individuals who tend to be highly self-focused reportedly respond to problems with rumination and fail to directly cope with difficult situations, which can result in anxiety. Interestingly, the relationship between anxiety and rumination is bi-directional, as anxiety can also increase the function of ruminative cognition. Sarason (1975) found that anxiety can increase ruminative cognition during performance of anxiety-provoking tasks.

As one can see, rumination causes a variety of problems in many aspects of one's life. With the negative impacts on mental health and overall health outcomes, it is critical to evaluate methods of intervention that may lessen the damaging extent of rumination. Since rumination can cause difficulty in shifting away from negative information, mindfulness, which focuses on letting go of maladaptive repetitive thoughts while simultaneously emphasizing the present moment and acceptance, may be a helpful mechanism to decrease rumination (Conley, Faleer, Raza, Bailey & Wu, 2018).

What is mindfulness?

Mindfulness is described as the practice of bringing attention and awareness to one's momentary experience with a sense of acceptance and non-judgement (Bluth & Eisenlohr-Moul, 2017). Mindfulness is a Buddhist-derived concept and practice that involves an undistracted awareness of the here and now (Hollis-Walker & Colosimo, 2011). In the Buddhist tradition, the term "mindfulness" is often associated with specifically developed methods of meditation as well as qualities of recollection, care, and circumspection (Shapiro, Oman, Thoresen, Plante, & Flinders, 2008). With the rise of contemporary Western psychology, mindfulness is typically defined as awareness built through intentionally attending to one's moment-to-moment experience in a nonjudgmental and accepting manner (Kabat-Zinn, 2003). It can be conceptualized simply as a practice of accepting a non-judgmental attitude to present moment thoughts and feelings, paving the way for intrapersonal and interpersonal awareness (Dvořáková et al., 2017).

With the rise in popularity of mindfulness in Western psychology, several prominent mindfulness-based programs have demonstrated positive outcomes. One well-documented program includes Mindfulness-Based Stress Reduction (MBSR), which is a widely known program based explicitly on cultivating mindfulness (Shapiro, Oman, Thoresen, Plante & Flinders, 2008). Evidence has shown that MBSR is effective in reducing distress while improving overall well-being in individuals with a variety of medical and psychiatric conditions in both clinical settings and randomized controlled studies in healthy adult populations (Bishop, 2002). Furthermore, a study by Conley, Faleer, Raza & Wu, (2018) demonstrated that even a single mindfulness session can significantly decrease reported distress in undergraduate participants.

In college populations, mindfulness interventions have demonstrated a wide array of benefits. Some of these benefits include stress reduction, greater emotional wellbeing, improved interpersonal relationships, and improved health-related behaviors, including the promotion of better sleep (Dvořáková et al., 2017). Upon reviewing the literature surrounding the implementation of mindfulness-based interventions with college programs, it is easy to see how the use of such interventions are helpful in decreasing distress. For example, Greeson, Juberg, Maytan, James & Rogers (2014) implemented Koru, a mindfulness program, with a group of undergraduate and graduate students with the hypothesis that implementing Koru would decrease perceived stress and sleep problems while increasing self-compassion, mindfulness, and gratitude compared to a control group. As expected, there was a significant improvement in perceived stress and sleep problems, as well as an increase in mindfulness, self-compassion, and gratitude (Greeson and colleagues, 2014). The work of Yamada and Victor (2012) also shows the effectiveness of mindfulness training on well-being, health, and capacity for learning with a college population. Yamada and Victor (2012) utilized a sample of college students from a southern California university and placed these students in a treatment and control group. The intervention was a 10-minute guided meditation lead by an instructor at the start of each biweekly class period over the course of 15 weeks. The control group did not receive treatment but were let out of class ten minutes earlier than the treatment group. Both groups were given the Freiburg Mindfulness Inventory (FMI: Buchheld, Grossman, & Walach, 2001), the Mindful Attention Awareness Scale (MAAS: Brown & Ryan, 2003), the Rumination-Reflection Questionnaire (RRQ: Trapnell & Campbell, 1999), the Perceived Stress Scale (PSS: Cohen, Kamarck, & Mermelstein, 1983) and the State Trait Anxiety Inventory (STAI: Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) to measure psychological well-being (Yamada &

Victor, 2012). To measure sense of learning capacity, the mindfulness group was given a questionnaire developed for the study to measure subjective sense of the impact of mindfulness-based practice on their learning experience. After controlling for significant demographic covariates, the mindfulness group demonstrated significant increases in mindful awareness traits and reductions in rumination and state anxiety compared with controls (Yamada & Victor, 2012). Mindfulness was not found to lead to significant increases in academic performance across the semester, however, 81% of students reported positive effects of mindfulness-based practice (Yamada & Victor, 2012).

Mindfulness was also found to be helpful in higher-stakes educational settings with older students. For example, Warnecke, Quinn, Ogden, Towle, and Nelson (2011) conducted a study implementing mindfulness for senior medical students with the goal of decreasing stress. Participants were given an audio CD with guided meditations and instructed to utilize the CD daily for the 8-week trial (Warnecke & colleagues, 2011) and then were instructed to take the Perceived Stress Scale (PSS: Cohen, Kamarck, & Mermelstein, 1983) and the Depression, Anxiety and Stress Scale (DASS: Lovibond & Lovibond, 1995). After the 8-week trial, the scores on the PSS and DASS demonstrated a reduction in stress and anxiety for the medical students (Warnecke & colleagues, 2011). As one can see, mindfulness interventions have demonstrated effectiveness across the board with managing stress, depression, anxiety, and rumination in students of higher education programming.

Now that the value of mindfulness has been established, it is important to consider how mindfulness and rumination are connected. Since mindfulness is centered on present experiences in the moment, the thought is that mindfulness can be used to counteract rumination which is typically focused on the past and is more abstract in nature (Svendsen, Kvernenes,

Wiker, & Dundas, 2016). This concept has been the foundation for some therapeutic treatments in the field of Psychology, specifically Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002). In MBCT, a decrease in rumination is identified as the key mechanism of change in mindfulness (Svendsen, Kvernenes, Wiker, & Dundas, 2016). Since mindfulness focuses on the “here and now,” it may help individuals notice and accept the present time experiences as they are, while being more mindful of the times in which they are ruminating, which would in turn positively impact health outcomes (Svendsen, Kvernenes, Wiker, & Dundas, 2016). Since it has been established that mindfulness-based stress reduction programs for college students have shown the same positive impact on student’s psychosocial wellbeing (Dvořáková et al., 2017), selecting the right program to target rumination is a critical consideration. The Learning to BREATHE program (L2B) is one such stress-targeted, mindfulness-based intervention program that holds promise in reducing stress in college students through decreasing rumination.

The Learning to BREATHE program (L2B) aims to provide stress-management skills, build the capacity for emotional regulation, strengthen the ability to focus and deliver quality performance, and establish meaningful social relationships (Broderick & Metz, 2009). It is intended to enhance emotion regulation, strengthen attention, teach stress management, and help students integrate mindfulness practice into daily life (Broderick & Frank, 2014). The program includes instruction in the practice of mindful awareness and provides opportunities to practice these skills in a group setting (Broderick & Frank, 2014). One of the main components of the L2B program includes strengthening distress tolerance; specifically, one of the goals is to reduce the tendency to react automatically to appetitive (approach) and aversive (avoid) stimuli (Broderick & Frank, 2014). Avoidance tends to lead to rumination, and Teasdale et al. (1995)

has shown that mindfulness training has led to decreases in rumination. Therefore, one could argue that the L2B program may be effective in decreasing maladaptive rumination as well.

Several research studies have been conducted to investigate the overall effectiveness of the L2B program. The original pilot study of twelfth-grade students demonstrated reductions in negative mood and improvements in calmness as well as self-acceptance compared to a small control group (Broderick & Frank, 2014). Recent findings from a study of regular education students in a Pennsylvania public high school showed significantly lower reported levels of perceived stress and psychosomatic complaints, as well as higher levels of efficacy in emotion regulation at the completion of the program (Broderick & Frank, 2014).

The L2B program specifically is appropriate to use for the college population as it is grounded in social-emotional learning (Broderick, 2013). As such, the program includes a strong emphasis on the benefits of mindfulness for emotion regulation and it has demonstrated effectiveness in enhancing emotion regulation skills in a variety of samples (Bluth et al., 2015; Broderick & Metz, 2009; Metz et al., 2013; Mahfouz, et al., 2018; Kerr, et al., 2017). Additionally, the L2B program is grounded in developmental psychology which is relevant as the typical college age student is in the intermediate phase of development between adolescence and adulthood known as “emerging adulthood” (Arnett, 2000). Key features of this period of life include identity exploration and increasing autonomy. Notably, however, risky behaviors are at their highest levels during emerging adulthood (Arnett, 2000) suggesting that the emotional volatility often present in adolescence is still prominent during emerging adulthood.

Dvořáková and colleagues (2017) conducted a study utilizing the L2B program with college students predicting that students who participate in the program will demonstrate better

outcomes in the areas of mental health and wellbeing, intrapersonal awareness, interpersonal awareness, and health behaviors. Participants in the study included 109 first-year undergraduate students from a large, public university in Pennsylvania (Dvořáková et al., 2017). Participants were assigned to receive the L2B program and were asked to attend a total of 8 sessions over the course of 6 weeks in which they were taught emotion regulation skills through simple mindfulness techniques with the goal of improving mental health outcomes (Dvořáková and colleagues, 2017). Students were provided with home practice cards to promote program retention and given a variety of questionnaires pre- and post- test to measure changes in depressive symptoms, anxiety, life satisfaction, mindfulness awareness, rumination, self-compassion, social connectedness, compassion, and health behaviors including sleep and alcohol use (Dvořáková et al., 2017). At the end of the study, Dvořáková and colleagues (2017) found that participants reported improved health behaviors, lower levels of depression and anxiety, and increased mindfulness practice adherence.

How does mindfulness impact rumination?

There have been few studies evaluating the effects of mindfulness on rumination in non-clinical settings. The research that does exist tends to evaluate the impact of mindfulness on rumination in the context of health outcomes, specifically in cancer populations (Campbell, Labelle, Bacon, Faris, and Carlson, 2011). Campbell and colleagues (2011) conducted a study evaluating the relationship between Mindfulness-Based Stress Reduction (MBSR), rumination, and blood pressure in women with cancer. Their study found positive effects of MBSR on self-report measures of mindful attentiveness and rumination (Campbell et al., 2011). A small to moderate-sized correlation was observed between decreased rumination and decreased casual systolic blood pressure (Campbell et al., 2011). This study shows that mindfulness does impact overall health outcomes, and that there may be a relationship between mindfulness practice and a decrease in rumination.

Frewen, Frewen, Evans, Maraj, Dozois, and Partridge (2008) evaluated 43 undergraduate psychology students for their ability to disconnect from the negative automatic thought patterns characteristic of depression and generalized anxiety. The eight-week intervention consisted of once-weekly 120-150-minute sessions of mindfulness meditation practices, yoga, homework, and education in mindfulness principles. Post-intervention participants reported a greater capacity to let go of their negative thoughts and a decrease in frequency of negative automatic thinking. These findings are consistent with earlier studies that reported mindfulness-based interventions can reduce rumination (Broderick, 2005; Ramel, Goldin, Carmona, & McQuaid, 2004)

Chambers et al. (2008), for example, had 20 participants participate in a 10-day intensive mindfulness meditation retreat and compared the outcomes to a control group that did not attend

the retreat. Those who participated in the retreat reported decreased depressive symptoms and reflective rumination (Chambers et al., 2008). Additionally, those who engaged in an 8-week mindfulness course showed decreased rumination (Ramel et al., 2004; Shapiro et al., 2008). Ramel et al. (2004) conducted a study hypothesizing that the primary change in mindfulness meditation involved reductions in rumination. The effects of mindfulness training on affective symptoms, including depression and anxiety, dysfunctional attitudes, and rumination, were examined with participants with lifetime mood disorders through the implementation of an 8-week mindfulness training program as compared to wait-list conditions. Through regression analyses, the authors found that the more mindfulness was practiced, the less rumination was reported in a follow-up assessment (Ramel et al., 2004).

Jain et al. (2007) conducted a study evaluating relaxation training versus mindfulness training on a group of 81 students to evaluate the effects on distress, positive states of mind, distraction, and rumination. In both groups, there were decreased levels of overall distress in addition to increased reported positive states of mind, however, the mindfulness meditation group had significantly higher rates of positive states of mind in the post-test condition (Jain et al., 2007). The mindfulness meditation group also showed a significant decrease in distraction and rumination in the post-test condition ($p < .04$ in all cases, Cohen's $d = .57$ for rumination and $.25$ for distraction for the meditation group) demonstrating that mindfulness meditation's effects on reducing distress were partially mediated by reducing rumination (Jain et al., 2007). This suggests that mindfulness training is a promising intervention in reducing rumination in college students.

Freudman, Jones, and Terry (2020) also found that mindfulness-based interventions were helpful in decreasing perceived stress, anxiety, and rumination in university students. Over the

course of four weeks, university students participated in a mindfulness-based intervention group, a traditional control group, or an active control group. Rumination was measured pre and posttest utilizing the Rumination Response Scale (RRS; Treynor, Gonzalez & Nolen-Hoeksema, 2003). At the end of the four weeks, rumination significantly decreased from pretest to post-test in the mindfulness-based intervention group (Freudman, Jones, & Terry 2020).

Purpose

The purpose of this study was to evaluate the effect of mindfulness training using the L2B program on rumination and to investigate the relationship between mindfulness and rumination. We chose this mindfulness program for several reasons. First, L2B is grounded in social-emotional learning (Broderick, 2013). Although changes in emotional regulation during emerging adulthood are not specifically addressed in Arnett's (2000) model, others (John & Gross, 2004) have argued that emotion regulation processes continue to change across the lifespan. Studies have shown that overt expressions of anger, for example, diminish during emerging adulthood, albeit gradually (Galambos, Barker, & Krahn, 2006), as does negative emotionality (McGue, Bacon, & Lykken, 1993) and neuroticism and negative affect (Watson & Walker, 1996). Using an emotion specific approach, Zimmerman and Iwanski (2015) found that although emerging adults as a group did increase in their ability to utilize adaptive emotion strategies, they still show evidence of emotional dysregulation with respect to anger and high levels of avoidance and passivity in response to feelings of sadness. Given the continuing development of emotion regulation skills during emerging adulthood, we felt it important to choose a mindfulness program with a specific emphasis on emotion regulation and social-emotional learning that is grounded in developmental psychology. Since the development of the program in 2003, *L2B* has been implemented in a variety of settings including private and public schools, clinical settings, and after-school programs (Bluth, Roberson, & Gaylord, 2015, Broderick & Frank, 2014; Broderick & Metz, 2009; Broderick, Pinger, & Worthen, 2013; Metz et al., 2013). The effectiveness of L2B is further supported by the fact that the Collaborative for Academic, Social, and Emotional Learning (CASEL) has selected L2B as one of only four

mindfulness programs to meet the CASEL standards for evidence-based social and emotional learning programs (CASEL, 2015).

In addition to its emphasis on emotional wellbeing, the L2B curriculum is intended to strengthen attention, enhance stress management skills, cultivate wholesome emotions (e.g., gratitude and compassion), and help participants integrate mindfulness into daily life. Although originally developed for use with adolescent populations, L2B has recently been successfully adapted for use with college students at two university sites (Dvorakova et al., 2017; Kerr et al., 2017). Dvorakova et al., (2017) found decreases in depression, anxiety, sleep problems, and alcohol use in a sample of college freshman after participation in the L2B program and Kerr et al. (2017) found that participation in L2B strengthened aspects of emotion regulation in students completing required semester-long student pre-service teaching assignments.

Based on previous research, we predicted that students who participated in the L2B program would report less rumination and show increased levels of mindfulness. Both the Rumination Reflection Questionnaire and the Mindful Attention Awareness Scale were selected as the primary measures to test our hypothesis. The rationale behind including the Mindful Attention Awareness Scale was to explore if an increase in reported mindfulness coincided with an observed decrease in rumination. It was hypothesized that participation in the L2B training sessions will lead to a reduction in rumination post-test, and that participation in the L2B training sessions will lead to an increase in mindfulness post-test.

Method

Materials and Procedures

Materials

Learning to BREATHE (L2B; Broderick, 2013). L2B is a manualized mindfulness-based curriculum developed for a classroom or group setting. L2B provides a session-by-session curriculum, and each lesson includes discussion, activities, and opportunities to practice mindfulness skills in a group setting. It is a structured program that includes detailed instructions for each session and extensive descriptions of program activities for program facilitators. The rich description included in the program facilitates comparisons across studies and allows for research replication, a key concern in assessing the methodological value of mindfulness research (Davidson & Kaszniak, 2015). The program is published in a commercially available book format (Broderick, 2013). The program activities were modified slightly for use with this cohort of students. For example, an activity designed to demonstrate a “chattering mind” used a practice example from a college class and the roles of the participants in the activity were changed to professors and students.

Measures

Mindful Attention Awareness Scale (MAAS). The MAAS is a 15-item scale designed to assess a core characteristic of dispositional mindfulness, namely, a receptive state of mind in which attention, informed by a sensitive awareness of what is occurring in the present, simply observes what is taking place (Brown & Ryan, 2003). The measure takes approximately 10 minutes or less to complete (Brown & Ryan, 2003). Scoring of the MAAS involves computing the mean of the 15 items. Higher scores reflect higher levels of dispositional mindfulness. The scale shows strong psychometric properties and has been validated with college, community, and

cancer patient samples (Carlson & Brown, 2005; Brown & Ryan, 2003). In the community sample, N=436 and had a mean of 4.20 with a standard deviation of .69 (Brown, Loverich, & Biegel, 2011). In the college student sample, N= 2,277 with a mean of 3.83 and a standard deviation of .70 (Brown, Loverich & Biegel, 2011). The MAAS has internal consistency levels (Cronbach's alphas) ranging from .80 to .90 (Brown, Loverich & Biegel, 2011). Correlational, quasi-experimental, and laboratory studies have shown the MAAS taps a unique quality of consciousness that is related to, and predicted of, a variety of self-regulation and well-being constructs (Brown & Ryan, 2003).

Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999). The RRQ is a 24-item questionnaire where respondents use a 5-point Likert scale with the points *strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5)*. Questionnaire items 6, 9, 10, 13, 14, 17, 20, 24, 25 are reverse scored. There is no total score for the RRQ, rather, there are two subscales that are individually scored. These subscales include the Rumination subscale and the Reflection subscale. The assumption is that greater scores in the Reflection subscale would correspond with a decrease of endorsed items in the Rumination subscale.

There is evidence of good internal consistency, stability over a 10-month period, and convergent validity (Brown & Ryan, 2003; Teasdale & Green, 2004, Trapnell & Campbell, 1999). The sample used to validate the RRQ consisted of N= 1,137 (females N= 687, males N= 447). The coefficient Alpha for the combined sample on the Reflection scale was .91 with a mean of 3.14 and standard deviation of 0.76 (Trapnell & Campbell, 1999). The Coefficient Alpha for the Rumination scale for the combined sample was .90 with a mean of 3.46 and a standard deviation of 0.71 (Trapnell & Campbell, 1999).

Participants

A total of fifty participants from West Chester University of Pennsylvania were recruited from PSY 100 classes in Fall semester of 2019. All participants volunteered to be a part of this study. Researchers were given permission from class professors to provide a short oral presentation at the beginning of classes to share information about the study. Following the brief discussion of the study, students who were interested provided contact information. All students who indicated interest in the study were contacted and given further details regarding the study including exclusion criteria as well as scheduling information for the in-person mindfulness group. Interested students were asked to respond with their age and if they had normal or corrected to normal vision and hearing. Students who were selected to participate in the study were assigned to the experimental or control group based on their availability. Twenty-five students were assigned to each group. One student dropped out of the study due to a family emergency before they could attend their pretesting session, and another student dropped out of the study after they completed their pretesting session. Both students were part of the in-person mindfulness group.

The inclusion criteria for the study stated that participants must be between the ages of 18 and 30 years of age and must have normal or corrected to normal hearing and vision. For participants to be able to participate in the in-person mindfulness group, they were required to be available from 2:00-3:30 on Tuesday afternoons.

Procedure

Design

Our study was a quasi-experimental design (due to the use of convenience sampling of students on campus), and the assignment of participants to either the experimental or control group based on their availability to attend the sessions. The total sample consisted of 50 students who were enrolled in an introductory psychology class: 25 in the Learning to Breathe (L2B) mindfulness group and 25 in the email education control group.

An email education control group was favored versus using a waitlist control group to further demonstrate that engaging in an in-person Learning to Breathe group contributes to any changes seen at posttest, and not just the introduction of information about mindfulness. The email education control group consisted of easy-to-read articles about mindfulness that were emailed to students weekly, on the same days as the in-person mindfulness groups. Participants completed pretesting before the start of the intervention and then completed post-testing within two weeks of the end of the mindfulness intervention. In this study, the effects of a mindfulness intervention on positive and negative affect, emotion regulation, and perceived stress were examined but are not reported here. Additional data on compassion, self-compassion, rumination, interpersonal reactivity, life satisfaction, and salivary cortisol samples were also collected but will not be discussed in this paper.

Data Collection

All measures were administered at pretest (before the start of the L2B sessions) and at posttest (within one weeks of the end of the L2B program). Both pretest and posttest questionnaires were made available to the students electronically using Qualtrics, an online survey platform. Students received links to the survey questionnaires via university email.

Pre- and post-testing were conducted with all participants. Between groups differences were measured by looking at differences between the experimental and control group at post-testing. Within groups differences were measured by examining differences between pretest and posttest for each group.

Pretest

Once participants were scheduled for a pretesting session, they were sent a confirmation email with the date and time of their pretest session, along with instructions for how to find the location of the lab. Participants were sent a reminder email 24 hours before their pretesting session.

The pretest and posttest conditions included one researcher and one participant. Once participants arrived at the lab, they were met by a researcher who asked that they leave their items by the door and turn off their phones to avoid distractions. Participants were then asked to read and sign a consent form that listed relevant information about the study, possible risks and benefits, and contact information for the principal investigators. Once participants completed the consent form, they were then seated at a computer where they followed a link to a Qualtrics survey where they provided demographic information and completed several questionnaires, including the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) and the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999), as well as measures of compassion, self-compassion, rumination, interpersonal reactivity, life satisfaction, and cortisol levels. Following completion of the surveys, participants were thanked for their time and told they would be contacted in several weeks to schedule their post-testing session.

Intervention

The in-person mindfulness group consisted of six weekly one-hour group sessions. The mindfulness group utilized the Learning to Breathe (L2B) protocol and was run by a trained group facilitator and a graduate student assistant. Each week participants were provided with information about the theme of the week (e.g., bodily awareness, thoughts, and feelings), engaged in an activity related to the material for the week, and were given information about optional activities they could try at home to further practice the skills that were discussed in group.

Posttest

During the post-testing session, participants followed the same procedure as pretesting. Upon arriving for their post-testing session, participants were greeted by a researcher and asked to confirm their names. Researchers then matched the participants' names to the confidential code that was assigned to them at pretesting. Participants were then asked to take several surveys, all of which were the same as at pretesting. Following the completion of all experimental tasks, participants were given a debriefing sheet, asked if they had any questions, reminded of the contact information for the principal investigators, and given their gift card. Participants were also told that they would be automatically assigned their research credits. Post testing sessions took roughly one hour. Participants were compensated with a 25-dollar gift card and two research credits for their Psych 100 class upon completion of the study.

Results

Descriptive Statistics

Demographics were assessed at pretesting. Participants were asked information about their age, gender, race/ethnicity, academic major, year in school, and if they had previous mindfulness training. Participants in the study ranged in age from 18-24. Race and Ethnicity breakdown can be observed in Table 1. Thirty seven of the 48 participants who completed both pre- and post-testing self-identified as White/Caucasian (77%), six of the 48 participants self-identified as Hispanic/LatinX (12.5%), three participants self-identified as "Other" (6.25%), and two of the participants self-identified as Black/African American (4%). Eleven participants identified as male, and 37 participants identified as female. Six students indicated they were psychology majors, with the remaining 42 participants identifying as another major. Thirty-two participants were in their freshman year, 11 in their sophomore year, four in their junior year, and one was a senior. Five participants indicated that they had previous experience with mindfulness practices.

Analyses

Data were analyzed with a two-way mixed ANOVA. When assessing for normality, two outliers were observed in the MAAS pre-test control group and in the MAAS post-test experimental group. Per the Shapiro-Wilk test ($p > .05$), all data was normally distributed except for MAAS pre-test total in the experimental group which had a $p=0.049$. Since the MAAS pre-test total experimental group was so close to the cutoff, no data transformations were conducted.

RRQ Reflection

Descriptive statistics were calculated for the RRQ Reflection subtest for the pre- and post-test experimental and control groups and can be found in Table 2. Tests of Within-Subjects

Effects were calculated and can be found in Table 3. There were no outliers, as assessed by boxplot. The data was normally distributed, as assessed by Shapiro-Wilk's test of normality ($p > .05$). There was homogeneity of variances ($p > .05$) and covariances ($p > .001$), as assessed by Levene's test of homogeneity of variances and Box's M test, respectively. Mauchly's test of sphericity was assumed. There was no statistically significant interaction between the intervention and time on reflection scores on the RRQ, $F(1, 46) = 1.522, p = .224$, partial $\eta^2 = .0322$. The main effect of time did not show a statistically significant difference in mean reflection scores at the different time points, $F(1, 46) = .561, p = .458$, partial $\eta^2 = .012$. The main effect of group did not show that there was a statistically significant difference in mean reflection scores between intervention groups $F(1, 46) = .0428, p = .516$, partial $\eta^2 = .009$.

RRQ Rumination

Descriptive statistics were calculated for the RRQ pre- and post-test groups, and the experimental and control groups as evidenced in Table 4. The RRQ pre-test rumination scores in the experimental group indicated $M=3.815, (SD= 0.6346)$. The control group scores indicated $M= 3.733, (SD= 0.6821)$. The RRQ post-test rumination scores were $M= 3.420, (SD= 0.7033)$, and the control group indicated $M= 3.603 (SD=0.7751)$.

Test of within-subject effects were assessed, as evidenced in Table 5. There were no outliers, as assessed by boxplot. The data was normally distributed, as assessed by Shapiro-Wilk's test of normality ($p > .05$). There was homogeneity of variances ($p > .05$) and covariances ($p > .001$), as assessed by Levene's test of homogeneity of variances and Box's M test, respectively. Mauchly's test of sphericity was assumed. There was no statistically significant interaction between the intervention and time on rumination scores on the RRQ, $F(1, 46) = 2.140, p = .150$, partial $\eta^2 = .044$. The main effect of time showed a statistically significant

difference in mean rumination scores at the different time points, $F(1, 46) = 1.650, p = .006$, partial $\eta^2 = .154$. The main effect of group showed that there was not statistically significant difference in mean rumination scores between intervention groups $F(1, 46) = 0.78, p = .782$, partial $\eta^2 = .002$.

MAAS

Descriptive statistics were calculated for the MAAS pre- and post-test groups for both the experimental and control conditions (Table 6). The descriptive statistics for the MAAS pre-test experimental group indicated $M=3.6319, (SD=0.65901)$, and the control group indicated $M=3.6133 (SD= 0.64521)$. The MAAS post-test experimental group indicated $M= 3.7536, (SD= 0.81809)$. The MAAS post-test control group indicated $M= 3.5787, (SD= 0.78828)$.

Test of within-subject effects for the MAAS was assessed (Table 7). There were no outliers, as assessed by boxplot. The data was normally distributed, as assessed by Shapiro-Wilk's test of normality ($p > .05$). There was homogeneity of variances ($p > .05$) and covariances ($p > .001$), as assessed by Levene's test of homogeneity of variances and Box's M test, respectively. Mauchly's test of sphericity was assumed. There was no statistically significant interaction between the intervention and time on mindfulness scores on the MAAS, $F(1, 46) = .198, p = .659$, partial $\eta^2 = .004$. The main effect of time did not show a statistically significant difference in mean reflection scores at the different time points, $F(1, 46) = .638, p = .429$, partial $\eta^2 = .014$. The main effect of group did not show that there was a statistically significant difference in mean reflection scores between intervention groups $F(1, 46) = 267, p = .508$, partial $\eta^2 = .006$.

Discussion

There was no statistically significant interaction on either the Reflection subscale of the RRQ or the Rumination subscale. There was no statistically significant interaction on the MAAS. Despite the lack of findings, several interesting yet small interactions can be observed in the dataset. For example, a small decrease in rumination can be observed in both the Experimental and Control groups from pre-test to post-test.

As previously noted, the use of the two-way mixed ANOVA was partially selected as this type of statistical analysis is particularly robust against outliers which is important given the two outliers observed in the MAAS pre-test control group and the single outlier observed in the MAAS post-test experimental group.

The lack of significant findings may be, in part, to the structure of the study. Participants in the experimental group were not required to practice mindfulness outside of the designated experimental sessions. In the Dvorakova et al., (2017) study, the experimental group was provided practice cards to be utilized outside of practice session time with the goal of promoting program adherence. Participants were also provided with stickers that outlined reminders to practice mindfulness techniques, and they also were provided worksheets with additional mindfulness suggestions. It is possible that requiring participants to practice mindfulness outside of the experimental sessions may have provided a more robust effect which may have been captured on the MAAS or RRQ scales.

Another consideration is the length and implementation of the L2B program. In the Dvorakova et al., (2017) study, participants completed 8 guided mindfulness sessions over the course of 6 weeks. In our study design, participants partook in 6 weekly guided mindfulness

sessions. It is possible that had our program included the two additional guided mindfulness sessions, clearer effects would have been observed in the RRQ and MAAS.

Additionally, the weekly mindfulness articles provided to the control group may have been highly effective, thus creating a wash out effect for the mindfulness program. There may be some credibility to this hypothesis as a small increase in Reflection scores can be observed in the Control group from pre-test scores to post-test scores. A small decrease in reported Rumination scores can also be observed in the Control group from pre-test scores to post-test scores. It is possible that a larger sample size would have further corroborated this hypothesis that the articles were highly effective. It is important to note that there were no manipulation checks integrated within the study, therefore it is not possible to evaluate the aforementioned effect after the fact.

It is also important to consider the structure of the scales used to measure rumination and mindfulness. For example, Brose, Raedt, and Vanderhasselt (2020) note that despite the fact the RRQ is a well-validated questionnaire, the measure has not been adapted to measure within-person variation regarding the tendency to ruminate across brief periods of time such as days or weeks. Thus, it may not be an appropriate scale to use for repeated or frequent use during a brief psychotherapeutic intervention (Brose, Raedt, & Vanderhasselt, 2020).

In revisiting previous rumination literature which did find a difference in rumination at posttest such as Shapiro et al., (2008), several possible explanations for our lack of findings arise. Despite similarities in overall sample in terms of size and demographics as well as similar measures used to collect data, several large differences were observed. In this particular study, a waitlist condition was used in which participants were informed that they could enroll in the meditation course the following semester. In our study, the use of weekly newsletters may have been particularly effective and thus created a washout effect. Another explanation to note is that

adherence to the program was implemented in the Shapiro et al., (2008) study. Participants in the intervention group were instructed to practice outside of class and to keep track of their practice through self-report diaries used to record their daily practice. In our study, no means of practice adherence were implemented to evaluate participant practice outside of the designated intervention. It is possible that had we included the instruction to practice outside of class or had an additional data collection measure such as self-report diary, student participants may have practiced more outside of the intervention implementation which may have increased overall scores in the RRQ.

Another study worth revisiting is Ramel et al., (2004) which also demonstrated an overall decrease in rumination posttest. In this particular study, the sample varied greatly from our sample. Participants in the Ramel et al., (2004) study had a mean age of 50.87, and the sample included veterans and nonveterans. The difference in ages between this study and our own may account for our lack of findings. As previously noted in the literature review, adolescents and young adults developmentally have different capacities for emotion regulation than older adults. Additionally, the Ramel et al., (2004) sample, all participants met criteria for a mood disorder. This type of data was not collected in our sample and can offer an explanation for our lack of findings. Recruitment in the Ramel et al., (2004) study occurred primarily through the VA San Diego Healthcare System, implying that many of these individuals may have received or are currently receiving treatment for their mood disorders. Again, this study utilized a waitlist control unlike our own study, which may have also influenced the differences in rumination scores observed across groups. Another noteworthy difference is that this study found that the more that an individual practiced mindfulness meditation, the lower their Rumination scores were at posttest. As this particular mindfulness intervention included daily 45-minute

mindfulness homework, participants were encouraged to practice outside of the designated class intervention times much like Shapiro et al., (2008). Lastly, the Ramel et al., (2004) study utilized different measures for rumination. Specifically, the rumination subscale in the Response Style Questionnaire (RSQ: Nolen-Hoeksema & Morrow, 1991) was the method used to collect data on rumination. The differences in scale use may explain our lack of findings as it is possible that the RSQ may have better captured the construct of Rumination versus the RRQ.

Limitations

One of the main limitations of this study is limited data. The original study design was to repeat the study and collect additional data. However, due to COVID-19, additional data with more participants was unable to be collected. The absence of more robust data may have impacted overall results. Additionally, there were two outliers that were included in the MAAS data analysis, including one in the control group and one in the experimental group. It was determined that data analysis should move forward regardless as the method of data analysis- the two-way mixed ANOVA, is particularly robust against outliers.

Another possible limitation of the study is that the experimental and control groups were not randomly selected. The rationale for this is that group assignment was based on student availability and schedules. It is important to note, however, that by not randomly selecting groups, this study more closely mirrors real life situations. In fact, Clay (2010) argues that one of the main pitfalls of randomized control trials is the lack of generalizability to the general public. Although randomized control trials are designed to have high internal validity, the individuals who partake in the study are rarely representative of the general population (Clay, 2010). Furthermore, the conditions of randomized control trials rarely mimic the everyday conditions (Clay, 2010).

Clinical Implications

There are many positive implications of this study. As previously mentioned, the transition between high school and college is a very challenging transition for adolescents and young adults, and this population in particular has disproportionately high reported levels of stress and poor health behaviors. Although this research did not yield statistically significant results, it serves as a starting point for future research regarding the impact of mindfulness on rumination in college students. Easily accessible and implemented interventions are particularly relevant in the two years since this study began due to COVID-19. Although the long-term impacts of a global pandemic are currently unknown, one can surmise that this added stressor on top of the transition to college may be contributing to increased mental health concerns. Mindfulness-based interventions demonstrate promise for decreasing the impact of a variety of stressors as evidenced by the literature review composed for this study. This study lays the foundation for continued exploration on the impacts of mindfulness on rumination in the college population and beyond.

Tables

Table 1

Crosstabs for Race between Experimental and Control

Variable	Experimental (N)	Control (N)	Total (N)
Race/Ethnicity			
White/Caucasian	18	19	37
Hispanic/LatinX	3	3	6
Black/African American	0	2	2
Other	2	1	3

Table 2

<i>Descriptive Statistics</i>				
	Group	Mean	Std. Deviation	N
RRQ Pre Reflection	Experimental	3.243	0.552	23
	Control	3.043	0.656	25
	Total	3.139	0.611	48
RRQ Post Reflection	Experimental	3.210	0.815	23
	Control	3.177	0.584	25
	Total	3.193	0.697	48

Table 3

<i>Tests of Within Subjects Effects</i>							
Measure: RRQ							
Source		Type of III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Pre Post Time Group	Sphericity						
	Assumed	0.42	1.00	0.42	2.14	0.15	0.04
	Greenhouse-Geisser	0.42	1.00	0.42	2.14	0.15	0.04
	Huynh-Feldt	0.42	1.00	0.42	2.14	0.15	0.04
	Lower-bound	0.42	1.00	0.42	2.14	0.15	0.04

Table 4

<i>Descriptive Statistics</i>				
	Group	Mean	Std. Deviation	N
RRQ Pre Rumination	Experimental	3.815	0.6346	23
	Control	3.733	0.6821	25
	Total	3.773	0.6541	48
RRQ Post Rumination	Experimental	3.420	0.7033	23
	Control	3.603	0.7751	25
	Total	3.516	0.7395	48

Table 5

Test of Within-Subjects Effects
Measure:
Reflection RRQ

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity						
	Assumed	0.061	1	0.061	0.561	0.458	0.012
Time Group	Sphericity						
	Assumed	0.165	1	0.165	1.522	0.224	0.012
Error (Time)	Assumed	4.984	46	0.108			

Table 6

<i>Descriptive Statistics</i>				
	Group	Mean	Std. Deviation	N
MAAS Pre Total	Experimental	3.632	0.659	23
	Control	3.613	0.645	25
	Total	3.622	0.645	48
MAAS Post Total	Experimental	3.754	0.818	23
	Control	3.579	0.788	25
	Total	3.663	0.799	48

Table 7

Test of Within-Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	0.045	1	0.045	0.198	0.659	0.004
Time Group	Sphericity Assumed	0.147	1	0.147	0.638	0.429	0.014
Error (Time)	Sphericity Assumed	10.568	46	0.23			

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Appendices

Weekly Newsletters

Week 1

What is mindfulness?



Mindfulness. It's a pretty straightforward word. It suggests that the mind is fully attending to what's happening, to what you're doing, to the space you're moving through. That might seem trivial, except for the annoying fact that we so often veer from the matter at hand. Our mind takes flight, we lose touch with our body, and pretty soon we're engrossed in obsessive thoughts about something that just happened or fretting about the future. And that makes us anxious.

Mindfulness is the basic human ability to be fully present, aware of where we are and what we're doing, and not overly reactive or overwhelmed by what's going on around us.

Yet no matter how far we drift away, mindfulness is right there to snap us back to where we are and what we're doing and feeling. If you want to know what mindfulness is, it's best to try it for a while. Since it's hard to nail down in words, you will find slight variations in the meaning in books, websites, audio, and video.

The (All-Purpose) Definition of Mindfulness

Mindfulness is the basic human ability to be fully present, aware of where we are and what we're doing, and not overly reactive or overwhelmed by what's going on around us.

Mindfulness is a quality that every human being already possesses, it's not something you have to conjure up, you just have to learn how to access it.

While mindfulness is innate, it can be cultivated through proven techniques, particularly seated, walking, standing, and moving meditation (it's also possible lying down but often leads to sleep); short pauses we insert into everyday life; and merging meditation practice with other activities, such as yoga or sports.

When we meditate it doesn't help to fixate on the benefits, but rather to just do the practice, and yet there are benefits or no one would do it. When we're mindful, we reduce stress, enhance performance, gain insight and awareness through observing our own mind, and increase our attention to others' well-being.

Mindfulness meditation gives us a time in our lives when we can suspend judgment and unleash our natural curiosity about the workings of the mind, approaching our experience with warmth and kindness—to ourselves and others.

8 Things to Know About Mindfulness:

1. **Mindfulness is not obscure or exotic.** It's familiar to us because it's what we already do, how we already are. It takes many shapes and goes by many names.
2. **Mindfulness is not a special added thing we do.** We already have the capacity to be present, and it doesn't require us to change who we are. But we can cultivate these innate qualities with simple practices that are scientifically demonstrated to benefit ourselves, our loved ones, our friends and neighbors, the people we work with, and the institutions and organizations we take part in
3. **You don't need to change.** Solutions that ask us to change who we are or become something we're not have failed us over and over again. Mindfulness recognizes and cultivates the best of who we are as human beings.
4. **Mindfulness has the potential to become a transformative social phenomenon.** Here's why:
5. **Anyone can do it.** Mindfulness practice cultivates universal human qualities and does not require anyone to change their beliefs. Everyone can benefit and it's easy to learn.

6. **It's a way of living.** Mindfulness is more than just a practice. It brings awareness and caring into everything we do—and it cuts down needless stress. Even a little makes our lives better.
7. **It's evidence-based.** We don't have to take mindfulness on faith. Both science and experience demonstrate its positive benefits for our health, happiness, work, and relationships.
8. **It sparks innovation.** As we deal with our world's increasing complexity and uncertainty, mindfulness can lead us to effective, resilient, low-cost responses to seemingly intransigent problems.

Meditation Is Not All in Your Head

When we think about meditating (with a capital M), we can get hung up on thinking about our thoughts: we're going to do something about what's happening in our heads. It's as if these bodies we have are just inconvenient sacks for our brains to lug around.

Having it all remain in your head, though, lacks a feeling of good old gravity.

Meditation begins and ends in the body. It involves taking the time to pay attention to where we are and what's going on, and that starts with being aware of our body

That approach can make it seem like floating—as though we don't have to walk. We can just waft.

But meditation begins and ends in the body. It involves taking the time to pay attention to where we are and what's going on, and that starts with being aware of our body. That very act can be calming, since our body has internal rhythms that help it relax if we give it a chance.

Adapted from: <https://www.mindful.org/what-is-mindfulness/>

Week 2

What are the benefits of mindfulness?

Empirically supported benefits of mindfulness

The term "mindfulness" has been used to refer to a psychological state of awareness, the practices that promote this awareness, a mode of processing information and a character trait. To be consistent with most of the research reviewed in this article, we define mindfulness as a moment-to-moment awareness of one's experience without judgment. In this sense, mindfulness is a state and not a trait. While it might be promoted by certain practices or activities, such as meditation, it is not equivalent to or synonymous with them.

Several disciplines and practices can cultivate mindfulness, such as yoga, tai chi and qigong, but most of the literature has focused on mindfulness that is developed through mindfulness meditation — those self-regulation practices that focus on training attention and awareness in order to bring mental processes under greater voluntary control and thereby foster general mental well-being and development and/or specific capacities such as calmness, clarity and concentration (Walsh & Shapiro, 2006).

Researchers theorize that mindfulness meditation promotes metacognitive awareness, decreases rumination via disengagement from perseverative cognitive activities and enhances attentional capacities through gains in working memory. These cognitive gains, in turn, contribute to effective emotion-regulation strategies.

More specifically, research on mindfulness has identified these benefits:

Reduced rumination. Several studies have shown that mindfulness reduces rumination. In one study, for example, Chambers et al. (2008) asked 20 novice meditators to participate in a 10-day intensive mindfulness meditation retreat. After the retreat, the meditation group had significantly higher self-reported mindfulness and a decreased negative affect compared with a control group. They also experienced fewer depressive symptoms and less rumination. In addition, the meditators had significantly better working memory capacity and were better able to sustain attention during a performance task compared with the control group.

Stress reduction. Many studies show that practicing mindfulness reduces stress. In 2010, Hoffman et al. conducted a meta-analysis of 39 studies that explored the use of mindfulness-based stress reduction and mindfulness-based cognitive therapy. The researchers concluded that mindfulness-based therapy may be useful in altering affective and cognitive processes that underlie multiple clinical issues.

Those findings are consistent with evidence that mindfulness meditation increases positive affect and decreases anxiety and negative affect. In one study, participants randomly assigned to an eight-week mindfulness-based stress reduction group were compared with controls on self-reported measures of depression, anxiety and psychopathology, and on neural reactivity as measured by fMRI after watching sad films (Farb et al., 2010). The researchers found that the participants who experienced mindfulness-based stress reduction had significantly less anxiety, depression and somatic distress compared with the control group. In addition, the fMRI data indicated that the mindfulness group had less neural reactivity when they were exposed to the films than the control group, and they displayed distinctly different neural responses while watching the films than they did before their mindfulness training. These findings suggest that mindfulness meditation shifts people's ability to use emotion regulation strategies in a way that enables them to experience emotion selectively, and that the emotions they experience may be processed differently in the brain (Farb et al., 2010; Williams, 2010).

Boosts to working memory. Improvements to working memory appear to be another benefit of mindfulness, research finds. A 2010 study by Jha et al., for example, documented the benefits of mindfulness meditation among a military group who participated in an eight-week mindfulness training, a nonmeditating military group and a group of nonmeditating civilians. Both military groups were in a highly stressful period before deployment. The researchers found that the nonmeditating military group had decreased working memory capacity over time, whereas working memory capacity among nonmeditating civilians was stable across time. Within the meditating military group, however, working memory capacity increased with meditation practice. In addition, meditation practice was directly related to self-reported positive affect and inversely related to self-reported negative affect.

Focus. Another study examined how mindfulness meditation affected participants' ability to focus attention and suppress distracting information. The researchers compared a group of experienced mindfulness meditators with a control group that had no meditation experience. They found that the meditation group had significantly better performance on all measures of attention and had higher self-reported mindfulness. Mindfulness meditation practice and self-reported mindfulness were correlated directly with cognitive flexibility and attentional functioning (Moore and Malinowski, 2009).

Less emotional reactivity. Research also supports the notion that mindfulness meditation decreases emotional reactivity. In a study of people who had anywhere from one month to 29 years of mindfulness meditation practice, researchers found that mindfulness meditation practice helped people disengage from emotionally upsetting pictures and enabled them to focus better on a cognitive task as compared with people who saw the pictures but did not meditate (Ortner et al., 2007).

More cognitive flexibility. Another line of research suggests that in addition to helping people become less reactive, mindfulness meditation may also give them greater cognitive flexibility. One study found that people who practice mindfulness meditation appear to develop the skill of self-observation, which neurologically disengages the automatic pathways that were created by prior learning and enables present-moment input to be integrated in a new way (Siegel, 2007a). Meditation also activates the brain region associated with more adaptive responses to stressful or negative situations (Cahn & Polich, 2006; Davidson et al., 2003). Activation of this region corresponds with faster recovery to baseline after being negatively provoked (Davidson, 2000; Davidson, Jackson, & Kalin, 2000).

Relationship satisfaction. Several studies find that a person's ability to be mindful can help predict relationship satisfaction — the ability to respond well to relationship stress and the skill in communicating one's emotions to a partner. Empirical evidence suggests that mindfulness protects against the emotionally stressful effects of relationship conflict (Barnes et al., 2007), is positively associated with the ability to express oneself in various social situations (Dekeyser et al., 2008) and predicts relationship satisfaction (Barnes et al., 2007; Wachs & Cordova, 2007).

Other benefits. Mindfulness has been shown to enhance self-insight, morality, intuition and fear modulation, all functions associated with the brain's middle prefrontal lobe area. Evidence also suggests that mindfulness meditation has numerous health benefits, including increased immune functioning (Davidson et al., 2003; see Grossman, Niemann, Schmidt, & Walach, 2004 for a review of physical health benefits), improvement to well-being (Carmody & Baer, 2008) and reduction in psychological distress (Coffey & Hartman, 2008; Ostafin et al., 2006). In addition, mindfulness meditation practice appears to increase information processing speed (Moore & Malinowski, 2009), as well as decrease task effort and having thoughts that are unrelated to the task at hand (Lutz et al., 2009).

By Daphne M. Davis, PhD, and Jeffrey A. Hayes, PhD

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Week 3

Five ways mindfulness meditation is good for your health

According to thousands of years of tradition, Buddhists meditate to understand themselves and their connections to all beings. By doing so, they hope to be released from suffering and ultimately gain enlightenment.

In recent decades, researchers have been gaining insight into the benefits of practicing this ancient tradition. By studying more secular versions of mindfulness meditation, they've found that learning to pay attention to our current experiences and accept them without judgment might indeed help us to be happier. Studies to date suggest that mindfulness affects many aspects of our psychological well-being—improving our mood, increasing positive emotions, and decreasing our anxiety, emotional reactivity, and job burnout.

But does mindfulness affect our bodies as well as our minds?

Recently, researchers have been exploring this question—with some surprising results. While much of the early research on mindfulness relied on pilot studies with biased measures or limited groups of participants, more recent studies have been using less-biased physiological markers and randomly controlled experiments to get at the answer. Taken together, the studies suggest that mindfulness may impact our hearts, brains, immune systems, and more.

Though nothing suggests mindfulness is a standalone treatment for disease nor the most important ingredient for a healthy life, here are some of the ways that it appears to benefit us physically.

Mindfulness is good for our hearts

Heart disease is the leading killer in the United States, accounting for about 1 in 4 deaths every year. So, whatever decreases the risks or symptoms of heart disease would significantly impact society's health. Mindfulness may help with that.

In one study, people with pre-hypertension were randomly assigned to augment their drug treatment with either a course in mindfulness meditation or a program that taught progressive muscle relaxation. Those who learned mindfulness had significantly greater reductions in their systolic and diastolic blood pressure than those who learned progressive muscle relaxation, suggesting that mindfulness could help people at risk for heart disease by bringing blood pressure down.

In another study, people with heart disease were randomly assigned to either an online program to help them practice meditation or to a waitlist for the program while undergoing normal treatment for heart disease. Those who took the mindfulness program showed significant improvements on the six-minute walking test (a measure of cardiovascular capacity) and slower heart rates than those in the waitlist group.

While one review of randomly controlled studies showed that mindfulness may have mixed effects on the physical symptoms of heart disease, a more recent review published by the American Heart Association concluded that, while research remains preliminary, there is enough evidence to suggest mindfulness as an adjunct treatment for coronary disease and its prevention.

Mindfulness may also be good for hearts that are already relatively healthy. Research suggests that meditating can increase respiratory sinus arrhythmia, the natural variations in heart rate that happen when we breathe that indicate better heart health and an increased chance of surviving a heart attack.

Mindfulness may decrease cognitive decline from aging or Alzheimer's

People tend to lose some of their cognitive flexibility and short-term memory as they age. But mindfulness may be able to slow cognitive decline, even in people with Alzheimer's disease.

In a 2016 study, people with Alzheimer's disease engaged in either mindfulness meditation, cognitive stimulation therapy, relaxation training, or no treatment, and were given cognitive tests over two years. While cognitive stimulation and relaxation training seemed to be somewhat

beneficial in comparison to no treatment, the mindfulness training group had much more robust improvements on cognitive scores than any other group.

Why might that be true? A 2017 study looking at brain function in healthy, older adults suggests meditation may increase attention. In this study, people 55 to 75 years old spent eight weeks practicing either focused breathing meditation or a control activity. Then, they were given the Stroop test—a test that measures attention and emotional control—while having their brains monitored by electroencephalography. Those undergoing breath training had significantly better attention on the Stroop test and more activation in an area of the brain associated with attention than those in the active control group.

While this research is preliminary, a systematic review of research to date suggests that mindfulness may mitigate cognitive decline, perhaps due to its effects on memory, attention, processing, and executive functioning.

Mindfulness may improve your immune response

When we encounter viruses and other disease-causing organisms, our bodies send out troops of immune cells that circulate in the blood. These cells, including pro- and anti-inflammatory proteins, neutrophils, T-cells, immunoglobulins, and natural killer cells, help us to fight disease and infection in various ways. Mindfulness, it turns out, may affect these disease-fighting cells.

In several studies, mindfulness meditation appeared to increase levels of T-cells or T-cell activity in patients with HIV or breast cancer. This suggests that mindfulness could play a role in fighting cancer and other diseases that call upon immune cells. Indeed, in people suffering from cancer, mindfulness appears to improve a variety of biomarkers that might indicate progression of the disease.

In another study, elderly participants were randomly assigned to an eight-week Mindfulness-Based Stress Reduction (MBSR) course or a moderate-intensity exercise program. At the end, participants who'd practiced mindfulness had higher levels of the protein interleukin-8 in their nasal secretions, suggesting improved immune function.

Another study found increases in interleukin-10 in colitis patients who took a mindfulness meditation course compared to a mind-body educational program, especially among patients whose colitis had flared up. Yet another study found that patients who had greater increases in mindfulness after an MBSR course also showed faster wound healing, a process regulated by the immune system.

Studies have found effects on markers of inflammation, too—like C-reactive protein, which in higher levels can harm physical health. Research shows that people with rheumatoid arthritis have reduced C-reactive protein levels after taking an MBSR course versus being on a waitlist for the course. Overall, these findings suggest that mindfulness meditation can have disease-fighting powers through our immune response.

Mindfulness may reduce cell aging

Cell aging occurs naturally as cells repeatedly divide over the lifespan and can also be increased by disease or stress. Proteins called telomeres, which are found at the end of chromosomes and serve to protect them from aging, seem to be impacted by mindfulness meditation.

Studies suggest that long-time meditators may have greater telomere lengths. In one experimental study, researchers found that breast cancer survivors who went through MBSR preserved the length of their telomeres better than those who were on a waitlist. However, this study also found that general supportive therapies impacted telomere length; so, there may not be something special about MBSR that impacts cell aging.

On the other hand, another study with breast cancer survivors found no differences in telomere length after taking an MBSR course; but they did find differences in telomere activity, which is also related to cell aging. In fact, a 2018 review of research ties mindfulness training to increased telomere activity, suggesting it indirectly affects the integrity of the telomeres in our cells. Perhaps that's why scientists are at least optimistic about the positive effects of meditation on aging.

Mindfulness may help reduce psychological pain

Of course, while the above physiological benefits of mindfulness are compelling, we needn't forget that mindfulness also impacts our psychological well-being, which, in turn, affects physical health. In fact, it's quite likely that these changes have synergistic effects on one another.

First of all, a great deal of research suggests that mindfulness can help healthy people reduce their stress. And thanks to Jon-Kabat Zinn's pioneering MBSR program, there's now a large body of research showing that mindfulness can help people cope with the pain, anxiety, depression, and stress that might accompany illness, especially chronic conditions.

For example, drug addictions, at heart, come about because of physiological cravings for a substance that relieves people temporarily from their psychological suffering. Mindfulness can be a useful adjunct to addiction treatment by helping people better understand and tolerate their cravings, potentially helping them to avoid relapse after they've been safely weaned off of drugs or alcohol. The same is true for people struggling with overeating.

Fascinating though it is, we shouldn't overplay meditation's effects on physical health at the expense of its importance to emotional health. In fact, it may be difficult to separate out the two, as a key impact of mindfulness is stress reduction, and psychological stress has been tied to heart health, immune response, and telomere length. This idea is further supported by the fact that other stress-reducing therapies also seem to impact physical health, as well.

Still, it's encouraging to know that something that can be taught and practiced can have an impact on our overall health—not just mental but also physical—more than 2,000 years after it was developed. That's reason enough to give mindfulness meditation a try.

Taken From:

https://greatergood.berkeley.edu/article/item/five_ways_mindfulness_meditation_is_good_for_our_health

Week 4

How mindful breathing trains your brain to focus

Your brain is actually shaped by your thoughts and your behaviors, which is why stress can take a toll on brain function over time. While some studies have shown that mindfulness meditation can help boost attention and keep the brain sharp as we age, we've yet to understand *why* that happens. Now, a new study published in the journal *Progress in Brain Research*, suggests that the answer to that question can be found by simply paying attention to the breath.

The study centered on mindful breath awareness training (M-BAT). Mindful breath awareness involves paying attention to the breath and observing thoughts, feelings, sensations and other experiences that arise without becoming fixated on them. No breath control or manipulation is required. For this study, 21 healthy adults received four hours of mindful breath awareness training and then were asked to practice breath awareness for 10 minutes per day, at least five days per week, for three weeks.

Participants in this study were told to either pay attention to the movement of the diaphragm and abdomen while breathing, or to focus on the airflow around their nostrils. They were provided with an audio CD with a guided meditation and a booklet with written instructions, and asked to log their meditation practice in a diary. After three weeks, their performance on a mental exercise was compared to results from 15 adults with no prior meditation experience.

Meditators also showed an increase in brain activity related to monitoring conflict and inhibiting their responses. The more they meditated, the better the results.

Previous research suggests that mindfulness meditation can increase awareness of our thoughts, or meta-cognitive awareness, as well as regulate emotion, enhance attention and reduce stress. These changes can also be detected in the brain. Scientists often use a “go/no go” task to test some of these skills. The task requires participants to respond (“go”) by pressing a button when they see one stimulus – say a green dot – and not respond (“no go”) when another object – like a red dot — appears. Accurate and speedy responses suggest greater attention, inhibition, and mental efficiency. Impulsivity can also be examined by looking at brain waves activity when a

person performs the go/no go task, to see how quickly the brain responds when a mistake is made.

When comparing their performance before and after training, researchers found the meditators to be less impulsive and more accurate on the go/no go task than adults with no meditation experience. Meditators also showed an increase in brain activity related to monitoring conflict and inhibiting their responses. The more they meditated, the better the results.

The study's authors are quick to note that although mindful breath awareness may improve attention and help curb impulsive behavior, this does not mean that breath awareness interventions are therapeutically effective for reducing impulsivity or increasing attention. It does suggest that breath awareness may be one of many avenues through which meditation may train the brain to work more efficiently.

Taken from: <https://www.mindful.org/how-mindful-breathing-trains-your-brain-to-focus/>

Week 5

5 tips for new meditators

There are so many reasons and ways to meditate that it can at first seem daunting, but the benefits of sustained practice are worth the effort. You just need to give it a go.

1. There is no one way

There are many approaches, theories and philosophies when it comes to meditation. At the start, these can seem overwhelming. If you have already tried meditation and found it difficult, it is important to know that this is completely normal and to be expected. People are complex creatures. But rather than give up before you have begun, instead explore different types of meditation as a way to get to know yourself a little better. What works for one person may not work for another. Try movement meditations such as yoga, t'ai chi or breathing techniques (pranayama) or explore different guided meditations online or in a class. They are all equally valid and effective.

2. Thoughts are completely normal

We live busy, complicated lives that involve attending to myriad tasks, solving problems and looking after family members. So, when you sit down to meditate, especially for the first time, do not be surprised when your mind wanders almost immediately. The art of meditation is noticing when your mind has taken a different direction and to bring it back to your original focus.

3. You cannot do it wrong

See your meditation practice as time and space just for you. In the moments of quiet, you are free of life's complications and challenges. You can let go of the roles and responsibilities with which you identify yourself. You will most likely have meditated naturally in everyday life at times but might not realize you were doing it. Unless you are following a structured path or approach to meditation, I believe you cannot ever do it wrong. You have to start somewhere – if that is just a few seconds of quiet, a feeling of deep relaxation, being free of distractions or a calming of thought you are meditating.

4. It takes patient practice

Western science now proves what Eastern philosophies have taught for centuries – taking time each day to sit quietly to simply breathe, listen to your surroundings and your heart and quieten your mind has enormous physiological and psychological benefits and can lead to a heightened sense of general wellbeing. In today’s fast-paced society taking time to be still is more important than ever. We remember to look after our bodies, other people, even our homes but often forget to look after our minds. The long-term benefits of meditation do not happen overnight, so be patient. Science and any long-term meditator will tell you the practice is worth it.

5. It is for anyone and everyone

You do not need to believe a certain thing, dress a certain way or have a certain outlook on life to benefit from meditation. Whether you are a chief executive trying to manage the pressures of running a company or a busy parent seeking to handle family challenges (or both) meditation is for you. Similarly, it does not matter if you are simply looking for a way to balance your emotions or you are a spiritual person hoping to deepen your connection to that which is greater than us... all are welcome. See meditation as yours – your mind, your meditation. Whether that is being more mindful in everyday life, carving out a few minutes each day to simply breathe with more awareness or a more formal practice, it is for you.

Taken from: <https://www.brethemagazine.com/portfolio-item/5-tips-new-meditation>

Week 6

The state of mindfulness science

Here's what we know right now about meditation—and what we don't.

During the past two decades, more and more scientists have studied mindfulness—a Buddhist-inspired collection of practices aimed at helping us to cultivate moment-to-moment awareness of ourselves and our environment. Their early findings triggered an enormous amount of enthusiasm for meditation.

Sometimes, however, journalists and even scientists (who should know better) have overstated the physical and mental health benefits, which has fed growing skepticism about mindfulness.

Indeed, the science behind mindfulness meditation has often suffered from poor research designs and small effect sizes, as 15 psychologists and neuroscientists found after reviewing hundreds of mindfulness studies. Their paper, published in October by *Perspectives on Psychological Science*, argues that there is still much we don't understand about mindfulness and meditation. Worse, many scientists and practitioners don't even agree on the definition of those words. They end the paper calling for “truth in advertising by contemplative neuroscience.”

In that spirit, here's a rundown of questions that seem fairly settled, for the time being, and questions researchers are still exploring.

Meditation almost certainly does sharpen your attention.

It's not surprising that meditation would affect attention, since many practices focus on this very skill. And, in fact, researchers have found that meditation helps to counter habituation—the tendency to stop paying attention to new information in our environment. Other studies have found that mindfulness meditation can reduce mind-wandering and improve our ability to solve problems.

There's more good news: Studies have shown that improved attention seems to last up to five years after mindfulness training, again suggesting trait-like changes are possible.

Do these benefits apply to people with attention-deficit disorders, and could meditation possibly supplant drugs like Adderall? We can't yet say for sure. While there have been some promising small-scale studies, especially with adults, we need larger randomized controlled trials to understand how meditation might mix with other treatments to help both kids and adults manage attention-deficits.

Long-term, consistent meditation does seem to increase resiliency to stress.

Note that we're not saying it necessarily reduces physiological and psychological reactions to threats and obstacles. But studies to date do suggest that meditation helps mind and body bounce back from stress and stressful situations.

For example, practicing meditation lessens the inflammatory response in people exposed to psychological stressors, particularly for long-term meditators. According to neuroscience research, mindfulness practices dampen activity in our amygdala and increase the connections between the amygdala and prefrontal cortex. Both of these parts of the brain help us to be less reactive to stressors and to recover better from stress when we experience it.

As Daniel Goleman and Richard Davidson write in their new book, *Altered Traits*, "These changes are trait-like: They appear not simply during the explicit instruction to perceive the stressful stimuli mindfully, but even in the 'baseline' state" for longer-term meditators, which supports the possibility that mindfulness changes our ability to handle stress in a better, more sustainable way."

Meditation does appear to increase compassion. It also makes our compassion more effective.

While we may espouse compassionate attitudes, we can also suffer when we see others suffering, which can create a state of paralysis or withdrawal.

Many well-designed studies have shown that practicing loving-kindness meditation for others increases our willingness to take action to relieve suffering. It appears to do this by lessening

amygdala activity in the presence of suffering, while also activating circuits in the brain that are connected to good feelings and love.

For longtime meditators, activity in the “default network”—the part of our brains that, when not busy with focused activity, ruminates on thoughts, feelings, and experiences—quiets down, suggesting less rumination about ourselves and our place in the world.

Meditation does seem to improve mental health—but it’s not necessarily more effective than other steps you can take.

Early research suggested that mindfulness meditation had a dramatic impact on our mental health. But as the number of studies has grown, so has scientific skepticism about these initial claims.

For example, a 2014 meta-analysis published in *JAMA Internal Medicine* examined 47 randomized controlled trials of mindfulness meditation programs, which included a total of 3,515 participants. They found that meditation programs resulted only in small to moderate reductions in anxiety and depression. Furthermore, there was also low, insufficient, or no evidence of meditation programs’ effect on positive mood and feelings and substance use (as well as physical self-care like eating habits and sleep).

According to the authors, meditation programs were not shown to be more beneficial than active treatments—such as exercise, therapy, or taking prescription drugs—on any outcomes of interest.

The research is also raising some interesting nuances about the effectiveness of meditation for different populations. For example, one recent, large-scale, well-designed study found that the “gold standard” Mindfulness Based Stress Reduction (MBSR) intervention for adults had no impact on depression or anxiety in teens. As the authors note, this doesn’t mean meditation can’t help teenagers—it could well be the case that we need to develop and test interventions aimed at younger people.

The upshot? Meditation is generally good for your well-being, yes, but so far it doesn’t appear to be actually better than many other steps you can take to stay healthy and happy. It should

definitely be considered an adjunct to, not a replacement for, other kinds of treatment for mental conditions like bipolar disorder.

Mindfulness could have a positive impact on your relationships.

There are many, many studies that find a positive link between mindfulness and relationship quality, which is probably a byproduct of the effects we've already described.

For example, in one 2016 study, researchers measured mindfulness in 88 couples. Then they took cortisol levels in each couple before and after they discussed a conflict in their relationship. Unsurprisingly, cortisol levels spiked during the discussion, a sign of high stress. But levels in the most mindful people—both men and women—were quicker to return to normal after the conflict ended, suggesting they were keeping their cool.

This result is echoed in many studies of mindfulness in romantic relationships from the beginning to the very end—in fact, there are quite a few studies that find that mindfulness makes breakup and divorce easier.

Mindfulness is also linked to better relationships with your kids. Studies have found that mindfulness practice can lessen stress, depression, and anxiety in parents of preschoolers and children with disabilities. Mindful parenting is also linked to more positive behavior in kids.

A small 2016 pilot study used neuroimaging to see how mindfulness practice changes the brains of parents—and then asked the kids about the quality of their parenting. The results suggest that mindfulness practice seemed to activate the part of the brain involved in empathy and emotional regulation (the left anterior insula/inferior frontal gyrus) and that the children of parents who showed the most activation perceived the greatest improvement in the parent-child relationship.

We must remember, however, that these studies are often very small, and the researchers themselves say results are very tentative.

Mindfulness seems to reduce many kinds of bias.

We are seeing more and more studies suggesting that practicing mindfulness can reduce psychological bias.

For example, one study found that a brief loving-kindness meditation reduced prejudice toward homeless people, while another found that a brief mindfulness training decreased unconscious bias against black people and elderly people. In a study by Adam Lueke and colleagues, white participants who received a brief mindfulness training demonstrated less biased *behavior* (not just attitudes) toward black participants in a trust game.

However, social bias isn't the only kind of mental bias mindfulness appears to reduce. For example, several studies convincingly show that mindfulness probably reduces sunk-cost bias, which is our tendency to stay invested in a losing proposition.

Mindfulness also seems to reduce our natural tendency to focus on the negative things in life. In one study, participants reported on their general mindfulness levels, then briefly viewed photos that induced strong positive emotion (like photos of babies), strong negative emotion (like photos of people in pain), or neither, while having their brains scanned. More mindful participants were less reactive to negative photos and showed higher indications of positive feeling when seeing the positive photos. According to the authors, this supports the contention that mindfulness decreases the negativity bias, something other studies support, too.

Meditation does have an impact on physical health—but it's modest.

Many claims have been made about mindfulness and physical health, but sometimes these claims are hard to substantiate or may be mixed up with other effects. That said, there is some good evidence that meditation affects physiological indices of health.

We've already mentioned that long-term meditation seems to buffer people from the inflammatory response to stress. In addition, meditators seem to have increased activity of telomerase, an enzyme implicated in longer cell life and, therefore, longevity.

But there's a catch. "The differences found [between meditators and non-meditators] could be due to factors like education or exercise, each of which has its own buffering effect on brains," write Goleman and Davidson in *Altered Traits*. "Then there's self-selection: Perhaps people with the brain changes reported in these studies choose to stick with meditation while others do not." In other words, we should use caution when championing results.

Meditation might not be good for everyone all the time.

Some seem to believe mindfulness practice will invariably induce a sense of peace and calm. While this can be the experience for many, it is not the experience for all. At times, sitting quietly with oneself can be a difficult—even painful—experience. For individuals who have experienced some sort of trauma, sitting and meditating can at times bring up recent or sometimes decades-old painful memories and experiences that they may not be prepared to confront.

In a new study published in the journal *PLoS ONE*, Jared Lindahl and colleagues interviewed 100 meditators about "challenging" experiences. They found that many of them experienced fear, anxiety, panic, numbness, or extreme sensitivity to light and sound that they attributed to meditation. Crucially, they found that these experiences weren't restricted to people with "pre-existing" conditions, like trauma or mental illness; they could happen to anyone at any time.

In this new domain of research, there is still a lot we do not understand. Future research needs to explore the relationship between case histories and meditation experiences, how the type of practice relates to challenging experiences, and the influence of other factors like social support.

What kind of meditation is right for you? That depends.

"Mindfulness" is a big umbrella that covers many different kinds of practice. A 2016 study compared four different types of meditation, and found that they each have their own unique benefits.

During body scan, for example, participants saw the biggest increases in how aware they were of their bodies (unsurprisingly) and the sharpest decline in the number of thoughts they were having, particularly negative thoughts and thoughts related to the past and future. Loving-

kindness meditation led to the greatest boost in their feelings of warmth and positive thoughts about others. Meanwhile, observing-thought meditation seemed to increase participants' awareness of their thoughts the most. Previous research also suggests that observing-thought meditation has an advantage in reducing our judgmental attitude toward others.

Taken together, these and other studies suggest that if you're tackling a specific issue—say, feeling disconnected from your body—then you can choose a practice aimed at helping that issue, like the body scan. Loving-kindness might help in conflict with others, while observing-thought meditation can help break rumination.

“The type of meditation matters,” explain postdoctoral researcher Bethany Kok and professor Tania Singer. “Each practice appears to create a distinct mental environment, the long-term consequences of which are only beginning to be explored.”

How much meditation is enough? That also depends.

This isn't the answer most people want to hear. Many of us are looking for a medically prescriptive response (e.g., three times a week for 45-60 minutes), but the best guide might be this old Zen saying: “You should sit in meditation for twenty minutes every day—unless you're too busy. Then you should sit for an hour.”

To date, empirical research has yet to arrive at a consensus about how much is “enough.” Aside from the raw number of minutes, other factors may interact to influence the benefits of mindfulness practice: the type (e.g., formal sitting meditation practice vs. informal meditation practices, mindfulness vs. compassion, etc.), the frequency (multiple times a day vs. multiple times a week), and the quality (sitting and actually doing the practice vs. doing the practice “on the go”). While it's possible that in the next 10-15 years we will see a CDC-style recommendation regarding meditation practice, to date, the empirical data on the topic are still inconclusive.

Our recommendation? Try out different durations, types, and frequencies of meditation and jot down how you feel before and after the practice—and see what seems to work for you.

Taken from: https://greatergood.berkeley.edu/article/item/the_state_of_mindfulness_science