University of Louisville

ThinkIR: The University of Louisville's Institutional Repository

---

Electronic Theses and Dissertations

5-2020

The intersection of mindfulness and gratitude: examining the roles of gratitude and mindfulness practices within a 4-week mindfulness-based intervention on depressive symptoms in undergraduates.

Allison Rodgers
University of Louisville

Follow this and additional works at: <https://ir.library.louisville.edu/etd>

Part of the [Clinical Psychology Commons](#)

Recommended Citation

Rodgers, Allison, "The intersection of mindfulness and gratitude: examining the roles of gratitude and mindfulness practices within a 4-week mindfulness-based intervention on depressive symptoms in undergraduates." (2020). *Electronic Theses and Dissertations*. Paper 3475.
<https://doi.org/10.18297/etd/3475>

This Doctoral Dissertation is brought to you for free and open access by ThinkIR: The University of Louisville's Institutional Repository. It has been accepted for inclusion in Electronic Theses and Dissertations by an authorized administrator of ThinkIR: The University of Louisville's Institutional Repository. This title appears here courtesy of the author, who has retained all other copyrights. For more information, please contact thinkir@louisville.edu.

THE INTERSECTION OF MINDFULNESS AND GRATITUDE: EXAMINING THE
ROLES OF GRATITUDE AND MINDFULNESS PRACTICES WITHIN A 4-WEEK
MINDFULNESS-BASED INTERVENTION ON DEPRESSIVE SYMPTOMS IN
UNDERGRADUATES

By

Allison Rodgers, M.S.
B.A., Belmont University, 2015
M.S., University of Louisville, 2017

A Dissertation
Submitted to the Faculty of the
College of Arts and Sciences of the University of Louisville
in Partial Fulfillment of the Requirements
for the Degree of

Doctor of Philosophy
in Clinical Psychology

Department of Psychological and Brain Sciences
University of Louisville
Louisville, Kentucky

August 2020

Copyright 2019 by Allison Rodgers

All rights reserved

THE INTERSECTION OF MINDFULNESS AND GRATITUDE: EXAMINING THE
ROLES OF GRATITUDE AND MINDFULNESS PRACTICES WITHIN A 4-WEEK
MINDFULNESS-BASED INTERVENTION ON DEPRESSIVE SYMPTOMS IN
UNDERGRADUATES

By

Allison Rodgers, M.S.
B.A., Belmont University, 2015
M.S., University of Louisville, 2017

A Dissertation Approved on

August 1, 2019

By the following Dissertation Committee:

Dissertation Director
Paul Salmon, Ph.D.

Sandra E. Sephton, Ph.D.

Marci DeCaro, Ph.D.

Elizabeth Cash, Ph.D.

Amanda Mitchell, Ph.D.

DEDICATION

This dissertation is dedicated to my Grandma Jean Kaufman. She was an example of a smart, strong, female writer who persevered despite many obstacles. I feel blessed to have been able to learn from her grace, compassion, and impeccably precise vocabulary. I am assured that her warm presence has guided me through this process and helped me persevere as well.

ACKNOWLEDGEMENTS

This work would not have been possible without the guidance, support, and mentorship of Dr. Paul Salmon and Dr. Sandra Sephton. Embodying the spirit of gratitude within this dissertation, I feel exceptionally grateful toward Dr. Salmon for his endless encouragement, persistence, and kindness he has shown me through the years of earning my doctoral degree. Dr. Salmon's exemplary mentorship has helped to craft and refine my skills as a researcher, clinician, meditation teacher, and person. I also feel incredibly fortunate to have had the opportunity to work with Dr. Sephton who has instilled within me a passion for research and a thirst for knowledge. I am also thankful to my wonderful research lab, the members of the Mindfulness and Biobehavioral Health Research Lab. I would like to acknowledge Kala Phillips, for her determination, wisdom and generosity in sharing this study with me, Chelsea Siwik, for her encouragement and steadfast support as we navigated the milestones of graduate school together, and to Jackie Ma for her friendship, authenticity and cheerfulness through this process.

This work would also not have been possible without my dissertation committee members. My gratitude extends to Drs. Marci DeCaro, Liz Cash, and Amanda Mitchell for the generous dedication of their time, expertise, and wisdom in helping this project reach fruition. Without their assistance in the many stages of this project, its success and completion would not have been possible.

I would like to thank my incredible parents, Bob and Barri Hicks. The depth of their love, support, and belief in me knows no bounds. I am grateful to my dad, for his example of tireless devotion to a craft, and to my mom for her kindness and selflessness.

I would also like to thank my brother, Dr. Adam Hicks, for his courageous example of pursuing his dreams, overcoming obstacles, and maintaining an unwavering work ethic that continues to inspire me. My journey through graduate school, including the completion of this dissertation, would not have been possible without the strong pillars of my family that I so heavily rely on. And finally, to my saint of a husband, Joshua Rodgers, for his unbelievable patience, encouragement and support that has lifted my sails and helped this project reach completion.

ABSTRACT

THE INTERSECTION OF MINDFULNESS AND GRATITUDE: EXAMINING THE ROLES OF GRATITUDE AND MINDFULNESS PRACTICES WITHIN A 4-WEEK MINDFULNESS-BASED INTERVENTION ON DEPRESSIVE SYMPTOMS IN UNDERGRADUATES

Allison Rodgers

August 1, 2019

The practice and research of mindfulness has increased exponentially in recent decades. The tendency to pay attention, on purpose, nonjudgmentally, in the present moment has strongly been associated with better physical and mental health outcomes. However, ongoing discourse between mindfulness practitioners and its purists highlights the necessity to better understand and define the concept. One related construct, gratitude, has received widespread popularity in everyday settings, but lacks depth in empirical investigation. It stands to reason that one's ability to pay careful attention to both internal and external stimuli would heighten the tendency to notice things for which one is grateful. Conversely, a grateful person is likely to be in tune with the present moment. While the overlap between gratitude and mindfulness may be intuitive, empirical investigation is significantly lacking. The present study sought to investigate the relative and combined influence of mindfulness and gratitude with symptoms of depression in undergraduate students. The current study explored these constructs (i.e. mindfulness, gratitude, symptoms of depression) in the context of a mindfulness-based intervention known as Koru. This 4-week, skills-based intervention includes mindfulness practices such as seated and walking meditation and requires daily gratitude logging. It was

hypothesized that mindfulness and gratitude would be significantly associated with one another and both negatively associated with symptoms of depression at baseline. Effects of the intervention were also explored; it was hypothesized that from baseline to follow-up, mindfulness and gratitude would significantly increase, while symptoms of depression would decrease. It was hypothesized that class attendance, meditation frequency/duration, and gratitude logging would predict slope of change in symptoms of depression. Finally, it was predicted that change in gratitude would mediate change in symptoms of depression and change in mindfulness would mediate change in symptoms of depression. Then, in gaining a better understanding of how mindfulness and gratitude interact, it was hypothesized that changes in mindfulness would mediate changes in gratitude and vice versa.

One hundred undergraduate roommate participants provided self-report measures of demographics, mindfulness, gratitude, and symptoms of depression prior to the intervention and again immediately following. Due to not meeting eligibility criteria, the final sample consisted of 93 participants. The intervention consisted of four 75-minute weekly sessions teaching mindfulness skills. Nine intervention groups were conducted over the course of one semester. Participants were required to complete an electronic log each evening responding to whether they meditated, meditation duration and type and what they were grateful for. Correlation and regression analyses examined relationships at baseline. Effects of the intervention were examined using repeated measures ANOVA and hierarchical regression analyses. Mediation was examined using the MacArthur Approach to mediation. Multiple hierarchical regression analyses adjusted for theoretical and empirically-derived controls in secondary analyses.

Results revealed that at baseline, gratitude was significantly associated with state but not trait mindfulness. Additionally, gratitude, state mindfulness, and trait mindfulness were all significantly negatively related to depression at baseline. In regression models, gratitude, trait mindfulness, and state mindfulness were each a significant independent predictor of symptoms of depression. When included in the same model, both state and trait mindfulness accounted for variance contributed by gratitude to symptoms of depression. Following Koru, gratitude significantly increased from baseline to follow-up, while symptoms of depression significantly decreased. Koru class attendance and gratitude log completion (frequency and number of items listed) significantly predicted the slope of reduction in depressive symptoms. In mediation analyses, slope of change in state mindfulness mediated the change in symptoms of depression.

Findings provide support for the association between mindfulness and gratitude and suggest that broader, state-like qualities of mindfulness are more strongly linked to gratitude than dispositional qualities. Further, both mindfulness and gratitude are strongly associated with fewer depressive symptoms, highlighting a potential protective factor for undergraduates. Results of the intervention demonstrate promise for the reduction of depressive symptoms and increase in gratitude through practicing mindfulness. Finally, results of mediation analyses suggest that the increase in state mindfulness may be an active component contributing to the beneficial results of Koru on symptoms of depression. Overall, implementation of mindfulness-based interventions on college campuses—that incorporate both mindfulness and gratitude components—may help alleviate psychological distress.

TABLE OF CONTENTS

	PAGE
DEDICATION.....	iii
ACKNOWLEDGEMENTS.....	iv
ABSTRACT.....	vi
LIST OF TABLES.....	xv
LIST OF FIGURES.....	xviii
INTRODUCTION.....	1
Mindfulness.....	3
Characterization of Mindfulness.....	4
Measurement of Mindfulness.....	5
Gratitude.....	5
Characterization of Gratitude.....	6
Measurement of Gratitude.....	7
The Relationship between Mindfulness and Gratitude.....	8
Current Research.....	9
Convergence and Divergence of Constructs.....	11
Convergence.....	11
Divergence.....	12
Mindfulness and Gratitude in Practice: An Experimental Model.....	13

Upward Spiral.....	13
Pragmatic Benefits.....	15
Application of Proposed Model.....	17
College Student Stress and Depression.....	17
Mindfulness and Depression.....	19
Gratitude and Depression.....	19
Koru Mindfulness for Emerging Adults.....	21
Study Purposes and Hypotheses.....	21
Aims and Hypotheses.....	23
METHOD.....	25
Recruitment.....	25
Participants	26
Procedure	27
Study Intervention	29
Measures	29
Demographic Questionnaire	30
Gratitude Resentment and Appreciation Task – Revised	31
Mindful Awareness Attention Scale—Trait Version	31
Cognitive and Affective Mindfulness Scale – Revised	32
Patient Health Questionnaire-9	32
Practice Log Data.....	33
Effects of Koru Session.....	33
Additional Practice Data Considerations.....	34

Attendance Data.....	34
Mindfulness Practice	35
Gratitude Practice	35
Statistical Analyses	36
Data Preparation	36
Testing Assumptions of Dyadic Data	36
Surveying Data for Contextual Factors of Intervention.....	37
Preliminary Analyses	38
Analyses.....	39
Aim 1.....	39
Aim 2.....	40
Aim 3.....	40
Aim 4.....	41
Secondary Analyses.....	42
Selection of Control Variables for Secondary Analysis.....	42
Theoretically-derived Control Variables.....	42
Empirically-derived Control Variables.....	43
Potential Roommate-related Control Variables.....	44
Data Preparation for Secondary Analysis.....	44
Preliminary Analyses for Secondary Analysis.....	45
Hierarchical Multiple Regression for Secondary Analysis.....	46
Sample Size and Statistical Power.....	46
RESULTS.....	48

Data Preprocessing.....	48
Sample Characteristics.....	48
Psychometric Properties.....	49
Intervention Data Preprocessing.....	51
Primary Analyses.....	53
Aim 1: Cross-Sectional Model: Preliminary Analyses.....	54
Aim 1: Cross-Sectional Model: Pearson's r Correlation.....	54
Aim 1: Cross-Sectional Model: Hierarchical Regression with Interaction Term.....	55
Aim 2: Effects of Intervention – Preliminary Analyses.....	57
Aim 2: Effects of Intervention – Repeated Measures ANOVA.....	59
Aim 2: Effects of Intervention – Hierarchical Linear Regressions.....	60
Aim 3: Upward Spiral—Preliminary Analyses.....	63
Aim 3: Upward Spiral—MacArthur Approach to Mediation.....	64
Aim 4: Upward Spiral for Symptoms of Depression—Preliminary Analyses.....	65
Aim 4: Upward Spiral—MacArthur Approach to Mediation.....	66
Secondary Analyses.....	67
Preliminary analyses of potential control variables for secondary analyses.....	68
Selection of control variables for secondary analyses.....	69
Aim 1: Mindfulness, Gratitude, Symptoms of Depression at Baseline— Hierarchical Regressions.....	71

Aim 2: Effects of Intervention—Repeated Measures ANCOVA.....	74
Aim 2: Effects of Intervention – Hierarchical Regressions.....	75
Aim 3: Upward Spiral – Hierarchical Regression.....	77
Aim 4: Upward Spiral for Symptoms of Depression—Hierarchical Regression.....	78
DISCUSSION.....	80
Main Findings.....	80
Primary Analyses.....	80
Aim 1.....	80
Aim 2.....	83
Aim 3.....	86
Aim 4.....	87
Further Discussion of Significant Results of Primary Analyses.....	88
Secondary Analyses Findings.....	95
Hypothesis 1.4 – Semester Stress.....	96
Hypothesis 1.4 and 2.3—Employment Status.....	96
Hypothesis 2.3 and 4.2—GPA.....	97
Summary of Secondary Analyses.....	98
Strengths and Limitations.....	99
Implications and Future Directions.....	102
Treatment Approach for Depression in Undergraduates.....	104
Examination of Active Intervention Components.....	104
Use of Control Variables in Secondary Analysis.....	105

Conclusions.....	105
REFERENCES.....	107
APPENDIX A.....	166
APPENDIX B.....	171
APPENDIX C.....	172
APPENDIX D.....	173
APPENDIX E.....	174
APPENDIX F.....	179
CURRICULUMM VITA.....	180

LIST OF TABLES

TABLE	PAGE
1. Correlations between mindfulness and gratitude subscales.....	123
2. Outline of proposed analyses including question of interest and hypotheses for each aim.....	124
3. Sample characteristics.....	125
4. Sample descriptives of independent and dependent variables at baseline and follow-up.....	126
5. Descriptive characteristics of attendance of Koru classes.....	127
6. Descriptive characteristics of daily meditation log completion.....	128
7. Descriptive characteristics of gratitude log completion.....	129
8. Correlation matrix of key study variables at baseline.....	130
9. Summary of regression models predicting symptoms of depression at baseline.....	131
10. Summary of repeated measures ANOVA examining effects of time on key study variables.....	132
11. Summary of regression analyses examining slope of change in symptoms of depression as the outcome variables, outlined by hypothesis number using intent-to-treat-principles for missing data.....	133
12. Summary of regression analyses examining slope of change in symptoms of depression as the outcome variables, outlined by hypothesis number without intent-to-treat principles.....	134

13. Summary of regression analyses using MacArthur Approach to mediation to examine the potential mediating role of slope of change in gratitude on the change in state mindfulness from baseline to follow-up.....	135
14. Summary of regression analyses using MacArthur Approach to mediation to examine the potential mediating role of slope of change in state mindfulness on the change in state mindfulness from baseline to follow-up.....	136
15. List of potential control variables, by type of control variable.....	137
16. Associations between control variables, predictor variables (mindfulness, gratitude), and outcome variables (symptoms of depression) for the purpose of screening multicollinearity and identifying empirically-derived control variables.....	138
17. Summary of regression analyses of baseline gratitude predicting symptoms of depression with inclusion of control variables.....	139
18. Summary of regression analyses of baseline trait mindfulness predicting symptoms of depression with inclusion of control variables.....	140
19. Summary of regression analyses including interaction term in Model 3 of baseline trait mindfulness, gratitude predicting symptoms of depression with inclusion of control variables.....	141
20. Summary of regression analyses of baseline state mindfulness predicting symptoms of depression with inclusion of control variables.....	142
21. Summary of regression analyses including interaction term in Model 3 of baseline state mindfulness, gratitude predicting symptoms of depression with inclusion of control variables.....	143

22. Summary of regression analyses of Koru class attendance predicting slope of change in symptoms of depression with inclusion of control variable, using intent-to-treat principles.....	144
23. Summary of regression analyses of gratitude log completion (mean # of items listed, total # of items listed) predicting slope of change in symptoms of depression with inclusion of control variables, both with and without intent-to-treat principles.....	145
24. Summary of regression analyses using MacArthur Approach to mediation to examine the potential mediating role of slope of change in gratitude on the change in state mindfulness from baseline to follow-up with inclusion of control variables.....	146
25. Summary of regression analyses using MacArthur Approach to mediation to examine the potential mediating role of slope of change in state mindfulness on the change in symptoms of depression from baseline to follow-up with inclusion of control variables.....	147
26. Summary of significant findings of primary analyses outlined by Aim (1-4).....	148
27. Summary of significant findings with control variables (sex, minority status, employment status, semester stress, GPA, and financial difficulties) in secondary analyses.....	149

LIST OF FIGURES

FIGURE	PAGE
1. Intention-Attention-Attitude Model adapted to illustrate cogno-affective qualities of attitude.....	150
2. Proposed conceptual intersection of mindfulness and gratitude.....	151
3. Illustration of conceptual model of upward spiral of mindfulness and gratitude.....	152
4. Aim 1: Baseline associations among mindfulness, gratitude and symptoms of depression.....	153
5. Aim 2: Effects of gratitude and mindfulness components of Koru Mindfulness on symptoms of depression.....	154
6. Aim 3. The slope of change in gratitude will mediate the change in mindfulness from the intervention. The slope of change in mindfulness will mediate the change in gratitude from the intervention.....	155
7. Aim 4: The effects of slope of change in gratitude and mindfulness from baseline to follow-up on changes in symptoms of depression: a mediation approach.....	156
8. Stepwise schedule of research activities for each of the nine intervention groups.....	157
9. Flow diagram of participant progression through recruitment to data analyzation.....	158

10. Frequency of depression scores at baseline illustrating significant elevation cut-off score.....	159
11. Line graph demonstrating change from baseline to follow-up in gratitude.....	160
12. Line graph demonstrating change from baseline to follow-up in state mindfulness...	161
13. Line graph demonstrating change from baseline to follow-up in trait mindfulness...	162
14. Line graph demonstrating change from baseline to follow-up in symptoms of depression.....	163
15. Line graph illustrating differences in slope of change in symptoms of depression by percentage of Koru sessions attended.....	164
16. Scatterplot demonstrating the significant association between greater grade point average and greater reduction in symptoms of depression.....	165

INTRODUCTION

In recent decades, striking economic development and technological advancements have propelled society into unprecedented heights of productivity and progress (Helliwell, Layard, & Sachs, 2012). Yet, new crises have emerged—evidenced by soaring rates of chronic health conditions (e.g., diabetes, obesity) and mood disorders (e.g., anxiety and depression). Why is it that now, with the most wealth, goods, and services intended to ease everyday living, rates of unhappiness are peaking (Helliwell et al., 2012)? According to the ‘hedonic treadmill’ theory, happiness is elusive and short-lived because individuals incorrectly believe happiness lies just around the corner once an item (relationship, goal, material good) is obtained—facilitating an endless and exhaustive pursuit of happiness (Brickman, 1971). Then, once the object of desire is obtained, individuals naturally adapt, awareness fades, and the emotional state returns to neutral—perpetuating the hedonic treadmill.

An evolving remedy may be found through mindfulness. Mindfulness is frequently defined as “awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2013, p.143). Mindfulness shifts the focus from incessant *doing* and *obtaining* to simply *being* through various forms of meditation. While often viewed as counter-culture, both practicing mindfulness meditation and the innate tendency to be mindful share associations with physical and mental health (Chiesa & Serretti, 2009; Keng, Smoski, & Robins, 2011; Khoury, Sharma, Rush, & Fournier, 2015; Zimmaro et

al., 2016). Practicing gratitude may also be an effective remedy to the hedonic treadmill. Gratitude is often referred to as a “cogno-affective” quality within a mindfulness framework that embodies both cognitive (i.e. logical, intellectual) and affective (i.e. emotion, warmth) characteristics (Shapiro & Schwartz, 2000). In a similar way to mindfulness, the practice of gratitude may counteract the tendency for upward social comparison by reversing the lens and viewing one’s life with abundance rather than scarcity (Polak & McCullough, 2006). Gratitude is commonly characterized as a “life orientation toward noticing and appreciating the positives in life” (Wood, Froh, & Geraghty, 2010). Gratitude may protect against the lifetime risk of mental health conditions including anxiety, depression, and substance use disorders (Wood et al., 2010).

Independently, mindfulness and gratitude provide a host of well-documented benefits, but their intentional co-investigation is lacking. Perhaps these elements, when practiced in synchrony, may mutually facilitate one another to bolster positive outcomes and most effectively target psychological distress prevalent in this fast-paced, perpetually under-satisfied culture. The current research proposes to examine both mindfulness in gratitude in the reduction of symptoms of depression and is organized as follows: first, the concepts of mindfulness and gratitude are delineated; second, a model by which mindfulness and gratitude may relate and mutually facilitate one another is introduced. Third, the proposal suggests the rising concern of college student mental health may serve as a prime candidate for application of the model. Finally, a research design is proposed by which this model may be employed and statistically analyzed.

Mindfulness

The origins of mindfulness can be traced to Buddhist philosophy and to the Pali word ‘sati,’ which incorporates elements of both “memory” and “lucid awareness” (Bodhi, 2011). Mindfulness as a practice, leads to liberation from suffering or ‘nibanna,’ (Bodhi, 2011). Although mindfulness awareness is incorporated in many wisdom traditions (Mikulas, 2011), its origins in a Western context are due largely to Jon Kabat-Zinn’s application of mindfulness in a medical setting (Kabat-Zinn, 2003). Stemming from Kabat-Zinn’s work, perhaps the most frequently cited definition characterizes mindfulness as ‘paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally’ (Kabat-Zinn, 1982). However, in later work, Kabat-Zinn (2003) expands upon this definition to include ‘an affectionate, compassionate quality within the attending, a sense of open-hearted, friendly presence and interest’ (p. 145). The embodied practice of mindfulness frequently occurs in the context of sitting meditation including breath and body awareness practices (Kabat-Zinn, 2003).

Although mindfulness has a rich historical tradition, in recent decades, scientists have begun to explore it from a more scientific and conceptual vantage point. Shapiro and colleagues (Shapiro, Carlson, Astin, & Freedman, 2006) delineate the three core ‘axioms’ of mindfulness: intention, attention, and attitude (Figure 1). Intention refers to the purpose for which an individual practices mindfulness—which shifts from self-regulation to self-exploration and finally to self-liberation (Shapiro, 1992). *Attention* is a moment-to-moment attending to internal and external experience. Finally, *Attitude* refers to the quality with which one attends to these experiences. In closer examination of the attitude component, Kabat-Zinn (Kabat-Zinn, 2013) has outlined seven attitudinal

qualities known as “mind” qualities: non-striving, patience, trust, acceptance, letting-go, non-judging, and openness (Kabat-Zinn, 1982). Shapiro and Schwartz (2000) suggest five additional, more affective-based “heart” qualities: gentleness, generosity, empathy, loving-kindness, and gratitude. The three axioms of this model are interconnected as part of a singular, cyclical process of mindfulness. Shapiro and colleagues (Shapiro et al., 2006) postulate that by *intentionally* harnessing *attention* with an open, non-judgmental *attitude* a shift in perspective occurs that accounts for many of the transformational effects in mindfulness.

Characterizations of Mindfulness. Despite its long-standing tradition as a meditative practice, in current research contexts, mindfulness has been increasingly characterized as a dispositional or intrinsic quality (Baer, 2011). Those who possess high levels of dispositional mindfulness, a ‘state’ of mindfulness is thought to be more easily accessible. Hollis-Walker and Colosimo (Hollis-Walker & Colosimo, 2011) contribute to the discussion characterizing dispositional mindfulness as, “a positive potentiality of human consciousness, comprised of a confluence of cognitive (e.g., observation) and attitudinal (e.g., self-compassion) elements” (p. 227). Importantly, each of these characterizations include an attitudinal component in addition to the traditionally cited attentional components.

In addition to its reference as a dispositional quality, mindfulness can also be cultivated through practice. Mindfulness was first introduced in Western healthcare as a clinical intervention in 1979 by Jon Kabat-Zinn and colleagues who developed the Mindfulness-Based Stress Reduction (MBSR) program. Since its inception, MBSR has been implemented in medical centers, hospitals, and clinics worldwide (Kabat Zinn,

2013). The MBSR program employs a range of contemplative practices, including sitting meditation, a body scan, and gentle yoga (Kabat-Zinn, 2003). In addition to MBSR—the hallmark intervention—numerous variations, known as Mindfulness-Based Interventions (MBIs), have been implemented. These interventions include Mindfulness-Based Cognitive Therapy (MBCT), an eight-session group-based mindfulness intervention for recurrent depression and Koru Mindfulness a four-session skills-based mindfulness intervention for emerging adults (Morgan, 2003; Greeson, Juberg, Maytan, James, & Rogers, 2014; Segal, Williams, & Teasdale, 2018).

Measurement of Mindfulness. Ongoing discussion among traditional mindfulness purists and more contemporary practitioners contributes to the difficulty in its measurement (Hofmann & Asmundson, 2008; Chiesa, 2013). Despite this difficulty, the burgeoning of mindfulness research has resulted in the development of several widely-cited self-report questionnaires including the Philadelphia, Toronto and Freiburg Mindfulness scales (Lau et al., 2006; Walach et al., 2006; Cardaciatto, et al., 2008). A more frequently cited measure, The Mindfulness Attention Awareness Scale – Trait Version (MAAS; Brown & Ryan, 2003) was developed to measure trait, or dispositional mindfulness through assessing one’s innate tendency for mindful attention and awareness in daily life. In contrast, the Cognitive Affective Mindfulness Scale-Revised (CAMS-R; Feldman et al., 2007) is posited as a measurement of state-like mindfulness in which responses measure the propensity for experiencing four components of the mindful state: attention, awareness, present-focus, acceptance/nonjudgment.

Gratitude

Gratitude is a less-studied, yet equally important component of psychological well-being. The theoretical underpinnings of gratitude span across religions, politics, and culture. Although its scientific analysis as a psychological construct is relatively recent, gratitude has long been valued by authors and philosophers. G.K. Chesterton (1917, p.59) stated, “I would maintain that thanks are the highest form of thought, and that gratitude is happiness doubled by wonder.” Cicero said that, “Gratitude is not only the greatest of virtues, but the parent of all the others” (Cicero, 1951).

Given its rich presence spanning across disciplines and generations, several competing gratitude theories exist. A frequently cited theory by Watkins (2014) known as the Amplification Theory posits that gratitude enhances well-being by amplifying the good in one’s life. Just as a magnifying glass focuses and enhances an image, Watkins suggests gratitude amplifies the good in past memories, the present, and in others. However, Frederickson (Fredrickson, 2004) suggests gratitude also builds future capital. In her widely-cited Broaden-and-Build theory, Frederickson describes evolutionary action-tendencies that result from conscious or subconscious emotion appraisals (Lazarus, 1991; Levenson, 1994; Oatley & Jenkins, 1996). For example, fear is linked with the urge to escape, anger with the urge to fight, and disgust with the urge to expel. Negative emotion action-tendencies are narrow and specific. However, in the case of positive emotions, action-tendencies are broadened, providing a wide array of possible response choices (e.g., play, explore, create). Fredrickson posits that gratitude, specifically, sparks an action-tendency to act prosocially in response to a perceived benefit. Gratitude builds capital by generating creativity in the ways in which gratitude is

expressed, deepening spirituality, building social bonds, and strengthening communities (Fredrickson, 2001; Emmons & Shelton, 2002)

Characterizations of Gratitude. The origins of the term ‘gratitude’ are derived from the word ‘gratia’ which means grace, graciousness or gratefulness (Pruyser, 1976). Presently, gratitude has several distinct forms including an emotion, a mood, a virtue, an affective trait, and a life-orientation (McCullough, Emmons, & Tsang, 2002; Watkins, 2014). However, for the sake of clarity and brevity, the prevailing definitional dichotomy exists between a temporary emotional state known as ‘benefit-triggered gratitude’ and a more generalized form of thankfulness (Fredrickson, Tugade, Shiota, & Kirby, 2016). For example, one can be grateful for a birthday gift (benefit-triggered) or thankful for a sunny day (generalized). In the first definition, gratitude is an emotion that arises in response to aid which is perceived to be costly, altruistic, and valuable (Wood, Maltby, Stewart, Linley, & Joseph, 2008). This characterization, however, is incomplete as it does not adequately capture the nature of gratitude which can be directed toward non-specific benefactors (e.g., Mother Nature). Bridging this gap, Wood and colleagues (2010) propose a definition of gratitude which defines gratitude as a broader life-orientation or worldview in which one notices and appreciates the positive aspects of life.

Conceptualized as both a disposition and a habit that can be cultivated through practice, the use of formal gratitude exercises in psychological research has increased in recent decades. To date, 38 studies have published outcomes of brief gratitude interventions with four main categories of intervention: lists, journaling, contemplation, and behavioral expression (Wood et al., 2010; Dickens, 2017). However, the “classic” method of inducing a grateful mood is through listing items for which one is grateful—

known as gratitude lists. Similar interventions utilize a gratitude journal which expands upon the list with additional, attributional detail. Both gratitude listing and journaling typically occur on a regular basis in which participants are asked to complete the grateful writing task several times per week.

Measurement of Gratitude. The ubiquitous nature of gratitude, existing in multiple disciplines and generations, complicates both its definition and assessment. Despite the difficulty in operationalizing the concept, a handful of self-report measures exist. Most frequently cited, is the Gratitude Questionnaire-6 (GQ-6)(McCullough et al., 2002) which is a unifactorial, 6-item questionnaire assessing the intensity, frequency, density (number of different situations) and span (number of different recipients) of gratitude. Multifactorial measurements of gratitude also exist including the Gratitude Resentment and Appreciation Task (GRAT; (Watkins, Woodward, Stone, & Kolts, 2003). The GRAT is a 44-item self-report questionnaire consisting of a 3-factor structure including: sense of abundance, simple pleasures and social appreciation. However, each of the measurements claiming to measure gratitude contains critical methodological flaws. In particular, the most widely used measurement, the GQ-6, is restricted by a small number of items, limited variability, and significant ceiling effects. Preliminary research suggests that use of the GRAT-R among undergraduate samples may be most effective as it reduces the risk of ceiling effects and provides more detailed information contained within subscales (Hicks & Salmon, 2017).

The Relationship between Mindfulness and Gratitude

Despite the widespread discussion of gratitude in religious, philosophical and everyday contexts, and the inherent overlap with mindfulness practice, these two

psychological constructs lack, concurrent empirical investigation. Whereas clinical applications of mindfulness in a Western setting primarily evolved from treatment for chronic pain (Kabat-Zinn, 1982), the roots of mindfulness can be found in many wisdom traditions, particularly Buddhism. This migration into a Western, medical setting has been criticized for its focus on “bare-attention” and neglect of cognitive and attitudinal components such as gratitude (Williams & Kabat-Zinn, 2011). Garland and colleagues (Garland, Gaylord, & Fredrickson, 2011) echo the necessity of returning to emotional and semantic frames of reference for mindfulness—contrasting with the contemporary, non-evaluative view that mindfulness exists in a “vacuum of dispassionate observation” (p.22). In his Mindfulness-in-Meaning model, Garland suggests mindfulness exerts an influence on well-being through increased flexibility, which facilitates reappraisals, and engenders positive emotion and meaning-making. Their model creates a foundation for understanding the function of positive emotions in mindfulness and serves to inform the following discussion of gratitude within MBIs.

Current Research. As of 2019, ten studies have examined both mindfulness and gratitude in some capacity (See Appendix A). The majority of these studies (n=7), offer preliminary evidence of a benefit in practicing mindfulness and gratitude together. Overall, the seven intervention studies provide initial evidence of increased gratitude, mindfulness, self-compassion, resilience, and positive affect, while reducing stress, anxiety and depression through practicing mindfulness and gratitude together. Among the two study designs that permitted comparison of gratitude and mindfulness interventions—each performed comparably. Specifically, both gratitude and mindfulness interventions showed improvements in positive affect and reduction of stress,

anxiety/depression with few significant differences emerging across groups. However, these studies lack data on how frequently participants practiced which does not allow for understanding of active components of the intervention. Further, these studies employ a broad approach to inclusion of variables which is untethered to theory. Nonetheless, these studies provide at least preliminary evidence that mindfulness and gratitude when combined may enhance aspects of well-being.

The available cross-sectional studies examining gratitude and mindfulness permit a narrower discussion of specific outcome variables (e.g., problem gambling, pregnancy experience) in unique subgroups. Table 1 categorizes these studies and shows mixed evidence of a significant relationship between mindfulness and gratitude. Importantly, these irregularities may be due to differences in sample characteristics and inconsistent measurement as no two studies examined the same populations or employed the same measurements. Despite the mixed findings, there is reason to believe a positive association exists, based on a more recent study of two independent samples of undergraduates (Hicks, Salmon, & Burke, 2017; Hicks, Neace, DeCaro, & Salmon, 2018). In this study, mindfulness and gratitude were significantly correlated to one another ($r = .421$; See Table 1) and contribute unique variance to the prediction of positive and negative affective states.

Based on the current status of the research, several important questions remain. First, how do mindfulness and gratitude relate to one another—how divergent or overlapping are these constructs? Second, can gratitude be intentionally included within a MBI for incremental benefits in targeting college student mental health? And third, do mindfulness and gratitude mutually facilitate one another? The following is an

integrative conceptual framework of mindfulness and gratitude that encompasses (a) their inherent similarities, (b) differences, (c) and practical interdependence for one another. Finally, a model is proposed that views gratitude as a potential mechanism by which mindfulness may enhance psychological well-being.

Convergence and Divergence of Constructs.

Convergence. Aside from the inclusion of gratitude as an attitudinal aspect of mindfulness (Figure 1; (Shapiro & Schwartz, 2000) and a broader discussion of positive emotion and mindfulness (Garland et al., 2010) integrative theories fail to capture this relationship. Despite this oversight, the conceptual similarities warrant further research. Figure 2 illustrates the proposed convergences and divergences of mindfulness and gratitude based on the existing burgeoning literature, drawing from respective measurement subscales (FFMQ, GRAT-R), and referencing research from their respective fields. Regarding their conceptual similarities, both mindfulness and gratitude originated in spiritual or religious origins and separately, recognize a sense of impermanence or recognition of what is—in light of its possible absence (Khong, 2009; Wood et al., 2010). Additionally, their intentional practice fosters a sense of awareness (Teasdale, Segal, & Williams, 1995; Watkins et al., 2003), openness (Neto, 2007; Giluk, 2009), equanimity (Desbordes et al., 2015), and savoring (Bryant & Veroff, 2017).

Several correlational analyses demonstrate modest, but significant positive associations among mindfulness and gratitude; however, findings are mixed (See Appendix B). A cross-sectional analysis of constructs conducted by the author suggest consistent, yet moderate, associations across measurement subscales (See Table 1). Specifically, these findings suggest several related constructs with a strong connection

between the *Observe* and *Simple Pleasures* subscales. Support is also found for analogous item content across measurements (Hicks et al., *under review*). For example, the FFMQ includes an item (#31) stating, “I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow” (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), which shares similarities to GRAT-R item (#15) “Every Fall I really enjoy watching the leaves change colors” (Watkins et al., 2003). In sum, these findings suggest that mindfulness and gratitude both share an awareness of external cues—even those seemingly insignificant. Finally, neuroanatomical studies have shown activation of the same brain region, the medial prefrontal cortex (MPFC), in both mindfulness and gratitude interventions (Kini, Wong, McInnis, Gabana, & Brown, 2016).

Divergence. Although mindfulness and gratitude appear to overlap both conceptually and empirically, they also differ in certain aspects. Both concepts employ a sense of ‘noticing’ elements of daily life that are overlooked (Kabat-Zinn, 1993; Wood et al., 2010, p. 891). In mindfulness, however, this awareness is objective, non-judgmental, and ideally unencumbered by evaluative tendencies. In contrast, expressions of gratitude embody a positive appraisal lens leading to a sense of appreciation for objects of awareness. Additionally, gratitude inherently involves a cognitive component that can be externally expressed through verbal or written expression; whereas mindfulness, as it is frequently practiced, is ‘bare-attention’ with an internal focus (Bodhi, 2011). Finally, although gratitude can be experienced “in-the-moment,” it can also be contemplative and “after-the-fact,” embodying a retrospective quality not shared by mindfulness. The similarities and differences proposed in Figure 2—exhibiting some preliminary empirical support from the ten reviewed studies—serve as a guide for additional research to explore

this interrelationship. Specifically, this proposal aims to expand upon the current correlational research by further examining the convergences and divergences presented in Figure 2 by utilizing more robust measures.

Mindfulness and Gratitude in Practice: An Experimental Model

In addition to their similarities as dispositional qualities illustrated in Figure 2, mindfulness and gratitude share many antecedent and consequential similarities in practice. Because of this, mindfulness and gratitude deserve intentional co-investigation in the context of MBIs. The following sections outline a rationale for why this union may be particularly fruitful and provides an experimental model by which mindfulness and gratitude may function—a model which serves as a preliminary step in its examination.

Upward Spiral. The incremental, synergistic benefits of mindfulness and gratitude are proposed through an ‘upward spiral’ model. The upward spiral contrasts with typical downward spirals or “vicious cycles” associated with emotional dysfunction (Teasdale, 1983). For example, a depressed mood tends to increase access to unpleasant memories which increases rumination and activates other negative emotions and memories. Excessive rumination and frequent recollection of negative events decreases confidence, increases avoidance of pleasant events, and may deepen the depressed mood in a downward spiraling fashion (Teasdale, 1983). In contrast, positive emotions can broaden the scope of attention, allow for a greater possibility of response options, and build upon existing resources which ultimately enhances well-being (Fredrickson & Joiner, 2002). Drawing from work by Frederickson (2001) and Garland (2011), it is proposed that gratitude and mindfulness function in a similar manner of a self-

perpetuating upward spiral toward optimal functioning and serve to reduce symptoms of depression (Figure 3).

The proposed upward spiral begins with the initiation of mindfulness practice; individuals modulate the scope of attention from narrow (e.g., breath) to broad (e.g., thoughts, emotions, sensations). Research suggests that mindful attention releases the default mode of fixation (i.e., rumination) and allows for a broadened awareness of contextual factors (Brewer et al., 2011). This new, broadened awareness frequently creates a metacognitive shift, (de-centering) which in turn may enhance cognitive flexibility and allow for adaptable responding (Kang, Gruber, & Gray, 2013). From a de-centered, flexible mindset, individuals are then able to re-appraise stressors and find enhanced value in aspects of life that may have otherwise been overlooked. This recognition of life's benefits through reappraisal often fosters a sense of gratitude and positive emotion—an experience that could be further enhanced with concurrent, intentional gratitude practice (Watkins et al., 2008). In this phase, the upward spiral model diverts from traditional mindfulness processes and, through inclusion of a gratitude component, adds a cognitive layer of reappraisal to one's experience.

Sustained gratitude practice has been shown to initiate a positive attentional bias by which individuals have a broadened awareness to attend to and appraise events as positive (Fredrickson, 2001; Watkins et al., 2014). This positive attentional bias may be an effective emotion regulation strategy (Wadlinger & Isaacowitz, 2008) that contrasts typical negative threat-based biases seen in anxiety and depressive disorders (Mathews & MacLeod, 2002). Further, positive emotion and a positive attentional bias increase the accessibility and retrieval of positive memories which further enhances positive emotion,

strengthens relational bonds, and builds a well of positive experiences to draw upon during times of stress (Watkins et al., 2014). Consistent with the traditional upward spiral model of positive emotion (Fredrickson, 2001), increased coping resources may broaden thought-action repertoires, and allow for more flexible responses to stress—a process that could be accentuated by mindfulness, which teaches a slower, more reflective response style (Papies, Barsalou, & Custers, 2011). Finally, cross-fertilization between mindfulness and gratitude may reinforce attitudinal qualities shared by both domains such as acceptance, equanimity, and contentment. Through this process, gratitude may function as a mechanism within a MBI to improve psychological well-being and reduce psychological distress. In subsequent sections, this proposal will introduce aims and hypotheses that serve as a basis for testing this model.

Pragmatic Benefits. The existing research on this topic (Appendix A) includes components of mindfulness and gratitude to some degree, but lack rationale for the dual use of these components. Despite this omission, there is reason to believe mindfulness interventions may practically benefit from inclusion of a gratitude component and vice versa. Mindfulness research has endured criticism for its disregard of its Buddhist heritage and narrow focus on attention, foregoing cognitive affective, and attitudinal qualities (Bodhi, 2011; Grossman & Van Dam, 2011). The inclusion of gratitude within MBIs reinstates an attitudinal framework and begins to reconnect mindfulness with its rich spiritual tradition. Mindfulness is also criticized as being intangible and elusive, which may make it difficult for new practitioners to initiate (Grossman & Van Dam, 2011; Baltzell, Caraballo, Chipman, & Hayden, 2014). Gratitude, on the other hand, is exceptionally tangible, reflected in simple, familiar practices like ‘counting your

blessings.’ Gratitude and mindfulness contribute unique variance to positive emotional states (Hicks et al., 2017), suggesting their dual use could further bolster outcomes. More pragmatically, teaching and implementing gratitude interventions are straight-forward as well as time and cost-effective—allowing for seamless integration within MBIs. Finally, gratitude interventions are regarded as enjoyable by their practitioners, more so than traditional psychotherapy techniques (Geraghty, Wood, & Hyland, 2010) which may boost adherence and retention rates in MBIs.

In addition to the potential benefits of intentionally implementing gratitude exercises into MBIs, gratitude may also be enhanced by being incorporated into a mindfulness context. The traditional method of practicing gratitude relies heavily on written and verbal forms of expression; however, research suggests that requiring external articulation (e.g. writing, speaking), may detract from the effect of the grateful mood induction and be incompatible with sustained positive affect (Fredrickson, 2001; Lyubomirsky, Sousa, & Dickerhoof, 2006). Therefore, use of gratitude within a meditation setting may be most advantageous by freeing the individual to embrace gratitude in the moment, unencumbered by mode of expression. In addition, mindfulness research has expanded exponentially in recent decades, whereas gratitude research maintains modest, but steady growth. Given that the evidence for gratitude interventions is overwhelmingly positive, inclusion within the widely-published mindfulness field may provide greater traction for its investigation and reach a wider audience—mirroring the growing interest of self-compassion within mindfulness contexts (Neff, Kirkpatrick, & Rude, 2007). In sum, these two components, while emerging in psychological research

from disparate fields, may benefit practically from the cross-fertilization of combined implementation.

Application of Proposed Model

This model contrasts with previous work—which was often devoid of theory—by providing a rationale for why, and for whom, the integration of mindfulness and gratitude may be particularly fruitful. It is suggested that blended use of mindfulness and gratitude may be beneficial both (a) conceptually for the mutually facilitating nature of mindfulness and gratitude in the promotion of psychological well-being, and (b) pragmatically for the adherence and retention of such interventions. Importantly, the proposed model illustrated in Figure 3 serves as an ambitious foundation for future investigation. However, examination of the full model is outside of the scope of the current proposal which only serves as an initial investigation of the primary constructs of mindfulness and gratitude. Further, the proposed framework was intentionally selected for implementation within an undergraduate population as this sample may possess characteristics especially relevant to the proposed model. The pressure on undergraduates to succeed and tendency for upward social comparison through social media, make them prime candidates for mindfulness and gratitude practices—two skills which may directly target these stressors.

College Student Stress and Depression. This current trend of heightened stress on college campuses has been evidenced through increased prevalence rates of depression and anxiety (Beiter et al., 2015). According to the most recent National College Health Assessment (2017), more than a third of the sample of college students reported experiencing stress that negatively impacted their education. Further, more than

half of the college students surveyed had felt “hopeless” in the last year and 40% had felt “so depressed that it was difficult to function” (ACHA, 2017, p.14). In a sample of 351 undergraduates, levels of clinical depression rose to 20% in previously symptom-free students by mid-semester, and the presentation of these symptoms was directly predicted by relational and financial stressors (Andrews & Wilding, 2004; Lester, 2014). Alarming, research suggests the issue of mental health on college campuses is worsening (Kitzrow, 2003; Kadison & DiGeronimo, 2004; Xiao et al., 2017). If left unaddressed, the decline in mental health among undergraduates may result in university counseling centers becoming unable to adequately address the needs of students (Watkins, Hunt, & Eisenberg, 2012), increasing dropout rates (Daley, 2010), and greater prevalence of college student suicide (Garlow et al., 2008). Given these rising concerns, application of the current proposed model of mindfulness and gratitude may be advantageous in the effectively reducing depressive symptoms.

For example, traditional depression profiles are characterized by a negativity bias, low emotionality, and negative appraisal of self, world, and future (Uher, Payne, Pavlova, Perlis, & anxiety, 2014). Gratitude has the potential to directly offset these symptoms through reappraisal, positive emotion, and a positive mental filter. In addition to the potential *direct* effects, gratitude within a mindfulness context may also *indirectly* alleviate suffering through a deeper understanding and shifted, decentered relationship with one’s experience. From this decentered perspective, an individual may practice acceptance of suffering; and then, shift lenses from scarcity and negativity to thankfulness for the present. This recognition may be most feasible once a foundation of mindful acceptance has been fostered. The two sections following provide a brief review

of literature for the evidence of mindfulness and gratitude, separately, for the reduction in depressive symptoms.

Mindfulness and Depression. Mindfulness—both the dispositional quality and the implementation of MBIs—has demonstrated significant associations with reduction in symptoms of depression (Grossman, Niemann, Schmidt, & Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010; Way, Creswell, Eisenberger, & Lieberman, 2010). The results of a meta-analysis of MBSR for healthy individuals conducted by Khoury and colleagues reported the largest effect size (moderate) for depression, followed by stress, anxiety, distress and quality of life outcomes (Khoury et al., 2015). Among students in particular, Shapiro and colleagues reported significant reductions in symptoms of depression among medical and premedical students who participated in MBSR compared to a wait-list control condition (Shapiro, Schwartz, & Bonner, 1998). Recent research suggests a possible mechanism whereby mindfulness may reduce depressive symptomatology via changes in ruminative thinking, worry, attention regulation, and emotional reactivity (Deyo, Wilson, Ong, & Koopman, 2009; van der Velden et al., 2015). Mounting evidence suggests efficacy for MBI in the alleviation of depressive symptoms; however, interventions targeting college students specifically are limited. Given the recent trend of increased utilization of mental health services on college campuses, MBIs which are delivered in an efficient group-based format warrant additional empirical attention.

Gratitude and Depression. Continued research supports the positive influence of gratitude, both in practice and as an innate characteristic, with features of psychological well-being (Wood et al., 2010). In a review by Wood and colleagues (2010) a dozen studies have supported the link between gratitude and subjective well-being, which

includes high positive affect, low negative affect, and satisfaction with life. More recently, a meta-analysis by Dickens (Dickens, 2017) including 38 gratitude interventions revealed small to medium effect sizes with consistently positive outcomes for happiness, well-being, life satisfaction, positive affect, and depression across positive, negative, and neutral comparison groups. In addition to the established relationships among gratitude and well-being, the use of gratitude practices are beginning to be implemented in clinical settings for the alleviation of psychological distress (Seligman, Rashid, & Parks, 2006).

Seligman (2006) found that positive psychological interventions, such as those incorporating gratitude practices, could significantly reduce mild-to-moderate depression with effects extending to one-year follow-up. Indeed, such interventions resulted in higher remission rates than treatment as usual with medication for major depressive disorder. Of the six positive psychological exercises Seligman employed, the gratitude intervention had the strongest immediate impact on depression outcomes (Seligman et al., 2006). Positive psychological strategies, such as gratitude, may serve to bolster the effects of traditional therapies such as Cognitive Behavioral Therapy and Mindfulness-based therapies for depression. It has been suggested that gratitude performs a unique function in targeting rumination, a core symptom of depression (Gudan, 2010). Specifically, practicing gratitude may counteract rumination by altering the negative valence, reversing the negative intrapersonal context, and simplifying the highly abstract nature of depressive thinking styles. Furthermore, research suggests gratitude increases accessibility of positive memories creating a well of positive experiences to draw upon during times of sadness or stress (Watkins, 2014). Finally, gratitude increases social connection which may offset the tendency for isolation in a depressive episode (Algoe,

Haidt, & Gable, 2008). The mounting evidence for both mindfulness and gratitude in the alleviation of depressive symptoms warrants co-investigation as incorporation of both in an intervention may be more effective than the sum of their independent parts.

Koru Mindfulness for Emerging Adults

Koru Mindfulness is the first known intervention to include a gratitude component within a MBI (Greeson et al., 2014). Koru Mindfulness is a four-week mindfulness-based intervention designed to help reduce stress in emerging adults (Rogers & Maytan, 2012). By practicing different forms of meditations (i.e. seated meditation, walking meditation) and teaching practical mind-body skills (diaphragmatic breathing, body scan) students gain a greater awareness stress and tangible skills to manage it. Koru Mindfulness consists of four weekly 75-minute sessions led by a certified instructor and a required 10-minutes of daily home practice. To track home practice, participants complete daily logs with questions regarding meditation type and duration, a meditation reflection section, and a gratitude reflection section. To date, evidence of the effectiveness of Koru is promising: a randomized controlled trial (RCT) of Koru for college students revealed significant reductions in perceived stress with improvements in sleep, self-compassion and mindfulness compared to a wait-list control group (Greeson et al., 2014). Given these promising results, along with the rising mental health concerns on college campuses, Koru Mindfulness was selected as the intervention of choice for the current study.

Study Purpose and Hypotheses

This dissertation explored four specific aims using baseline and follow-up data from college student's participation in Koru Mindfulness. The first aim of this study was

to replicate and further extend previous findings demonstrating a correlational association between mindfulness, gratitude and depressive symptoms at baseline in a sample of undergraduates. This was accomplished through examination of associations between key variables of interest; specifically mindfulness (state and trait), gratitude and symptoms of depression. Shared and unique variance were explored within the relationship of mindfulness and gratitude with symptoms of depression. The second aim of this study was to examine the effects of the gratitude and mindfulness practice components of Koru Mindfulness on depressive symptoms. First (2.1), pre-post changes in mindfulness, gratitude and depressive symptoms were examined from baseline to follow-up. Second (2.2), attendance of Koru Mindfulness sessions were examined as a predictor of the slope of change in symptoms of depression. Next, reported daily meditation practice (2.3) and gratitude practice (2.4) were examined as separate predictor variables for the reduction of depressive symptoms. The third aim of the study explored the interrelationship of mindfulness and gratitude through the intervention—first (3.1), by testing if an increase in mindfulness from baseline to follow-up was partially or fully explained by changes in gratitude. Conversely (3.2), by testing if an increase in gratitude from baseline to follow-up was partially or fully explained by changes in mindfulness. The fourth aim of the study tested the effects of changes in (4.1) gratitude and (4.2) mindfulness on the changes in symptoms of depression from baseline to follow-up of the intervention. In congruence with the primary aims of this study, the following hypotheses are presented below and visually represented in Figures 4-6.

Aims and Hypotheses:

Aim 1: Examine baseline associations among mindfulness, gratitude and symptoms of depression (Figure 4)

- 1.1 Gratitude will be positively associated with mindfulness
- 1.2 Gratitude will be negatively associated with symptoms of depression
- 1.3 Mindfulness will be negatively associated with symptoms of depression
- 1.4 Mindfulness and gratitude will contribute independent and shared variance in their association with symptoms of depression

Aim 2: Examine the effect of gratitude and mindfulness components of Koru Mindfulness on symptoms of depression (Figure 5)

- 2.1 Pre-post participation in Koru Mindfulness will be associated with:
  - 2.1.1 an increase in gratitude
  - 2.1.2 an increase in mindfulness
  - 2.1.3 a decrease in symptoms of depression
- 2.2 Attendance of Koru Mindfulness courses will predict slope of change in symptoms of depression
- 2.3 Mindfulness practice (average time in minutes, total time in minutes, frequency of daily practice, percentage of days of intervention practiced) will predict slope of change in symptoms of depression
- 2.4 Gratitude practice (total # of entries, mean # of entries, total days gratitude log was completed, percentage of intervention days gratitude log was completed, and novelty of gratitude items listed) will predict slope of change in symptoms of depression

Aim 3: Exploring the relationship between changes in mindfulness and changes in gratitude through the intervention (Figure 6)

- 3.1 Changes in gratitude will mediate the change in mindfulness from (T1) baseline to (T2) follow-up
- 3.2 Changes in mindfulness will mediate the change in gratitude from (T1) baseline to (T2) follow-up

Aim 4: Explore mediation effects of gratitude and mindfulness on symptoms of depression (Figure 7)

- 4.1 Changes in gratitude will mediate the change in symptoms of depression from (T1) baseline to (T2) follow-up
- 4.2 Changes in mindfulness will mediate the change in symptoms of depression from (T1) baseline to (T2) follow-up

METHODS

Recruitment

Undergraduate roommates were recruited during the fall semester as part of a larger parent study examining mindfulness in the context of roommate dyads including attentional, cognitive, psychological, circadian, and neuroanatomical measures.

Participants were recruited through an online participation system (Sona Systems, Ltd.) and short in-class presentations conducted by a research associate from the lab. The online participation program provided a list of active research studies at the University. A brief summary of the larger research project (IRB 17.0059, A Dyadic Mindfulness Intervention for College Students and their Roommates – Mechanisms and Health Effects, University of Louisville EVPRI Internal Grant Program) was displayed on the online participation program which included a link and a description of research activities and eligibility criteria. Students who were recruited through the online participation system were largely first or second-year students who were primarily students enrolled in a course (i.e. Psychology 201) that involved participation in research for some form of extra credit or course credit.

In the Summer of 2017, a research assistant contacted course instructors from psychology classes, first-year orientation groups, and “Living-Learning Community” (LLC) courses to obtain permission to provide short in-class presentations to aid in study recruitment. Presentations included a brief description of mindfulness, a summary of the

larger research project, eligibility/exclusion criteria, and contact information for the study coordinator. Recruitment efforts focused on first-year orientation courses, as first and second-year students were the population of interest in the parent study. A total of 42 professors were contacted; and of these, 27 allowed a research associate to provide a short in-class presentation. Twenty-six brief class presentations were led by various research personnel.

Students expressed interest in participating in the larger research project by either registering online through the participation system website or by sending an email to the study coordinator. Interested students were reached through email by the study coordinator to confirm that they met eligibility criteria and to coordinate enrollment into groups based on the research activity schedule of the larger research project illustrated in Figure 8. A stepwise approach was used to allow research activities of the larger research project to be scheduled throughout the course of the semester to allow for the efficient allocation of resources.

Participants

A total of 98 students demonstrated initial interest in participating in the study. Figure 9 illustrates a flow chart of participant enrollment. Of the 98 students who initially expressed interest in participating, 13 students used the online participation website to sign up and 85 students emailed the study coordinator following a short in-class presentation. All 98 students were subsequently contacted by the study coordinator to ensure eligibility criteria were met and for coordination of enrollment in the larger research project.

It was a study requirement that participants live with a roommate who was willing to participate and whom also met eligibility criteria for the study. Eligibility criteria required that roommates both be first- or second-year students, between the ages of 18-26, and fluent in English. Recruitment was limited to first- and second-year students, as it was theorized that these students may experience additional stressors as a result of the new transitions into college (Economos, Hildebrandt, & Hyatt, 2008). Students who enrolled in undergraduate courses at the age of 17 were excluded from the study due to the requirement of parental consent. Students older than 26 were excluded due to assumed differences in life stage and the stressors that are typically associated with individuals of this age.

Among the 98 students contacted by the study coordinator, 8 did not meet eligibility criteria, 11 could not commit to the parameters of the study due to time constraints, and 25 did not reply to the study coordinator when contacted. Among the 98 who first expressed interest, 54 students and their roommates ($N=108$) were enrolled in the larger research project. Following email communication with the instructor for the Living Learning Community Course, an additional eight students were enrolled. Following confirmation with each of these eight students regarding initial interest in participation, a final total of 58 roommate dyads ($N=116$) agreed and were enrolled.

Procedure

This study was reviewed by the University of Louisville Institutional Human Subjects and was in accordance with its committee guidelines. Roommates who agreed to participate were reached through email by the study coordinator to organize participation according to the stepwise study design (Figure 8). The stepwise strategy allowed for nine

groups with start dates spread throughout the semester. Each group had a maximum of sixteen members. Participation groups were constituted by roommate dyads with the consideration of class schedules, employment commitments, and coordination of both roommates' schedules to participate in study activities together.

Roommate dyads were instructed to attend a one-hour lab visit in which they provided consent and began study procedures. At the time of the initial lab visit, research assistants confirmed eligibility criteria, outlined study procedures of the larger research project, and then asked participants to provide informed consent. Three roommate pairs ($n=6$) did not attend the first lab visit, one dyad chose not to participate at the time of lab visit due to the time commitment, and four dyads were excluded because one participant within each dyad did not meet eligibility criteria. A total of 50 dyads ($N=100$) provided informed consent and agreed to participate in the study.

Following informed consent, participants finished an online survey using REDCap (Research Electronic Data Capture), a website for managing online data. Roommates completed online surveys separately on private lab computers which compiled demographic information and email addresses. Following the lab visit, participants were informed that a link to study questionnaires would be emailed to them, and that they were to complete the questionnaires in a single, uninterrupted sitting within one week. Online questionnaires assessed a number of demographic domains, including personal, academic, and social variables, and measures of trait mindfulness, gratitude, and depressive symptoms.

Participant dyads were subsequently assigned to one of nine staggered Koru Mindfulness groups with instructions to attend all four sessions together. The intervention

took place over the course of 3-4 weeks. Following the final class, they were contacted to schedule a follow-up lab visit within one week. After the follow-up lab visit, participants completed tasks related to the larger research project and were again instructed to complete the same online questionnaires sent via email in one, uninterrupted sitting.

Study Intervention

As detailed previously and in a published manual (Rogers & Maytan, 2012), the Koru Mindfulness program consists of four 75-minute classes designed for emerging adults (Appendix C). Classes typically consist of 12-14 students taught by a certified Koru mindfulness teacher. As part of this study, the Koru Mindfulness program was free to participate, voluntary, not graded, and participation was not required for course credit. Some students received research participation credit as part of a course, although this was not required. Participants were required to enroll in the same Koru Mindfulness class as their roommate. Students were expected to practice meditation for a minimum of 10 minutes daily but were not required to practice with their roommate. Participants completed an online meditation log (Appendix D). The meditation log included space for daily documentation of meditation duration, meditation skills used, reflections on the meditation, and space to list items or experiences for which the student was grateful. Within each class, students learned and practiced different forms of meditation and mind-body skills such as dynamic breathing exercises, walking meditation, guided imagery, and eating meditation. Participants were provided iPods with meditation tracks that corresponded with Koru Mindfulness teachings. They were instructed to listen to the iPod tracks following each class and encouraged to do so with their roommate on a Bluetooth speaker provided through the study.

Measures

The measures included within this study are discussed below and presented in Appendix E. These measures were selected in acknowledgement of the methodological critiques of mindfulness and gratitude questionnaires. The GRAT-R was selected as the primary self-report measurement of gratitude as it has been validated among undergraduates, has a wider range of response options, and reduced risk of ceiling effects compared to the more frequently used GQ-6. In consideration of the current discourse among mindfulness measurements, two questionnaires assessing both dispositional/trait and broader, state mindfulness were selected for their respective purposes. The MAAS trait version questionnaire assessed dispositional or trait-level mindfulness. As a separate measurement of mindfulness, the CAMS-R was selected to measure changes in mindfulness through the intervention and capture a more flexible characterization. Inclusion of two measures of mindfulness helps to fill gaps in understanding regarding the classification of mindfulness (e.g. trait, state).

Demographic Questionnaire. The demographic questionnaire assessed personal and contact information, including name, email address, birthdate, age, sex, race, ethnicity, parent/guardian home address, and employment status, including typical shifts worked. Specific academic and roommate-related information were assessed through inclusion of additional questions on the demographic questionnaire. For example, the academic section asked questions about current major, credit hours completed, GPA, first- or second-year status, tuition assistance (merit-based or need-based), and stress of the semester. The roommate-specific section included questions regarding housing situation (e.g., dormitory room, off-campus house), living situation (e.g., number of

roommates), sharing of room (e.g., personal bedroom, separate beds in same room, shared bed), duration of relationship with roommate, method of roommate placement (e.g., random placement, roommate request), mean number of waking hours spent with roommate, and which roommate suggested participation in the study.

Gratitude Resentment and Appreciation Task – Revised (GRAT-R). The GRAT-R is a 44-item self-report measure aiming to assess gratitude (Watkins, Woodward, Stone & Kolts 2003; Appendix E). The GRAT-R consists of three components of gratitude: Sense of Abundance, Simple Pleasures, and Social Appreciation. Items are rated on a nine-point scale from 1 (“I strongly disagree”) to 9 (“I strongly agree.”) Sample items include, “I’m really thankful for friends and family” and “Life has been good to me.” A total composite score (ranging from 44-396) is calculated, as well as three factor scores (Sense of Abundance, Simple Pleasures and Social Appreciation) with greater values reflecting higher levels of gratitude. The GRAT-R demonstrates a high level of internal consistency (.92) and has been validated on a sample of college students (Watkins et al. 2003).

Mindful Attention Awareness Scale (MAAS), trait version. The MAAS trait version (Brown & Ryan, 2003) is a 15-item measure of dispositional mindfulness characteristics (Appendix E). The trait MAAS surveys an individual’s tendency to pay attention to, and general awareness of, events occurring in the present moment (e.g., “I rush through activities without being really attentive to them.” “I forget a person’s name almost as soon as I’ve been told it for the first time.”). Each of the 15 items are rated on a six-point Likert scale that ranges from ‘*Almost Always*’ to ‘*Almost Never*.’ A mean score is generated, with higher scores indicating greater levels of trait mindfulness. The trait

MAAS has been validated for use among undergraduate samples (Brown & Ryan, 2003) and has demonstrated strong internal consistency (Cronbach's alpha .80-.90), with similarly high test-retest reliability (Brown & Ryan, 2003).

Cognitive and Affective Mindfulness Scale - Revised (CAMS-R). The CAMS-R is a unidimensional 12-item measure designed to capture a broad range of mindfulness attributes (Feldman, Hayes, Kumar & Greeson, 2003; Appendix E). It assesses state-like qualities of mindfulness during general day-to-day occurrences on four components (attention, awareness, present-moment focus, non-judgment/acceptance) posited to be necessary to reach a mindful state. Sample items include, "I can accept things I cannot change" and "I am able to focus on the present moment." Each item is rated on a 4-point scale from 1 ("Rarely/Not at All) to 4 (Almost Always). A summary score of the 12 items is calculated with greater values reflecting more mindful qualities. The CAMS-R has been validated among two student samples and has demonstrated suitable internal consistency ($\alpha = .74, .80$) as well as convergent and divergent validity (Feldman, Hayes, Kumar & Greeson, 2003). Contrasting the MAAS, the CAMS-R is purported to measure a more fluid and state-like characterization of mindfulness.

Patient Health Questionnaire-9 (PHQ-9). The PHQ-9 is a self-report questionnaire widely used to screen for depression (Kroenke, Spitzer & Williams, 2001; Appendix E). The nine items of the PHQ-9 mirror the nine diagnostic criteria for major depressive disorder in the Diagnostic and Statistical Manual of Mental Disorders-V (DSM-V). Individuals rate the extent to which they have been bothered by symptoms of depression over the course of the past two weeks (e.g., "Little interest or pleasure doing things," "Feeling tired or having little energy"). Each item is rated on a four-point scale

from 0 (“Not at all”) to 3 (“Nearly every day.”) A total score is calculated by summing scores on the nine items. PHQ-9 scores greater than 8 represent a significant elevation, while scores greater than 10 indicate the clinical elevation of symptoms of depression. The PHQ-9 has demonstrated high sensitivity (88%) and specificity (88%) using a cut-off of >10 as diagnostically significant for major depressive disorder.

Practice Log Data

During the Koru intervention, daily electronic survey data was collected to capture mindfulness practice and gratitude responses. The daily electronic log was first sent to participants following the first Koru class and each subsequent day of the intervention until (and including) the fourth and final class. The log was sent electronically via email once in the morning, and if not completed, once again in the evening. It queried participants about their daily practice. A drop-down menu with more specific questions regarding the practice (i.e., duration, type) was then presented. Regardless of the response to practicing (i.e. yes or no) participants were provided a section for “Reflection” and a section labeled “I am grateful for...”. Several ways of observing use of intervention were explored and outlined in the following sections.

Effects of Koru Session. The Koru intervention was delivered over four group sessions. Each session focused on teaching and practicing different mindfulness skills (see Appendix C). The number of days on which electronic data were collected varied by Koru group. Within groups, there were different days on which Koru session 1-4 material was received (e.g. Monday, Tuesday). Additionally, some participants missed a scheduled group session and were allowed to “make up” their absence at another group’s session.

Additional Practice Data Considerations. Several additional considerations regarding the intervention were made. The week of data collection may have had an effect over time (i.e., building mindfulness skills over days and weeks is expected to increase both mindfulness and gratitude). Therefore, a variable was created to calculate weekly summary variables of data. Group assignment (in 1 of 9 Koru groups) and group teacher were included as categorical variables to test for extraneous differences. The number of intervention days varied slightly by group (21-28); and therefore, both mean and total scores were calculated for intervention-related variables to account for potential differences in intervention duration. Methods of calculating mindfulness and gratitude practice variables were designed to consider each of these problems/effects and are outlined in the analysis section for Hypotheses 2.3 and 2.4.

Further, it seems probable that the missingness of electronic log data would correlate inversely with meditation practice – such that those who did not practice are assumed less likely to have completed the log. Data are likely not missing at random and excluding cases on the basis of missing data would bias the results. Thus, liberal criteria were applied for data inclusion: All data was included for every participant who provided any response on the electronic log. Further, intent-to-treat principles were used to account for participants who were lost-to-follow-up. Analyses were run both with and without intent-to-treat principles to clarify any potential bias.

Attendance Data. For each of the nine groups, attendance was taken at the beginning of each class. Participants could make-up missed classes in another group if necessary. Attendance data ranged from 0 (no classes attended) to 4 (all classes attended).

Mindfulness Practice. Amount of mindfulness practice during the intervention was calculated by reviewing daily meditation logs. Participation in mindfulness home practice was calculated in four ways: frequency (total days, percentage of days), duration (total minutes, mean minutes). Frequency was calculated as the (1) total number of times the participant responded “yes” to meditating, regardless of the duration of meditation, and (2) percentage of total intervention days in which participant responded “yes” to meditating. Duration was calculated as total minutes meditated over the intervention period and mean minutes meditated per day.

Gratitude Practice. Gratitude practice was calculated by reviewing daily meditation logs. Similar to the meditation practice variables, gratitude practice was calculated in several ways. First, a variable was calculated to assess the total number of times the participant provided data on the last question, “I’m grateful for...” as a dichotomous ‘yes’ or ‘no’ style measure. Due to differences in intervention length, a percentage score was calculated to assess percentage of intervention days in which the participant provided a gratitude response. Second, the total number of gratitude responses across all logs was summed. Due to differences in intervention length, an average score was also calculated to measure mean number of gratitude items listed per day. Additionally, the mean number of responses as well as total number of responses on each of weeks 1, 2, 3, and 4 was calculated. Third, to gauge the scope and variety of items for which one endorsed gratitude for a variable was calculated that measured novelty of gratitude responses. Logs were reviewed qualitatively to identify redundancy/novelty in responses. A percentage score was calculated to measure the number of unique or novel things listed grateful for across the intervention.

Statistical Analyses

Data preparation. Statistical analyses were conducted using SPSS v25.0 (SPSS IBM, Armonk, NY, 2013). Variable summary scores were calculated for each measure listed above. Data were examined to confirm inclusion criteria (lived with at least one roommate, were a first- or second-year student, and aged 18-26).

To explore changes in variables of interest (i.e., mindfulness, gratitude, and symptoms of depression) across the intervention period, a within-subjects regression coefficient analysis was conducted. As such, intercepts and slope of change variables were calculated as a measurement of change from baseline (T1) to immediate follow-up (T2). Slope of change (unstandardized beta) and intercept variables were calculated via linear regression from T1 to T2 with outcome variables regressed across time (i.e. number of days from baseline to follow-up data collection) to create new variables for each participant (Pfister, Schwarz, Carson, & Janczyk, 2013). To account for individual differences, intercept values (baseline values) were entered as control variables in regression models. Following the recommendation of Lachin (2000), intent-to-treat principles were utilized to account for missing data. Baseline values were inserted in place of missing data for those lost to follow-up, resulting in slopes of zero for participants who did not complete data collection at T2 (Lachin, 2000).

Testing assumptions of dyadic data. Given the dyadic nature of roommates, prior to running analyses, the assumption of dyadic data analysis termed ‘nonindependence’ was tested (Kenny et al., 2006). Nonindependence between variables demonstrates that the dyad members are more similar to one another on the variable of interest than are two individuals outside of the dyad. In order to test nonindependence,

the dataset containing cleaned summary scores was transformed from an individual-level dataset, in which each row contains data for one individual, to a pairwise dataset, in which each row contains data for both the individual and his/her roommate. Intraclass correlations (ICC) for the independent variable in each hypothesis were computed. Data revealed a non-significant ICC between baseline actor and partner mindfulness (CAMS-R, $r = .034, p = .823$; MAAS, $r = .103, p = .499$), gratitude (GRAT-R, $r = .100, p = .512$), and symptoms of depression (PHQ-9, $r = .237, p = .120$) as well as follow-up (CAMS-R, $r = .884, p = .839$; MAAS, $r = -.132, p = .462$; GRAT-R, $r = .229, p = .387$; PHQ-9, $r = -.122, p = .497$). Therefore, data from the present study did not meet the assumption for dyadic data analysis as participants appeared statistically independent from his/her roommate. As such, correlations, regression analyses and repeated measures ANOVA were used as the appropriate statistical method to analyze hypothesized relationships.

Surveying Data for Contextual Factors of Intervention. In addition to the checking of analytic assumptions for dyadic data, several nuanced factors of the intervention should be explored to aid in the understanding of the greater context with which the intervention occurred. Specifically, in order to capture the level of roommate cohesion, pre-intervention screener questions such as length of relationship with roommate and hours per day spent with roommate were examined as potential confounding variables with intervention outcome variables. Similarly, home practice logs were examined for the extent to which roommates practiced mindfulness skills together and attendance data were analyzed to assess for roommates attending sessions together as these variables may function as an additional measure of roommate cohesion. Practice log content were surveyed to identify emerging patterns in ways in which participants

practiced (i.e. alone, skills used). Exploration of these variables may help to better contextualize the intervention given its specific roommate participation requirements. In a similar vein, nuanced characteristics of the intervention may potentially play a role in determining outcomes such as: teacher effects, group effects, time of day of Koru class, and time of the semester. As such, in order to tease apart these potential unintended differences, preliminary analyses explored if group level or teacher level differences existed among main variables of interest (i.e. mindfulness, gratitude, and symptoms of depression).

Preliminary analyses. Preliminary analyses and exploration of data assessed additional assumptions of hierarchical linear regression analyses including identifying significant outliers, homoscedasticity, linearity, and normality of residuals. A scatterplot was graphed for each continuous control variable to visually examine the presence of outliers. Moreover, casewise diagnostics tested outliers by identifying scores greater than three standard deviations from the mean for each continuous variable. For cases that were identified as statistical or visual outliers were re-examined on a case-by-case basis for potential removal from analyses. In adherence to laboratory convention, correlation coefficients greater than or equal to an absolute value of 0.5 constitute multicollinearity. As an added step, these variables were also examined for tolerance values less than 0.1 within regression analyses, as these values suggest that the assumption of multicollinearity was violated (Field, 2009). Variables found to violate assumptions of multicollinearity were further assessed for inclusion/exclusion in analyses. To assess for the presence of demographic, academic, and roommate-related variables that may confound hypothesized associations, Pearson correlations were employed between

potential confounding variables (i.e., demographic, academic variables) and study outcome variables.

Analyses. *Aim 1.* In examination of Aim 1, zero-order correlations were employed to examine baseline associations among (1.1) gratitude (summary score and subscales) and two measures of mindfulness (MAAS and CAMS-R), (1.2) gratitude and symptoms of depression, and (1.3) two measures of mindfulness (MAAS and CAMS-R) with symptoms of depression. Aim 1.4 examines the independent and shared effects of mindfulness and gratitude in their association with symptoms of depression at baseline through inclusion of the interaction term in a linear model. Specifically, Kraemer and colleagues (2008) discuss a statistical approach termed the MacArthur approach; one component of the MacArthur approach necessitates the inclusion of an interaction term between two variables in a linear model. This approach is suitable for the current question, as there is theory and prior research to suggest mindfulness and gratitude are related constructs (Figure 2, Table 1). As such, inclusion of the interaction term in the model recognizes the nonzero interaction effect present in the population and will help to tease apart shared and unique variance. To do so, an interaction term was created by calculating the product of the centered predictors. Next, a linear regression model was created in which symptoms of depression is entered as the dependent variable with trait mindfulness (MAAS) and gratitude entered as independent variables in the first block. Then, in the second block, the interaction term of mindfulness x gratitude was entered as the independent variable in the second block to create two models—with and without the interaction term which serves to illustrate shared and independent variance, respectively.

This procedure was repeated to for state mindfulness (CAMS-R) with gratitude as predictors of symptoms of depression.

Aim 2. Aim 2 consists of two components. First (2.1), pre-post changes from participation in Koru Mindfulness was assessed via a repeated measures ANOVA to identify the presence of significant differences within each variable (GRAT-R, MAAS, CAMS-R, PHQ-9) from T1 to T2. Second, to test practice effects of the intervention hierarchical regressions were employed with slope of change as the outcome variable. In testing Hypothesis 2.2, attendance of mindfulness sessions was entered as the predictor variable with slope of change in symptoms of depression as the outcome variable. To account for individual differences, the intercept of depressive symptoms was entered into the first step of the regression model as a control variable. To test Hypothesis 2.3, two measures of mindfulness practice time (duration and frequency) were entered into separate models as the predictor variable with slope of change in symptoms of depression as the outcome variable. In examination of Hypothesis 2.4, two measures of gratitude practice (number of items, frequency) were entered into separate models as the predictor variable with slope of change in depressive symptoms as the outcome variable, while entering the intercept of depressive symptoms as the control variable in the first step.

Aim 3. Aim 3 was examined following the recommendations for mediation analysis proposed by Kraemer and colleagues (2008) in the MacArthur approach to mediation. In order to meet eligibility criteria for a mediation analysis with the MacArthur approach temporal precedence must be demonstrated. Therefore, in testing the mediation of B on the relationship between A and C, it must be shown that A, B, and C occur in that order. Additionally, an assumption that A and B are correlated must be

met. Finally, for a linear model B must explain all (full mediation) or part (partial mediation) of the relationship between A and C. For the following proposed hypotheses, baseline values were used as the predictor (A) with follow-up values as the outcome (C) and slope of change as the mediator (B)—which meets the assumption for temporal precedence. Correlation analyses were run prior to mediation analyses to ensure significant correlations between the predictor and mediator variable. Additionally, predictor variables were grand median centered and interaction terms were included within the regression model.

Aim 3 includes two hypotheses that share the same basic structure and adhere to the MacArthur approach. First (3.1), a hierarchical regression was employed with follow-up trait mindfulness as the outcome variable and baseline trait mindfulness entered as the predictor variable. The slope of change in gratitude was entered as the mediator variable while controlling for baseline (intercept) values of gratitude. The interaction term of baseline trait mindfulness and slope of change in gratitude was entered into the model. The same procedure from hypothesis 3.1 was repeated to examine the potential mediation of gratitude on changes in state mindfulness. Hypotheses 3.2 was examined by entering baseline gratitude as the predictor variable with follow-up gratitude entered as the follow-up variable and slope of change in trait mindfulness as the mediating variable in the model. This procedure and structure was repeated for state mindfulness.

Aim 4. The fourth aim follows the same structure of Aim 3 in using the MacArthur approach to test mediation. To do so, for Hypothesis 4.2, symptoms of depression at baseline were entered into the first block as the predictor variable with symptoms of depression at follow-up entered as the outcome variable. Slope of change in

gratitude was entered as the mediating variable, while controlling for baseline (intercept) values of gratitude. Finally, Hypothesis 4.3 maintains the same structure as Hypothesis 4.2, but examines slope of change in mindfulness (trait and state, separately) as the potential mediating variable. Table 2 displays each analyses with corresponding hypotheses and aims.

Secondary Analyses. In a review of research among undergraduates, several factors that may significantly contribute to, or are associated with, mindfulness, gratitude and college student depression were identified. These factors included several demographic and environmental characteristics which are outlined in the following section. Secondary analyses repeated primary analyses, but were adjusted for control variables. Secondary analyses were considered exploratory in nature and employed for the purpose of informing future hypotheses.

Selection of control variables for secondary analysis. Variables that were assessed as potential control variables included demographic, academic and stress-related variables that could potentially confound primary hypothesized associations. Control variables were selected for inclusion either for a) theoretical rationale or b) empirical rationale or c) related to roommate-factors of recruitment. A summary of theoretical and empirical control variable candidates is presented in the following section and were assessed for inclusion in secondary analyses.

Theoretically-derived control variables. First, theoretically-derived control variables were selected based on the existing empirical support for their association with depressive symptoms in undergraduate samples. Specifically, variables were considered to be a theoretically-derived control variable if prior research indicated a significant,

direct association with one of the dependent variables across two or more empirical studies. Based on a comprehensive review of existing literature, the following variables were identified as theoretically-derived controls for depressive symptoms among undergraduates: female sex (Eisenberg, Gollust, Golberstein, & Hefner, 2007; Bickham, 2015; Soysa & Wilcomb, 2015), racial minority status (Eisenberg et al., 2007; Wei et al., 2010; Cokley, McClain, Enciso, & Martinez, 2013), employment status (Hysenbegasi, Hass, & Rowland, 2005; Lindsey, Fabiano, & Stark, 2009), stress during the semester (Dyson & Renk, 2006; Friedlander, Reid, Shupak, & Cribbie, 2007; Gress-Smith, Roubinov, Andreotti, Compas, & Luecken, 2015), GPA (Deroma, Leach, & Leverett, 2009; Bickham, 2015), and financial difficulties (Andrews & Wilding, 2004; Eisenberg et al., 2007). These aforementioned variables were considered theoretically-derived and included in secondary analyses of hypotheses. The following potential control variables (empirically-derived and roommate-related) were first tested for their association with the outcome variable, which then determined their inclusion in secondary analyses.

Empirically derived control variables. Second, in addition to the well-established associations present among theoretically-derived control variables, additional candidates for *empirically-derived* control variables were explored. The pool of possible empirically-derived variables was selected based on associations suggested in tangential research or indirect associations found in the literature. For example, college students' level of motivation and interest has been shown to be predictive of positive outcomes and intervention engagement (Harackiewicz, Barron, Tauer, & Elliot, 2002; Walker, Greene, & Mansell, 2006). In particular, highly motivated participants may increase the risk of social desirability bias and potentially confound outcome variables (Antin & Shaw,

2012). Additionally, mindfulness research suggests individuals with prior meditation histories may perform in a distinct manner from meditation naïve individuals (Gu et al., 2016). Specifically, those with meditation experience have been shown to report less of a negative appraisal of pain (Brown & Jones, 2010). As such, meditation experience prior to the intervention may confound the analyses of the current proposed study. Given this existing corollary research, participant motivation and prior meditation history—as assessed by the demographic screener—served as potential candidates for empirically-derived control variables in analyses of the intervention (Aims 2-4).

Potential roommate-related control variables. Finally, to assess the extent to which participation in the intervention with a roommate may have influenced outcomes, several roommate-related control variables were explored and considered for potential inclusion. Specifically, (a) length of relationship with roommate, (b) hours per day spent with roommate, (c) frequency of meditating with roommate (d) and percentage of Koru sessions attended with roommate were explored through a correlation analysis with key variables of interest (i.e., mindfulness, gratitude and depression). Inclusion in secondary analyses was considered only for variables in which significant correlation coefficients emerged.

Data preparation for secondary analysis. Demographic questionnaire data included sex, minority status, employment status, GPA, financial need, motivation for participation in the intervention, prior meditation history and self-rated stress of the semester. For minority status, a summary score variable was calculated by dichotomizing race into majority (i.e. Caucasian) and minority (i.e. African American, Hispanic, Asian, Other). Concerning employment status, participants were categorized based on

employment or not employed. Need-based financial aid was categorized as a dichotomous variable for participants who qualified for need-based financial aid and those who did not. As a component of the consenting process, participants completed a brief screening protocol to assess motivation for a separate part of the study. Motivation scores were calculated based on a brief 20-item screening measurement and treated as continuous variables in secondary analyses. Past meditation history was dichotomized into participants with and without past meditation experience. For GPA and self-rated stress during the semester, raw scores were used as continuous variables.

Preliminary analyses for secondary analysis. Preliminary analyses and exploration of data tested for additional assumptions of hierarchical multiple regression analyses including identifying and removing significant outliers, linearity, homoscedasticity and normality of residuals for control variables. In a similar fashion to the primary analytic strategy, control variable outliers were identified both through visual recognition via a scatterplot and statistical recognition as assessed by three standard deviations from the mean. Scatterplots were also generated to examine the association between a given control variable and each outcome variable to assess the assumptions of linearity and homoscedasticity. To assess for the assumption of normality among control variables, a histogram and Predicted Probability (P-P) plot of residuals was generated for each continuous control variable. A skewness statistic was also examined for each continuous control variable to assess non-normality; a z-skewness value was calculated by dividing the skewness statistic by the standard error of skewness.

Hierarchical multiple regression analyses for secondary analysis. To test the statistical assumption of multicollinearity among both theoretically and empirically-

derived control variables, Pearson bivariate and point-biserial correlations were calculated among continuous and binary control variables, respectively, for each hypothesis. Associations between two binary control variables were examined using chi-square analyses. In preparation for secondary analyses, continuous control variables (i.e., self-rated stress, motivation) were grand median centered. Categorical control variables (i.e., sex, minority status, employment status, qualification for financial aid) were effects coded (e.g., minority status coded as +1/2 and majority status coded as -1/2) to allow for ease in interpretation of coefficients generated in regression analyses and minimization of errors in statistical inferencing (Kraemer & Blasey, 2004).

Secondary analyses replicated primary analyses for Aims 2-4 concerning the effects of the intervention and mediation analyses. In exploring practice effects of the intervention, control variables and intercepts were entered into the first block with attendance (2.2) entered into the second block predicting slope of change in symptoms of depression. In a similar fashion, control variables and intercepts were entered into the first block with mindfulness practice (2.3) entered into the second block predicting slope of change in symptoms of depression. Gratitude practice (2.4) was re-analyzed with the same structure. In secondary analysis of Aims 3 and 4, control variables and intercepts were entered into the first block in each of the regression models examining mediation.

Sample Size and Statistical Power. A statistical power analysis was conducted using G*Power 3.1.9.2 power analysis software to aid in determining the necessary sample size (Faul, Erdfelder, Lang, & Buchner, 2007). In order to conduct the appropriate statistical analyses to explore relationships among mindfulness, gratitude and depressive symptoms, a power analysis was completed for each statistical analysis employed. First,

regarding the correlational analysis proposed in Aim 1, with $\alpha = .05$ and power at 95%, the power analysis estimates the sample size needed to have been greater than 19 participants. The regression analyses proposed in hypothesis 1.4 (with $\alpha = .05$ and power at 95%) estimates a suitable sample size at greater than 67 participants. Second, regarding the repeated measures ANOVA proposed in Aim 2.1, with $\alpha = .05$ and power at 95%, a total sample size greater than 54 is needed to maximize power and reduce risk of inferencing errors. Regarding regression analyses of the intervention in Aims 2, simple two-tailed linear hierarchical regressions with two predictor variables (predictor and intercept) were conducted to test the hypothesized relationships. With $\alpha = .05$ and power at 95%, this power analysis estimated that 67 participants are needed to achieve optimal parameters of minimizing the risk of type I and type II errors. Regarding Aims 3 and 4 of the analysis, a two-tailed linear regression with 3 predictor variables the ideal number of participants is 78. Therefore, for each of the analyses proposed, the current sample size of the larger parent study of 100 participants is sufficient to account for 10% missing data.

In utilizing available research with similar study design, predictor and outcome variables expected effect size can also be calculated. In drawing from research on mindfulness and depression, with 100 subjects, the current proposed study had a power value of .70 to predict changes in study outcome variables using linear multiple regression (Jimenez, Niles, & Park, 2010). In drawing upon research on gratitude and depression, with 100 subjects, the current proposed study had a power value of .87 to predict changes in study outcome variables using linear multiple regression (Sin & Lyubomirsky, 2009).

RESULTS

Data Preprocessing

Sample Characteristics. One-hundred student participants (50 dyads) consented to participate in the study in the Fall 2017 semester. Preliminary examination of data revealed six students did not meet inclusion criteria (18 years of age or older) and were thus excluded from all analyses. Exploration of data revealed missing data for one participant who completed baseline data collection but did not attend intervention classes or complete any other data collection sessions. Given the lack of data from this participant—beyond basic demographic information—the data from this individual was excluded from all analyses. With the exclusion of the six participants who did not meet inclusion criteria, and one participant who did not complete the majority of study components, the final sample of baseline data used in analyses consisted of 93 participants. Of the sample of 93 participants at baseline, a total of 16 were lost to follow-up. Cited reasons for loss-to-follow-up include no longer attending the University of Louisville, no longer interested in completing aspects of the study, or not responding to follow-up data collection communication. From the 78 participants who responded to follow-up data collection prompts, a total of 75 participants completed online questionnaires.

A summary of sample characteristics for the final baseline sample (N=93) is provided in Table 3. Participants ranged in age from 18 to 20 years. The sample consisted

of primarily female (72%), non-Hispanic (93.5%), White (72%), unemployed (65.6%) students in their first semester (92.5%) of college. Participants' GPA ranged from 2.3-4.36, with the average GPA of 3.57. The majority (60.2%) of students in the sample reported receiving a scholarship to attend college. On average, participants in the sample recorded a stress level of 6.49 on a scale of 1 to 10 with higher numbers indicating greater stress.

Psychometric Properties. Calculation of Cronbach's alpha for independent and dependent variables revealed that the measure of trait mindfulness demonstrated high reliability at baseline (MAAS $\alpha=.93$) and follow-up ($\alpha=.91$). The measure of state mindfulness demonstrated low, but marginal reliability at baseline (CAMS-R $\alpha=.56$) and modest reliability at follow-up ($\alpha=.67$). Cronbach alpha for the gratitude measure demonstrated strong reliability at baseline (GRAT-R; $\alpha=.81$) and follow-up ($\alpha=.85$). Similarly, the measure of depression revealed strong reliability at both time points (PHQ-9; $\alpha=.89$, $\alpha=.87$). Descriptive statistics of independent and dependent variables at both baseline and follow-up are displayed in Table 4.

At baseline, scores of trait mindfulness (MAAS) were well-distributed, with a range of 1 to 5.93. Greater scores on the MAAS reflect higher degrees of trait mindfulness. The mean score was 3.49 ($SD = 1.14$) which suggests a moderate degree of mindfulness and is consistent with previously documented college sample means ($M=3.85$) (Brown & Ryan, 2003). At follow-up, trait mindfulness mean scores (MAAS) were similarly well-distributed with a range of 1-6 and a mean score of 3.74 ($SD = 0.95$). State mindfulness mean scores (CAMS-R) at baseline were well-distributed and ranged from 17 to 43 with higher scores reflecting a greater degree of state mindfulness. On

average, participants responded with a moderate degree of state mindfulness ($M=30.62$, $SD=6.19$), consistent with previously-documented college student samples (males $M = 32.71$, females $M = 30.51$) (Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). At follow-up, state mindfulness mean scores were similarly well-distributed, ranging from 19 to 45 with a mean score of 31.42 ($SD = 5.43$).

Gratitude mean summary scores (GRAT-R Total) at baseline were normally-distributed, ranging from 166 to 365. Higher scores on the gratitude measure reflect a greater degree of gratitude. On average, participants reported a total gratitude score of 292 ($SD = 42.64$), consistent with other healthy college student populations (Rochowiak, 2017). The Sense of Abundance subscale at baseline was slightly negatively skewed with a mean of 121.22 ($SD = 21.35$) and a range from 55 to 153. The Simple Pleasures subscale at baseline was normally distributed, demonstrated a mean of 92.38 ($SD = 20.52$) and a range of 40-126. The Social Appreciation subscale at baseline was normally distributed with a mean of 77.82 ($SD = 11.63$) with a range of 53-98. At follow-up, gratitude mean summary scores (GRAT-R Total) were similarly normally-distributed, ranged from 188-375 with a mean of 303.84 ($SD = 49.15$). At follow-up, gratitude subscale scores were each slightly negatively skewed. Negative skew is typical among character strength constructs such as gratitude in which respondents are likely to answer in a socially desirable fashion (Brdar & Kashdan, 2010). The Sense of Abundance subscale ranged from 55 to 153 with a mean score of 125.05 ($SD = 24.36$). The Simple Pleasures subscale ranged from 26 to 126 with a mean score of 90.05 ($SD = 23.07$). Lastly, the Social Appreciation subscale ranged from 37 to 98 with a mean score of 78.90 ($SD = 15.04$).

Baseline depressive symptom scores ranged from 0 to 24 with a mean score of 7.89 ($SD = 6.44$). Greater scores on the PHQ-9 represent a greater severity of depressive symptoms. Participant scores on the PHQ-9 indicated that on average, students endorsed mild depression severity. Thirty-six (38.71%) participants responded with significantly elevated scores ($PHQ-9 > 8$; Figure 10). Of those 36 with significant elevations, 32 (34.4%) participants met criteria for clinically elevated scores comprising greater than a third of the overall sample ($PHQ-9 > 10$) (Kroenke, Spitzer, & Williams, 2001; Kroenke, 2012). Follow-up scores of depression ranged from 0 to 20 with a mean score of 5.47 ($SD = 5.42$). Participant scores on the PHQ-9 revealed that 17 (21.79%) participants responded with significantly elevated scores, while 14 (17.95%) participants responded with clinically elevated scores (Kroenke et al., 2001; Kroenke, 2012).

Preliminary analyses also examined potential group and teacher effects on key study variables. Pearson's bivariate correlations were run to determine significant associations between Koru intervention group number, Koru teacher, gratitude, trait mindfulness, state mindfulness and symptoms of depression. Koru group number and state mindfulness emerged as significantly correlated, $r = .296, p = .004$. Participants in groups later in the semester demonstrated greater levels of trait mindfulness. No other significant associations emerged.

Intervention Data Preprocessing. Intervention data included Koru class attendance, frequency and duration of meditation practice recorded on the daily practice log as well as gratitude log responses. The number of Koru classes attended ranged from 1 to 4 with a mean number of classes attended of 3.31 ($SD=.96$). Fifty-three participants in the sample (56.99%) attended all four classes. Koru class attendance data are presented

in Table 5. Daily meditation log data revealed participants completed the log on 50.61% of the total days for a mean of 11.37 ($SD=6.93$) logs and a range of 0 to 26 days. Participants meditated an average of 5.98 ($SD=4.64$) minutes per day during the intervention period. The total logged meditation practice time ranged from 0 to 675 minutes with a mean of 133.77 total minutes ($SD=108.71$). Meditation data are presented in Table 6. Participants completed the gratitude section of the log on 9.34 days ($SD=8.25$). On average, 13.97 ($SD=18.25$) total items were listed on the gratitude log. In examination of the novelty of items listed, 9.89 ($SD=14.53$) novel items were listed which comprises 78.5% of total items listed. Gratitude log data is displayed in Table 7.

To analyze intervention outcomes (i.e. change from baseline to follow-up data collection), slopes analyses were conducted. These analyses were calculated in two ways; first, with only the data of participants who completed both baseline and follow-up data collection periods ($N=71$). Then, slope analyses were run using intent-to-treat principles described by Lachin (2000). Following these guidelines, missing data were replaced with baseline values resulting in slopes of zero for participants who were lost-to-follow-up resulting in a sample of 93. For both types of slope analyses (with and without intent-to-treat-principles), slope of change was calculated via linear regression in which the slope of change from baseline to follow-up was regressed over time. The time variable was calculated as the difference between the timestamp of completion of questionnaires at follow-up from the timestamp of completion of questionnaires at baseline with the difference score calculated in days. In regression models, the time variable was entered as the independent variable with the variable of interest entered as the dependent—distinguished by data collection period (i.e. baseline, follow-up). Unstandardized beta

values produced by the regression models represent the slope of change from the intervention period.

A check of normality was run on slope variables to ensure necessary assumptions were met for subsequent analyses. In the first slope analyses, not including loss-to-follow-up data, the mean slope of change in state mindfulness (CAMS-R) was .041 ($SD=.22$). The slopes produced a normal distribution and ranged from -.47 to .56. The mean slope of gratitude (GRAT-R) was .31 ($SD=1.14$). The slopes of gratitude variables were normally distributed and ranged from -2.99 to 2.84. The mean slope of change in depressive symptoms (PHQ-9) was .10 ($SD=.20$). The slopes were normally distributed and ranged from -.91 to .33. Using intent-to-treat principles, slopes were similarly normally distributed with a slightly greater concentration of values near zero. The mean slope of state mindfulness using intent-to-treat principles was .03 ($SD=.18$). Mean slope of gratitude using intent-to-treat principles was .27 ($SD=.99$). The mean slope of depressive symptoms using intent-to-treat principles was -.08 ($SD=.19$). Each of the variables demonstrated normality—evidenced by lack of significant skew and kurtosis. No significant outlier emerged from the data (<3 SD from the mean).

Primary Analysis

The primary analyses are subdivided into four separate aims. Aim 1 explores the cross-sectional relationship between gratitude, mindfulness (state and trait) and symptoms of depression at baseline. Aim 2 examines the effects of participation in the Koru intervention on outcomes of gratitude, mindfulness and symptoms of depression. Aim 3 tested the upward spiral hypothesis relating mindfulness and gratitude reciprocally, and then Aim 4 tested it individually with symptoms of depression.

Preliminary analyses—including checking of assumptions and data cleaning processes—are outlined for each analyses section designated per aim.

Aim 1: Cross-Sectional Model: Preliminary Analyses. Preliminary analyses and data exploration were performed in statistical tests of assumptions for correlational analyses. Scatterplots and descriptive diagnostic tests revealed the presence of two outliers for the gratitude total score variable. Both cases exceeded three standard deviations below the mean and therefore were removed from the sample. Following the removal of these cases, assumptions of linearity and homoscedasticity were met for each hypothesized association.

Examination of skewness was accomplished in two ways: through calculation of the z-skewness statistic of each variable and visual examination of the normality of residuals for each hypothesized association. For cases in which the z-skewness statistic exceeded the rule-of-thumb cut-off of $|1.96|$, the normality of the residuals was examined in a linear model with the hypothesized associations. Following recommendations of Glass, Peckham and Sanders (1972), for variables that demonstrated a slight skew ($>|1.96|$), but produced normal distribution of residuals in a linear model, transformation of variables to correct for skew was not utilized (Glass, Peckham, & Sanders, 1972).

Aim 1: Cross-Sectional Model: Pearson's r Correlation. Pearson's bivariate correlation coefficients assessed the relationships at baseline of gratitude, mindfulness and symptoms of depression. Results of correlation analyses are presented in Table 8.

Hypothesis 1.1. Gratitude and state mindfulness (CAMS-R) were significantly positively correlated, $r = .374, p < .001$. Gratitude and trait mindfulness (MAAS) were not significantly correlated, $r = .155, p > .05$. In examination of gratitude subscales, Sense of

Abundance was significantly positively associated with state mindfulness $r = .384, p < .001$, but not trait mindfulness $r = -.151, p > .05$. The Simple Pleasures subscale was not significantly correlated with state or trait mindfulness, $r = .202, p > .05, r = .081, p > .05$. Lastly, the Social Appreciation subscale was significantly positively correlated with state mindfulness $r = .373, p < .001$, but not trait mindfulness $r = .204, p > .05$. Of note, the relationship between Social Appreciation and Simple Pleasures with state mindfulness both approached significance, $p = .051, p = .052$.

Hypothesis 1.2. Gratitude and symptoms of depression were significantly negatively correlated, $r = -.226, p < .05$. In examination of gratitude subscales with symptoms of depression, Sense of Abundance ($r = -.420, p < .001$) was significantly negatively associated with symptoms of depression. The association between Social Appreciation and Simple Pleasures with symptoms of depression was non-significant, $r = -.181, p > .05, r = .023, p > .05$.

Hypothesis 1.3. State mindfulness and symptoms of depression were significantly negatively correlated, $r = -.617, p < .001$. Trait mindfulness and symptoms of depression were significantly negatively correlated, $r = -.362, p < .001$.

Aim 1: Cross-Sectional Model: Hierarchical Regression with Interaction

Term. To determine the independent and shared variance of gratitude and mindfulness as predictors of symptoms of depression a series of three hierarchical regressions were employed. This series of regressions were employed for trait mindfulness (MAAS) and state mindfulness (CAMS-R) respectively for a total of six. In the first linear model, gratitude (GRAT-R) was entered as the independent variable with symptoms of depression (PHQ-9) as the dependent variable. In the second linear model, trait

mindfulness (MAAS) was entered as the independent variable with symptoms of depression (PHQ-9) as the dependent variable. Finally, to determine shared variance, a strategy from the MacArthur approach was utilized in which a linear model was constructed in which gratitude and mindfulness were entered into the first block together as independent variables with depression as the dependent variable. Then, the interaction term of the product of trait mindfulness and gratitude was entered into the second block. Following the same structure, state mindfulness (CAMS-R) was included in the next set of three linear models. Results of this regression analysis are displayed in Table 9.

Hypothesis 1.4. Gratitude was a significant predictor of symptoms of depression when entered into the model independently. Participants who reported greater levels of gratitude also had fewer symptoms of depression, $t(90)=4.851, p=.030$. Gratitude accounts for 5.1% of the variance observed in symptoms of depression. Trait mindfulness was a significant predictor of symptoms of depression when entered into the model independently. Participants who reported greater levels of trait mindfulness also had fewer symptoms of depression, $t(91)=13.752, p<.001$. Trait mindfulness accounted for 13.1% of the variance observed in symptoms of depression. With trait mindfulness and gratitude entered into the same model as predictors of symptoms of depression, gratitude became non-significant, $p=.078$. Trait mindfulness remained a significant predictor of symptoms of depression, $\beta=-.323, p=.002$. The interaction term of trait mindfulness and gratitude was non-significant, $p=.391$.

In a separate set of regression analyses examining state mindfulness with gratitude predicting symptoms of depression, state mindfulness was a significant predictor of symptoms of depression when entered into the model independently, $\beta=-$

.617, $p < .001$. Participants who reported greater levels of state mindfulness also had fewer symptoms of depression, $t(91) = 56.005$, $p < .001$. State mindfulness accounted for 38.1% of the variance observed in symptoms of depression. With state mindfulness and gratitude entered into the same model as predictors of symptoms of depression, gratitude became non-significant, $p = .990$. State mindfulness remained a significant predictor of symptoms of depression when entered with gratitude, $\beta = -.608$, $p < .001$. The interaction term of state mindfulness and gratitude was non-significant, $p = .362$.

Aim 2: Effects of Intervention – Preliminary Analysis. Prior to performing the statistical analyses for Aim 2, assumptions for repeated measures ANOVA and hierarchical linear regression were checked. Baseline and follow-up scores used for the repeated measures ANOVA inherently meet the assumptions of continuous, matched pairs. Scatterplots and case diagnostics were run to examine the visual and statistical presence of outliers in follow-up data. Three cases within the gratitude measure follow-up data were determined to be outliers by exceeding three standard deviations below the mean. These three cases were removed from the sample and subsequent analyses. In examination of the normality of follow-up scores among key variables of interest, depressive symptoms (PHQ-9) were slightly positively skewed, as is typical in the self-report measurement of depressive symptoms (Ruscio & Ruscio, 2002). Therefore, distributions of residuals were examined in the repeated measures ANOVA model to assess normality. Examination of residual plots (QQ-plots, histograms) for baseline and follow-up scores of depressive symptoms revealed a relatively normal distribution. Similarly, follow-up scores of the gratitude measure summary score produced a slightly positively skewed distribution. Examination of the distribution of residuals demonstrated

a relatively normal distribution of residuals for baseline and follow-up gratitude summary scores. Therefore, original variable structure was retained and transformations were not utilized. Finally, the assumption of sphericity for a repeated-measures ANOVA is inherently met by the use of only two levels within the general linear model.

To test assumptions for hierarchical regressions for intervention analyses, scatterplots and casewise diagnostics were generated to visually identify statistical outliers. Total meditation minutes and mean meditation minutes revealed the same individual as an outlier. This participant's meditation practice (675 minutes total) significantly exceeded (>3 SD) that of the mean of the sample. A separate participant's total amount (124 items) and mean of gratitude items listed constituted an outlier (>3 SD above mean). Given that these points of data reflect a serious level of engagement with the intervention—and are not by mistake or chance—the following regressions initially retained these participants. However, as a check of the data, the linear models were assessed with outliers removed and both analyses were reported. In addition, data were visually inspected for normality of residuals using histograms of the distribution of residuals and PP-plots. For each of the hypothesized associations, the assumption of normality of residuals was met by visual examination of plots generated by the linear models. In addition, each model was checked to ensure multicollinearity between variables was limited. Each of the hypothesized associations demonstrated a variance inflation factor (VIF) of approximately 1, with values under 10 meeting this assumption demonstrating lack of multicollinearity. Finally, the predictor variables used in hierarchical linear regression [session attendance, meditation frequency (percentage and total), meditation duration (total and mean minutes), gratitude practice frequency (total

and mean), gratitude entry (total and mean), and gratitude entry novelty] were grand median centered prior to running analyses. Median centering assists with interpretation of coefficients generated through analyses (Kraemer & Blasey, 2004).

Aim 2: Effects of Intervention – Repeated Measures ANOVA. A series of three Repeated Measures ANOVAs were calculated to examine the effect of time on changes in key study variables: gratitude, state mindfulness, and symptoms of depression. Repeated Measures ANOVA were then conducted again using intent-to-treat principles in which participants who did not complete follow-up data had baseline scores imputed as follow-up scores. This conservative approach was used to help protect against inflated treatment effects that could result from examination of only participants who provided follow-up data. Further, comparison of both analyses allowed for greater understanding of the use of the intervention—especially for those who did not provide follow-up data—and allow for a larger sample size in analyses. Results are presented below, in text, in Table 10, and visually in Figures 11-14.

Hypothesis 2.1.1. Utilizing all data with intent-to-treat principles ($N=92$), a statistically significant effect of time on reported levels of gratitude was observed, $F(1,91)=5.906, p<.05$ (Figure 11). Using only data provided by participants who completed both data collection periods ($N=71$), a statistically significant effect of time on reported levels of gratitude was observed, $F(1,75)=5.974, p<.05$.

Hypothesis 2.1.2. Utilizing all data with intent-to-treat principles ($N=93$), a statistically significant effect on reported levels of state mindfulness (CAMS-R) was not found, $F(1,92)=3.540, p=.063$ (Figure 12). Similarly, without use of intent-to-treat principles ($N=71$), a statistically significant effect of time on reported levels of state

mindfulness was not observed, $F(1,77)=3.559, p=.063$ (Figure 13). No significant association was found on the effect of time on reported levels of trait mindfulness (MAAS), with and without use of intent-to-treat principles $F(1,92)=1.635, p=.204$; $F(1,77)=1.540, p=.204$.

Hypothesis. 2.1.3. Utilizing all data with intent-to-treat principles ($N=93$), a statistically significant effect of time on reported symptoms of depression was observed, $F(1,92)=14.396, p<.001$ (Figure 14). Similarly, without intent-to-treat principles ($N=71$), a statistically significant effect of time on reported symptoms of depression was observed, $F(1,76)=14.846, p<.001$.

Aim 2: Effects of Intervention – Hierarchical Linear Regressions.

Hierarchical linear regressions were used to examine practice effects—or the degree to which participants utilized the intervention—as a predictor of slope of change in symptoms of depression. Degree of engagement with the intervention was assessed in three key ways: (a) attendance of Koru Mindfulness classes, (b) frequency (total number of times participant responded “yes” to meditating, regardless of duration of meditation and percentage of total intervention days in which participant responded “yes” to meditating) and duration (total minutes and mean minutes by days of intervention) of mindfulness home practice and (c) use of the gratitude log as measured by: frequency of logging gratitude items (regardless of number of items listed), percentage of days of intervention in which gratitude log was completed, amount of total items listed that one was grateful for, mean number of items listed by day, and percentage of novel items listed. Total and mean scores of practice variables were used to account for change in

number of intervention days for some participants whose intervention spanned across a university holiday break—accounting in 28 days of intervention, rather than 21 days.

Two hierarchical regressions were employed both with and without intent-to-treat principles adjusting for missing data (Lachin, 2000). For variables with outliers, the following linear models were run both with and without the outlier participant. Results with and without intent-to-treat principles are presented in Table 11 and Table 12, respectively.

Hypothesis 2.2 Utilizing all data ($N=93$), attendance of Koru class sessions significantly predicted the slope of reduction in symptoms of depression from baseline to follow-up, $t(90)=18.08$, $p=.006$. This result demonstrated that when controlling for one's baseline depression score, an individual's attendance of Koru class sessions explained an additional 6.3% of the variance in his/her change in symptoms of depression. When using data from participants who completed follow-up data collection ($N=71$), this relationship was non-significant.

Hypothesis 2.3 Meditation frequency and duration were not significant predictors of slope of change in symptoms of depression. This relationship was non-significant both with and without use of intent-to-treat principles and with and without including data from the participant which was a meditation-time outlier.

Hypothesis 2.4 Utilizing all data ($N=93$), the total number of days in which the gratitude section of the daily log was completed (regardless of number of items listed) was a significant predictor of the slope of reduction in symptoms of depression from baseline to follow-up, $t(90)=16.92$, $p=.024$. When controlling for baseline symptoms of depression, the total number of gratitude logs completed explained an additional 4.2% of

the variance in reduction in depressive symptoms. Given that participants' length of intervention varied due to interruptions in the school calendar, the *percentage* of days of the intervention in which the gratitude log was completed was also examined. This percentage was a significant predictor of the reduction in symptoms of depression from baseline to follow-up, $t(90)=16.89, p=.025$. Similarly, when controlling for baseline depression scores, the percentage of days in which the gratitude log was completed explained an additional 4.2% of the variance in reduction of depressive symptoms. However, when only using data from participants who completed follow-up data ($N=71$), these relationships were non-significant.

Utilizing all data ($N=93$), total number of items listed that one was grateful for was a significant predictor of the slope of reduction in symptoms of depression, $t(90)=24.81, p<.001$. When controlling for baseline depression scores, total number of items listed grateful for explained an additional 12.6% of the variance in the reduction of depressive symptoms. As previously stated, this relationship was examined using mean number of items across days to account for differences in intervention days. The mean number of items listed grateful for per intervention day was a significant predictor of the slope of change in symptoms of depression, $t(90) = 25.02, p<.001$. When controlling for baseline depression scores, the mean number of items listed per day across the intervention period explained an additional 12.4% of the variance in the reduction of depressive symptoms. When using intent-to-treat principles ($N=71$), the association of items listed on the gratitude log (both total and mean) with the slope of change in symptoms of depression remained significant, $t(68) = 25.30, p = .001$; $t(68) = 25.09, p=.001$. However, when removing the participant who provided a significantly greater

number of gratitude log responses than that of the sample mean, these associations were non-significant. The relationship between the novelty of gratitude responses (unique items) and slope of depressive symptom reduction was non-significant.

Aim 3: Upward Spiral—Preliminary Analyses. In examination of the proposed theoretical framework of the interaction between change in gratitude and change in mindfulness, the MacArthur approach to mediation was utilized. This approach necessitates temporal precedence in order to test mediation. In order to show that B mediates the relationship between A and C, it must be demonstrated that A, B, and C occur in that order. Hypothesis 3.1 predicted that slope of change in gratitude would mediate the relationship between baseline and follow-up levels of mindfulness. Hypothesis 3.2, predicted that slope of change in mindfulness will mediate the relationship between baseline and follow-up levels of gratitude. This structure meets the assumption of temporal precedence as baseline assessments occurred before the intervention period and follow-up assessments occurred following the intervention.

The MacArthur approach also requires that A and B are correlated. To satisfy requirements for MacArthur approach to mediation, Pearson bivariate correlation coefficients were calculated to determine if there was a significant association between the mediation variable (slope of change) and the predictor variable (baseline values). For hypothesis 3.1, when implementing intent-to-treat principles ($N=93$), the association between slope of change in gratitude and baseline trait mindfulness (MAAS) was non-significant, $r=-.116$, $p=.268$. The correlation was also non-significant when utilizing only data provided from both data collection periods ($N=71$), $r=-.157$, $p=.180$. With intent-to-treat-principles used ($N=93$), slope of change in gratitude was significantly negatively

associated with baseline state mindfulness (CAMS-R), $r=-.208$, $p=.045$. That is, lower levels of state mindfulness at baseline was related to an increase in gratitude from baseline to follow-up. However, the relationship was non-significant when only utilizing data provided from both data collection periods ($N=71$), $r=-.211$, $p=.070$.

For hypothesis 3.2, when using intent-to-treat principles ($N=93$), slope of change in both trait and state mindfulness were not significantly associated with baseline gratitude, $r=.043$, $p=.684$; $r=-.097$, $p=.359$. When utilizing only data provided from both data collection periods ($N=71$), the associations remained non-significant, $r=.041$, $p=.725$; $r=-.115$, $p=.341$.

In addition, the MacArthur approach also requires that B (mediator) mediates all (complete) or part (partial) of the relationship between A and C. When utilizing a linear model, mediation would exist only if the main effect of B, the interaction between A and B, or both, meet statistical significance. Hierarchical regressions tested the MacArthur approach to mediation. In examining the mediating role of slope of change in one variable (B) on the relationship between baseline (A) and follow-up (C) values of a separate variable, the baseline value was entered as the predictor variable with follow-up as the outcome variable. Slope of change was entered into the second block with the interaction term [product of baseline value and slope of change ($A*B$)]. The intercept of the slope was entered into the first block to control for individual differences.

Aim 3: Upward Spiral—MacArthur Approach to Mediation. Only hypotheses with significant correlation coefficients between mediator and predictor variables were carried forward for primary analyses.

Hypothesis 3.1. There was no significant association between state mindfulness at follow-up and the interaction term ($\beta=.150, p=.740$). Additionally, there was no significant main effect of slope of change in gratitude on follow-up state mindfulness ($\beta=.105, p=.814$). Therefore, mediation was not demonstrated. A summary of regression analyses for hypothesis 3.1 is displayed in Table 13.

Aim 4: Upward Spiral for Symptoms of Depression—Preliminary Analyses.

The association between slope of change in gratitude and slope of change in mindfulness was also examined as a potential mediator in change in symptoms of depression from baseline to follow-up. In a similar fashion to Aim 3, the MacArthur Method of testing mediation was employed. The assumption of temporal precedence was met by the nature of using baseline values as the predictor variable, slope of change as the mediator variable, and follow-up values as the outcome variable.

To determine a pre-existing relationship between predictor (A) variables and mediator (C) variables, Pearson bivariate correlations were calculated. For hypothesis 4.1, when utilizing intent-to-treat principles ($N=93$), slope of change in gratitude was not significantly associated with baseline symptoms of depression, $r=.151, p=.149$. When utilizing only data provided from both data collection periods ($N=71$), the relationship remained non-significant, $r=.166, p=.154$. For hypothesis 4.2, when utilizing intent-to-treat principles, slope of change in state mindfulness (CAMS-R) was significantly positively associated with baseline symptoms of depression, $r=.321, p=.002$ —such that participants who reported greater levels of baseline depression also reported an increase in state mindfulness. This relationship remained significant without the use of intent-to-treat principles, $r=.379, p=.001$. However, the relationship between slope of change in

trait mindfulness (MAAS) and baseline symptoms of depression was non-significant both with ($r=.122, p=.245$) and without ($r=.146, p=.212$) intent-to-treat principles used.

Aim 4: Upward Spiral for Symptoms of Depression—MacArthur Approach to Mediation. Only hypotheses (4.2) with significant associations between mediator and predictor variables were carried forward for primary analyses. Slope of change in state mindfulness was examined as a potential mediator between baseline and follow-up symptoms of depression—both with and without intent-to-treat principles. Following the structure of the previous analyses using MacArthur approach, hierarchical regressions including interaction terms and controlling for slope intercepts were used.

Hypothesis 4.2. Using intent-to-treat principles ($N=93$), there was no significant association between the interaction term and follow-up symptoms of depression, $\beta=-.284, p=.070$. There was also no main effect of slope of change of state mindfulness on follow-up symptoms of depression, $\beta=-.211, p=.175$. Therefore, mediation was not demonstrated. However, when only utilizing data from participants who completed both data collection sessions ($N=71$), the interaction term was significantly associated with the outcome variable of follow-up symptoms of depression, $\beta=-.382, p=.017$. The main effect of slope of change in state mindfulness on follow-up symptoms of depression was non-significant both with and without use of intent-to-treat principles, $\beta=-.211, p=.175, \beta=-.243, p=.119$. In this linear model, all criteria for MacArthur mediation were met; baseline symptoms of depression (A) preceded slope of change in mindfulness (B), A was significantly correlated with B, and the interaction term was significant. A summary of hierarchical regression analyses for Hypothesis 4.2 is displayed in Table 14. An overall summary of the results of primary analyses is presented in Table 26. In the

following section, the primary analyses are repeated with inclusion of control variables to provide a set of secondary analyses, labeled as such.

Secondary Analyses

Secondary analyses were conducted to determine the effects of extraneous variables on the relationships of interest. As previously outlined, inclusion of control variables were determined in three ways. First, control variables were included for the extent to which a theoretical rationale exists for their inclusion. Theoretically-derived control variables have previously demonstrated a direct association with the outcome variable (symptoms of depression) in at least two empirical studies. These include sex, minority status, employment status, semester stress, GPA, and financial difficulties. Second, control variables with an empirical-rationale for inclusion were explored. More specifically, these variables were tested prior to inclusion in secondary analyses to determine the statistical presence of confound with the dependent variable. These variables include motivation to participate in intervention and prior meditation history. Finally, given that the larger research project intentionally recruited roommate pairs, potential roommate-related control variables were explored to further clarify the role of roommate participation in the intervention. Potential roommate-related control variables were examined for the extent to which they relate to outcome variables—should significant correlations emerge; such variables were included in secondary analyses. These variables include length of relationship with roommate, hours spent per day with roommate, frequency of meditating with roommate, and percentage of Koru classes attended with roommate. Control variables, categorized by type, are presented in Table 15.

Preliminary analyses of potential control variables for secondary analysis.

Preliminary analyses and exploration of potential control variables (theoretically-driven, empirically-driven, and roommate-related) were performed to identify normality of controls for inclusion in secondary analyses. Scatterplots and casewise diagnostics were generated for each continuous control variable. Among continuous control variables, an outlier was identified in the pre-intervention motivation screener. This participant reported a motivation score that fell significantly (> 3 SD) below the mean. Outliers were also identified for the variable of months known roommate due to family members living together. Two dyads ($n=4$) reported knowing each other for greater than seven years, which significantly surpassed the mean. Hours spent per day with roommate also produced one outlier response in which the participant responded with 24 hours per day which significantly exceeded the mean (>3 SD). Frequency of meditation with roommate also produced one dyad outlier ($n=2$) where roommates reported meditating together more than ten times which significantly (>3 SD) exceeded that of the mean. These participants whose responses significantly exceeded the mean and are classified as statistical outliers and were removed from the sample for secondary analyses.

In examination of the assumption of distribution normality, semester stress was normally distributed. However, several potential control variables illustrated significant skew. For cases in which the z-skewness statistic exceeded the rule-of-thumb cut-off of $|1.96|$, the normality of the residuals was examined in a linear model with the hypothesized associations. Given the significance in skew of demographic variables and the lack of normality in residual distributions, transformations were utilized to help correct for skew (Glass et al., 1972). GPA displayed a negative skew ($Z\text{-skew}=-3.46$) and

was corrected via reflection and then subsequent square-root transformation (Z -skew=1.48). The motivation measure given prior to the intervention displayed a slight negative skew (Z -Skew=-3.05) which was corrected via reflection and then subsequent log-transformation (Z -skew=.127). The roommate-related control variables of months known roommate, hours per day spent with roommate and frequency of meditating together demonstrated significant positive skew (Z -skew=7.80, 4.78, 9.09). A log-transformation was applied to months known roommate which approved upon the skew (Z -skew=3.61). A log-transformation was applied to hours per day spent with roommate which corrected for the skew (Z -skew=0.87). Frequency of meditating with roommate was also corrected with a log-transformation (Z -skew=2.04).

Selection of control variables for secondary analysis. As previously outlined and displayed in Table 15, six variables (sex, minority status, employment status, semester stress, GPA, and financial difficulties have previously demonstrated a strong theoretical rationale and were included in subsequent analyses. A total of six additional control variables—two empirically-derived (pre-intervention motivation and prior meditation history) and four roommate-related (months known roommate, hours per day spent with roommate, frequency of meditating with roommate, and percentage of Koru classes taken with roommate) were statistically examined via correlations to determine eligibility of inclusion in secondary analyses. Pearson bivariate correlations were computed for continuous control variables; whereas, for binary control variables, point-biserial correlations were utilized.

Correlation coefficients were examined for three purposes. First, the six potential candidate control variables were analyzed to determine if a significant correlation (p

<.05, two-tailed) existed with the symptoms of depression. A significant correlation would provide the rationale of inclusion in secondary analyses. Second, the assumption of multicollinearity was examined to assess that the correlation coefficient was less than 0.5 to allow for inclusion in subsequent analyses. Third, correlations between control variables were also examined for the purpose of generating future hypotheses. The correlation matrix with these associations is displayed in Table 16. For associations among dichotomous, categorical control variables Chi-square tests were employed.

Correlation analyses did not reveal any significant relationships among the six *potential* candidates for control variables with the outcome of symptoms of depression. Therefore, these variables were not used to supplement the theoretically-derived control variables in secondary analyses. In examination of the associations with the theoretically-derived control variables and symptoms of depression, two relationships emerged as significant. Employment status was significantly correlated with symptoms of depression ($r = .238, p < .05$), such that students who were employed reported greater symptoms of depression. Semester stress was significantly correlated with symptoms of depression ($r = .208, p < .05$). The assumption of multicollinearity was also assessed by examination of correlation coefficients. The correlation coefficients among theoretically-derived control variables had an absolute value of less than 0.5, which suggests that the assumption of multicollinearity was met.

Correlation analyses among theoretically-derived control variables revealed several significant associations. Semester stress was significantly negatively associated with trait mindfulness ($r = -.211, p < .05$), such that students who were more stressed also reported less trait mindfulness. Financial difficulties were significantly associated with

sex ($X^2= 4.70, p<.05$), minority status ($X^2= 4.70, p<.05$), and employment status ($X^2= 4.77, p<.05$), such that students who qualified for need-based loans were more likely to be female, belonging to the racial majority, and employed. Associations between pre-intervention motivation, meditation history, and roommate-related control variables are presented in Table 16.

Aim 1: Mindfulness, Gratitude, Symptoms of Depression at Baseline—Hierarchical Regressions. Control variables with continuous measurement (e.g. GPA, stress) were grand median centered while binary control variables (e.g. sex, minority status) were effects coded to aid in interpretation of regression coefficients and reduce the risk of statistical inferencing errors. Of the hypotheses in Aim 1, hypothesis 1.4, which employed hierarchical regressions, was replicated with the inclusion of control variables. For each hierarchical regression, control variables were entered into the first block, with the predictor variable entered into the second block of analyses.

Hypothesis 1.4. Hierarchical regressions were employed with six control variables (sex, minority status, employment status, semester stress, GPA, financial difficulties) to examine the association between gratitude with depression, trait mindfulness with depression and both trait mindfulness and gratitude together as predictors of symptoms of depression. Similarly, a second set of regression analyses examined the association between state mindfulness with depression and then both state mindfulness and gratitude together as predictors of symptoms of depression.

First, in the analyses examining the association of baseline gratitude with symptoms of depression (Table 17), control variables in Model 1 did not significantly predict symptoms of depression, $F(6,85)=1.963, p=.080$. In Model 1, employment status

($\beta=.217, p=.049$) and stress of the semester ($\beta=.216, p=.038$) emerged as significant individual predictors of symptoms of depression. The addition of gratitude in Model 2 significantly predicted symptoms of depression, $F(7,84)=2.351, p=.030$, and accounted for 4.2% of the total variance (16.4%). After controlling for all theoretical variables, gratitude emerged as a significant predictor of symptoms of depression ($\beta=.216, p=.043$). In Model 2, stress of the semester also emerged as a significant individual predictor of symptoms of depression ($\beta=.211, p=.040$), such that students who reported more stress also reported greater symptoms of depression at baseline.

Second, in analyses examining the association of baseline trait mindfulness with symptoms of depression (Table 18), control variables in Model 1 did not significantly predict symptoms of depression, $F(6,86)=1.641, p=.146$. No individual control variable emerged as significant predictors of symptoms of depression in this model. The addition of trait mindfulness in Model 2 significantly predicted symptoms of depression, $F(7,85)=2.883, p=.009$ and accounted for 8.9% of the total variance (19.2%). After controlling for all theoretical variables, trait mindfulness emerged as a significant predictor of symptoms of depression ($\beta=.309, p=.003$). No significant control variables emerged from Model 2.

Third, the control variables were included in re-examination of the linear model with an interaction term in Model 3 (Table 19). Model 1 of this analysis replicated findings described above where control variables did not significantly predict symptoms of depression $F(6,85)=1.963, p=.080$. In Model 1, employment status ($\beta=.217, p=.049$) and stress of the semester ($\beta=.216, p=.038$) emerged as significant individual predictors of symptoms of depression. In Model 2, the addition of gratitude and trait mindfulness

together significantly predicted symptoms of depression, $F(8,83)=3.025, p=.005$. This model accounted for 22.6% of the variance in symptoms of depression. However, in examination of trait mindfulness and gratitude individually in this model, only trait mindfulness emerged as a significant predictor of symptoms of depression ($\beta=-.261, p=.012$). The addition of the interaction term in Model 3 helped account for an additional 0.7% of variance accounted for and significantly predicted symptoms of depression, $F(9,82)=2.746, p=.007$. The interaction term did not emerge as a significant predictor, nor did theoretical control variables.

Next, in the re-examination of the association of state mindfulness with symptoms of depression (Table 20), control variables were included. Control variables alone did not significantly predict baseline symptoms of depression, $F(6,86)=1.641, p=.146$. No individual control variables emerged as significant predictors of symptoms of depression in this model. The addition of state mindfulness in Model 2 significantly predicted symptoms of depression, $F(7,85)=8.874, p<.001$ and accounted for 31.9% of the total variance (42.2%). With controlling for all theoretical variables, state mindfulness emerged as a significant predictor of symptoms of depression ($\beta=-.594, p<.001$). No significant control variables emerged from Model 2.

Finally, secondary analyses of Hypothesis 1.4 included control variables in the linear model with the interaction term of gratitude and state mindfulness predicting symptoms of depression (Table 21). Model 1 of this analyses repeats findings described above where control variables did not significantly predict symptoms of depression $F(6,85)=1.963, p=.080$. As reported above, stress of the semester and GPA significantly predicted symptoms of depression. In Model 2, the addition of gratitude and state

mindfulness together significantly predicted symptoms of depression, $F(8,83)=7.560$, $p<.001$. This model accounted for 42.2% of the variance in symptoms of depression. However, in an examination of state mindfulness and gratitude individually in this model, only state mindfulness emerged as a significant predictor of symptoms of depression ($\beta=.589$, $p<.001$). The addition of the interaction term in Model 3 helped to account for an additional 0.6% of variance accounted for and still resulted in a significant model predicting symptoms of depression, $F(9,82)=6.827$, $p<.001$. The interaction term did not emerge as a significant predictor, nor did theoretical control variables. To briefly summarize secondary analyses for Hypotheses 1.4, inclusion of control variables did not significantly change the results of primary analyses. Additionally, employment status and semester stress were the only control variables that were significantly associated with symptoms of depression.

Aim 2: Effects of Intervention—Repeated Measures ANCOVA. Secondary analyses of the effect of the intervention were conducted using an ANCOVA. As described above, primary analyses of change across the intervention (baseline vs. follow-up) were conducted using a repeated measures ANOVA. However, to examine the potential confounding effect of control variables, an ANCOVA, which allows for inclusion of covariates in the general linear model was employed. Sex, minority status, employment status, semester stress, GPA and financial difficulties are considered time-invariant covariates—meaning that these variables did not change as a result of the intervention and were only measured at one time point. As such, these six time-invariant covariates were entered as covariates into ANCOVA model.

Hypotheses 2.1.1. With the inclusion of the six theoretically-derived control variables as covariates in the model, there was no significant effect of time on gratitude with or without intent-to-treat principles, $F = .417, p = .520$; $F = .271, p = .604$. Additionally, no covariates emerged as significant in between-subject contrasts in the general linear model.

Hypothesis 2.1.2. With control variables, there was no significant effect of time on trait or state mindfulness with, $F = .880, p = .351$, $F = 1.218, p = .273$, and without intent-to-treat principles, $F = .695, p = .407$, $F = .963, p = .330$. When using intent-to-treat principles, in the model of trait mindfulness, the effect of time by semester stress was statistically significant, $F = 2.542, p = .039$.

Hypothesis 2.1.3. With control variables, there was no significant effect of time on symptoms of depression with or without intent-to-treat principles, $F = 2.334, p = .130$, $F = 1.973, p = .165$. Additionally, no covariates emerged as significant in the general linear model.

Aim 2: Effects of Intervention – Hierarchical Regressions. In re-examination of the effects of attendance, practice time and log use on slope of change in symptoms of depression, control variables were entered into hierarchical linear regressions. For each hierarchical regression, the following control variables were entered into the first block: sex, minority status, employment status, GPA, stress of the semester and financial difficulties—alongside the baseline depression score to account for individual differences. The predictor variable was entered into the second block of analyses with slope of change in symptoms of depression entered as the dependent variable for each regression.

Following the same procedure for primary analyses, in the secondary analyses of intervention effects, intent-to-treat principles in which baseline values were imputed for loss-to-follow-up data were used. Analyses are reported both with and without intent-to-treat-principles utilized to demonstrate differences in utilizing the full sample compared to only those who completed data collection at both time points. Similarly, given that two participants' level of participation in the intervention were considered outliers based on high level of engagement in minutes meditated and number of gratitude items listed—analyses were reported on both with and without these outliers.

For each of the regression models, the outcome variable is the same, slope of change in symptoms of depression. Therefore, Model 1—which only includes the same set of control variables—is identical for each hypothesis as the effect of different predictors appeared only in Model 2 for each regression. Given this, the effect of control variables alone on slope of change in symptoms of depression were reported below and not repeated for each subsequent hypothesis. When utilizing all data ($N=93$), no control variables emerged as statistically significant. When utilizing only data from participants who completed both sets of data collection ($N=71$), the association among GPA and slope of change in symptoms of depression was statistically significant ($\beta=-.208, p=.05$). Participants who reported higher GPAs were more likely to show a greater reduction in symptoms of depression.

Hypothesis 2.2. In re-examination of the association among Koru class attendance and slope of change in symptoms of depression, no control variables emerged as significant in Model 2 (Table 22). With the inclusion of control variables, Koru class attendance remained significant, ($\beta=-.209, p=.028$) when utilizing intent-to-treat-

principles ($N=93$). However, this effect became non-significant when only utilizing data from participants who completed both data collection periods ($N=71$).

Hypothesis 2.3. In re-examination of the association among meditation frequency and duration, employment status and GPA emerged as significant controls in two respective models. First, utilizing intent-to-treat principles ($N=93$), when using total minutes meditated to predict slope of change in symptoms of depression, employment status emerged as a significant control, ($\beta=.204$, $p=.048$), such that employed participants demonstrated less of a reduction in depressive symptoms. Second, when utilizing only data from participants who attended both data collection sessions ($N=71$), GPA emerged as a significant control variable when predicting slope of change in symptoms of depression from mean minutes of daily meditation practice. Participants with higher GPAs demonstrated greater reduction in symptoms of depression ($\beta=-.208$, $p=.049$). With regard to the hypothesized predictor variables (meditation duration and frequency), no significant associations emerged with slope of change in symptoms of depression.

Hypothesis 2.4. In re-examination of the association among gratitude log completion variables and slope of change in symptoms of depression, no theoretically derived control variables emerged as significant in Model 2 (Table 23). When controlling for these variables, total and mean gratitude items listed remained a significant predictor of slope of change in symptoms of depression both with ($\beta=-.310$, $p=.001$; $\beta=-.312$, $p=.001$), and without use of intent-to-treat principles, ($\beta=-.272$, $p=.008$; $\beta=-.272$, $p=.008$). However, this result becomes non-significant when removal of the high-engagement participant outliers.

Aim 3: Upward Spiral – Hierarchical Regression. In a similar fashion to primary analyses, the MacArthur approach to mediation was used. In secondary analyses, the six theoretically-derived control variables were entered into the first block with the slope intercept. Following the same structure as primary analyses, the predictor variable (A) was the baseline value with the same variable at follow-up as the dependent variable (C). The slope and interaction term were also included in the model following guidelines of the MacArthur approach.

Hypothesis 3.1. There was no significant association of the interaction term with state mindfulness at follow-up, $\beta=.245, p=.597$. Additionally, the main effect of slope of change in gratitude with state mindfulness at follow-up was non-significant, $\beta=-.005, p=.991$. Therefore, mediation was not demonstrated. No control variables emerged as significant from the model. (Table 24)

Aim 4: Upward Spiral for Symptoms of Depression—Hierarchical Regression. The MacArthur approach to mediation was applied again for secondary analyses testing for mediation. A significant correlation between the predictor variable and mediator was demonstrated only for Hypothesis 4.2—both with and without intent-to-treat principles; therefore, both were re-analyzed in secondary analyses including theoretically-derived control variables.

Hypothesis 4.2. When utilizing intent-to-treat principles, ($N=93$), a significant association was demonstrated between the interaction term and symptoms of depression at follow-up, $\beta=.380, p=.017$. The main effect of slope of change in state mindfulness was non-significant, $\beta=-.066, p=.674$. GPA emerged as significantly associated with symptoms of depression at follow-up, $\beta=-.262, p=.008$. Participants with higher GPAs

also reported fewer symptoms of depression at T2. When utilizing only data from participants who completed both assessment periods ($N=71$), the significant associations between the interaction term and GPA with symptoms of depression at follow-up remained. A summary of hierarchical regression analyses for hypothesis 4.2 including control variables is displayed in Table 25.

In summary, secondary analyses revealed several significant control variables related to the intervention. First, inclusion of control variables in the ANCOVA analyses reduced significance for all analyses; however, when using intent-to-treat principles, semester stress was a significant control such that when holding stress constant, trait mindfulness increased significantly as a function of time. Second, with employment status and GPA included in the model with meditation time predicting symptoms of depression, employment status and GPA emerged as significant controls. Additionally, GPA emerged as a significant control variable in re-examination of Hypothesis 4.2 such that participants with lower GPAs had greater symptoms of depression at follow-up. A summary of significant control variables from all secondary analyses is displayed in Table 26.

DISCUSSION

Main Findings

Primary Analyses. Primary analyses included four main aims and subsequent hypotheses. Collectively, these hypotheses sought to further outline the relationship between mindfulness, gratitude and symptoms of depression at baseline and following a mindfulness-based intervention. This chapter is organized as follows: first, results of primary analyses are re-stated and discussed, aim by aim. Second, a broader-picture discussion including implications, and existing/future research is considered for each aim. Third, results of secondary analyses are outlined by variable (e.g., semester stress, employment status, GPA). Finally, this chapter concludes with discussion of strengths, limitations, implications and future directions. An overview of significant findings is also presented in Table 26 to guide reading.

Aim 1. Among this sample of undergraduates, at baseline, gratitude was significantly related to state mindfulness, but not trait mindfulness. This finding contributes to the small body of literature examining the relationship between mindfulness and gratitude by introducing a potential differentiation. While previous studies have demonstrated significant relationships between gratitude and trait mindfulness (Loo, Tsai, Raylu, & Oei, 2014; Hicks et al., 2017), perhaps a stronger association is present when measuring more state-like features or a broader conceptualization of mindfulness. This dissertation is the first known study to

demonstrate a relationship between gratitude and the CAMS-R mindfulness measure. This association suggests that undergraduates who possess greater levels of gratitude may also have a greater propensity for present-moment awareness.

In deeper examination of the relationship between mindfulness and gratitude, several key associations emerged at the subscale level. Sense of Abundance was significantly associated with state mindfulness, but not trait mindfulness. The Social Appreciation subscale revealed significant associations with state mindfulness, and marginal significance with trait mindfulness ($p = .051$). Reflecting the relationship demonstrated between summary scores, these findings suggest appreciating the richness of life and valuing relationships have stronger links to state-like features of mindfulness, rather than a disposition. Of interest, the Simple Pleasures subscale did not reveal significant associations with either characterization of mindfulness. Despite previous studies suggesting gratitude for life's simpler blessings is associated with greater mindfulness (Hicks et al., 2017), the current study does not support this notion. These mixed findings necessitate a greater understanding of how mindfulness and gratitude may intersect. This avenue of research is important for recognizing how mindfulness measurements map on to related positive psychology constructs in order to outline a clearer characterization of mindfulness.

In addition to providing novel associations between gratitude and mindfulness, the current study also replicated previous research on the relationship between gratitude and mindfulness to symptoms of depression. In the current sample of undergraduates, at baseline, gratitude was significantly negatively related to symptoms of depression. At the subscale level, Sense of Abundance and Social Appreciation contributed to this

relationship. As discussed previously, the Simple Pleasures subscale did not significantly relate to symptoms of depression. Although previous studies have demonstrated a relationship between gratitude and symptoms of depression (Watkins et al., 2003), this study is the first known to utilize a screener-based questionnaire for depression (PHQ-9). Prior studies have largely used the Beck Depression Inventory. Utilization of a separate measure of depression, or perhaps a clinician-based diagnostic assessment, would help strengthen the association. This study also demonstrated that undergraduates with greater state and trait levels of mindfulness reported fewer symptoms of depression. Despite the lack of associations with trait mindfulness and gratitude, both characterizations of mindfulness share an association with fewer symptoms of depression.

In further examination of the baseline associations among mindfulness, gratitude, and symptoms of depression, hierarchical regression analyses demonstrated several significant relationships. When entered into the linear model as an independent predictor, gratitude was significantly negatively associated with symptoms of depression.

Individuals who reported more gratitude also reported fewer depressive symptoms at baseline. This finding confirms previous research demonstrating a negative association between gratitude and depression in young adults (Lin, 2015). When examining both measures of mindfulness as independent predictors of symptoms of depression, both the CAMS-R and MAAS emerged as significantly negatively associated. Individuals higher in both characterizations of mindfulness also had fewer symptoms of depression.

Mounting evidence suggests a protective role of both state (Feldman et al., 2007) and trait mindfulness (Deng, Li, & Tang, 2014) with symptoms of depression.

When examined as individual predictors, each variable was significantly associated with symptoms of depression; however, when gratitude was entered into the linear model concurrently with mindfulness, its unique prediction of symptoms of depression became non-significant. This suggests that mindfulness (both state and trait, separately) accounted for the variance predicted by gratitude in the relationship with depression. In other words, gratitude did not demonstrate a unique, predictive relationship with symptoms of depression when considering the influence of mindfulness. Similarly, in these models the interaction terms (gratitude*state mindfulness; gratitude*trait mindfulness) were not significantly associated with symptoms of depression suggesting their shared variance does not significantly predict symptoms of depression. Taken together, these findings implicate a stronger association of mindfulness with symptoms of depression than gratitude. This conclusion adds to the literature which has previously shown that the relationship between gratitude and depression is fully mediated by self-esteem and well-being (Lin, 2015). Perhaps the relationship between gratitude and symptoms of depression is indirect and better explained by a third variable—such as mindfulness.

Aim 2. Repeated-measures ANOVA analyses revealed several important changes as a function of time coinciding with participation in Koru mindfulness. From baseline to follow-up, a significant increase in gratitude was demonstrated. This finding highlights the importance of engaging in the daily gratitude practice log. In contrast to the mindfulness teachings which are integral to the Koru curriculum, gratitude-specific didactics are not explicitly included in the structure of Koru. Therefore, perhaps the explicit teaching of gratitude was not necessary to increase gratitude, but daily log

practice was sufficient. From baseline to follow-up, there was no significant increase in trait mindfulness. Similarly, a significant increase in state mindfulness was not demonstrated; however, the association was nearly significant. While definitive conclusions cannot be drawn based on non-significance, descriptively, mindfulness increased as a function of time. Finally, repeated-measures ANOVA revealed a significant decrease in depressive symptoms from baseline to follow-up. This finding is promising as Koru may be an effective approach in reducing psychological distress among college students. These findings help to bolster the current body of research on Koru which has previously demonstrated improvements in perceived stress, sleep problems, mindfulness and self-compassion (Greeson et al., 2014). Results of the current study provide additional support for increases in gratitude and reduction in depressive symptoms.

The methodological design of the study allowed examination of practice effects of the intervention. Participants were asked to complete daily logs for the four-week intervention requesting specific information regarding meditation frequency, duration, type, a meditation reflection section and a gratitude reflection section. The variables were used in the prediction of slope of change in symptoms of depression to better understand the benefits of practicing Koru. When using intent-to-treat principles, results suggested attendance of Koru Mindfulness classes significantly predicted slope of change in symptoms of depression. Participants who attended more classes experienced a greater reduction in symptoms of depression. This finding suggests a potential dose-response effect of class attendance and highlights the importance of each class (Figure 15). Similar results have been published suggesting class attendance predicts outcomes of MBIs

(Creswell, Myers, Cole, Irwin, & immunity, 2009). Importantly, class attendance provides an objective measure of participation that is not reliant on self-report or memory, but rather sign-in records from each class. However, attendance of class sessions may also represent the effect of social support. Teasing this apart using a social support control group would help to strengthen these results. Figure 15 illustrates slope of change in symptoms of depression by percentage of classes attended and provides another important implication. Participants who attended fewer Koru classes had a greater number of depressive symptoms at baseline. This suggests that depression may serve as a barrier to class attendance and reduce the benefit of Koru Mindfulness reaching students with a greater severity of depression. Mindfulness teachers should consider this bias—that individuals with greater baseline mental health are more likely to attend a greater number of sessions—and as such, should take steps to retain students with more severe symptoms.

Meditation frequency and duration were also examined as predictors of slope of change in symptoms of depression. No significant associations were found between amount or frequency of meditation and change in symptoms of depression. This null finding contradicts existing research in MBSR literature suggesting meditation time predicts greater well-being (Carmody & Baer, 2008) and less psychological distress (Rosenzweig et al., 2010).

Finally, the gratitude section of the daily log was examined as a predictor of intervention outcomes. Frequency of logging items grateful for was significantly associated with slope of change in symptoms of depression. Both with and without intent-to-treat principles, mean and total number of items logged were significant predictors of

slope of change in symptoms of depression. However, this finding was only significant when including a participant who was considered a statistical outlier based on a high number of gratitude responses. Given this important limitation, these results should be interpreted cautiously. Despite this, frequency of gratitude log completion was a key factor in the benefits reaped from the intervention, regardless of the number of items logged. Previous research has shown positive benefits of creating gratitude lists on depression (Southwell & Gould, 2017). Perhaps the positive valence of remembering, savoring, and writing things for which one is grateful helped to counter the negative emotions of depression. Additionally, the consistent practice of doing so across 21 or 28 days of the intervention may have fostered a positive lens and positive memory bias that reduced the negative bias common in depression (Watkins, 2014). This finding highlights the importance of incorporating positive psychology components in MBIs.

Aim 3. The proposed ‘upward spiral’ model of mindfulness and gratitude was examined via the MacArthur approach to mediation using hierarchical regression. Given the necessary criteria needed to run such analyses, only one hypothesis (3.1) was carried forward in analyses. One such criterion is that the predictor and mediator must be significantly correlated. Baseline state mindfulness (predictor) was significantly associated with the slope of change in gratitude (mediator). This association revealed that participants with greater levels of state mindfulness at baseline demonstrated a reduction in gratitude from baseline to follow-up. Although this finding may seem counter-intuitive, it may be helpful to consider its inverse—that individuals with lower levels of state mindfulness had a greater positive change in gratitude. Perhaps individuals

with low initial state mindfulness experienced increases in both mindfulness and gratitude as there was more ‘room for improvement’—helping to explain this association.

When examining the potential mediating role of change in gratitude in the association from state mindfulness at baseline with state mindfulness at follow-up, there was no significant mediation. Therefore, an upward spiral theory of changes in gratitude affecting changes in mindfulness or vice versa is not currently supported by the data. However, varied methodology and statistical techniques such as use of extended data collection time periods, ecological momentary assessment, and structural equation modeling would be beneficial in further testing this theory.

Aim 4. Mediation using the MacArthur approach was also examined to help understand the association between slope of change in gratitude as a mediator for the change observed in symptoms of depression from baseline to follow-up. Similarly, slope of change in mindfulness (state and trait) were considered as potential mediators in the change in symptoms of depression. Examination of these potential mediators helps to identify mechanisms by which depression decreases as a function of time/intervention. MacArthur criteria were met only for hypothesis 4.2 examining the potential mediating relationship of slope of change in state mindfulness with change in symptoms of depression from baseline to follow-up. A significant positive relationship was found between baseline symptoms of depression and slope of change in state mindfulness—such that participants who reported greater levels of baseline depression also reported an increase in state mindfulness. This association suggests that participants who were experiencing significant elevations in depression had steeper increases in state

mindfulness through the intervention perhaps indicating a greater necessity for mindfulness skills.

Regarding the mediation analysis, the hierarchical regression model demonstrated a significant interaction term indicating mediation. Slope of change in state mindfulness partially mediated the association between baseline symptoms of depression and follow-up symptoms of depression. This finding highlights one of the mechanisms by which Koru Mindfulness may be effective in reducing depressive symptoms. Namely, increasing mindfulness had a significant effect on reducing symptoms of depression. Studies examining the active components of mindfulness-based interventions have shown similar findings (Labelle, Campbell, & Carlson, 2010). Specifically, among heart disease patients in an MBCT intervention, change in mindfulness mediated the improvement in depressive symptoms (O'Doherty et al., 2015). A similar study of MBSR among cancer patients demonstrated changes in mindfulness mediated the changes in stress and positive states of mind (Bränström, Kvillemo, Brandberg, & Moskowitz, 2010). Importantly, these studies utilized self-report mindfulness measures (FFMQ, MAAS) from different theoretical backgrounds. Findings from the present study contribute to the literature by replicating findings of mindfulness as a mediator of changes in depressive symptoms; however, novelty is also contributed through use of the CAMS-R measure of state mindfulness and demonstrating such findings through Koru Mindfulness.

Further Discussion of Significant Results of Primary Analyses

The current study sought to fill gaps in the research by exploring mindfulness and gratitude at the cross-sectional level and as ameliorative factors in the reduction of depressive symptoms through a Koru Mindfulness intervention in a sample of

undergraduate roommates. This study addressed four main questions: (Aim 1) How are mindfulness and gratitude related to one another and symptoms of depression? (Aim 2) What effects does participation in Koru Mindfulness have on gratitude, mindfulness and symptoms of depression? (Aim 3) Do mindfulness and gratitude reciprocally influence one another? (Aim 4) What mechanisms account for the changes in depressive symptoms from Koru Mindfulness? The following paragraphs detail how the results of this dissertation serve to inform these questions. A summary of significant results is presented in Table 26.

First, regarding the associations at baseline data collection of gratitude and mindfulness (Aim 1), little is known about the relationships between these constructs. Mindfulness has received a wealth of research attention in the last decade; meanwhile, gratitude has experienced modest growth despite its frequent use in society. Understanding the ways in which these constructs converge and diverge can help to inform researchers as to inclusion of these variables in future studies. To date, five studies assessed correlational associations of gratitude and mindfulness (Appendix B). Of these, only three demonstrated a significant association between gratitude and mindfulness. Importantly, separate measures of gratitude and mindfulness, evolving from separate theoretical origins and with varying degrees of psychometric strength, were used. The present study adds to this discussion by utilizing a robust measure of gratitude (GRAT-R) and two separate measures of mindfulness (CAMS-R, MAAS) that capture both dispositional or trait-like characteristics as well as a broader, more state-like characterization. In the present study, a significant association of gratitude with the CAMS-R, but not the MAAS was demonstrated. It is possible that qualities of

gratitude—such as sense of abundance, social appreciation, and general thankfulness—relate more strongly to mindfulness as a present state of being rather than a personality trait. This notion aligns with the characterization of gratitude more as a practice than a fixed state of being (Watkins, 2014). Overall, results of Aim 1 contribute to the examination of mindfulness and gratitude as related, yet distinct constructs.

In addition to the association of gratitude and mindfulness, their associations with symptoms of depression were also examined. Several studies have found positive associations of mindfulness (Way et al., 2010) and gratitude (Wood, et al., 2010) with lower levels of depression. As hypothesized, mindfulness (state, trait) and gratitude were negatively associated with symptoms of depression. This finding replicates existing research and further supports the positive, and potentially protective, nature of mindfulness and gratitude. Finally, at baseline, mindfulness and gratitude were examined for the degree to which they contributed independent or shared variance in the prediction of reduced symptoms of depression. Independently, mindfulness (state, trait) and gratitude each predicted symptoms of depression. However, when gratitude and mindfulness were included in a linear model together, both state and trait mindfulness accounted for the variance contributed by gratitude in the prediction of symptoms of depression. This novel finding suggests that both state and trait mindfulness are stronger predictors of symptoms of depression than gratitude. Additional implications of these findings are outlined in sections below.

Second, this study examined the role of participation Koru Mindfulness on gratitude, mindfulness and symptoms of depression (Aim 2). To date, only one published RCT provides evidence for the benefits of Koru including improvements in stress, sleep,

state mindfulness and self-compassion compared to wait-list controls (Greeson et al., 2014). In the initial study, no significant change in gratitude was found and depression was not assessed. The present study complements Greeson and colleagues' work through the addition of a more robust measure of gratitude, a depression measure and two measures of mindfulness. As hypothesized, gratitude significantly increased and symptoms of depression significantly decreased from baseline to follow-up. No significant change was evidenced in state or trait mindfulness, although both approached significance. Importantly, because a control group was not used, interpretations should be made cautiously. These findings provide two additional benefits of Koru—increased gratitude and decreased depression. This may be particularly salient given the steadily rising rates of depression on college campuses. Koru may function as a preventative or reparative intervention for college students experiencing depression.

The benefits of participation in Koru were also assessed through examining attendance, mindfulness practice, and gratitude practice using daily log data. As hypothesized, attendance was significantly associated with slope of change in depressive symptoms. Participants who attended more classes had a steeper downward slope of depressive symptoms than those who attended fewer classes (Figure 15). Examination of dose-response effects is novel for Koru, but among other MBIs, treatment dose (i.e. attendance) has been shown to be a predictor of superior outcomes (Weissbecker et al., 2002; Tamagawa et al., 2015). Mindfulness practice (frequency and duration) was not a significant predictor of slope of change in depressive symptoms. There may be a few potential explanations for the lack of a significant finding. First, participants were asked to meditate for ten minutes each day; because participation in this study fulfilled some

participant's research requirement, they may have felt obligated to inflate the amount of time spent meditating to meet the expectations of the researchers. Alternatively, qualitative responses gathered by Koru teachers suggested that participants would meditate informally throughout the day to aggregate the required ten minutes of daily practice. This method of informal practice may complicate the use of meditation time as a predictor of outcomes. Finally, self-reported meditation time may not be the most precise measure of mindfulness learning or practice. Perhaps the less tangible aspects of mindfulness (e.g. acceptance, non-judgment), which do not lend themselves well to objective measurement, may predict changes in symptoms of depression—above and beyond meditation time alone. Finally, as hypothesized, gratitude log completion and number of items grateful for listed daily predicted slope of change in symptoms of depression. Previous research on this topic has shown the number of gratitude-related items listed contributes to a greater 'grateful mood' (McCullough, Tsang, & Emmons, 2004). However, the present study furthers this connection to illustrate a reduction in depressive symptoms. This novel finding highlights the potential dose-response effect of maintaining a gratitude practice.

Third, the present study explored the hypothesized 'upward spiral' relationship between reciprocal changes in mindfulness and changes in gratitude. This theory posits that increases in mindfulness will facilitate increases in gratitude—and increases in gratitude will facilitate increases in mindfulness. No significant mediating relationship was found for changes in gratitude with changes in mindfulness or vice versa (Figure 6). Despite the null finding, further examination of the theory is warranted. Both mindfulness and gratitude are theoretically related constructs and increased over the course of the

intervention. Further, qualitative remarks from participants suggest an experience of increased awareness facilitating increased levels of gratitude. Perhaps this reciprocally increasing relationship between mindfulness and gratitude occurred on a smaller scale and was not accurately analyzed by use of pre-post data. Use of more sophisticated statistical analyses to assess this theory may better identify the phenomenon at play.

Fourth, this study sought to examine the potential mechanistic components of Koru that help predict changes in depressive symptoms (Aim 4). Results of mediation analyses demonstrated a significant mediating effect of increased state mindfulness on changes in depressive symptoms from baseline to follow-up (Figure 7). This finding, while novel in the context of Koru, has previously been shown in MBSR and other MBIs. Specifically, increased mindfulness may be the ‘active component’ of MBSR that exerts change on depressive symptoms (Dobkin & Zhao, 2011). These results provide a strong theoretical foundation for understanding how symptoms of depression change for individuals participating in Koru and highlight a potential avenue for a preventative intervention for college student depression. Interestingly, gratitude demonstrated a significant increase from baseline to follow-up, was significantly associated with depressive symptoms, but was not a significant mediator of changes in depressive symptoms. It may be the case, that as seen in the results of Hypothesis 1.4, mindfulness accounts for the variance provided by gratitude in the prediction or change of symptoms of depression. Or, perhaps more sophisticated statistical approaches such as time series analyses or structural equation modeling could be used to further clarify the role of gratitude in reducing depression.

Returning to the theoretical bases of this dissertation, several important conclusions can be drawn. First, the Intention-Attention-Attitude model proposed by Shapiro and Schwartz (2000) and further delineated by Kabat-Zinn (2013), suggested a greater focus on the attitude component of mindfulness. Specifically, that practitioners recognize the particular attitude (e.g. joy, patience, gratitude) with which one attends to mindfulness meditation. Both correlational and regression analyses demonstrated a significant relationship between state mindfulness and gratitude, which suggests an important overlap and highlights the benefits of considering attitudinal components of mindfulness. Further, gratitude significantly increased from baseline to follow-up in a primarily mindfulness-focused intervention. Despite the daily logging of gratitude, there was no formal teaching of gratitude as part of Koru—however, a significant increase was observed. This suggests that gratitude may naturally increase as a function of MBI without specifically addressing it in class sessions.

This notion is supported by the upward spiral model of gratitude and mindfulness proposed in this dissertation. Although mediation analyses did not support the hypotheses, both mindfulness and gratitude demonstrated increases. Further, aspects of this model, and the larger conceptual framework (Figure 3) deserve future empirical attention. Specifically, in understanding how mindfulness and gratitude may work together to foster positive emotion, create a positive attentional bias, increase accessibility of positive emotion, and increase coping resources. While not tested in the current study, these mechanisms may have been at play in the reduction of depressive symptoms as a function of increased mindfulness and gratitude.

The combination of mindfulness and gratitude may be particularly salient for an undergraduate population. Spiking rates of mental health concerns point to a larger problem of students facing increased demands with diminishing social and emotional resources. Now, more than ever, students are reporting feeling stressed, overwhelmed, anxious, and depressed (Beiter et al., 2015; Pope, Brown, & Miles, 2015). Further, Pope and authors (2015) suggest that the prevalence of social media use has increased materialism in young adults. With students facing increased stress, pressure to perform, and materialism, the hedonic treadmill accelerates. Students are faced with the challenge to ‘have it all, do it all, and be it all’ without breaking a sweat. This mounting pressure likely explains the increase in usage of counseling center mental health services and young adults suicides (Garlow et al., 2008; Watkins et al., 2012). Mindfulness and gratitude serve as a timely antidote to the perpetually overworked and undersatisfied college student. Teaching skills of nonjudgment, acceptance, and gratitude contrast typical societal messages and may ultimately lead to better physical and mental well-being in undergraduates.

Secondary Analyses. Secondary analyses explored theoretically-derived, empirically-derived and roommate-related control variables as potential confounding factors in hypothesized relationships. Necessary inclusion criteria for empirically-derived and roommate-related control variables was not met. Due to lack of significant correlation results with empirically-derived and roommate-related variables (Table 16), only the six theoretically-derived control variables were included for secondary analyses. An overview of significant results of secondary analyses is displayed in Table 27.

Hypothesis 1.4 and 2.1 – Semester Stress. Inclusion of theoretically derived control variables in analyses of baseline associations demonstrated a significant association of stress of the semester with symptoms of depression. Students who rated their semester as more stressful were more likely to also report symptoms of depression. This finding is not surprising given the strong association between stress and depression (Hammen, 2005). However, the significant association among stress and symptoms of depression in this college sample highlights an alarming, rising trend of over-stressed students with increasing mental health complaints (Beiter et al., 2015). In fact, recent estimates suggest that one in three college freshmen reported mental health concerns in the past year (Bruffaerts et al., 2018). Additionally, when holding semester stress constant, a significant increase was observed in trait mindfulness. This finding suggests that stress may serve as a barrier to receiving the benefits of a stress-reduction program such as Koru. In light of this growing concern, greater attention should be paid to precursors to mental health concerns such as perceived stress of the semester.

Hypothesis 1.4 and 2.3 – Employment Status. Employment status emerged as a significant control variable among two hypotheses. First, in re-examination of baseline associations of gratitude with symptoms of depression, employment status emerged as a significant control variable in both Model 1 (controls only) and Model 2 (controls with gratitude). Participants who reported being employed also demonstrated greater symptoms of depression at baseline. Second, in the regression model examining meditation time as a predictor of slope of change in depressive symptoms, employment status emerged as a significant control variable. Employed participants demonstrated less of a reduction in depressive symptoms across the intervention period.

Regarding the association between employment status and depression in undergraduates, findings have been mixed. Nolen-Hoekesma, and Ahrens found that unemployment correlated positively with symptoms of depression in college students (2002). These findings have been replicated among a young adult population both enrolled and not enrolled in college (Galambos, Barker, & Krahn, 2006). Conversely, a strong association exists between employment stress and depression (Byun & Park, 2014). Considering the contextual factors of employment at the University of Louisville, in which a major corporation employing students requires full-time, third-shift employment, the association of employment with depression could be due in part to the stressful nature of shiftwork. In post-hoc examination of students in the study who worked shift work ($n=5$), these students reported a higher score of depressive symptoms of ($M= 9.00$; $SD= 6.52$) compared to non-shift workers ($n=88$, $M=7.83$, $SD=6.47$). Close attention should be paid toward the stressful and potentially deleterious effects of employment—especially shiftwork among college students.

Hypothesis 2.3 and 4.2 – GPA. GPA was also found to be a significant control variable among two hypotheses. First, in the hierarchical regression model examining meditation time as a predictor of slope of change in symptoms of depression, GPA emerged as a significant control variable. Participants with higher GPAs demonstrated greater reduction in symptoms of depression (Figure 16). Second, in hypothesis 4.2, slope of change in state mindfulness was found to mediate the change in depressive symptoms from baseline to follow-up. However, GPA emerged as a significant such that participants with higher GPAs also reported fewer symptoms of depression at follow-up. GPA was significantly associated with both the (a) change in symptoms of depression

and (b) depressive symptoms at follow-up. Taken together, these two significant control variable findings highlight the potential buffering nature a high GPA and symptoms of depression. Conversely, the reality of having a low GPA—a relatively stable academic statistic that carries potential future consequences—may maintain symptoms of depression. The association of GPA and depression may also be bidirectional such that symptoms of depression make academic success more difficult and thus, lowers GPA; or, consistently obtaining poor grades and having a low GPA leads to symptoms of depression (Deroma et al., 2009). Research suggests that this cycle of low academic performance and depression may further exacerbate one another (Heiligenstein, Guenther, Hsu, & Herman, 1996).

Summary of secondary analyses. Semester stress, employment, and GPA were the only control variables that were significantly associated with the major outcome variable of interest—symptoms of depression. The intention of including control variables was to identify potential confounding variables and inform future analyses. Considering this, the following suggestions for future studies are provided. Degree of semester stress should be carefully considered when assessing for depression outcomes. In particular, close attention should be paid toward time of the semester (i.e. finals, exams) in which data collection is occurring as this has been shown to heighten stress (Garett, Liu, & Young, 2017). Adjusting analyses for semester stress could help to minimize the confounding effect of stress on symptoms of depression. Next, analyses examining depressive symptoms as an outcome may need to adjust for employment status. As detailed above, a complex association may exist among employment and depressive symptoms and considering this confound in statistical models would be

beneficial. Finally, in studies researching depressive symptoms among undergraduates, GPA should be considered as a possible confounding variable and adjusted for in analyses. Sex, minority status, and financial difficulties did not emerge as significant control variables in the association with depressive symptoms. Despite this, these variables have been demonstrated to covary with depressive symptoms. It is possible that due to the small sample size or low representation of men and minority-group members in our sample that these variables did not act as confounding variables. Similarly, financial difficulties were approximated based on qualification for financial need; however, additional factors including scholarships, extended family support, and employment may have played a role in the qualification for financial need and therefore diminished the accuracy of this variable.

Strengths and Limitations

The current study possessed several key strengths. First, one primary strength was the conceptual model and use of previous research to inform research questions which provided a solid basis for further investigating the relationship between gratitude and mindfulness. In particular, a thorough literature review was conducted to assess for existing research covering the intersection of mindfulness and gratitude. Previous research was essentially devoid of theoretical rationale for inclusion of these variables and the discussion of their association was extremely limited. Additionally, an adaptation of Garland's *Mindfulness-in-Meaning* model (2011) and Fredrickson's upward spiral theory of positive emotion was used as the foundation for exploring the connection between mindfulness and gratitude. Second, a strength of this study was the rigor of methodology and design. Baseline data collection, the intervention and follow-up data

collection occurred within one semester for the entire sample which helps to limit variability of data collection from semester to semester (i.e. Fall vs. Spring). Additionally, log-based data collection was electronically collected compared to the traditional method of Koru which involves weekly handwritten logs. Use of electronic data sent twice daily via email likely increased the ecological validity and minimized the reliance on memory to complete the log. Third, the selection of survey instruments served as a strength of this study. Specifically, the use of the GRAT-R, rather than the widely-used, 6-item GQ-6, reduced the risk of ceiling effects, increased variability and allowed for examination of subscales. The intentional use of two measures of mindfulness—each designed to measure facets of state and trait mindfulness respectively—helped to expand the discussion of mindfulness and its associations with gratitude and symptoms of depression. Finally, an important strength of this study is the selection of Koru Mindfulness as the mindfulness intervention. Koru Mindfulness was designed for the emerging adult/college student population and has a foundation of empirical support. Thus, it was aptly suited for examination of depression in college students. Additionally, Koru Mindfulness requires its teacher to complete a certification process that helps to ensure uniformity and standardized implementation. Further, the brief, skills-based approach with required logging of home practices aligned well with the data collection process and dynamic nature of college students' lives.

Limitations of the study have been acknowledged throughout the discussion; however, additional discussion is provided in the following section to emphasize key points. First, the restricted age range of the sample, while informative for college administrators and campus mental health providers, limits the generalizability of the

findings. Replication using a different sample would help determine if the significant findings of the study translate to other populations. Second, our sample consisted of predominately Caucasian females with high GPAs. A common critique of mindfulness research is that it does not adequately recruit, retrain, treat, or discuss members of minority groups (Magee, 2016). This creates two main problems; first, the findings of the current study are not generalizable to members of minority groups, and second, members of minority groups experience uniquely stressful events that could serve as prime candidates for a stress-reduction program such as Koru. Future researchers should design studies with the intentional recruitment of minority populations in mind. Third, the majority of our sample were self-identified participants who self-selected to join the study. This may result in sampling bias and does not constitute a clinical sample of depressed individuals, despite the high representation of depressed students in our sample. An additional limitation of the current study is the use of self-report measures and self-reported practice time. Such questionnaires are subject to social-desirability and response-bias. Innovative ways of objectively or experimentally measuring mindfulness and gratitude could strengthen the results. Similarly, use of clinician-monitored symptoms of depression, rather than self-report could add validity to the results. Practice-time could also be measured more objectively through use of a meditation timer or app that captures data. A final limitation of the study is the lack of explicit gratitude teaching in the Koru Mindfulness curriculum. Gratitude is present on the meditation log, but students are not provided explicit teachings, metaphors, or practice experiences with gratitude within the current structure of Koru. Given that the present study examined gratitude as a key variable of interest, perhaps an adaptation of the curriculum to more

precisely target gratitude could better inform the intersection of mindfulness and gratitude.

Implications and Future Directions

The present study provides several important implications for researchers, practitioners and students. Notably, this study adds to the small body of literature supporting the benefits of Koru Mindfulness for undergraduates. However, it is important to note that the present study had a few minor differences from that of traditional Koru. Namely, the daily log was sent electronically via RedCap email reminders to complete a survey link, rather than completed via paper and pencil. While it is believed this method may better capture practice data as it is likely more accessible, it may have also changed how participants log data. Specifically, the meditation and reflection section of the electronic log provides a text box that allows for unlimited characters (Appendix D), while the paper and pencil log only provides a small box. It is possible that the electronic log allowed for more open-ended and longer responses than the traditional Koru log. Additionally, this study recommended, but did not require the associated text, “The Mindful Twenty-Something” that typically accompanies Koru. This may have limited the ways in which participants could engage outside of class sessions. Finally, participants in the current study were enrolled with their roommates. Even though dyadic analyses demonstrated independence and roommate-related control variables were non-significant, subtle, latent differences from roommate participation may affect the interpretation of the current study’s findings.

Despite these differences, this study expands the understanding of how mindfulness and gratitude may be related to one another in several important ways. First,

findings of this study will help to increase the understanding of the connection between mindfulness and gratitude by demonstrating the relationship between variables with psychometrically valid assessment tools (MAAS; CAMS-R, GRAT-R) that have not previously been examined. Investigation of subscale associations clarifies the convergences and divergences of these constructs effectively creating a nomological net for their dual use. Second, this study provides further insights regarding the benefits of Koru Mindfulness. The single previously published study of Koru did not assess depressive symptoms, nor did it find a statistically significant change in gratitude. The present study contributes several novel findings of Koru Mindfulness including reduction in depressive symptoms and an increase in gratitude from baseline to follow-up. Third, this study carries significant implications for the importance of class attendance in predicting change in depressive symptoms as well as the ‘active component’ of increased mindfulness as a mechanism of change. This study serves as the first study examining the practice effects of Koru using log data as a predictor of change. Finally, findings from this study represent the first step in testing the proposed upward spiral model of practicing gratitude and mindfulness in synchrony. In particular, these findings may highlight the importance of inclusion of a gratitude component within MBIs to aid in effectively target depressive symptoms in undergraduates.

Overall, this study offers one avenue of investigation by which college student mental health may be most effectively and efficiently addressed. Future researchers should consider these implications when designing, implementing and analyzing mindfulness and MBI research. Many implications for future directions have been detailed throughout this discussion; however, a few considerable implications are

recognized again in the following section for their importance and extent to which they direct future investigation.

Treatment Approach for Depression in Undergraduates. With the increasing rates of depression and mental health concerns on college campuses, future research is warranted to investigate effective ways of preventing and treating depression in undergraduates. Given the understaffing difficulties in university counseling centers, a group-format such as Koru may be an effective and efficient means of targeting sub-clinical as a preventative approach. Future researchers would benefit from examining Koru among clinical populations of undergraduate depression to discern if Koru may function as a group-based treatment for more severe levels of depression. Further, it may be of additional benefit for universities to implement such programs during orientation week or early in the semester to build foundational skills to help prevent the onset of depressive symptoms. This preventative approach of targeting undergraduate depression would likely be more cost and time effective for college mental health workers.

Examination of Active Intervention Components. The design and implementation of the current study allowed for a better understanding of the ways in which the intervention was effective. In particular, use of data from daily logs and class attendance was advantageous because it allowed for preliminary examination of practice and dose-response effects. Given that most MBIs require a degree of home practice, researchers should profitably use this data to better understand the ‘why’ of MBI effectiveness. The current study provided a potential avenue of doing so through use of an electronic log linked to a data collection program. Future researchers should consider similar streamlined methods of daily data collection. Additionally, the longitudinal design

of the current study allowed for mediation analyses with temporal precedence. There is increased scrutiny toward studies which claim mediation in a cross-sectional design (Zhao, Lynch Jr, & Chen, 2010). MBI researchers should aim to collect data longitudinally to better understand the mechanistic influences of mindfulness.

Use of Control Variables in Secondary Analysis. Finally, the current study utilized theoretically-derived control variables in the re-analysis of primary hypotheses. In doing so, the results are strengthened and further clarified in context. Use of control variables recognizes the greater backdrop with which these relationships occur. It is important for researchers to recognize and analyze ways in which gender, race and socioeconomic status factor into the results. This knowledge can help to inform future hypotheses and shape the recruitment and inclusion of specific samples of interest. Future investigation of mindfulness research should follow suit in inclusion of control variables to better understand the extraneous factors that affect MBIs.

Conclusions

The current study examined the relationship of mindfulness and gratitude at baseline and through Koru Mindfulness—an MBI with a gratitude component on symptoms of depression. Results revealed a significant association of mindfulness and gratitude with one another and symptoms of depression. Further, this study served to provide evidence for the benefits of Koru—increased gratitude and decreased depressive symptoms—and highlighted the importance of class attendance and practicing gratitude through a daily log. Ultimately, this research provides preliminary evidence for the overlap of mindfulness and gratitude at baseline, and the benefits of practicing both in tandem for symptoms of depression in undergraduates. In working to reduce the

increasing prevalence of depression in college students, administrators and mental health workers should consider MBIs such as Koru as an effective and efficient means of reducing symptoms of depression. Future investigation should continue to explore the potential reciprocal relationship between increased mindfulness and increased gratitude in facilitating adaptive psychological functioning.

REFERENCES

- Algoe, S. B., Haidt, J., & Gable, S. L. (2008). Beyond reciprocity: Gratitude and relationships in everyday life. *Emotion*, 8(3), 425.
- Andrews, B., & Wilding, J. M. (2004). The relation of depression and anxiety to life-stress and achievement in students. *British Journal of Psychology*, 95(4), 509-521.
- Antin, J., & Shaw, A. (2012). *Social desirability bias and self-reports of motivation: a study of amazon mechanical turk in the US and India*. Paper presented at the Proceedings of the SIGCHI Conference on Human Factors in Computing Systems.
- Baer, R. (2011). Measuring mindfulness. *Contemporary Buddhism*, 12(01), 241-261.
- Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13(1), 27-45.
- Baltzell, A., Caraballo, N., Chipman, K., & Hayden, L. (2014). A qualitative study of the mindfulness meditation training for sport: Division I female soccer players' experience. *Journal of Clinical Sport Psychology*, 8(3), 221-244.
- Beiter, R., Nash, R., McCrady, M., Rhoades, D., Linscomb, M., Clarahan, M., & Sammut, S. (2015). The prevalence and correlates of depression, anxiety, and stress in a sample of college students. *Journal of affective disorders*, 173, 90-96.
- Bickham, G. A. (2015). Major Depressive Disorder: Precursors, Predictors, and Coping Mechanism Among Undergraduate Students.

- Bodhi, B. (2011). What does mindfulness really mean? A canonical perspective. *Contemporary Buddhism*, 12(01), 19-39.
- Bränström, R., Kvillemo, P., Brandberg, Y., & Moskowitz, J. T. (2010). Self-report mindfulness as a mediator of psychological well-being in a stress reduction intervention for cancer patients—A randomized study. *Annals of behavioral medicine*, 39(2), 151-161.
- Brdar, I., & Kashdan, T. B. (2010). Character strengths and well-being in Croatia: An empirical investigation of structure and correlates. *Journal of research in personality*, 44(1), 151-154.
- Brewer, J. A., Mallik, S., Babuscio, T. A., Nich, C., Johnson, H. E., Deleone, C. M., . . . Weinstein, A. J. (2011). Mindfulness training for smoking cessation: results from a randomized controlled trial. *Drug and alcohol dependence*, 119(1-2), 72-80.
- Brown, C. A., & Jones, A. K. (2010). Meditation experience predicts less negative appraisal of pain: electrophysiological evidence for the involvement of anticipatory neural responses. *Pain*, 150(3), 428-438.
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of personality and social psychology*, 84(4), 822.
- Bruffaerts, R., Mortier, P., Kiekens, G., Auerbach, R. P., Cuijpers, P., Demyttenaere, K., . . . Kessler, R. C. (2018). Mental health problems in college freshmen: Prevalence and academic functioning. *Journal of affective disorders*, 225, 97-103.

- Byun, E.-K., & Park, S.-H. (2014). Effects of major satisfaction and employment stress on depression in college students. *Journal of the Korea Academia-Industrial cooperation Society*, 15(1), 323-330.
- Carmody, J., & Baer, R. A. J. J. o. b. m. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. 31(1), 23-33.
- Chiesa, A. (2013). The difficulty of defining mindfulness: current thought and critical issues. *Mindfulness*, 4(3), 255-268.
- Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: a review and meta-analysis. *The journal of alternative and complementary medicine*, 15(5), 593-600.
- Cicero, M. T. (1951). *Pro Plancio*: University Tutorial Press.
- Cokley, K., McClain, S., Enciso, A., & Martinez, M. (2013). An examination of the impact of minority status stress and impostor feelings on the mental health of diverse ethnic minority college students. *Journal of multicultural counseling and development*, 41(2), 82-95.
- Creswell, J. D., Myers, H. F., Cole, S. W., Irwin, M. R. J. B., behavior,, & immunity. (2009). Mindfulness meditation training effects on CD4+ T lymphocytes in HIV-1 infected adults: A small randomized controlled trial. 23(2), 184-188.
- Daley, F. (2010). Why College Students Drop out and What We Do about It. *College Quarterly*, 13(3), n3.
- Deng, Y.-Q., Li, S., & Tang, Y.-Y. (2014). The relationship between wandering mind, depression and mindfulness. *Mindfulness*, 5(2), 124-128.

- Deroma, V. M., Leach, J. B., & Leverett, J. P. (2009). The Relationship between Depression and College Academic Performance. *College Student Journal*, 43(2).
- Desbordes, G., Gard, T., Hoge, E. A., Hölzel, B. K., Kerr, C., Lazar, S. W., . . . Vago, D. R. (2015). Moving beyond mindfulness: defining equanimity as an outcome measure in meditation and contemplative research. *Mindfulness*, 6(2), 356-372.
- Deyo, M., Wilson, K. A., Ong, J., & Koopman, C. (2009). Mindfulness and rumination: does mindfulness training lead to reductions in the ruminative thinking associated with depression? *EXPLORE: The Journal of Science and Healing*, 5(5), 265-271.
- Dickens, L. R. (2017). Using Gratitude to Promote Positive Change: A Series of Meta-Analyses Investigating the Effectiveness of Gratitude Interventions. *Basic and Applied Social Psychology*, 39(4), 193-208.
- Dobkin, P. L., & Zhao, Q. (2011). Increased mindfulness—The active component of the mindfulness-based stress reduction program? *Complementary therapies in clinical practice*, 17(1), 22-27.
- Dyson, R., & Renk, K. (2006). Freshmen adaptation to university life: Depressive symptoms, stress, and coping. *Journal of clinical psychology*, 62(10), 1231-1244.
- Economos, C. D., Hildebrandt, M. L., & Hyatt, R. R. (2008). College freshman stress and weight change: differences by gender. *American journal of health behavior*, 32(1), 16-25.
- Eisenberg, D., Gollust, S. E., Golberstein, E., & Hefner, J. L. (2007). Prevalence and correlates of depression, anxiety, and suicidality among university students. *American Journal of Orthopsychiatry*, 77(4), 534-542.

- Emmons, R. A., & Shelton, C. M. (2002). Gratitude and the science of positive psychology. *Handbook of positive psychology*, 18, 459-471.
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior research methods*, 39(2), 175-191.
- Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J.-P. (2007). Mindfulness and emotion regulation: The development and initial validation of the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R). *Journal of Psychopathology and Behavioral Assessment*, 29(3), 177.
- Field, A. (2009). *Discovering statistics using SPSS*: Sage publications.
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American psychologist*, 56(3), 218.
- Fredrickson, B. L. (2004). Gratitude, like other positive emotions, broadens and builds. *The psychology of gratitude*, 145, 166.
- Fredrickson, B. L., & Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychological science*, 13(2), 172-175.
- Fredrickson, B. L., Tugade, M. M., Shiota, M. N., & Kirby, L. D. (2016). *Handbook of positive emotions*: Guilford Publications.
- Friedlander, L. J., Reid, G. J., Shupak, N., & Cribbie, R. (2007). Social support, self-esteem, and stress as predictors of adjustment to university among first-year undergraduates. *Journal of college student development*, 48(3), 259-274.

- Galambos, N. L., Barker, E. T., & Krahn, H. J. (2006). Depression, self-esteem, and anger in emerging adulthood: seven-year trajectories. *Developmental psychology*, 42(2), 350.
- Garett, R., Liu, S., & Young, S. D. (2017). A longitudinal analysis of stress among incoming college freshmen. *Journal of American College Health*, 65(5), 331-338.
- Garland, E., Gaylord, S. A., & Fredrickson, B. L. (2011). Positive reappraisal mediates the stress-reductive effects of mindfulness: An upward spiral process. *Mindfulness*, 2(1), 59-67.
- Garland, E. L., Fredrickson, B., Kring, A. M., Johnson, D. P., Meyer, P. S., & Penn, D. L. (2010). Upward spirals of positive emotions counter downward spirals of negativity: Insights from the broaden-and-build theory and affective neuroscience on the treatment of emotion dysfunctions and deficits in psychopathology. *Clinical Psychology Review*, 30(7), 849-864.
- Garlow, S. J., Rosenberg, J., Moore, J. D., Haas, A. P., Koestner, B., Hendin, H., & Nemeroff, C. B. (2008). Depression, desperation, and suicidal ideation in college students: results from the American Foundation for Suicide Prevention College Screening Project at Emory University. *Depression and anxiety*, 25(6), 482-488.
- Geraghty, A. W., Wood, A. M., & Hyland, M. E. (2010). Attrition from self-directed interventions: Investigating the relationship between psychological predictors, intervention content and dropout from a body dissatisfaction intervention. *Social Science & Medicine*, 71(1), 30-37.
- Giluk, T. L. (2009). Mindfulness, Big Five personality, and affect: A meta-analysis. *Personality and Individual differences*, 47(8), 805-811.

- Glass, G. V., Peckham, P. D., & Sanders, J. R. (1972). Consequences of failure to meet assumptions underlying the fixed effects analyses of variance and covariance. *Review of educational research*, 42(3), 237-288.
- Greeson, J. M., Juberg, M. K., Maytan, M., James, K., & Rogers, H. (2014). A randomized controlled trial of Koru: a mindfulness program for college students and other emerging adults. *Journal of American College Health*, 62(4), 222-233.
- Gress-Smith, J. L., Roubinov, D. S., Andreotti, C., Compas, B. E., & Luecken, L. J. (2015). Prevalence, severity and risk factors for depressive symptoms and insomnia in college undergraduates. *Stress and Health*, 31(1), 63-70.
- Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of psychosomatic research*, 57(1), 35-43.
- Grossman, P., & Van Dam, N. T. (2011). Mindfulness, by any other name...: trials and tribulations of sati in western psychology and science. *Contemporary Buddhism*, 12(01), 219-239.
- Gu, J., Strauss, C., Crane, C., Barnhofer, T., Karl, A., Cavanagh, K., & Kuyken, W. (2016). Examining the factor structure of the 39-item and 15-item versions of the Five Facet Mindfulness Questionnaire before and after mindfulness-based cognitive therapy for people with recurrent depression. *Psychological Assessment*, 28(7), 791.
- Gudan, E. M. (2010). *Gratitude-based interventions for treating ruminative depression*: The Institute for the Psychological Sciences.
- Hammen, C. (2005). Stress and depression. *Annu. Rev. Clin. Psychol.*, 1, 293-319.

- Harackiewicz, J. M., Barron, K. E., Tauer, J. M., & Elliot, A. J. (2002). Predicting success in college: A longitudinal study of achievement goals and ability measures as predictors of interest and performance from freshman year through graduation. *Journal of Educational Psychology, 94*(3), 562.
- Heiligenstein, E., Guenther, G., Hsu, K., & Herman, K. (1996). Depression and academic impairment in college students. *Journal of American College Health, 45*(2), 59-64.
- Helliwell, J. F., Layard, R., & Sachs, J. (2012). World happiness report [2012].
- Hicks, A., Neace, S., DeCaro, M., & Salmon, P. (2018). *The Role of Gratitude in Intrinsic and Extrinsic Exercise Motivation*. Paper presented at the American College of Sports Medicine, Minneapolis, MN.
- Hicks, A., & Salmon, P. (2017). *A Comparison of Two Measures of Gratitude and their Relation to Affective States*. Paper presented at the Neglected Emotions, University of Louisville
- Hicks, A., Salmon, P., & Burke, N. (2017). *Minding your blessings: an exploration of gratitude and mindfulness as predictors of affect*. Paper presented at the American Psychological Society, Boston, MA.
- Hofmann, S. G., & Asmundson, G. J. (2008). Acceptance and mindfulness-based therapy: New wave or old hat? *Clinical Psychology Review, 28*(1), 1-16.
- Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of consulting and clinical psychology, 78*(2), 169.

- Hollis-Walker, L., & Colosimo, K. (2011). Mindfulness, self-compassion, and happiness in non-meditators: A theoretical and empirical examination. *Personality and Individual differences*, 50(2), 222-227.
- Hysenbegasi, A., Hass, S. L., & Rowland, C. R. (2005). The impact of depression on the academic productivity of university students. *Journal of Mental Health Policy and Economics*, 8(3), 145.
- Jimenez, S. S., Niles, B. L., & Park, C. L. (2010). A mindfulness model of affect regulation and depressive symptoms: Positive emotions, mood regulation expectancies, and self-acceptance as regulatory mechanisms. *Personality and Individual differences*, 49(6), 645-650.
- Kabat-Zinn. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation. *General Hospital Psychiatry*, 4, 33-47.
- Kabat-Zinn. (2013). *Full catastrophe living, revised edition: how to cope with stress, pain and illness using mindfulness meditation*: Hachette UK.
- Kabat-Zinn, J. (2003). Mindfulness-Based Interventions in Context: Past, Present, and Future. *Clinical psychology: Science and practice*, 10(2), 144-156.
doi:10.1093/clipsy.bpg016
- Kadison, R., & DiGeronimo, T. F. (2004). *College of the overwhelmed: The campus mental health crisis and what to do about it*: Jossey-Bass.
- Kang, Y., Gruber, J., & Gray, J. R. (2013). Mindfulness and de-automatization. *Emotion review*, 5(2), 192-201.

- Keng, S.-L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, 31(6), 1041-1056.
- Khong, B. S. L. (2009). Expanding the understanding of mindfulness: Seeing the tree and the forest. *The Humanistic Psychologist*, 37(2), 117.
- Khoury, B., Sharma, M., Rush, S. E., & Fournier, C. (2015). Mindfulness-based stress reduction for healthy individuals: A meta-analysis. *J Psychosom Res*, 78(6), 519-528. doi:10.1016/j.jpsychores.2015.03.009
- Kini, P., Wong, J., McInnis, S., Gabana, N., & Brown, J. W. (2016). The effects of gratitude expression on neural activity. *NeuroImage*, 128, 1-10.
- Kitzrow, M. A. (2003). The mental health needs of today's college students: Challenges and recommendations. *NASPA journal*, 41(1), 167-181.
- Kraemer, H. C., & Blasey, C. M. (2004). Centring in regression analyses: a strategy to prevent errors in statistical inference. *International journal of methods in psychiatric research*, 13(3), 141-151.
- Kroenke, K. (2012). Enhancing the clinical utility of depression screening. *Canadian Medical Association Journal*, 184(3), 281-282.
- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of general internal medicine*, 16(9), 606-613.
- Labelle, L. E., Campbell, T. S., & Carlson, L. E. (2010). Mindfulness-based stress reduction in oncology: evaluating mindfulness and rumination as mediators of change in depressive symptoms. *Mindfulness*, 1(1), 28-40.

- Lachin, J. M. (2000). Statistical considerations in the intent-to-treat principle. *Controlled clinical trials*, 21(3), 167-189.
- Lazarus, R. S. (1991). *Emotion and adaptation*: Oxford University Press on Demand.
- Lester, D. (2014). College student stressors, depression, and suicidal ideation. *Psychological reports*, 114(1), 293-296.
- Levenson, R. W. (1994). Human emotion: A functional view. *The nature of emotion: Fundamental questions*, 1, 123-126.
- Lin, C.-C. (2015). Gratitude and depression in young adults: The mediating role of self-esteem and well-being. *Personality and Individual Differences*, 87, 30-34.
- Lindsey, B. J., Fabiano, P., & Stark, C. (2009). The prevalence and correlates of depression among college students. *College Student Journal*, 43(4).
- Loo, J. M., Tsai, J.-S., Raylu, N., & Oei, T. P. (2014). Gratitude, hope, mindfulness and personal-growth initiative: Buffers or risk factors for problem gambling? *PloS one*, 9(2), e83889.
- Lyubomirsky, S., Sousa, L., & Dickerhoof, R. (2006). The costs and benefits of writing, talking, and thinking about life's triumphs and defeats. *Journal of personality and social psychology*, 90(4), 692.
- Magee, R. V. (2016). Teaching mindfulness with mindfulness of race and other forms of diversity *Resources for Teaching Mindfulness* (pp. 225-246): Springer.
- Mathews, A., & MacLeod, C. (2002). Induced processing biases have causal effects on anxiety. *Cognition & emotion*, 16(3), 331-354.

- McCullough, M. E., Emmons, R. A., & Tsang, J.-A. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of personality and social psychology*, 82(1), 112-127. doi:10.1037/0022-3514.82.1.112
- McCullough, M. E., Tsang, J.-A., & Emmons, R. A. (2004). Gratitude in intermediate affective terrain: links of grateful moods to individual differences and daily emotional experience. *Journal of personality and social psychology*, 86(2), 295.
- Mikulas, W. L. (2011). Mindfulness: Significant common confusions. *Mindfulness*, 2(1), 1-7.
- Morgan, D. (2003). Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse: Taylor & Francis.
- Neff, K. D., Kirkpatrick, K. L., & Rude, S. S. (2007). Self-compassion and adaptive psychological functioning. *Journal of research in personality*, 41(1), 139-154.
- Neto, F. (2007). Forgiveness, personality and gratitude. *Personality and Individual differences*, 43(8), 2313-2323.
- O'Doherty, V., Carr, A., McGrann, A., O'Neill, J. O., Dinan, S., Graham, I., & Maher, V. (2015). A controlled evaluation of mindfulness-based cognitive therapy for patients with coronary heart disease and depression. *Mindfulness*, 6(3), 405-416.
- Oatley, K., & Jenkins, J. (1996). *Understanding Emotions*. Cambridge, MA: Blackwell.
- Pfister, R., Schwarz, K., Carson, R., & Janczyk, M. (2013). Easy methods for extracting individual regression slopes: Comparing SPSS, R, and Excel. *Tutorials in Quantitative Methods for Psychology*, 9(2), 72-78.
- Pope, D., Brown, M., & Miles, S. (2015). *Overloaded and underprepared: Strategies for stronger schools and healthy, successful kids*: John Wiley & Sons.

- Pruyser, P. W. (1976). *The minister as diagnostician: Personal problems in pastoral perspective*: Westminster John Knox Press.
- Rochowiak, R. (2017). A model of gratitude, psychological well-being, and academic engagement in college students.
- Rogers, H., & Maytan, M. (2012). *Mindfulness for the next generation: Helping emerging adults manage stress and lead healthier lives*: OUP USA.
- Rosenzweig, S., Greeson, J. M., Reibel, D. K., Green, J. S., Jasser, S. A., & Beasley, D. J. J. o. p. r. (2010). Mindfulness-based stress reduction for chronic pain conditions: variation in treatment outcomes and role of home meditation practice. *68*(1), 29-36.
- Ruscio, A. M., & Ruscio, J. (2002). The latent structure of analogue depression: Should the Beck Depression Inventory be used to classify groups? *Psychological Assessment, 14*(2), 135.
- Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2018). *Mindfulness-based cognitive therapy for depression*: Guilford Publications.
- Seligman, M. E., Rashid, T., & Parks, A. C. (2006). Positive psychotherapy. *American psychologist, 61*(8), 774.
- Shapiro, D. H. (1992). A preliminary study of long-term meditators: Goals, effects, religious orientation, cognitions. *The Journal of Transpersonal Psychology, 24*(1), 23.
- Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of clinical psychology, 62*(3), 373-386.
- Shapiro, S. L., & Schwartz, G. E. (2000). The role of intention in self-regulation: Toward intentional systemic mindfulness.

- Shapiro, S. L., Schwartz, G. E., & Bonner, G. (1998). Effects of mindfulness-based stress reduction on medical and premedical students. *Journal of behavioral medicine*, 21(6), 581-599.
- Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of clinical psychology*, 65(5), 467-487.
- Southwell, S., & Gould, E. J. T. J. o. P. P. (2017). A randomised wait list-controlled pre–post–follow-up trial of a gratitude diary with a distressed sample. 12(6), 579-593.
- Soysa, C. K., & Wilcomb, C. J. (2015). Mindfulness, self-compassion, self-efficacy, and gender as predictors of depression, anxiety, stress, and well-being. *Mindfulness*, 6(2), 217-226.
- Tamagawa, R., Specia, M., Stephen, J., Pickering, B., Lawlor-Savage, L., & Carlson, L. E. (2015). Predictors and effects of class attendance and home practice of yoga and meditation among breast cancer survivors in a mindfulness-based cancer recovery (MBCR) program. *Mindfulness*, 6(5), 1201-1210.
- Teasdale, J. D. (1983). Negative thinking in depression: Cause, effect, or reciprocal relationship? *Advances in Behaviour Research and Therapy*, 5(1), 3-25.
- Teasdale, J. D., Segal, Z., & Williams, J. M. G. (1995). How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? *Behaviour Research and therapy*, 33(1), 25-39.
- Uher, R., Payne, J. L., Pavlova, B., Perlis, R. H. J. D., & anxiety. (2014). Major depressive disorder in DSM-5: Implications for clinical practice and research of changes from DSM-IV. 31(6), 459-471.

- van der Velden, A. M., Kuyken, W., Wattar, U., Crane, C., Pallesen, K. J., Dahlgaard, J., . . . Piet, J. (2015). A systematic review of mechanisms of change in mindfulness-based cognitive therapy in the treatment of recurrent major depressive disorder. *Clinical Psychology Review, 37*, 26-39.
- Wadlinger, H. A., & Isaacowitz, D. M. (2008). Looking happy: The experimental manipulation of a positive visual attention bias. *Emotion, 8*(1), 121.
- Walker, C. O., Greene, B. A., & Mansell, R. A. (2006). Identification with academics, intrinsic/extrinsic motivation, and self-efficacy as predictors of cognitive engagement. *Learning and individual differences, 16*(1), 1-12.
- Watkins. (2014). Gratitude and the good life. *Netherlands: Springer*.
- Watkins, D. C., Hunt, J. B., & Eisenberg, D. (2012). Increased demand for mental health services on college campuses: Perspectives from administrators. *Qualitative Social Work, 11*(3), 319-337.
- Watkins, P. C., Woodward, K., Stone, T., & Kolts, R. L. (2003). Gratitude and happiness: development of a measure of gratitude, and relationships with subjective well-being. *Social Behavior and Personality, 31*(5), 431-452.
- Way, B. M., Creswell, J. D., Eisenberger, N. I., & Lieberman, M. D. (2010). Dispositional mindfulness and depressive symptomatology: Correlations with limbic and self-referential neural activity during rest. *Emotion, 10*(1), 12.
- Wei, M., Liao, K. Y.-H., Chao, R. C.-L., Mallinckrodt, B., Tsai, P.-C., & Botello-Zamarron, R. (2010). Minority stress, perceived bicultural competence, and depressive symptoms among ethnic minority college students. *Journal of Counseling Psychology, 57*(4), 411.

- Weissbecker, I., Salmon, P., Studts, J. L., Floyd, A. R., Dedert, E. A., & Sephton, S. E. (2002). Mindfulness-based stress reduction and sense of coherence among women with fibromyalgia. *Journal of Clinical Psychology in Medical Settings*, 9(4), 297-307.
- Williams, J. M. G., & Kabat-Zinn, J. (2011). Mindfulness: diverse perspectives on its meaning, origins, and multiple applications at the intersection of science and dharma. *Contemporary Buddhism*, 12(01), 1-18.
- Wood, Froh, & Geraghty. (2010). Gratitude and well-being: a review and theoretical integration. *Clin Psychol Rev*, 30(7), 890-905. doi:10.1016/j.cpr.2010.03.005
- Wood, A. M., Maltby, J., Stewart, N., Linley, P. A., & Joseph, S. (2008). A social-cognitive model of trait and state levels of gratitude. *Emotion*, 8(2), 281.
- Xiao, H., Carney, D. M., Youn, S. J., Janis, R. A., Castonguay, L. G., Hayes, J. A., & Locke, B. D. (2017). Are we in crisis? National mental health and treatment trends in college counseling centers. *Psychological services*, 14(4), 407.
- Zhao, X., Lynch Jr, J. G., & Chen, Q. J. J. o. c. r. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. 37(2), 197-206.
- Zimmaro, L. A., Salmon, P., Naidu, H., Rowe, J., Phillips, K., Rebholz, W. N., . . . Bayley-Veloso, R. (2016). Association of dispositional mindfulness with stress, cortisol, and well-being among university undergraduate students. *Mindfulness*, 7(4), 874-885.

Table 1.

Correlations between mindfulness and gratitude subscales (Hicks et al., 2018; N=141).

<u>Mindfulness Subscales</u>	<u>Gratitude Subscales</u>			
	<u>Abundance</u>	<u>Simple Pleasures</u>	<u>Social Appreciation</u>	<u>GRAT-R Total</u>
Observe	.101	.445**	.292**	.341**
Describe	.195*	.198*	.272**	.274**
Awareness	.333*	.137	.193*	.288**
Nonjudgment	.390*	.050	.192*	.272**
Non-react	.101	.096	.117	.140
FFMQ Total	.376**	.281**	.340**	.421**

Note: * $p < 0.05$, ** $p < 0.001$

Table 2.

Outline of proposed analyses including question of interest and hypotheses for each aim.

	Question of Interest	Hypotheses	Statistical Approach
Aim 1	How do mindfulness and gratitude relate to one another and symptoms of depression at baseline? (Cross-sectional Model)	1.1 Gratitude and mindfulness will be positively associated	Pearson's r correlation
		1.2 Gratitude and symptoms of depression will be negatively associated	Pearson's r correlation
		1.3 Mindfulness and symptoms of depression will be negatively associated	Pearson's r correlation
		1.4 Mindfulness and gratitude will contribute independent and shared variance in the prediction of symptoms of depression at baseline	Hierarchical Regression with Interaction Term (MacArthur Approach)
Aim 2	Does participation in Koru Mindfulness increase mindfulness and gratitude and decrease symptoms of depression? (Effect of Intervention)	2.1.1 Gratitude will significantly increase from baseline to follow-up	Repeated Measures ANOVA
		2.1.2 Mindfulness will significantly increase from baseline to follow-up	Repeated Measures ANOVA
		2.1.3 Symptoms of depression will significantly decrease from baseline to follow-up	Repeated Measures ANOVA
		2.2 Attendance of Koru Mindfulness sessions will predict slope of change in symptoms of depression	Hierarchical linear regression
		2.3 Meditation practice as indicated on home practice logs (frequency and duration) will predict slope of change in symptoms of depression	Hierarchical linear regression
		2.4 Gratitude practice as indicated on home practice logs (frequency and # of entries) will predict slope of change in symptoms of depression	Hierarchical linear regression
Aim 3	Are changes in mindfulness from the intervention accounted for by changes in gratitude and vice versa? (Upward Spiral)	3.1 Changes in gratitude will mediate the change in mindfulness from baseline to follow-up	Hierarchical Regression Mediation Model (MacArthur Approach)
		3.2 Changes in mindfulness will mediate the change in gratitude from baseline to follow-up	Hierarchical Regression Mediation Model (MacArthur Approach)
Aim 4	Do changes in mindfulness and gratitude help to explain the change in depressive symptoms from baseline to follow-up? (Upward Spiral for Depression)	4.1 Changes in gratitude will mediate the change in symptoms of depression from baseline to follow-up	Hierarchical Regression Mediation Model (MacArthur Approach)
		4.2 Changes in mindfulness will mediate the change in symptoms of depression from baseline to follow-up	Hierarchical Regression Mediation Model (MacArthur Approach)

Table 3

<i>Sample Characteristics (N=93)</i>		
<u>Demographic Variables</u>	<u>Frequency</u>	<u>Percentage</u>
Age	(M=18.22)	(SD=0.44)
Sex		
Male	26	28%
Female	67	72%
Race		
White	67	72%
African American	18	19.4%
Asian	7	7.5%
Native Hawaiian or Other Pacific Islander	1	1.1%
Ethnicity		
Non-Hispanic	87	93.5%
Hispanic	6	6.5%
<u>Academic Variables</u>		
Stress of the Semester (1-10 scale)	(M=6.49)	(SD=1.83)
Semesters Completed		
0 Semesters	86	92.5%
1 Semester	1	1.1%
2 Semesters	5	5.3%
3 Semesters	1	1.1%
Grade Point Average (GPA)		
2.0-2.49	2	2.2%
2.5-2.99	9	9.7%
3.0-3.49	20	21.5%
3.5-3.99	38	40.9%
4.0-4.0+	24	25.8%
<u>Financial Variables</u>		
Tuition Payment		
Loans	39	41.9%
Scholarship	56	60.2%
Employer	2	2.2%
Family	41	44.1%
Employment		
Not Employed	61	65.6%
Employed	32	34.4%

Table 4

Sample Descriptives of Independent and Dependent Variables at Baseline and Follow-up

	Baseline (N=93)		Follow-up (N=78)	
<u>Self-Report Measures</u>	<u>Mean</u>	<u>SD</u>	<u>Mean</u>	<u>SD</u>
Trait Mindfulness (MAAS)	3.49	1.14	3.74	0.95
State Mindfulness (CAMS-R)	30.62	6.19	31.42	5.43
Gratitude (GRAT-R)	292.00	45.81	303.84	49.15
<i>Sense of Abundance</i>	121.22	21.35	125.05	24.36
<i>Simple Pleasures</i>	92.39	20.52	90.05	23.07
<i>Social Appreciation</i>	77.83	11.63	78.90	15.04
Symptoms of Depression (PHQ-9)	7.89	6.43	5.47	5.42

Table 5

Descriptive Characteristics of Attendance of Koru Classes (N=93)

Attendance of Individual Classes	<u>Frequency</u>	<u>Percentage</u>
Class 1	90	96.77%
Class 2	78	83.87%
Class 3	68	73.12%
Class 4	72	77.42%
Attendance of all 4 Classes	53	56.99%
Mean Number of Classes Attended	<i>(M = 3.31)</i>	<i>(SD = .96)</i>

Table 6
Descriptive Characteristics of Daily Meditation Log Completion (N=93)

<u>Mean Minutes of Logged Meditation Practice</u>	<u>Minutes of Daily Practice</u>	<u>Weekly Total</u>
Week 1 (<i>N</i> = 93)	7.11(4.98)	49.78
Week 2 (<i>N</i> = 93)	6.00 (4.95)	42.01
Week 3 (<i>N</i> = 93)	4.74 (5.05)	33.21
Week 4 (<i>N</i> = 37)	4.76 (10.71)	8.76
Total	5.98 (4.64)	133.77
Days Logged Meditation Practice	(<i>M</i> = 11.37; <i>SD</i> = 6.93)	(50.61%)

Note. Due to interruptions in the school calendar (i.e. Fall Break, Thanksgiving Break), three intervention groups spanned across 4 weeks.

Table 7

Descriptive Characteristics of Gratitude Log Completion (N=93)

<u>Week of Intervention</u>	<u>Mean Items Listed</u>	<u>Novel Items</u>	<u>Percent of Novel Items</u>
Week 1 (<i>N</i> = 93)	5.85 (7.75)	5.09 (7.10)	88.53%
Week 2 (<i>N</i> = 93)	4.48 (6.38)	3.71 (5.39)	87.27%
Week 3 (<i>N</i> = 93)	3.12 (4.74)	2.61 (4.05)	89.38%
Week 4 (<i>N</i> = 37)	.52 (1.69)	.419 (1.38)	88.97%
Total	13.97 (18.25)	9.89 (14.53)	78.47%
Days Gratitude Log Completed	(<i>M</i> = 9.34)	(<i>SD</i> = 8.25)	

Table 8

Correlation matrix of key study variables at baseline.

Variables	1	2	3	4	5	6
1. Symptoms of Depression (PHQ-9)	--					
2. State Mindfulness (CAMS-R)	-.617***	--				
3. Trait Mindfulness (MAAS)	-.362***	.331**	--			
4. Gratitude (GRAT-Total)	-.226*	.374***	.155	--		
5. Sense of Abundance (GRAT-R)	-.420***	.384***	.151	.826***	--	
6. Simple Pleasures (GRAT-R)	.024	.202	.081	.810***	.403***	--
7. Social Appreciation (GRAT-R)	-.181	.373***	.204	.767***	.504***	.519***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 9

Summary of regression models predicting symptoms of depression at baseline.

<u>Regression Models</u>	<u>B</u>	<u>SE B</u>	<u>β</u>
1. Gratitude	-.034	.015	-.226*
2. Trait Mindfulness (MAAS)	-2.041	.550	-.362***
3. <i>Block 1</i> : Gratitude	-.026	.015	-.176
<i>Block 1</i> : Trait Mindfulness	-1.806	.553	-.323**
<i>Block 2</i> : Gratitude * Trait Mindfulness	-.014	.016	-.088
1. Gratitude	-.034	.015	-.226*
2. State Mindfulness (CAMS-R)	-.642	.086	-.617***
3. <i>Block 1</i> : Gratitude	.002	.014	.001
<i>Block 1</i> : State Mindfulness	-.642	.095	-.608***
<i>Block 2</i> : Gratitude * State Mindfulness	-.002	.002	-.078

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 10

Summary of repeated measures ANOVA examining effect of time on key study variables.

<u>Variable</u>	<u>Baseline M(SD)</u>	<u>Follow-up M(SD)</u>	Intent-to-Treat Principles Used	No Intent-to- Treat Principles
			<u>F</u>	<u>F</u>
1. Gratitude (GRAT-R)	292.00(45.81)	303.84(49.15)	5.906*	5.974*
2. State Mindfulness (CAMS-R)	30.62(6.19)	31.42(5.43)	3.540 ^τ	3.559 ^τ
3. Trait Mindfulness (MAAS)	3.49(1.14)	3.74(0.95)	1.635	1.540
4. Symptoms of Depression (PHQ-9)	7.89(6.43)	5.47(5.42)	14.396***	14.846***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$; τ : $p = .063$

Table 11

Summary of regression analyses examining slope of change in symptoms of depression as the outcome variables, outlined by hypothesis number using intent-to-treat-principles for missing data (N = 93).

<u>Variables</u>	<u>B</u>	<u>SE B</u>	<u>β</u>
2.1 Class Session Attendance	-.200	.070	-.257**
2.2 Meditation Log Completion Total	-.003	.002	-.124
Meditation Log Completion Percentage	-.095	.057	-.152
Meditation Total Minutes	.000	.004	-.012
Meditation Total Minutes [†]	.000	.000	-.134
Meditation Mean Minutes	.001	.001	.035
Meditation Mean Minutes [†]	-.006	.004	-.142
2.3 Gratitude Log Completion Total	-.106	.046	-.206*
Gratitude Log Completion Percentage	-.005	.002	-.206*
Gratitude Log Total Items	-.004	.001	-.355***
Gratitude Log Total Items [†]	-.002	.001	-.150
Gratitude Log Mean Items	-.079	.019	-.357***
Gratitude Log Mean Items [†]	-.048	.030	-.146
Gratitude Log Percentage Novel	.039	.084	.049

Note. * $p < .05$, ** $p < .01$, *** $p < .001$; [†] = outlier removed

Table 12

Summary of regression analyses examining slope of change in symptoms of depression as the outcome variables, outlined by hypothesis number (N=71).

<u>Variables</u>	<u>B</u>	<u>SE B</u>	<u>β</u>
2.1 Class Session Attendance	-.110	.086	-.126
2.2 Meditation Log Completion Total	-.002	.003	-.073
Meditation Log Completion Percentage	-.074	.069	-.106
Meditation Total Minutes	.000	.000	.092
Meditation Total Minutes ^t	.000	.000	-.082
Meditation Mean Minutes	.002	.004	.052
Meditation Mean Minutes ^t	-.004	.005	-.083
2.3 Gratitude Log Completion Total	-.004	.002	-.161
Gratitude Log Completion Percentage	-.094	.056	-.163
Gratitude Log Total Items	-.004	.001	-.311**
Gratitude Log Total Items ^t	-.002	.002	-.116
Gratitude Log Mean Items	-.077	.023	-.315**
Gratitude Log Mean Items ^t	-.042	.037	-.115
Gratitude Log Percentage Novel	-.007	.098	-.008

Note. * $p < .05$, ** $p < .01$, *** $p < .001$; ^t = outlier removed

Table 13

Summary of regression analyses using MacArthur Approach to mediation to examine the potential mediating role of slope of change in gratitude on the change in state mindfulness from baseline to follow-up (N = 93).

<u>Variable</u>	<u>Model 1</u>			<u>Model 2</u>		
	<u>B</u>	<u>SE B</u>	<u>β</u>	<u>B</u>	<u>SE B</u>	<u>β</u>
Baseline Gratitude	.038	.014	.296**	.016	.013	.124*
Baseline State Mindfulness				.448	.094	.512***
Slope of Change in Gratitude				.827	2.478	.150
Interaction Term (Δ Gratitude x T1 State Mindfulness)				.020	.084	.105
R^2		.088**			.337***	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 14

Summary of regression analyses using MacArthur Approach to mediation to examine the potential mediating role of slope of change in state mindfulness on the change in state mindfulness from baseline to follow-up (N = 71).

Variable	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Baseline State Mindfulness	-.463	.090	-.529***	-.475	.101	-.543***
Baseline Symptoms of Depression				.416	.097	.494***
Slope of Change in State Mindfulness				-6.294	3.988	-.243
Interaction Term (Δ State Mindfulness x T1 Symptoms of Depression)				-.840	.342	-.382*
R^2		.280***			.586***	

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 15.

List of potential control variables, by type of control variable.

<u>Theoretically-Derived</u>	<u>Empirically-Derived</u>	<u>Roommate-Related</u>
Sex	Pre-Intervention Motivation	Months Known Roommate
Minority Status	Prior Meditation History	Hours Per Day with Roommate
Employment Status		Freq. of Meditating with Roommate
Semester Stress		% of Koru Classes Attended Together
GPA		
Financial Difficulties		

Table 16

Associations between control variables, predictor variables (mindfulness, gratitude), and outcome variables (symptoms of depression; created for the purpose of screening multicollinearity and identifying empirically-derived control variables. Associations among continuous variables tested with Pearson's r ; associations among two dichotomous variables tested with Chi-square.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Symptoms of Depression	--														
2. State-Mindfulness (CAMS-R)	-.617***	--													
3. Trait-Mindfulness (MAAS)	-.362***	.331*	--												
4. Gratitude	-.226*	.374***	.155	--											
5. Sex	.038	.009	.013	.072	--										
6. Minority Status	-.053	.124	.065	-.194	.427	--									
7. Employment Status	.238*	-.191	-.155	-.127	5.79*	.896	--								
8. Semester Stress	.208*	-.162	-.211*	-.023	.064	-.064	.101	--							
9. GPA	.104	.036	.004	-.094	-.141	.040	.153	-.080	--						
10. Financial Difficulties	.019	.083	-.037	-.090	4.70*	4.70*	4.77*	.065		--					
11. Pre-Intervention Motivation	-.026	-.029	-.108	.282***	.259*	.142	.176	.331**	.263*	.028	--				
12. Prior Meditation History	.152	-.082	-.075	.110	3.08	1.79	2.53	.078	-.061	1.34	-.087	--			
13. Months Known Roommate	-.053	-.118	-.102	.063	-.322**	-.104	-.038	.176	.004	-.142	.001	-.039	--		
14. Hours Per Day with Roommate	-.081	.178	.311**	-.052	.072	.142	-.086	.032	.089	.050	.011	-.079	.042	--	
15. Frequency of Meditating with Roommate	.107	-.200	.105	-.157	-.010	-.090	.282	-.001	.169	-.161	.002	-.041	-.071	.259	--
16. Percentage of Koru Classes Attended with Roommate	-.017	.066	.077	.135	.137	.156	-.222*	-.148	-.031	-.030	.210*	-.010	-.204	.062	-.154

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan; Prior Meditation History: -1/2=no, +1/2=yes; Chi-square tests were used for associations between two dichotomous variables. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 17

Summary of regression analyses of baseline gratitude predicting symptoms of depression with inclusion of control variables (N = 92).

<u>Variable</u>	<u>Model 1</u>			<u>Model 2</u>		
	<u>B</u>	<u>SE B</u>	<u>β</u>	<u>B</u>	<u>SE B</u>	<u>β</u>
Sex	.561	1.576	.039	1.029	1.563	.072
Minority Status	-.367	1.497	-.026	-1.134	1.516	-.080
Employment Status	2.895	1.453	.217*	2.458	1.442	.184
Semester Stress	.752	.358	.216*	.732	.351	.211*
GPA	3.295	2.806	.126	3.168	2.754	.121
Financial Difficulties	-.820	1.494	-.061	-1.238	1.481	-.091
Gratitude				-.032	.016	-.216*
R^2		.122			.164*	

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 18

Summary of regression analyses of baseline trait mindfulness predicting symptoms of depression with inclusion of control variables (N= 93)

Variable	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Sex	.046	1.585	.003	.325	1.516	.023
Minority Status	-.547	1.523	-.038	-.404	1.455	-.028
Employment Status	2.880	1.480	.214	2.250	1.428	.167
Semester Stress	.687	.363	.196	.475	.353	.135
GPA	2.569	2.836	.097	2.728	2.707	.103
Financial Difficulties	-.887	1.522	-.065	-.885	1.453	-.065
Trait Mindfulness				-1.742	.569	-.309**
R^2		.103			.192**	

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 19

Summary of regression analyses including interaction term in Model 3 of baseline trait mindfulness, gratitude predicting symptoms of depression with inclusion of control variables (N = 92).

<u>Variable</u>	<u>Model 1</u>			<u>Model 2</u>			<u>Model 3</u>		
	<u>B</u>	<u>SE B</u>	<u>β</u>	<u>B</u>	<u>SE B</u>	<u>β</u>	<u>B</u>	<u>SE B</u>	<u>β</u>
Sex	.561	1.576	.039	1.092	1.513	.076	.934	1.530	.065
Minority Status	-.367	1.497	-.026	-.908	1.471	-.064	-1.185	1.515	-.084
Employment Status	2.895	1.453	.217*	2.005	1.407	.150	2.071	1.412	.155
Semester Stress	.752	.358	.216*	.546	.348	.157	.511	.351	.147
GPA	3.295	2.806	.126	3.201	2.666	.122	3.055	2.679	.117
Financial Difficulties	-.820	1.494	-.061	-1.173	1.434	-.087	-1.319	1.449	-.097
Gratitude				-.027	.015	-.177	-.028	.015	-.185
Trait Mindfulness				-1.462	.567	-.261*	-1.321	.596	-.236*
Gratitude*Trait Mindfulness							-.013	.017	-.085
<i>R</i> ²		.122			.226***			.232	

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan. *p <.05, **p<.01, ***p<.001

Table 20

Summary of regression analyses of baseline state mindfulness predicting symptoms of depression with inclusion of control variables (N= 93)

<u>Variable</u>	<u>Model 1</u>			<u>Model 2</u>		
	<u>B</u>	<u>SE B</u>	<u>β</u>	<u>B</u>	<u>SE B</u>	<u>β</u>
Sex	.046	1.585	.003	.319	1.280	.022
Minority Status	-.547	1.523	-.038	.514	1.239	.036
Employment Status	2.880	1.480	.214	1.173	1.220	.087
Semester Stress	.687	.363	.196	.391	.296	.111
GPA	2.569	2.836	.097	3.133	2.290	.119
Financial Difficulties	-.887	1.522	-.065	.389	1.243	.028
State Mindfulness				.617	.090	.594***
R^2		.103			.422***	

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 21

Summary of regression analyses including interaction term in Model 3 of baseline state mindfulness, gratitude predicting symptoms of depression with inclusion of control variables (N = 92).

Variable	Model 1			Model 2			Model 3		
	B	SE B	β	B	SE B	β	B	SE B	β
Sex	.561	1.576	.039	.543	1.310	.038	.307	1.332	.022
Minority Status	-.367	1.497	-.026	.719	1.305	.051	1.094	1.359	.078
Employment Status	2.895	1.453	.217*	1.265	1.222	.095	1.390	1.229	.104
Semester Stress	.752	.358	.216*	.434	.298	.125	.413	.299	.119
GPA	3.295	2.806	.126	3.562	2.306	.136	3.228	2.331	.123
Financial Difficulties	-.820	1.494	-.061	.475	1.271	.035	.745	1.300	.055
Gratitude				.005	.014	.032	.008	.015	.056
State Mindfulness				.610	.100	.589***	.632	.103	.609***
Gratitude*State Mindfulness							-.002	.002	-.089
R^2		.122			.422***			.428***	

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 22

Summary of regression analyses of Koru class attendance predicting slope of change in symptoms of depression with inclusion of control variable, using intent-to-treat principles (N= 93)

Variable	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Baseline Depression	-.016	.003	-.545***	-.017	.003	-.572***
Sex	-.043	.040	-0.103	-.025	.040	-0.06
Minority Status	.043	.039	0.105	.045	.038	0.109
Employment Status	.068	.039	0.174	.053	.038	0.136
Semester Stress	.008	.009	0.074	.006	.009	0.054
GPA	.114	.073	0.149	.104	.071	0.136
Financial Difficulties	.032	.039	0.08	.028	.038	0.071
Class Attendance				-.163	.073	-0.209*
R^2		.314***			.352***	

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 23

Summary of regression analyses of gratitude log completion (mean # of items listed, total # of items listed) predicting slope of change in symptoms of depression with inclusion of control variables, both with and without intent-to-treat principles (N=71; N= 93)

Variable	Without Intent-To-Treat Principles (N=71)						With Intent-To-Treat Principles (N=93)					
	Model 1			Model 2			Model 1			Model 2		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Baseline Depression	-.023	.004	-.644***	-.021	.004	-.595***	-.016	.003	-.545***	-.015	.003	-.504***
Sex	.008	.050	.017	.009	.048	.020	-.043	.040	-.103	-.036	.038	-.088
Minority Status	.020	.047	.044	.011	.045	.025	.043	.039	.105	.032	.037	.077
Employment Status	.057	.046	.131	.037	.045	.086	.068	.039	.174	.047	.037	.121
Semester Stress	.011	.011	.101	.14	.011	.123	.008	.009	.074	.010	.009	.101
GPA	.177	.089	-.208*	.125	.087	.146	.114	.073	.149	.065	.070	.085
Financial Difficulties	-.011	.048	-.025	-.017	.046	-.038	.032	.039	.080	.022	.037	.055
Mean Gratitude Items				-.067	.024	-.272**				-.068	.020	-.310**
R ²		.403***			.468***			.314***			.399**	

Variable	Without Intent-To-Treat Principles (N=71)						With Intent-To-Treat Principles (N=93)					
	Model 1			Model 2			Model 1			Model 2		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Baseline Depression	-.023	.004	-.644***	-.021	.004	-.595***	-.016	.003	-.545***	-.015	.003	-.506***
Sex	.008	.050	.017	.009	.048	.019	-.043	.040	-.103	-.037	.038	-.090
Minority Status	.020	.047	.044	.013	.045	.028	.043	.039	.105	.033	.037	.080
Employment Status	.057	.046	.131	.038	.045	.086	.068	.039	.174	.048	.037	.122
Semester Stress	.011	.011	.101	.014	.011	.127	.008	.009	.074	.011	.009	.106
GPA	.177	.089	-.208*	.129	.086	.151	.114	.073	.149	.069	.069	.090
Financial Difficulties	-.011	.048	-.025	-.015	.046	-.033	.032	.039	.080	.024	.037	.059
Total Gratitude Items				-.003	.001	-.272**				-.003	.001	-.312**
R ²		.403***			.468***			.314***			.401**	

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 24

Summary of regression analyses using MacArthur Approach to mediation to examine the potential mediating role of slope of change in gratitude on the change in state mindfulness from baseline to follow-up with inclusion of control variables (N = 93).

Variable	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Baseline Gratitude	.037	.014	.290*	.013	.014	.102
Sex	-.849	1.409	-.071	-.628	1.281	-.052
Minority Status	1.482	1.381	.123	.394	1.270	.033
Employment Status	-2.464	1.316	-.217	-1.144	1.213	-.101
Semester Stress	-.420	.319	-.142	-.175	.290	-.059
GPA	3.301	2.493	.148	4.149	2.248	.186
Financial Difficulties	1.123	1.351	.097	-.342	1.251	-.030
Baseline State Mindfulness				.425	.101	.484***
Slope of Change in Gratitude				-.030	2.562	-.005
Interaction Term (Δ Gratitude x T1 State Mindfulness)				.046	.087	.245
R^2			.206*			.397***

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 25

Summary of regression analyses using MacArthur Approach to mediation to examine the potential mediating role of slope of change in state mindfulness on the change in symptoms of depression from baseline to follow-up with inclusion of control variables (N = 71).

Variable	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Baseline State Mindfulness	-.437	.087	-.499***	-.454	.100	-.520***
Sex	1.349	1.241	.112	1.969	1.011	.164
Minority Status	.639	1.202	.053	.714	.961	.059
Employment Status	1.713	1.184	.151	.196	.976	.017
Semester Stress	.316	.287	.107	.242	.239	.082
GPA	-7.716	2.221	-.323**	-5.505	1.810	-.248**
Financial Difficulties	-.390	1.205	-.034	-1.271	.977	-.110
Baseline Symptoms of Depression				.391	.095	.465
Slope of Change in State Mindfulness				-1.870	4.096	-.072
Interaction Term (Δ State Mindfulness x T1 Symptoms of Depression)				-1.123	.348	-.511**
R^2		.440***			.664***	

Note. Sex: -1/2=male, +1/2=female; Minority Status: -1/2=majority, +1/2=minority; Employment Status: -1/2=not employed; +1/2 = employed; Financial Difficulties: -1/2=did not qualify for need-based loan, +1/2=qualified for need-based loan. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 26.

Summary of significant findings of primary analyses outlined by Aim (1-4).

<u>Aim</u>	<u>Hypothesis</u>	<u>Statistical Approach</u>	<u>Finding</u>
1	1.1	Pearson's r correlation	At baseline, gratitude was significantly positively correlated with state, but not trait mindfulness.
	1.2	Pearson's r correlation	At baseline, gratitude was significantly negatively correlated with symptoms of depression.
	1.3	Pearson's r correlation	At baseline, both trait and state mindfulness were significantly negatively correlated with symptoms of depression.
	1.4	Hierarchical Regressions with Interaction Term	At baseline, gratitude, trait mindfulness, and state mindfulness were each a significant independent predictor of symptoms of depression. When included in the same model, both state and trait mindfulness accounted for the variance provided by gratitude on symptoms of depression.
2	2.1.1	Repeated measures ANOVA	Gratitude significantly increased from baseline to follow-up.
	2.1.2	Repeated measures ANOVA	Trait and state mindfulness did not significantly increase from baseline to follow-up.
	2.1.3	Repeated measures ANOVA	Symptoms of depression significantly decreased from baseline to follow-up.
	2.2	Hierarchical Regression	Koru class attendance predicted slope of change in symptoms of depression.
	2.3	Hierarchical Regression	Meditation frequency and duration did not significantly predict slope of change in symptoms of depression.
	2.4	Hierarchical Regression	Gratitude log completion and number of items grateful for listed daily predicted slope of change in symptoms of depression.
3	3.1	Hierarchical Regression (MacArthur Approach)	Slope of change in gratitude did not significantly mediate the association of state mindfulness from baseline to follow-up.
4	4.2	Hierarchical Regression (MacArthur Approach)	Slope of change in state mindfulness partially mediated the association of symptoms of depression from baseline to follow-up.

Table 27.

Summary of significant findings with control variables (sex, minority status, employment status, semester stress, GPA, and financial difficulties) in secondary analyses.

Aim	Hypothesis	Statistical Approach	Predictor(s)	Outcome	Control Variables					
					Sex	Minority Status	Employment Status	Semester Stress	GPA	Financial Difficulties
1	1.4	Hierarchical Regression	Controls Only	Symptoms of Depression	--	--	*	*	--	--
			Gratitude; Control Variables	Symptoms of Depression	--	--	--	*	--	--
			State Mindfulness; Control Variables	Symptoms of Depression	--	--	--	--	--	--
			Trait Mindfulness; Control Variables	Symptoms of Depression	--	--	--	--	--	--
2	2.1.1	RM ANOVA	T1 Gratitude	T2 Gratitude	--	--	--	--	--	--
	2.1.2	RM ANOVA	T1 State Mindfulness	T2 State Mindfulness	--	--	--	--	--	--
		RM ANOVA	T1 Trait Mindfulness	T2 Trait Mindfulness	--	--	--	*	--	--
	2.1.3	RM ANOVA	T1 Depression	T2 Depression	--	--	--	--	--	--
	2.2	Hierarchical Regression	Koru class attendance	Δ Symptoms of Depression	--	--	--	--	--	--
	2.3	Hierarchical Regression	Meditation frequency (total days)	Δ Symptoms of Depression	--	--	--	--	--	--
		Hierarchical Regression	Meditation frequency (mean days)	Δ Symptoms of Depression	--	--	--	--	--	--
		Hierarchical Regression	Meditation duration (total minutes)	Δ Symptoms of Depression	--	--	*	--	--	--
		Hierarchical Regression	Meditation duration (mean minutes)	Δ Symptoms of Depression	--	--	--	--	*	--
	2.4	Hierarchical Regression	Gratitude log completion (total days)	Δ Symptoms of Depression	--	--	--	--	--	--
		Hierarchical Regression	Gratitude log completion (mean days)	Δ Symptoms of Depression	--	--	--	--	--	--
		Hierarchical Regression	Gratitude log completion (total items)	Δ Symptoms of Depression	--	--	--	--	--	--
		Hierarchical Regression	Gratitude log completion (mean items)	Δ Symptoms of Depression	--	--	--	--	--	--
		Hierarchical Regression	Novelty of Gratitude Items Listed	Δ Symptoms of Depression	--	--	--	--	--	--
3	3.1	Hierarchical Regression (MacArthur Approach)	T1 State Mindfulness Mediator: Δ Gratitude	T2 State Mindfulness	--	--	--	--	--	--
4	4.2	Hierarchical Regression (MacArthur Approach)	T1 Depression Mediator: Δ State Mindfulness	T2 Depression	--	--	--	--	**	--

Note. * $p < .05$, ** $p < .01$

Figure 1. Intention-Attention-Attitude Model adapted to illustrate cogno-affective qualities of attitude (Kabat-Zinn, 1982; Chlebak, 2013; Shapiro, 2006).

Key:

Empirical support from ten reviewed studies integrating mindfulness and gratitude

¹ McIntosh, 2008, ² O’Leary & Dockray, 2015, ³ Chlebak, 2004, ⁴ Kam, 2015, ⁵ Greeson et al., 2014, ⁶ Shao et al., 2016, ⁷ Sood et al., 2011, ⁸ Chen et al., 2016, ⁹ Loo et al., 2014, ¹⁰ O’Leary & Dockray, 2016

Measurement subscale relationships determined by strength of association in Table 1.

^a Five Facet Mindfulness Questionnaire (FFMQ) Subscales

^b Gratitude Resentment Appreciation Task – Revised (GRAT-R) Subscales

Figure 2. Proposed conceptual intersection of mindfulness and gratitude.

Figure 3. Illustration of conceptual model of upward spiral of mindfulness and gratitude

Figure 4. Aim 1: Baseline associations among mindfulness, gratitude and symptoms of depression.

Figure 5. Aim 2: Effects of gratitude and mindfulness components of Koru Mindfulness on symptoms of depression

Figure 6. Aim 3. The slope of change in gratitude will mediate the change in mindfulness from the intervention. The slope of change in mindfulness will mediate the change in gratitude from the intervention.

Figure 7. Aim 4: The effects of slope of change in gratitude and mindfulness from baseline to follow-up on changes in symptoms of depression: a mediation approach.

Figure 8. Stepwise schedule of research activities for each of the nine intervention groups. Reprinted with permission from

Figure 9. Flow diagram of participant progression through recruitment to data analysis.

Figure 10. Frequency of depression scores at baseline illustrating significant elevation cut-off score.

Figure 11. Line graph demonstrating change from baseline to follow-up in gratitude

Figure 12. Line graph demonstrating change from baseline to follow-up in state mindfulness

Figure 13. Line graph demonstrating change from baseline to follow-up in trait mindfulness

Figure 14. Line graph demonstrating change from baseline to follow-up in symptoms of depression.

Figure 15. Line graph illustrating differences in slope of change in symptoms of depression by percentage of Koru sessions attended.

Figure 16. Scatterplot demonstrating the significant association between greater grade point average and greater reduction in symptoms of depression.

APPENDIX A

Summary of Research Studies Investigating Mindfulness and Gratitude

Author(s)	Study Design	Sample Characteristics	Mindfulness Component	Gratitude Component	Outcome and Correlates Findings	Specific Findings
<u>Experimental Designs: Head-to-head Comparisons</u>						
1. McIntosh (2008)	Longitudinal; Quasi-experimental	165 undergraduate psychology students (gratitude induction/blended mindfulness and gratitude induction/control)	-Blended mindfulness and gratitude induction (5 min) -The Revised Cognitive-Affective Mindfulness Scale (CAMS-R)	-Gratitude listing (5 min) -Gratitude Questionnaire-6 (GQ-6) -Grateful Scenarios (GR-S)	-Affect -Empathy	-Both gratitude inductions increased positive affect and decreased anger, fear and negative affect compared to control. -No significant differences were observed between the outcomes of the two gratitude interventions
2. O’Leary & Dockary (2015)	Randomized Controlled Trial	65 women (29 gratitude intervention /22 mindfulness intervention/ 10 waitlist control)	Online Mindfulness Diary and Body Scan (10-15 min; 4 times per week/3 weeks)	Online Gratitude Diary and Grateful Reflection (10-15 min; 4 times per week/3 weeks)	-Depression -Stress -Happiness	-In both intervention groups, depression, stress and happiness improved from baseline to week 3. No changes seen over time in waitlist control. -The gratitude intervention was most effective in stress reduction continuing decline at 5 weeks

-The mindfulness intervention was most effective at reducing depression and increasing happiness

Experimental Designs: Blended Interventions

167	3. Chlebak (2013)	Longitudinal; Quasi-experimental; Qualitative	9 graduate counseling psychology students	Interviews following participation in mindfulness meditation (10 min/weekly, 11 weeks)	Interviews following participation in gratitude journaling (5 min/weekly, 11 weeks)	Overall experience	-Thematic analysis techniques revealed four major themes: Routine & Structure, Relationships, Attitudes of Mindfulness, and Overall Impressions. -Gratitude diary themes included: Relationships, Situational / Life Circumstances, and Ineffable Life Enhancers
	4. Kam (2015)	Longitudinal; Quasi-experimental	15 graduate counseling psychology students (12 mindfulness meditation and gratitude journaling/3 control)	Kentucky Inventory of Mindfulness Skills (KIMS)	Gratitude Questionnaire-6 (GQ-6)	Perceived Stress Scale (PSS)	- No main effect of intervention found on gratitude, mindfulness or stress. -Main effect of time was found to be significant for the Observing subscale of the KIMS. -Significant negative correlations were found between perceived stress and gratitude at 6 and 12 weeks. -Significant negative correlations between perceived stress and the subscales of the KIMS (Observing and Describing, Acting with Awareness, Accepting without Judgment) were found at pre-intervention, week 1, 6, and 12.

5. Greeson, Juberg, Maytan, James & Rogers (2014)	Randomized Controlled Trial	90 undergraduate students (Koru/waitlist control)	Koru Mindfulness (4 75-min sessions); Cognitive and Affective Mindfulness Scale-Revised (CAMS-R)	Gratitude Listing in a nightly log; Gratitude Questionnaire-6 (GQ-6)	-Perceived Stress -Sleep -Mindfulness -Self-Compassion -Gratitude	-Post-Koru participants improvements in stress, sleep problems mindfulness and self-compassion. - Associations were observed among changes in stress, sleep, mindfulness and self-compassion -No significant changes in gratitude were demonstrated
6. Shao, Gao & Cao (2016)	Randomized Controlled Trial	121 Chinese post-operative cervical cancer patients (49 intervention/46 wait-list control)	Gratitude Diary (4 weeks/15 min each night)	Guided mindfulness audio recording (4 weeks/15 min each night)	-Affect -Rumination -Emotion Regulation	-The brief psychological intervention improved positive affect and reappraisal and reduced negative affect and rumination in women with cervical cancer. -Rumination significantly mediated the effects of the intervention on affect.
7. Sood, Prasad, Schroeder & Varkey (2011)	Randomized Controlled Trial	32 physicians at a tertiary medical care center (SMART/waitlist control)	Stress Management and Resiliency Training (SMART); “attention and interpretation” (8 weeks, one 90 min training session, 5-15 min 1-2x daily)	Stress and Resiliency Training (SMART); “cultivating skills of gratitude” (8 weeks, one 90 min training sessions, 5-15 min 1-2x daily)	-Resilience -Stress -Anxiety -Quality of life -Fatigue	-Significant improvement in resiliency, perceived stress, anxiety, and overall quality of life at 8 weeks was observed in post-intervention physicians compared to wait-list control

Cross-sectional Designs

8. Chen, Wu & Chang (2017)	Cross-sectional	190 Taiwanese collegiate athletes	Mindfulness Awareness Attention Scale (MAAS)	Gratitude Questionnaire-Taiwan version (GQ-T)	Life Satisfaction	-Gratitude and mindfulness positively associated with life satisfaction -Gratitude and mindfulness not significantly correlated - Mindfulness moderated the relationship between gratitude and life satisfaction (life satisfaction is strengthened by high mindfulness)
9. Loo, Tsai, Raylu & Oei (2014)	Cross-sectional	801 Taiwanese students (8% screened as problem gamblers)	Mindfulness Awareness Attention Scale (MAAS)	Gratitude Questionnaire-Chinese Version (GQ-C)	-Examine positive factors (gratitude, mindfulness, hope, and curiosity) as buffers against problem gambling	-Gratitude and mindfulness were significantly correlated -Gratitude negatively associated with gambling-related cognitions and urges -Mindfulness negatively associated with gambling-related behaviors, moderated by gender
10. O'Leary & Dockray (2016)	Study 1: cross-sectional	375 pregnant women	Mindfulness Awareness Attention Scale (MAAS)	Gratitude During Pregnancy Scale (GDPS)	Exploratory factor analysis in test-construction of GDP; examination	-An 18-item GDP scale was developed demonstrating good reliability and four factors (general gratitude, physical changes, antenatal care and social support)

				of psychometric properties of MAAS in a pregnant population	-One factor structure of MAAS was retained and demonstrated good reliability for novel population
Study 2: cross- sectional	87 pregnant women	Mindfulness Awareness Attention Scale (MAAS)	Gratitude During Pregnancy Scale (GDPS)	-Affect -Life Satisfaction -Pregnancy Experience	-Gratitude during pregnancy and mindfulness were not significantly correlated -Gratitude was positively associated with positive affect, life satisfaction and positive uplifts -Mindfulness was negatively associated with negative affect and pregnancy hassles and positively associated with positive affect and pregnancy uplifts

APPENDIX B

Existing cross-sectional studies examining association between mindfulness and gratitude measures.

Authors	Sample	Mindfulness Measure	Gratitude Measure	Significant Association
Chen, Wu & Chang (2016)	190 Taiwanese collegiate athletes	Mindfulness Awareness Attention Scale (MAAS)	Gratitude Questionnaire-Taiwan version (GQ-T)*	No
Loo, Tsai, Raylu & Oei (2014)	801 Taiwanese students (8% screened as problem gamblers)	Mindfulness Awareness Attention Scale (MAAS)	Gratitude Questionnaire-Chinese version (GQ-C)*	Yes
O'Leary & Dockray (2016)	87 pregnant women	Mindfulness Awareness Attention Scale (MAAS)	Gratitude During Pregnancy Scale (GDPS)	No
Hicks, Altman & Salmon, 2017	141 U.S. college students	Five-Facet Mindfulness Questionnaire (FFMQ)	Gratitude Resentment and Appreciation Task (GRAT-R)	Yes
Hicks, Neace, DeCaro, & Salmon, 2018	181 U.S. college students	Five-Facet Mindfulness Questionnaire (FFMQ)	Gratitude Resentment and Appreciation Task (GRAT-R)	Yes

Note. *The GQ-T and GQ-C measurements have not been validated with their respective Taiwanese and Chinese populations.

APPENDIX C

Outline of Koru Mindfulness Class Content

	Meditation	Mind-Body Skill	Teaching Points
Class 1	Body Scan	Diaphragmatic Breathing Dynamic Breathing	Introduction to Mindfulness Non-Judgment/Beginner's Mind
Class 2	Gatha	Walking Practice	Acceptance Thinking mind vs. Observing mind
Class 3	Labeling Thoughts	Guided Imagery	De-centering Resilience
Class 4	Labeling Emotions	Eating Practice	Self-Compassion Lessening Emotional Reactivity

APPENDIX D

Participant View of Daily Log

Practice Log

Resize font:

Please complete the survey below.
Thank you!

Did you practice today?

☒ Yes
☐ No

reset

How many minutes did you spend practicing today?

minutes

What skill(s) did you practice today?

☐ Diaphragmatic/Belly breathing
☐ Dynamic/Chaotic breathing
☐ Body scan
☐ Walking meditation
☐ Gatha
☐ Guided imagery
☐ Labeling thoughts
☐ Eating meditation
☐ Labeling feelings
☐ Sitting meditation

How did you practice today?

☐ By myself
☐ With my roommate
☐ With one other person (not my roommate)
☐ With multiple others (including my roommate)
☐ With multiple others (not including my roommate)

What did you use to facilitate practice today?

☐ My memory of in-session practice
☐ Audio tracks on iPod
☐ Bluetooth speaker
☐ My roommate's memory of in-session practice
☐ Meditation app
☐ Other

Reflections:

Expand

I'm grateful for...

Expand

Submit

Save & Return Later

APPENDIX E

Measure of Trait Mindfulness. Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2001)

Below is a collection of statements about your everyday experience. Using the scale below, please indicate *how frequently or infrequently you currently have each experience*. Please answer according to what *really reflects* your experience rather than what you think your experience should be.

	Almost always	Very frequently	Somewhat frequently	Somewhat infrequently	Very infrequently	Almost never
1. I could be experiencing some emotion and not be conscious of it until some time later.	1	2	3	4	5	6
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.	1	2	3	4	5	6
3. I find it difficult to stay focused on what's happening in the present.	1	2	3	4	5	6
4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	1	2	3	4	5	6
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	1	2	3	4	5	6
6. I forget a person's name almost as soon as I've been told it for the first time.	1	2	3	4	5	6
7. It seems I am "running on automatic" without much awareness of what I'm doing.	1	2	3	4	5	6
8. I rush through activities without being really attentive to them.	1	2	3	4	5	6
9. I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	1	2	3	4	5	6
10. I do jobs or tasks automatically, without being aware of what I'm doing.	1	2	3	4	5	6
11. I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6
12. I drive places on "automatic pilot" and then wonder why I went there.	1	2	3	4	5	6
13. I find myself preoccupied with the future or the past.	1	2	3	4	5	6
14. I find myself doing things without paying attention.	1	2	3	4	5	6
15. I snack without being aware that I'm eating.	1	2	3	4	5	6

Measure of State Mindfulness. Cognitive and Affective Mindfulness Scale – Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, Laurenceau, 2007).

Cognitive and Affective Mindfulness Scale- Revised (CAMS-R)

Please respond to each item by marking <u>one box per row</u>		Rarely/Not at All	Sometimes	Often	Almost Always
CAMS-R1	It is easy for me to concentrate on what I am doing.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R3	I can tolerate emotional pain.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R4	I can accept things I cannot change.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R5	I can usually describe how I feel at the moment in considerable detail.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R6	I am easily distracted. (R)	☐ 4	☐ 3	☐ 2	☐ 1
CAMS-R8	It's easy for me to keep track of my thoughts and feelings.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R9	I try to notice my thoughts without judging them.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R10	I am able to accept the thoughts and feelings I have.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R11	I am able to focus on the present moment.	☐ 1	☐ 2	☐ 3	☐ 4
CAMS-R12	I am able to pay close attention to one thing for a long period of time.	☐ 1	☐ 2	☐ 3	☐ 4

Scoring: Note that 6 is reversed scored. Sum of all values reflect greater mindful qualities.

Your total score: _____

Measure of Gratitude. Gratitude Resentment Appreciation Task – Revised (GRAT-R; Watkins, 2002)

GRAT -R

Please provide your honest feelings and beliefs about the following statements which relate to you. There are no right or wrong answers to these statements. We would like to know how much you feel these statements are true or not true of you. Please try to indicate your true feelings and beliefs, as opposed to what you would like to believe. Respond to the following statements by filling in the number that best represents your real feelings in the blank provided next to each statement. Please use the scale provided below, and please choose one number for each statement (i.e. don't circle the space between two numbers).

1	2	3	4	5	6	7	8	9
I strongly disagree		I disagree somewhat		I feel neutral about the statement		I mostly agree with the statement		I strongly agree with the statement

1. ___ I couldn't have gotten where I am today without the help of many people.
2. ___ I think that life has been unfair to me.
3. ___ It sure seems like others get a lot more benefits in life than I do.
4. ___ I never seem to get the breaks or chances that other people do.
5. ___ Often I'm just amazed at how beautiful the sunsets are.
6. ___ Life has been good to me.
7. ___ There never seems to be enough to go around and I never seem to get my share.
8. ___ Often I think, "What a privilege it is to be alive."
9. ___ Oftentimes I have been overwhelmed at the beauty of nature.
10. ___ I feel grateful for the education I have received.
11. ___ Many people have given me valuable wisdom throughout my life that has been important to my success.
12. ___ It seems like people have frequently tried to impede my progress.
13. ___ Although I think it's important to feel good about your accomplishments, I think that it's also important to remember how others have contributed to my success.
14. ___ I really don't think that I've gotten all the good things that I deserve in life.
15. ___ Every Fall I really enjoy watching the leaves change colors.
16. ___ Although I'm basically in control of my life, I can't help but think about all those who have supported me and helped me along the way.
17. ___ Part of really enjoying something good is being thankful for that thing.
18. ___ Sometimes I find myself overwhelmed by the beauty of a musical piece.
19. ___ I'm basically very thankful for the parenting that was provided to me.
20. ___ I've gotten where I am today because of my own hard work, despite the lack of any help or support.
21. ___ Over the December holidays, the presents I get aren't as good or as many as others seem to get.
22. ___ Sometimes I think, "Why am I so fortunate so as to be born into the family and culture I was born into?"
23. ___ One of my favorite times of the year is Thanksgiving.
24. ___ I believe that I am a very fortunate person.
25. ___ I think that it's important to "Stop and smell the roses."
26. ___ More bad things have happened to me in my life than I deserve.
27. ___ I really enjoy the changing seasons.
28. ___ Because of what I've gone through in my life, I really feel like the world owes me something.
29. ___ I believe that the things in life that are really enjoyable are just as available to me as they are to the very rich.

- 30. ☐ I love to sit and watch the snow fall.
- 31. ☐ I believe that I've had more than my share of bad things come my way.
- 32. ☐ Although I think that I'm morally better than most, I haven't gotten my just reward in life.
- 33. ☐ After eating I often pause and think, "What a wonderful meal."
- 34. ☐ Every spring, I really enjoy seeing the flowers bloom.
- 35. ☐ I think that it's important to pause often to "count my blessings."
- 36. ☐ I think it's important to enjoy the simple things in life.
- 37. ☐ I basically feel like life has ripped me off.
- 38. ☐ I feel deeply appreciative for the things others have done for me in my life.
- 39. ☐ I feel that God, or fate, or destiny, doesn't like me very well.
- 40. ☐ The simple pleasures of life are the best pleasures of life.
- 41. ☐ I love the green of spring.
- 42. ☐ For some reason I never seem to get the advantages that others get.
- 43. ☐ I think it's important to appreciate each day that you are alive.
- 44. ☐ I'm really thankful for friends and family.

Measure of Symptoms of Depression. Patient Health Questionnaire-9 (PHQ-9; Kroenke, 2001)

	Not at all	Several days	More than half the days	Nearly every day
1. Over the <i>last 2 weeks</i> , how often have you been bothered by any of the following problems?				
a. Little interest or pleasure in doing things	☐	☐	☐	☐
b. Feeling down, depressed, or hopeless	☐	☐	☐	☐
c. Trouble falling/staying asleep, sleeping too much	☐	☐	☐	☐
d. Feeling tired or having little energy	☐	☐	☐	☐
e. Poor appetite or overeating	☐	☐	☐	☐
f. Feeling bad about yourself or that you are a failure or have let yourself or your family down	☐	☐	☐	☐
g. Trouble concentrating on things, such as reading the newspaper or watching television.	☐	☐	☐	☐
h. Moving or speaking so slowly that other people could have noticed. Or the opposite; being so fidgety or restless that you have been moving around a lot more than usual.	☐	☐	☐	☐
i. Thoughts that you would be better off dead or of hurting yourself in some way.	☐	☐	☐	☐
2. If you checked off any problem on this questionnaire so far, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
	☐	☐	☐	☐

APPENDIX F

Funding for this study was provided by a Research – Type II Grant, #140436 (PI: Sandra E. Sephton, Ph.D.) from the University of Louisville Office of the Executive Vice President for Research and Innovation.

CURRICULUM VITAE

Allie M. Rodgers, M.S.

University of Louisville
Clinical Psychology Doctoral Candidate
Tel: 317.439.9071 | E-mail: allie.m.hicks@gmail.com

EDUCATION

Doctor of Philosophy in Clinical Psychology <i>University of Louisville, Louisville, Kentucky</i> <i>Distinguished Pass of Preliminary Examination for Doctoral Candidacy</i> <i>Defended Dissertation 8/1/2019</i> GPA: 4.0/4.0 Faculty Advisor: Paul Salmon, Ph.D	2015-Present
APPIC Pre-Doctoral Clinical Internship <i>Richard L. Roudebush VA Medical Center, Indianapolis, Indiana</i> Health Psychology Track Major Rotations: PCMH/Pain; Minor Rotations: Neuropsychology	2019-Present
Master of Science in Clinical Psychology <i>University of Louisville, Louisville Kentucky</i> Cumulative GPA: 4.0/4.0 Faculty Advisor: Paul Salmon, Ph.D	2017
Bachelor of Arts in Psychological Science Valedictorian, <i>Summa Cum Laude</i> <i>Belmont University Nashville, Tennessee</i> Minors: Social Justice; Health Cumulative GPA: 4.0/4.0 Senior Thesis: <i>Gratitude Induction and Injured Athletes</i> Faculty Mentor: Pete Giordano, Ph.D	2015
Florida State International Programs <i>Valencia, Spain</i>	June, 2013

HONORS AND AWARDS

Academic

Award for Excellence in Research <i>Awarded by UofL faculty to a student who demonstrates outstanding research</i>	2019
Award for Excellence in Clinical Work <i>Awarded by UofL faculty to a student who demonstrates outstanding clinical work</i>	2018
Award for Excellence in Professional Service <i>Awarded by UofL faculty to a student who shows dedication to professional service</i>	2018
Robert E. Watson Scholarship Award <i>Awarded at Belmont University Graduation to the student with highest GPA</i>	2015
Marie H. Means Award <i>Awarded to the Outstanding Senior in Psychology</i>	2015
Belmont Athletic Department Senior Academic Award <i>Awarded to the Senior Student-Athlete with the highest GPA</i>	2015

Belmont Athletic Department Academic Achievement Award	2013-2015
<i>Awarded to the Student-Athlete with the highest GPA</i>	
Ohio Valley Conference Medal of Honor Winner	2012-2015
<i>Awarded for academic achievement in sport season</i>	
Ohio Valley Conference Commissioner's Honor Roll	2013-2015
Dean's List	2011-Present
Academic Merit Scholarship Recipient	2011-2015
Athletic	
Co-captain of Belmont University Women's Soccer Team	2014
Leadership Committee of Belmont Women's Soccer Team	2012-2015
Division I Athletic Scholarship for Belmont Women's Soccer Team	2011-2015

CLINICAL EXPERIENCE

HEALTH-FOCUSED CLINICAL EXPERIENCE:

Sleep Medicine Specialists Behavioral Medicine Intern **May, 2018-Present**

3430 Newburg Road, Suite 150, Louisville, KY

Supervisor: Ryan Wetzler, Psy.D, DBSM, ABPP

Sleep Medicine Specialists is a pulmonary practice and sleep disorders clinic accredited by the American Academy of Sleep Medicine (AASM). Clients include diverse, community-based (urban/rural) individuals referred by self, physicians, or mental health professionals. Common population diagnoses include: insomnia, obstructive sleep apnea, conversion disorder, somatic symptoms disorder, anxiety disorders, depressive disorders, circadian rhythm sleep disorder, narcolepsy, bruxism, chronic pain conditions, REM sleep behavior disorders and trauma-related disorders.

Responsibilities:

- Deliver health psychology-related services including cognitive behavioral treatment for insomnia (CBT-I), relaxation training, and health education
- Facilitate biofeedback for an array of medical and psychological disorders such as chronic pain, anxiety disorders, bruxism, and continuous positive airway pressure machinery desensitization.
- Screen for coexisting psychiatric and medical conditions
- Delivered a battery of assessments to determine diagnostic impressions and evidence-based treatment plan for sleep disturbances

Eating Disorder Specialty Team Therapist **August, 2017-August, 2018**

Noble H. Kelly Psychological Services Center; University of Louisville, Louisville, KY

Supervisor: Cheri Levinson, Ph.D

Eating Anxiety Treatment (EAT) Laboratory operates a clinical team through the University of Louisville Psychological Center which offers the only outpatient eating disorder specific treatment in Louisville. Clients include men, women and children experiencing symptoms of eating disorders including: anorexia, bulimia, binge eating disorder, and other-specified eating disorders.

Responsibilities:

- Implement cognitive-behavioral treatment plans to target key symptoms of eating disorders and comorbid mood disorders
- Facilitated use of Recovery Record, a mobile application for eating disorder recovery
- Led biweekly Eating Disorder Support Group for individuals in the community
- Participate in weekly group supervision for discussion and direction on implementation of treatment, client needs, and relevant empirical literature

Frazier Rehabilitation Institute Psychology Intern

August, 2017-July, 2018

Kentucky One Health, 220 Abraham Flexner Way, Louisville, KY

Supervisor: Megan Jablonski, Ph.D; Abbey Roach, Ph.D

Frazier Rehabilitation Institute is a world-class comprehensive acute rehabilitation hospital. Frazier incorporates a 135-bed hospital on the Jewish Hospital Medical Campus and offers a multitude of specialty programs for individuals experiencing: traumatic brain injury, spinal cord injury, stroke, neuroblastoma, and other medical and neurological illness and injuries.

Responsibilities:

- Delivered health and behavior assessment and intervention for individuals and groups impacted by traumatic medical and neurological illnesses and injuries
- Implemented cognitive behavioral, mindfulness, acceptance-based and self-compassion skills in a therapeutic setting with individuals recovering from physical illness or injury
- Co-facilitated brain injury education group and spinal cord injury education group
- Clinical exposure with individuals with Functional Movement Disorder as part of an innovative treatment approach known as the MoRE program
- Functioned as a psychological consult liaison and facilitated psychological assessment and intervention in an interdisciplinary ALS clinic for patients with ALS and their caregivers
- Participated in weekly rounding on patients as part of medical care team. Facilitated communication among medical providers in the multi-disciplinary care process

Pain Clinic Behavioral Health Specialist

January-December, 2017

University of Louisville Hospital Pain Management Center

550 South Jackson Street, Louisville KY

Supervisor: Brian Monsma, Ph.D

University of Louisville Hospital Pain Management Center uses a non-pharmacological approach to treating chronic pain. In addition to epidural infusions and peripheral nerve injections to treat pain, this center offers behavioral management services to address psychological components to pain and strategies for its management. Patients include diverse community-based (urban/rural) individuals referred by physicians. Common populations included: chronic pain, trauma and stress-related illnesses, conversion disorder, anxiety disorders, depressive disorders and severe mental illness.

Responsibilities:

- Implemented an integrative treatment approach, including mindfulness, cognitive-behavioral therapy and interpersonal skills training in the treatment of chronic pain and its associated stressors
- Assessed mental status and level of functioning in patients experiencing chronic pain to conceptualize treatment outcome goals and implementation plan
- Collaborated with medical staff regarding patient care

MILITARY CLINICAL EXPERIENCE:

Military Clinical Liaison

August, 2018-Present

Noble H. Kelley Psychological Services Center; University of Louisville, Louisville, KY

Supervisor: Bernadette Walter, Ph.D

The University of Louisville Psychological Services Center (PSC) is a community-mental health clinic facilitated by clinical psychology doctoral students which maintains a commitment to community integration. As such, the PSC provides community outreach programs to several community members including undergraduates, active military, and veterans.

Responsibilities:

- Facilitated communication between the PSC and military-affiliated community members

- Coordinated outreach efforts at The Kentucky Air National Guard and Athena Sisters including drop-in hours for therapy services and public talks

Kentucky Operation Immersion

May, 2018

*Cabinet for Health and Family Services—Division of Behavioral Health
Wendell H. Ford Regional Training Center; Greenville, KY*

The Kentucky Cabinet for Health and Family Services offers a week-long intensive military immersion experience for mental health professionals. Operation Immersion is designed to expand the knowledge of professionals and providers who support Kentucky Service Members, Veterans and Families (SMVF).

Responsibilities:

- Participated in a military cultural immersion experience that mirrored basic training (e.g. living in barracks, physical training) in order to better understand the needs of the military to provide culturally competent services
- Gained a greater understanding of evidence-based treatments and special issues (e.g. moral injury, survivor's guilt) for military and veterans equivalent to 40 CEUs

Mindfulness-based Move Stretch Strengthen (MMSS) Program

January, 2018-Present

Louisville Air National Guard Base; 1101 Grade Lane #2, Louisville KY

Supervisor: Paul Salmon, Ph.D

The University of Louisville maintains a grant-funded collaboration with The Kentucky Air National Guard (KANG). Through this partnership, the KANG requested assistance with a health promotion program for airmen whose performance on the annual fitness test is marginal or poor. Based on this need, the MMSS program was developed, implemented, and tested.

Responsibilities:

- Assisted in strategizing, organizing, and implementing an eight-session mindfulness-based movement program for KANG members
- Selected assessment measurements to evaluate pre/post outcomes for program development

Mindfulness Program Co-facilitator

Spring, 2017

Louisville Air National Guard Base; 1101 Grade Lane #2, Louisville KY

Supervisor: Paul Salmon, Ph.D

As part of a grant-funded collaboration between University of Louisville and the Kentucky Air National Guard, a mindfulness-based program was implemented among airmen and women

Responsibilities:

- Co-facilitated a mindfulness based program for members of the Air National Guard based on the text "Mindfulness: An Eight-Week Plan for Finding Peace in a Frantic World"
- Introduced and taught proficiency in the use of meditations through a mobile phone application

COMMUNITY-BASED MENTAL HEALTH CLINICAL EXPERIENCE:

Graduate Clinical Assistant

July, 2018-Present

Noble H. Kelley Psychological Services Center; University of Louisville, Louisville, KY

Supervisor: Bernadette Walter, Ph.D.

The University of Louisville offers a community mental health training clinic operated by its clinical psychology doctoral students. The clinic serves diverse community members (urban/rural) by providing outpatient therapy and assessment services. Four upper-level doctoral students, known as clinic assistants serve in leadership roles to help maintain the day-to-day administrative functions.

Responsibilities:

- Selected by faculty to provide peer supervision to graduate students, including assistance with intake assessments, therapy sessions, psychological testing, and clinic procedures

- Serve as a first-line of contact for individuals calling the clinic in crisis and facilitating treatment services, assessment services, or providing necessary referrals
- Collaborate with external agencies to provide referrals, outreach and client case management
- Responsible for management of clinical operations, including scheduling, payment records, and chart audits; entrusted with clinic key and file room access
- Attend weekly staff meetings with clinic directors to discuss incoming clients and other clinic concerns

Graduate-Level Therapist—Integrative Approach Clinical Team

July, 2018-Present

Noble H. Kelly Psychological Services Center; University of Louisville, Louisville, KY

Supervisor: Rich Lewine, Ph.D

The University of Louisville offers a community mental health training clinic operated by its clinical psychology doctoral students. The clinic provides therapeutic services from a variety of therapeutic orientations under the supervision of supervisors trained in the following specialties: Cognitive-Behavioral Therapy, Mindfulness, Integrative, and Eating Disorders.

Responsibilities:

- Implemented an integrated approach drawing from several evidence-based treatment strategies to craft an individualized treatment plan for clients with more complex and severe presentations
- Participated in weekly group supervision for discussion and direction on implementation of treatment, client needs, and relevant empirical literature

Graduate-Level Therapist—Mindfulness Clinical Team

August, 2015-August, 2017

Noble H. Kelly Psychological Services Center; University of Louisville, Louisville, KY

Supervisor: Paul Salmon, Ph.D

The University of Louisville offers a community mental health training clinic operated by its clinical psychology doctoral students. The clinic provides therapeutic services from a variety of therapeutic orientations under the supervision of supervisors trained in the following specialties: Cognitive-Behavioral Therapy, Mindfulness, Integrative, and Eating Disorders.

Responsibilities:

- Implemented a mindfulness and acceptance-based therapeutic approach to address symptoms of anxiety, depression, and somatic symptoms
- Formulated client conceptualizations and treatment plans grounded in empirical literature to tailor treatment to meet individual client needs
- Maintained best practices in mindfulness-based therapy by reading and discussing new protocol, didactic experiences and workbooks
- Participated in weekly group supervision for discussion and direction on implementation of treatment, client needs, and relevant empirical literature

Graduate-Level Assessor

August, 2015-Present

Noble H. Kelly Psychological Services Center; University of Louisville, Louisville, KY

Supervisors: Bernadette Walter, Ph.D, David Winsch, Ph.D

The University of Louisville offers a community mental health training clinic operated by its clinical psychology doctoral students. The clinic provides a variety of assessments including neuropsychological, personality, full diagnostic, and cognitive assessments.

Responsibilities:

- Conduct semi-structured intake assessments for incoming clients (children and adults) seeking psychological assessment or therapy services
- Administer relevant clinical assessments to children and adults, including the Wechsler Intelligence Scale for Children (WISC-V), Wechsler Adult Intelligence Scale (WAIS-IV), Woodcock-

- Johnson III, Minnesota Multiphasic Personality Inventory (MMPI-2), and full diagnostic assessment for ADHD, learning disabilities, and Gifted and Talented programs
- Collaborate with external agencies, including teachers, physicians, and other health care providers for receipt of additional client information and reports
- Prepare integrative reports detailing client history, presenting problem, key symptoms, diagnosis, treatment suggestions and accommodations under the supervision of licensed psychologists

Youth Villages; Tallwood Group Home Support Staff

Summer, 2014

3310 Perimeter Hill Dr., Nashville, Tennessee 37211

Supervisor: Dwight Webster, M.A.

Youth Villages is a national non-profit organization providing assistance for children who face a wide range of emotional, mental and behavioral problems by offering residential treatment facilities and group homes with trained staff. Recreational therapists, behavioral therapists, psychologists and social workers engage with children to identify problematic behaviors and increase coping skills with the goal of family reunification.

Responsibilities:

- Provided support in delivery of behavioral treatment plans for youth
- De-escalated crisis situations
- Implemented daily activities schedule for eight male youths residing full-time in a group home
- Organized a career-fair tailored for job opportunities for youth in group home
- Planned and taught life-skills (cooking, financial management, living situation arrangements) in preparation for youth's transition from residential living
- Met weekly with team members to discuss implementation of individual treatment plans

Tennessee Voices for Children Teen Screen Internship

October, 2013-2014

701 Bradford Avenue, Nashville, Tennessee 37204

Tennessee Voices for Children Teen Screen offers a mental health screening assessment program which emphasizes prevention and early intervention for teens at risk for future mental health concerns.

Supervisor: Anna Clare Bowen, MFT

Responsibilities:

- Organized and implemented a suicide-risk assessment computer in youth detention centers followed by debriefing and safety planning following results of risk assessment
- Translated documents from English to Spanish
- Served as first-line of contact for individuals calling Tennessee Voices for Children and providing appropriate referrals and supportive counseling

TEACHING EXPERIENCE

UNIVERSITY SETTING:

Co-Instructor

July 2018- Present

Interviewing Skills Graduate Psychology Class

University of Louisville, Louisville, KY

- Lectured, graded, and planned graduate-level introduction to interviewing, risk assessment, mental status examination and clinical competence.
- Supervised graduate students' first therapy intake interview and provided feedback

Graduate Teaching Assistant **January, 2018-Present**
Life Span Development
University of Louisville, Louisville, KY

- Graded, proctored and reviewed exams with students six times throughout the semester
- Tutored students on lecture material outside of class time

Graduate Teaching Assistant **August, 2017-December, 2017**
Health Psychology
University of Louisville, Louisville, KY

- Aided in lesson planning and project development implementing CBT-i coach sleep application as a class project. Assisted with assessment, selection of class topics, test question creation
- Lecturer for upper-division psychology course for the following lectures: Coping and Health, Exercise and Injury Prevention, Complementary and Alternative Medicine Practices

Graduate Teaching Assistant **August, 2015-August, 2017**
Introduction to Psychology
University of Louisville, Louisville, KY

- Supported three professors in two sections of Introductory Psychology for four semesters
- Calculated six course weighted average grade updates throughout the semester
- Prepared documents, organized and proctored exams for each section
- Attended lectures and provided study strategies to trouble-shoot specific course questions
- Graded research journal entries summarizing selected research articles

Undergraduate Teaching Assistant **Spring, 2015**
Abnormal Psychology
Belmont University, Nashville, TN

- Supported professor in decision making regarding specific issues relating to course
- Assisted in organization of group projects, provided feedback and student guidance
- Supported students learning of material and answered questions relating course content
- Held exam review sessions prior to exams
- Lecturer on topic of Eating Disorders to an upper-division psychology course

Graduate Teaching Academy II Participant **Spring 2018**
University of Louisville School of Interdisciplinary and Graduate Studies

- Applied and was selected to participate in the second series of an interactive didactic workshop teaching excellence in the classroom
- Practiced lecture skills, designed course syllabi, applied classroom management techniques, and utilized technology in the classroom with feedback from faculty members and colleagues

Graduate Teaching Academy I Participant **2015-2016**
University of Louisville School of Interdisciplinary and Graduate Studies

- Participated in a year-long series of sessions designed to teach knowledge, skills, and excellence in college teaching through interactive workshops alongside faculty members with expertise in teaching
- Practiced lecture skills with feedback from faculty members and colleagues

COMMUNITY SETTING:

Certified Koru Mindfulness Teacher **July, 2015-Present**

The Center for Koru Mindfulness

- Teacher for five 4-week Koru workshop groups at The University of Louisville educating emerging adults about the stress-reducing benefits of mindfulness through meditative practice, selected text reading, and engaged discussion
- Participated in intensive teacher certification training with hands-on teaching opportunities

Mindfulness Mentor

August, 2016-Present

The Passionist Earth and Spirit Center

- Member of a team of mindfulness practitioners who provide an Outreach Program Teaching Awareness and Compassion several times throughout the year
- Provide a 10-session, weekly mindfulness-based intervention for at-risk populations including children in foster care and with ranging developmental and physical abilities

Mindfulness in Engineering Students Intervention

Fall, 2016

University of Louisville

- Developed a 50-minute, four-week curriculum for a mindfulness-based intervention targeting test anxiety in undergraduate engineering students. Helped in generating specific considerations for tailoring the intervention, located relevant teaching materials and planned delivery method
- Co-facilitated three sections of the “Mindfulness in Engineering” intervention, aiding with email communication, technology preparation, and development of materials

20-Mindful Minutes Facilitator

Fall, 2016

University of Louisville

- Co-facilitated a university-wide initiative through the office of Health Promotions to promote wellness and decrease stress in college students via a brief mindfulness-based intervention

Mindfulness Presentations

2016-Present

Coalition for Serving Young Adults

- Gave a community presentation teaching mindfulness to individuals working with at-risk youth

University of Louisville Women’s Golf Team

- Co-facilitated an introduction to mindfulness as it relates to sports performance

Louisville Public Library Teen Staff

- Taught 60-minute interactive workshop for practicing mindfulness in a stressful work setting

---

RESEARCH

EXPERIENCE:

Graduate Research Assistant

July, 2015-Present

Mindfulness and Biobehavioral Health Research Laboratory

Department of Psychological and Brain Sciences

University of Louisville, Louisville KY

Supervisors: Sandra E. Sephton, Ph.D; Paul Salmon, Ph.D

- *Intersection of Mindfulness and Gratitude with Affective Constructs*
  - Organized, planned and executed data collection among undergraduate sample utilizing Qualtrics and SONA data collection software
  - Completed data analysis using SPSS
  - Composed manuscript for submission of first-author publication
- *Mindfulness and Gratitude as Predictors of Exercise Motivation*

- Planned, Organized and executed data collection among undergraduate sample examining mindfulness and gratitude in relation to exercise motivation and self-efficacy
- Assisted with grant-writing for pilot research project among Air National Guard members
- *A Brief iPod-based Mindfulness Intervention for Undergraduates*
  - Assist in the planning and execution of statistical analyses of psychosocial and psychoneuroimmune data
  - Conduct statistical analyses examining the role of innate mindfulness on stress-health pathways in undergraduates as well as the benefits of a mindfulness-based iPod intervention
  - Composed two manuscripts based on this data for submission of a first-author publication
- *Mindfulness-Based Stress Reduction for Parkinson's Disease Patients and Caregivers*
  - Assisted in the analyses, planning and writing of a project examining the effects of Mindfulness-Based Stress Reduction (MBSR) on stress-health pathways among patients with Parkinson's disease and their Caregivers
  - Composed a first-author manuscript on dispositional mindfulness as a protective factor
- *Dyadic Undergraduate Koru Mindfulness Study*
  - Co-study coordinator for a large grant-funded pilot study examining Koru mindfulness in the context of dyadic roommates
  - Led the recruiting initiative for 130 undergraduate roommates, providing dozens of brief mindfulness presentations to classrooms
  - Organized teachers and teaching materials for nine mindfulness workshops
  - Coordinated research participant scheduling for laboratory visits
  - Led and organized 4-month follow-up data collection and six focus groups
  - Mentor undergraduate research assistants with projects and tasks aimed at teaching the research process. Supervised two honors theses for undergraduate students

Graduate Research Assistant

July, 2016-Present

*Koru Mindfulness Research Initiative
The Center for Koru Mindfulness
Duke University, Durham NC*

- Collaboration with Dr. Jeff Greeson and Dr. Holly Rogers in planning and completing secondary analysis of a Koru Mindfulness RCT study
- Assisted in the analyses and writing of a project examining the moderating roles of age, gender, education and religious affiliation on the salutary effects of a mindfulness-based intervention for undergraduate students

Undergraduate Research Assistant

Fall, 2013-2015

*Appraisal, Stress, Coping and Emotions Lab
Department of Psychology
Vanderbilt University*

Supervisors: Leslie D. Kirby, Ph.D & Craig A. Smith, Ph.D

- Assisted in data collection and execution of graduate students' research projects involving the role of trait emotional intelligence in stress buffering
- Collaborated with lab members and colleagues on projects exploring the differentiation of, and motivational functions served by, positive emotional experience
- Participated in a weekly research reading group on the topic of emotion theory

Undergraduate Research Assistant

Department of Psychological Science

Belmont University

Supervisor: Pete Giordano, Ph.D

Spring, 2012

- Aided Dr. Giordano literature review and logistical planning for a continued project on the role of professor comments to students titled “Serendipity in Teaching and Learning: The Importance of Critical Moments”

DISSERTATION:

The Intersection of Mindfulness and Gratitude: Examining the Role of a Gratitude Practice within a 4-Week Mindfulness-based Intervention on Depressive Symptoms in Undergraduates

Dissertation Chair: Paul Salmon, Ph.D

Date Defended: August 1, 2019

- **Topic:** Dissertation examined proposed upward spiraling model of dual implementation of gratitude and mindfulness practice in the reduction of depressive symptoms. Analyses compared the relative effects of a daily gratitude practice and daily meditation within a mindfulness-based intervention on the rising rates of college student depression.
- Spearheaded recruitment effort and successfully enrolled over 100 students in one semester. Coordinated data collection of nine intervention groups while also personally teaching groups.

PUBLICATIONS:

Zimmaro, L.A., Salmon, P., Naidu, H., Rowe, J., Phillips, K., Rebholz, W.N., Giese-Davis, J., Cash, E., Dreeben, S., Bayley-Veloso, R., Jablonski, M., **Hicks, A.**, Siwik, C., and Sephton, S.E. (2015). Association of Dispositional Mindfulness with Stress, Cortisol, and Well-being Among University Undergraduate Students. Published in *Mindfulness*.

Siwik, C; **Hicks, A.**; Phillips, K.; Rebholz, W.N.; Zimmaro, L.A.; Weissbecker, I.; Cash, E.; Sephton, S.E. (2017). Psychological and Physiological Effects of Coping Styles Among Gynecologic Cancer Patients. Under Press in *Journal of Health Psychology*.

Hicks, A., Siwik, C., Phillips, K., Zimmaro, L.A., Salmon, P., Burke, N., Albert, C., Fields, O., Dorsel, D., Sephton, S.E. (2019). Dispositional Mindfulness is Associated with Lower Basal Sympathetic Arousal and Less Psychological Stress. *International Journal of Stress Management*.

Hicks, A., Phillips, K., Siwik, C., Salmon, P., Litvan, I., Jablonski, M.E., Filoteo, V., Kayser, K., Sephton, S.E. (Accepted, 2019). The Role of Dispositional Mindfulness in a Stress-Health Pathway Among Parkinson's Disease Patients and Caregiving Partners. *Quality of Life Research Journal*.

IN PREPARATION:

Hicks, A., Salmon, P., Phillips, K., Siwik, C., Sephton, S.E. (In preparation, 2019). The Role of Self-Compassion in a Stress-Health Pathway.

Siwik, C., Hicks, A., Phillips, K., Ma, J., van der Gryp, K., Salmon, P., Sephton, S.E. (In preparation, 2019). Mindfulness-Based Stress Reduction for Parkinson's Disease Patients and Caregiving-Partners.

Neace, S., **Hicks, A.**, DeCaro, M., Salmon, P. (In preparation, 2019). Exploring the Role of Mindfulness in the Relationship Between Self-Efficacy and Exercise Motivation in College Students.

ORAL PRESENTATIONS:

Hicks, A., Salmon, P., Rebholz, W., Phillips, K., Siwik, C., Zimmaro, L.A., Cash, E., van der Gryp, K., & Sephton, S. E. (March, 2018). The Role of Self-Compassion in a Stress-Health Pathway. Oral Presentation at American Psychosomatic Society 76th Annual Meeting, Louisville, KY.

Phillips, K., Siwik, C., **Hicks, A.**, Salmon, P., Cash, E., Litvan, I., Filoteo, J.V., van der Gryp, K., & Sephton S.E.

(March, 2018). Exploration of Dyadic Associations of Anxiety and Diurnal Cortisol among Parkinson's Disease Patient/Caregiver Dyads. Oral Presentation at American Psychosomatic Society 76th Annual Meeting, Louisville, KY.

Phillips, K., Siwik, C., Segerstrom, S., Zimmaro, L., Rebholz, W., Cash, E., **Hicks, A.**, van der Gryp, K., Sephton,

S.E. (March, 2018). Associations Between Daily Affect, Intrusive Thoughts, and Cortisol Levels Among Lung Cancer Patients. Oral Presentation at the American Psychosomatic Society 76th Annual Meeting, Louisville, KY.

Siwik, C., Segerstrom, S., Phillips, K., Cash, E., Rebholz, W., **Hicks, A.**, van der Gryp, K., Sephton, S.E. (March, 2018). Associations of Actigraphically Measured Daytime Sedentariness and Nighttime Restfulness with Waking and Bedtime Salivary Cortisol Levels. Oral Presentation at American Psychosomatic Society 76th Annual Meeting, Louisville, KY.

POSTER PRESENTATIONS:

Bennett, A., **Hicks, A.**, Lundstrum, J., Wall, A (April, 2013) Cognitive style and moral judgment. Presented at Belmont Undergraduate Research Symposium, Nashville TN.

Hicks, A. (December, 2014). Gratitude induction and injured athletes. Presented at Sciences Undergraduate Research Symposium, Nashville TN.

Hicks, A., DeTrude, E., Oman, D., Ramos, R., Sanders, S., Sorci, M. (December, 2014). Social transmission of food preference in lab rats. Presented at Belmont University Sciences Undergraduate Research Symposium, Nashville TN.

Hicks, A., Brosz, E., Flury, B., (April, 2015). Dispositional gratitude and health. Presented at Belmont Undergraduate Research Symposium, Nashville TN.

Hicks, A., Salmon, P., Phillips, K., Zimmaro, L., Siwik, C., Bayley-Veloso, R., Albert, C., Fields, O., Cash, E., & Sephton, S.E. (2016) The role of mindfulness in stress and depressive symptoms of undergraduate students. Poster presentation at the American Psychosomatic Society 74th Annual Scientific Conference, Denver, CO.

Phillips, K., Bayley-Veloso, R., Zimmaro, L.A., Siwik, C., **Hicks, A.**, Cash, E., Salmon, P., & Sephton, S.E. (2016). Does living situation affect stress and health outcomes among cancer patients? Poster presentation at the American Psychosomatic Society 74th Annual Scientific Conference, Denver, CO.

Siwik, C.J., Phillips, K., Zimmaro, L.A., Bayley-Veloso, R., **Hicks, A.**, Cash, E., Salmon, P., Sephton, S.E. (2016). Psychological and Physiological Effects of Problem-focused and Emotional Approach to Coping Styles in Gynecological Cancer Patients. Poster presentation at the American Psychosomatic Society 74th Annual Scientific Conference, Denver, CO.

Hicks, A. & Yandell, L. (2015). *Gratitude Induction and Injured Athletes*. Presented at Eastern Psychological Association, Philadelphia, PA.

Fields, O., Zimmaro, L.A., Sephton S.E., **Hicks, A.**, Albert, C., & Cash, E. (2016). Rest-activity Rhythms and Quality of Life in Lung Cancer Patients. Poster presented at Research!Louisville 2016 at the University of Louisville.

Hicks, A., Burke, N., Salmon, P. (2017). Minding your blessings: an exploration of gratitude and mindfulness as predictors of affect. Poster presentation at the American Society for Psychological Sciences Conference, Boston, MA.

Burke, N., **Hicks, A.**, Sephton, S.E., Salmon, P. (2017). Relation of Mindfulness and Self-Compassion to Affect in Undergraduates. Poster presentation at the American Society for Psychological Sciences Conference, Boston, MA.

Hicks, A., Salmon, P. (2017). A Comparison of Two Measures of Gratitude and their Relation to Affective States. Poster presentation at the Neglected Emotions Conference, University of Louisville, Louisville, KY.

- Siwik, C., Phillips, K., Salmon, P., Litvan, I., Filoteo, J.V., Rebholz, W., Cash, E., **Hicks, A.**, van der Gryp, K., & Sephton, S.E. (2017). An MBSR Intervention for Parkinson's Disease Patients and Caregiving Partners: Effects on Distress, Social Support, Cortisol, and Inflammation. Poster presentation at the American Psychosomatic Society Mid-Year Scientific Conference, Berkeley, CA.
- Phillips, K., Siwik, C., **Hicks, A.**, Salmon, P., Cash, E., Litvan, I., Filoteo, J.V., van der Gryp, K., & Sephton S.E. (2017, October). Exploration of Dyadic Associations of Anxiety and Diurnal Cortisol among Parkinson's Disease Patient/Caregiver Dyads. American Psychosomatic Society Mid-Year Meeting, Berkeley, CA.
- Hicks, A.**, Neace, S., DeCaro, M., Salmon, P. (2018). The Role of Gratitude in Intrinsic and Extrinsic Exercise Motivation. Poster presentation to American College of Sports Medicine 65th Annual Meeting, Minneapolis, MN.
- Neace, S., **Hicks, A.**, DeCaro, M., Salmon, P. (2018). Mindfulness and Intrinsic Exercise Motivation—The Mediating Role of Exercise Self-Efficacy. Poster presentation to American College of Sports Medicine 65th Annual Meeting, Minneapolis, MN.
- Sephton, S.E., **Hicks, A.**, Phillips, K., Siwik, C., Zimmaro, L.A., van der Gryp, K., Salmon, P. (2018) A Brief iPod-based Mindfulness Intervention for Undergraduates: Effects on Psychological and Physiological Outcomes. Presentation at American Psychosomatic Society 76th Annual Meeting, Louisville, KY.
- van der Gryp, K., Siwik, C., Zimmaro, L.A., Phillips, K., Rebholz, W., Cash, E., **Hicks, A.**, Sephton, S.E (2018). Lung Cancer-related Distress Is Associated with Elevated Mean Diurnal Cortisol. Poster presentation at American Psychosomatic Society 76th Annual Meeting, Louisville, KY.
- Siwik, C., Phillips, K., Zimmaro, L. A., Cash, L., **Hicks, A.**, Sephton, S.E (2019). The Relationship Between Shame, Guilt, and Depressive Symptoms and the Ameliorative Role of Self-Compassion among Lung Cancer Patients. Poster presentation at American Psychosomatic Society 77th Annual Meeting, Vancouver, BC.

RESEARCH GRANTS AND AWARDS

- News-worthy Poster Designation** **2016**
American Psychosomatic Society 74th Annual Scientific Conference, Denver, Colorado
- Research poster “The role of mindfulness in stress and depressive symptoms of undergraduate students” designated as “news-worthy” and included in a press release
- Graduate Student Council (GSC) Travel Award** **2016, 2017**
University of Louisville, Louisville, KY
- Awarded \$350 competitive travel award to support research activities and travel to the American Psychosomatic Society 74th Annual Scientific Conference.
- Graduate Network in Arts and Sciences (GNAS) Research Fund Award** **2016**
University of Louisville, Louisville, KY
- Awarded \$100 grant to support research activities and travel to the American Psychosomatic Society 74th Annual Scientific Conference

SERVICE

SERVICE TO PROFESSION:

- Reviewer** **August, 2016**
Journal of Happiness Studies
- Reviewed a scientific research manuscript submitted to the *Journal of Happiness Studies*

- Reviewed and edited chapters of *Manuscript in Motion* in preparation for publication

American Psychosomatic Society

Fall, 2017

- Reviewed research conference abstracts submitted to the American Psychosomatic Society 75th annual conference in Sevilla, Spain

Kentucky Psychological Association Poster Judge

April, 2016; April, 2017

Georgetown College

- Volunteered as a poster judge at the 2016 Spring Academic Conference
- Volunteered as a poster judge and Psych Bowl moderator at the 2017 Spring Academic Conference

SERVICE TO UNIVERSITY:

Student Representative for First Year Orientation

2017

Clinical Psychology Doctoral Program

- Organized and hosted orientation for new first year psychology doctoral students

Applicant Interview Student Representative

2016, 2017

Clinical Psychology Doctoral Program

- Selected by peers to organize prospective graduate student pre-interview dinners, coordinated peer interviews and welcome applicants

APA Graduate Students Campus Ambassador

2016- Present

American Psychological Association

- Coordinated advocacy efforts on campus through distribution of information, opportunities and current events
- Served as a point of contact between APA and University of Louisville Graduate Students to facilitate communication and ideas for improving programs for graduate students

Graduate Student Ambassador

2016-Present

School of Interdisciplinary and Graduate Studies

- Student representative for the graduate program designed to increase student involvement in the graduate student recruitment and retention efforts
- Provided current and prospective students with additional networking and professional development skills

Youth Villages Campus Representative

Fall, 2014-2015

Youth Villages Non-Profit Child Advocacy Organization

- Functioned as a liaison to engage college students in internship opportunities at Youth Villages
- Provided in-person and virtual presentations to interested students

Undergraduate Research Mentor

Fall, 2014

Belmont University Research Mentorship Program

- Mentored fellow students in the research process by allowing students to shadow senior thesis project and aid in their psychology course research presentations

- Served as an official representative of the university for various events on campus involving the Alumni Office, the Office of Development, and the President's Office, bridging the gap between current and former students

---

PROFESSIONAL AFFILIATIONS AND ORGANIZATIONS

Indiana Psychological Association	2019
American Psychological Association	2015-2019
American College of Sports Medicine	2018
American Psychosomatic Society	2015-2019
American Society for Psychological Science	2016
Kentucky Psychological Association	2015-2019
Psi Chi Honor Society of Psychology	Inducted 2012
Alpha Chi Honor Society	Inducted 2012

PROFESSIONAL DEVELOPMENT

Body Project Support Training **January, 2018**

The Body Project

- Trained in facilitation of a cognitive-dissonance-based body acceptance intervention for college-aged women to reduce sociocultural pressures for idealistic thinness

ANAD Eating Disorder Support Group Teacher Training **December, 2017**

National Association for Anorexia Nervosa and Associated Disorders

- Completed eating disorder support group training to facilitate recovery groups based on evidence-based principles

Tier One Military Sensitivity Training **December, 2016**

Star Behavioral Health Providers

- Participated in a workshop promoting military sensitivity in health care providers through an introduction to military culture and information about deployment cycles