

Louisiana Tech University

Louisiana Tech Digital Commons

Doctoral Dissertations

Graduate School

Fall 11-2020

Improving Sleep and Learning Motivation, and Decreasing Psychological Distress Through Different Modalities of Written Expression: Controlling for Resilience and Hardiness

Samantha Aarstad Martin
Louisiana Tech University

Follow this and additional works at: <https://digitalcommons.latech.edu/dissertations>

Recommended Citation

Aarstad Martin, Samantha, "" (2020). *Dissertation*. 890.
<https://digitalcommons.latech.edu/dissertations/890>

This Dissertation is brought to you for free and open access by the Graduate School at Louisiana Tech Digital Commons. It has been accepted for inclusion in Doctoral Dissertations by an authorized administrator of Louisiana Tech Digital Commons. For more information, please contact digitalcommons@latech.edu.

IMPROVING SLEEP AND LEARNING MOTIVATION,
AND DECREASING PSYCHOLOGICAL DISTRESS THROUGH DIFFERENT
MODALITIES OF WRITTEN EXPRESSION:
CONTROLLING FOR RESILIENCE AND HARDINESS

by

Samantha Aarstad Martin, B.A., M.S.

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

COLLEGE OF EDUCATION
LOUISIANA TECH UNIVERSITY

November 2020

LOUISIANA TECH UNIVERSITY
GRADUATE SCHOOL

August 11, 2020

Date of dissertation defense

We hereby recommend that the dissertation prepared by

Samantha Aarstad Martin

entitled **Improving Sleep and Learning Motivation, and Decreasing**

Psychological Distress Through Different Modalities of Written Expression:

Controlling for Resilience and Hardiness

be accepted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Counseling Psychology



Walter Buboltz, Ph.D.

Supervisor of Dissertation Research



Donna Thomas, Ph.D.

Head of Psychology and Behavioral Science

Doctoral Committee Members:

John Brandon Waits, Ph.D.

Jeffrey Walczyk, Ph.D.

Approved:



Don Schillinger
Dean of Education

Approved:



Ramu Ramachandran
Dean of the Graduate School

ABSTRACT


College is a time of increased risk for developing psychological distress, poor sleep, and poor academic motivation. Additionally, many students who need mental health services fail to engage in treatment due to perceived barriers. As a result, it is important to find creative ways to reach this group. Research has shown that emotional expression, as well as engaging in written and verbal expression, can be associated with physical, emotional, and cognitive benefits. Specifically, years of research indicate that emotional expression through journaling is highly effective with the college population. Additionally, most college students own a cell phone, typically spending an average of 8 to 10 hours a day using them, and one of the most common activities performed is communication via short message service (SMS), or text messaging. Research also indicates that hand-written and typed writing formats of expression are comparable. However, it appears that prior research has not examined the effects of journaling using the modality of SMS among college students. Thus, the purpose of the present study was to determine whether SMS text-based journaling would benefit college students' psychological distress, sleep, and learning motivation, above and beyond the effects of traditional journaling, and whether resilience or hardiness would act as control variables in the relationship between the intervention and the outcome variables. Data were collected from 126 college students attending a public university in the South. Participants were randomly assigned to four conditions: a traditional journal entry group, a daily SMS text-based journal entry group,

a bi-weekly SMS text-based journal entry group, and a control condition. Prior to engaging in the intervention, participants were instructed to complete a baseline survey, which included informed consent; a demographic questionnaire; and measures of psychological distress, sleep quality, learning motivation, resilience, and hardiness. Participants in experimental groups reflected on positive experiences in varying written modalities, while participants in the control group were informed that they would not actively participate in the intervention. Participants engaged in one of these interventions for four weeks. After the four-week intervention, all participants completed a survey immediately and six weeks later, which included the same baseline measures along with some questions concerning the specific intervention assigned. The results of a repeated measures multiple analysis of variance (MANOVA) indicated there were only significant differences between pre-intervention and post-intervention psychological distress and learning motivation, with no significant group differences for psychological distress and significant group differences between the traditional journal group and the bi-weekly SMS text-based group for learning motivation. Additionally, results of the repeated measures multiple analysis of covariance (MANCOVA) indicated that participants in the traditional journaling group scored significantly higher than the bi-weekly SMS text-based journaling group on learning motivation over time when controlling for resilience, and when controlling for hardiness.

APPROVAL FOR SCHOLARLY DISSEMINATION

The author grants to the Prescott Memorial Library of Louisiana Tech University the right to reproduce, by appropriate methods, upon request, any or all portions of this Dissertation. It is understood that "proper request" consists of the agreement, on the part of the requesting party, that said reproduction is for his personal use and that subsequent reproduction will not occur without written approval of the author of this Dissertation. Further, any portions of the Dissertation used in books, papers, and other works must be appropriately referenced to this Dissertation.

Finally, the author of this Dissertation reserves the right to publish freely, in the literature, at any time, any or all portions of this Dissertation.

Author 

Date October 12, 2020

DEDICATION

I dedicate my dissertation and the entire process of graduate school to my family.

Words cannot express how grateful I am to my father for instilling in me a love for learning, critical thought, and success; and who funded my many educational pursuits. Also, to my late mother whose unconditional love and support allowed me to achieve my goals and dreams. And, to my sister, Jordan, who has always been there for me.

Also, to my in-laws, Randall and Jeannie, who have supported my husband and me through all of our family decisions, and who have always been a source of positivity and motivation.

Most importantly, without whom my accomplishments would not have been possible, I dedicate my work to my loving husband and best friend, Kyle, who has been by my side every step of the way. He has been a constant source of inspiration and creativity, holding me up, and making me a better person every day. Kyle, I love you more than words can ever express. And finally, to my daughter, Iris, my future, and the reason I will always strive to do better.

TABLE OF CONTENTS

ABSTRACT	iii
DEDICATION	vi
LIST OF TABLES.....	xi
LIST OF FIGURES.....	xii
CHAPTER I Introduction	1
Statement of the Problem.....	4
Justification	6
CHAPTER II Review of the Literature.....	9
Psychological Distress	9
Psychological Distress in College Students	9
Sleep.....	12
Sleep Length and Quality	13
Sleep and Health.....	14
Sleep and College Students	15
Learning Motivation	17
Emotional Expression	19
Inhibition of Psychosomatics	21
Writing about Distress	22

Language and Disclosure	24
Benefits of Written Disclosure	25
Specifics of Written Expression	28
College Students and Technology	30
Computer-Based Journals	32
SMS Text-Based Interventions	35
Controlling Variables.....	38
Metatheory of Resilience and Resiliency	39
Hardiness	42
Positive Psychology	46
Broaden-and-Build Theory of Positive Emotions	49
Positive Emotional Disclosure	50
Positive Emotion and Resiliency.....	53
The Present Study.....	54
Hypotheses	55
CHAPTER III Method.....	58
Participants.....	58
Measures	63
Demographics	63
The General Health Questionnaire (GHQ-28).....	63
Adult Sleep Wake Scale (ADSWS).....	64
Academic Motivation Scale College Version (AMS-C 28)	65
The Brief Resilience Scale (BRS).....	67

Dispositional Resilience Scale (DRS-15)	67
Post-Intervention Questions.....	68
Procedure	69
CHAPTER IV Results.....	74
Data Screening and Missing Values	75
Preliminary Analysis.....	76
Primary Analyses	79
Repeated Measures MANCOVA	81
Repeated Measures MANOVA	82
Hypothesis 1.....	87
Hypothesis 2.....	87
Hypothesis 3.....	87
Follow Up Analysis	88
Repeated Measures MANCOVA.....	88
Hypothesis 4.....	88
Resilience	88
Hardiness	89
Follow-Up Questionnaires	90
CHAPTER V Discussion.....	93
Preliminary Analysis.....	93
Hypothesis 1.....	94
Hypothesis 2.....	96
Hypothesis 3.....	97

Hypothesis 4.....	98
Practical Implications and Strengths.....	100
Limitations and Suggestions for Future Research	103
REFERENCES	107
APPENDIX A Human Use Approval Letter.....	145
APPENDIX B Informed Consent Form	147
APPENDIX C Demographic Questionnaire	149
APPENDIX D Other Surveys.....	152
APPENDIX E Traditional Journal Group Post Test Questions	162
APPENDIX F SMS Text-Based Groups Post Test Questions	164

LIST OF TABLES

TABLE 1. <i>Frequencies of Demographic Variables</i>	61
TABLE 2. <i>Pre-Intervention Means, Standard Deviations, Alphas, and Bivariate Correlations</i>	76
TABLE 3. <i>Post-Intervention Means, Standard Deviations, Alphas, and Bivariate Correlations</i>	76
TABLE 4. <i>Pre-Intervention Means, Standard Deviations, Alphas, and Bivariate Correlations Outliers Removed</i>	80
TABLE 5. <i>Post-Intervention Means, Standard Deviations, Alphas, and Bivariate Correlations Outliers Removed</i>	81
TABLE 6. <i>Means and Standard Deviations at Each Level of the Independent Factors</i> ..	83

LIST OF FIGURES

FIGURE 1. <i>Estimated Marginal Means of Psychological Distress, Sleep, and Learning Motivation</i>	84
FIGURE 2. <i>Estimated Marginal Means of Psychological Distress</i>	85
FIGURE 3. <i>Estimated Marginal Means of Sleep</i>	86
FIGURE 4. <i>Estimated Marginal Means of Learning Motivation</i>	86

CHAPTER I

Introduction

College is a time of great freedom and excitement for many adolescents; however, it is also a time of increased risk for developing issues related to distress. For the first time in many students' lives, they gain a great deal of control over making personal decisions. These decisions include class scheduling, class attendance, extracurricular activities, socializing, studying, sleep routines, substance use, etc. Students must also deal with the stressor of living in a new location, meeting new people, and an overall change in developmental stage. College requires additional independence, initiative, and self-regulation (Bryde & Milburn, 1990) which can be quite demanding and stressful for an undergraduate (Levitz, Noel, & Saluri, 1985). Research indicates that many college students experience psychological distress (Geisner, Larimer, & Neighbors, 2004; Kushner & Sher, 1993; McDermott, Hawkins, Littlefield, & Murray, 1989; Pritchard, Wilson, & Yamnitz, 2007; Reetz, Barr, & Krylowicz, 2013; Rickinson & Rutherford, 1995; Upcraft & Gardner, 1989), poor sleep (Buboltz et al., 2006; Buboltz et al., 2009; Lund, Reider, Whiting, & Prichard, 2010; Pilcher & Walters, 1997; Ye, Hutton Johnson, Keane, Manasia, & Gregas, 2015), and low levels of academic motivation (Brackney & Karabenick, 1995; Cole, Feild, & Harris, 2004; Colquitt, LePine, & Noe, 2000; Fisher, 1998).

Overall, research indicates that psychotherapy, regardless of format, is beneficial

to both mental and physical health (Mumford, Schlesinger, & Glass, 1983; Smith, Glass, & Miller, 1980). In fact, the mere act of expression has been shown to account for a significant amount of the variance in the healing process (Pennebaker, 1997). However, some researchers have noted that mere disclosure is not enough. There is strong support that an individual disclosing should also reexperience the emotions tied to the issue in order to reprocess those emotions and related cognitions, which in turn will result in behavioral symptom reduction (Nichols & Efran, 1985; Safran & Greenberg, 1987). This reexperiencing and reprocessing of emotions can be theorized as resulting in the extinction of heightened emotions regarding the issue (Gewirtz & Davis, 2000; Pavlov, 1927). It is no wonder emotional expression is a common component among the schools of psychotherapy (Beck, 1976; Ellis, 1962; Perls, 1969; Rogers, 1951). Given this information, one would assume that verbal expression of emotions would generalize to the written expression of emotions. Actually, studies comparing written expression to verbal expression, typically find that the physical, emotional, and cognitive benefits of the two forms of expression are comparable (Donnelly & Murray, 1991; Esterling, Antoni, Fletcher, Margulies, & Schneiderman, 1994; Murray, Lamnin, & Carver, 1989). In fact, numerous studies over the past 30 years have revealed various physical and mental benefits of written emotional expression (Frattaroli, 2006; Lepore & Smyth, 2002; Pennebaker, 1990; Smyth, 1998; Smyth & Pennebaker, 2001).

Given the plethora of research indicating the benefits of written emotional expression and the fact that there are unique mental health risks associated with being a college student, it seems an important area of future research is to explore interventions to find an ideal format for reaching this population. For instance, younger generations

may be more receptive to computer-mediated forms of written expression. In fact, research indicates that hand-written and typed writing formats of emotional expression show no difference in participant benefit (Sharp & Hargrove, 2004). Furthermore, research has indicated that the length of individual writing entries does not correlate with self-report values of writing, but the length over time that writing takes place is important (Smyth, 1998).

Approximately 73% of Americans have Internet service in their home, and 18 to 29-year olds make up 86% of social media users (Pew Research Center, 2017). In addition, 95% of American adults own a cell phone (Pew Research Center, 2017). In fact, it is expected that by 2020 there will be 4.78 billion mobile phone subscriptions worldwide (Statista, 2018). Within the population of cell phone users, over two-thirds of 18 to 29-year olds live in households with only a mobile phone (FCC, 2016). Furthermore, 77% of those cellular devices are smartphones, which are especially popular for individuals aged 18 to 29 (Pew Research Center, 2017).

One of the most common activities performed on cellular devices is communication via short message service (SMS), or text messaging. In fact, 71% of American adults report text messaging at least once per day, resulting in an unbelievable 1.939 trillion messages sent in 2016 (FCC, 2016). Additionally, 99% of Americans open received text messages, and 90% report reading received messages within three minutes (Johnson, 2013). Unsurprisingly, research indicates college students spend an average of 8 to 10 hours a day on their cell phones (Roberts, Yaya, & Manolis, 2014). Given the benefits of written expression, the findings of typed expression and written expression being comparable, the length of entry being less important than the stretch of writing over

time, and the accessibility of technology and amount of time college students spend on their cellular devices, this age group may be more comfortable using electronic devices to disclose emotional experiences.

Statement of Problem

Many college students experience sleep problems (Buboltz et al., 2006; Buboltz et al., 2009; Lund et al., 2010; Pilcher & Walters, 1997; Ye et al., 2015) and psychological distress (Geisner et al., 2004; Kushner & Sher, 1993; McDermott et al., 1989; Pritchard et al., 2007; Reetz et al., 2013; Rickinson & Rutherford, 1995; Upcraft & Gardner, 1989). According to Kessler et al. (2007) 75% of mental health conditions begin before the age of 25. In fact, research indicates that 11.9% of college students suffer from anxiety disorders (Blanco et al., 2008), 7-9% suffer from depression (Blanco et al., 2008; Eisenberg, Hunt, & Speer, 2013), 3.2% meet criteria for bipolar disorder (Blanco et al., 2008), 9.5% screen positive for an eating disorder (Eisenberg, Nicklett, Roeder, & Kirz, 2011), and 2-8% of college students have ADHD (DuPaul, Weyandt, O'Dell, & Varejao, 2009). Additionally, the American College Health Association (ACHA, 2014) notes that in 2013, 30% of college students reported having difficulty functioning due to feeling so down. Unsurprisingly, psychological distress has been linked to lack of learning motivation in college students (Brackney & Karabenick, 1995; Cole et al., 2004; Colquitt et al., 2000; Fisher, 1998).

Given this information, it is unfortunate that research indicates many college students who need services are not engaged in mental health treatment. In addition to a general lack of services among college students, Blanco, Okuda, Wright, et al. (2008) reported only 20% of college students diagnosed with anxiety disorders receive

treatment. Shockingly, Eisenberg, Golberstein, and Gollust's (2007) survey indicated that less than 50% of college students who screened positive for major depression or anxiety disorders received treatment during the previous year. In addition to college students experiencing psychological distress that is going untreated, 46.8% of college students reported experiencing traumatic or very difficult to handle experiences within the academic setting during the last year (ACHA-NCHA, 2017), further indicating that academia can be extremely stressful, and as a result, many college students could benefit from services.

The American College Health Association-National College Health Assessment's 2017 assessment of 31,463 college students indicated that only 41.5% of college students have ever received mental health services, while only 19.5% have ever received counseling services from their current college counseling center (ACHA-NCHA, 2017). Inconsistently, many college campuses report high numbers of students seeking services. In fact, the 2013 Association for University and College Counseling Center Directors (AUCCCD) Survey reported that 45.2-48.7% of students attended college counseling centers for mental health concerns between the years 2010 to 2013. Furthermore, 32% of college counseling centers report having a waiting list at some point during the school year (AUCCCD, 2013). This information indicates that college students fluctuate from failing to seek mental health services to not being able to due to overpopulation and unavailability.

Given the statistics concerning low therapy attendance rates among college students, many studies have explored possible barriers to treatment. Overall, barriers to treatment for college students include lack of time, lack of emotional openness, lack of

awareness of services, lack of perceived need for help, skepticism about the effectiveness of treatment, financial constraints, mental health stigma, discomfort, mistrust, and privacy concerns (Blacklock, Benson, Johnson, & Bloomberg, 2003; Eisenberg et al., 2007; Givens & Tjia, 2002; Hunt & Eisenberg, 2010; Komiya, Good, & Sherrod, 2000; Megivern, Pellerito, & Mowbray, 2003; Mowbray et al., 2006). It is imperative that researchers continue to explore college students' barriers to treatment in order to further parse out how to aid this population which is clearly in need of services.

As noted, a plethora of research indicates high levels of psychological distress (Geisner et al., 2004; Kushner & Sher, 1993; McDermott et al., 1989; Pritchard et al., 2007; Reetz et al., 2013; Rickinson & Rutherford, 1995; Upcraft & Gardner, 1989), poor sleep (Buboltz et al., 2006; Buboltz et al., 2009; Lund et al., 2010; Pilcher & Walters, 1997; Ye et al., 2015), and links with academic motivation (Brackney & Karabenick, 1995; Cole et al., 2004; Colquitt et al., 2000; Fisher, 1998), as well there are numerous perceived barriers to treatment (Blacklock et al., 2003; Eisenberg et al., 2007; Givens & Tjia, 2002; Hunt & Eisenberg, 2010; Komiya et al., 2000; Megivern et al., 2003; Mowbray et al., 2006) and lack of received treatment among college students (ACHA-NCHA, 2017; Blanco et al., 2008; Eisenberg et al., 2007). On the other hand, research indicates emotional expression through journaling is highly effective with this population (Frattaroli, 2006; Lepore & Smyth, 2002; Murray et al., 1989; Smyth, 1998). Thus, interventions aimed at combating college student's perceived barriers to treatment, and as a result, increasing treatment levels is very much needed.

Justification

Psychological distress has become a common occurrence in modern society.

Unfortunately, college students are caught in the middle of experiencing the psychological stressors of adolescence simultaneously with the psychological stressors of emerging adulthood, such as new-found freedom and responsibility, and an extended search for identity.

Emotional expression is one well-documented way to decrease psychological illness through the process of cognitive reprocessing. Specifically, the format of written expression can be beneficial for many college-aged individuals receiving counseling services. Written expression is easy, cheap, and effective. Furthermore, this form of intervention is far reaching and can be implemented anywhere and at any time of the day. This would be a good intervention for individuals failing to access needed treatment, as it is a cost-effective alternative modality of treatment which includes few barriers.

In addition to experiencing psychological and physical issues, many college students neglect their health by failing to address psychological and physical issues as they occur. Oftentimes important life aspects such as self-care, sleep, and learning motivation are neglected. In addition, many college students who could benefit from psychological services fail to seek treatment (ACHA-NCHA, 2017; Blanco et al., 2008; Eisenberg et al., 2007). There are a number of reasons college students fail to seek help such as experiencing stigmatization, lack of motivation, apprehension, or even lack of knowledge concerning services. Furthermore, looking at any college campus bulletin board one can clearly see college students are busy. They may desire services but are unable to seek them due to scheduling conflicts, class loads, sports involvement, and jobs. In addition, college counseling centers are typically closed during holiday breaks and this may result in irregular treatment, which in turn, may be associated with negative

outcomes (e.g., set-backs, relapse, feelings of abandonment). As a result, it is important to find creative ways to reach this group.

Because the average college student lives a fast-paced life, it may be difficult for someone in this population to take the time to sit and write. College students do, however, stop to text message. Many college students carry their cell phone with them everywhere they go and are very attached to the devices. As a result, this may be an optimal route of intervention. By implementing SMS text-based written expression interventions among college populations, a new door may open for reaching many students who would otherwise miss out on treatment. Text messaging is cost-effective, instant, and convenient. In fact, even people who may not have access to expensive technology can benefit from this service. Moreover, text message intervention is not meant to be a stand-alone treatment. Written expression via text messaging may be a useful way for college students to improve their mental health when they cannot see a therapist, but also written expression is better than no treatment at all.

CHAPTER II

Review of the Literature

College can be both thrilling and exciting, a step towards future goals. College promises new experiences and a new environment, it can be viewed as a fresh beginning. This is a time of new-found freedom, and often adolescents have more choices and options than ever before. With this freedom comes responsibility and independence (Bryde & Milburn, 1990) which can be quite demanding and stressful (Levitz et al., 1985). As such, college is a time of increased distress and risk for developing issues.

Psychological Distress

Often, psychological distress is operationalized using the General Health Questionnaire (GHQ; Goldberg & Williams, 1988). There are four components of distress: anxiety and insomnia, severe depression, social dysfunction, and somatic symptoms, which are clearly defined by the questionnaire.

Psychological Distress in College Students

Pritchard et al. (2007) suggest that undergraduate students, specifically freshman, experience significant stress during their transition to college comparable to that of law students and medical students. In fact, research indicates that roughly 25% of college freshman do not return to the same school the following year, with half of these student leaving school within the first six weeks (Upcraft & Gardner, 1989). More recently, the U.S. Department of Education reported that 19% of first-time,

full-time degree-seeking students in fall 2015 did not return the following fall.

Additionally, at the least selective institutions retention rate was found to be even lower with 38% of first-year students failing to return the following year (USDE, 2017).

Furthermore, most students who choose to leave during the first six weeks of their freshman year attribute their decision to psychological distress (Rickinson & Rutherford, 1995). Additionally, Tobey (1997) reports that students who have anxiety are more likely than their less-anxious peers to drop out of school. Unfortunately, research indicates a significant increase in the reported stress levels of college students over the past few decades (Sax, 1997). Pritchard et al. (2007) suggest that the college experience may cause physical and psychological distress. These researchers conducted a longitudinal study analyzing data from a small sample of undergraduate students and found that health problems and negative moods (i.e., anxiety, tension, depression, anger, confusion, fatigue, and lack of vigor) increased during the first year of college (Pritchard et al., 2007).

Research indicates high rates of psychological distress among college students. Specifically, college students tend to report high rates of depression and anxiety (Eisenberg et al., 2007; Kushner & Sher, 1993; McDermott et al., 1989). Eisenberg et al., (2007) conducted a large study ($N = 2,843$) exploring prevalence rates of depression, anxiety, and suicidality among undergraduate and graduate students. These researchers found that 13.8% of undergraduate students and 11.3% of graduate students screened positive for a depressive disorder, 4.2% of undergraduate students and 3.8% of graduate students screened positive for an anxiety disorder, and 2.5% of undergraduate students and 1.6% of graduate students reported experiencing suicidal thoughts in the previous 4

weeks. It is important to note that many anxiety disorders have high comorbidity rates with depressive disorders as well (APA, 2013).

The 2016 Association for University College Counseling Center Directors (AUCCCD) Survey indicated that approximately 50% of the college students who present to college counseling centers present with elevated depressive symptoms and 41.23% with anxiety symptoms (Reetz, Bershad, LeViness, & Whitlock, 2016). Furthermore, 52% of college students attending college counseling centers have severe psychological problems (Reetz et al., 2016). In addition, research indicates that college females, in particular, report even higher rates of psychological distress symptoms (Geisner et al., 2004).

Shockingly, the 2015 National Survey of College Counseling Centers (NSCCC) analyzed data concerning 286,700 college students seeking treatment from college counseling centers and found that 94% of directors report increases in severe psychopathology over the previous 5 years (Gallagher, 2015). Specifically, college counseling centers have seen an 89% increase in college students with anxiety disorders, a 69% increase in crises requiring immediate response, a 60% increase in college students with psychiatric medication issues, and a 58% increase in college students with clinical depression (Gallagher, 2015). Additionally, in 2016 college counseling center staff members reported an overall increase in the severity of student mental health concerns and related behaviors by 57.1% (Reetz et al., 2016). It is quite clear that college students are in need of mental health services.

Sleep

Research indicates sleep is both universal and necessary for survival (Hirshkowitz, Moore, & Minhoto, 1997). For instance, sleep is the body's process of restoration (Shapiro & Flanigan, 1993). As previously noted, with the transition to college, many students are faced with new responsibilities, which is also associated with autonomy and an influx of choices. Such decisions often include class scheduling, determining bed and wake-times, and other sleep habits (e.g., napping, caffeine consumption, bed comfort, bed use, and activity before bedtime).

Research indicates sleep consists of four stages, to include: stage 1, stage 2, stage 3, and rapid eye movement (REM) sleep. These stages occur in cycles that start and restart throughout each sleep episode. Stage 1 is brief, lasting up to 7 minutes, and it is during this stage that an individual awakens more easily and sometimes recalls disjointed visual images (American Sleep Association, n.d.). Stage 2 makes up about 45-55% of a total sleep episode, lasting approximately 10 to 25 minutes in the initial cycle of a sleep episode and increasing in length of time with each subsequent cycle (Colten & Altevogt, 2006). Like stage 1, this stage is also light (Sleep.org, n.d.). Stage 3 represents the start of deep sleep, which lasts roughly 20 to 40 minutes and comprises about 13-23% of the total sleep episode (Colten & Altevogt, 2006). This stage is when the body performs reparative processes that include muscle and tissue healing, immune system enhancement, energy storage for the next day's performance, and overall growth and development. Unlike the other stages, during this stage, it is difficult to awaken an individual (Sleep.org, n.d.).

The final stage of sleep is REM (rapid eye movement). This stage occurs approximately 90 minutes into a sleep episode, and with each cycle lasts up to an hour.

Interestingly, it is during this stage that individuals may experience dreams (Sleep.org, n.d.). Overall, this stage involves a loss of voluntary muscle tone, and only the muscles involved in automatic functions are operational (heart rate, breathing, digestion, etc.; Hirshkowitz et al., 1997). In fact, during this stage an individual's breathing changes to become more rapid, shallow, and irregular (ASA, n.d.). This stage is important for learning and memory as the mind works to reinforce information gleaned from what the individual has experienced (Smith & Lapp, 1991). As a result, REM sleep deprivation can impair the process of learning new information when awake (Wood, Bootzin, Kihlstrom, & Schacter, 1992). The average adult cycles through five to six REM cycles per night (Sleep.org, n.d.), and the most REM sleep occurs during the last two hours of a sleep episode. These last two hours are also the most important for the consolidation and reinforcement of memories (De Koninck, Lorrain, Christ, Proulx, & Coulombe, 1989).

Sleep Length and Quality

The National Sleep Foundation (NSF, 2015) suggests the average young adult (18-25 years) obtain between 7 and 9 hours of sleep per night and the average adult (26-64 years) receive 7 to 9 hours of sleep per night. In 2013, the National Sleep Foundation conducted the International Bedroom Study, gathering data from 1,500 adult participants residing in various countries. Data indicated that American adults report sleeping an average of 6.5 hours per weeknight but recognized that they perform optimally after an average of 7 hours and 13 minutes of sleep per weeknight (NSF, 2013). Interestingly, these same participants reported sleeping on average 7 hours and 22 minutes on weekends, while 26% reported sleeping less than 7 hours on weekends (NSF, 2013).

The National Sleep Foundation defines sleep quality as an individual's perceived satisfaction with their sleep experience (NSF, 2016). This experience includes sleep initiation (falling asleep), sleep quantity (length of sleep), sleep maintenance (sleeping through the night or waking frequently), and a feeling of refreshment upon awakening (NSF, 2016). Roughly half of Americans indicate experiencing good quality sleep only a few nights per week, rarely, or never (NSF, 2013). Furthermore, of American adults who believe they do not get good enough sleep, roughly half report that this has had a negative impact on their work productivity or intimate relationships, and over three-fourths report this has negatively impacted their social life or leisure activities, family life and home-related responsibilities, mood, and physical health (NSF, 2013). Surprisingly, research suggests that only 4% of American adults wake up feeling refreshed in the morning (NSF, 2013). This is worrying information as sleep length and quality are very important in terms of both physical and mental health.

Sleep and Health

Sleep is a basic human need that supports physical health. For instance, good sleep quality is related to a stronger immune system (Division of Sleep Medicine, DSM; 2007; Irwin et al., 1996). Additionally, individuals who report fatigue also report a lack of physical activity (DSM, 2007). The Harvard Medical School's Division of Sleep Medicine (2007) also found that individuals who reported sleeping less than the minimum recommended hours per night reported higher than average body mass index (BMI; i.e., measure of one's body fat based on his or her weight in relation to height). Conversely, individuals who reported sleeping eight hours had the lowest overall BMI.

Research also indicates that sleep is related to mental health. For instance, the DSM (2007) found that a single night of sleep difficulty was attributed to increased feelings of irritability and moodiness the following day. Furthermore, chronic sleep difficulty can be related to more serious issues such as depression and anxiety (DSM, 2007). In fact, Harvard Health (2009) reports sleep difficulties increase an individual's risk for developing depression, with approximately 65 to 90% of individuals suffering from major depression also suffering from sleep difficulties. Additionally, sleep difficulties may increase an individual's risk for developing anxiety disorders. In fact, these researchers found a significant relationship between individuals diagnosed with generalized anxiety disorder (GAD) and sleep difficulties, with more than half of GAD patients also reporting sleep difficulties (Harvard Health, 2009).

Sleep and College Students

Sleep is very important for restoration. Shapiro and Flanigan (1993) observed that psychological, rather than physiological, deficits are more typical following sleep deprivation. Restorative sleep is especially important for college students. In fact, research indicates a significantly positive correlation between cognitive functioning and sleep quality, sleep length, and REM sleep, such that poor sleep functions are related to poorer cognitive functioning (Buboltz et al., 2006). For instance, Pilcher and Walters (1997) found that when compared to college students who had not been sleep deprived, college students who had stayed up for 24 hours (sleep deprived) performed worse than non-sleep deprived individuals on a cognitive task that measured critical thinking skills.

We can see how important sleep is, unfortunately, college students are not getting the recommended amount of sleep. For example, Lund et al. (2010) surveyed college

students and found that approximately 25% of participants reported sleeping less than 6.5 hours per night. Additionally, roughly 29% of participants reported sleeping eight or more hours per night, which is the average amount of sleep most adults require (i.e., 7-9 hours). In other words, these researchers found that a little over half of their sample engaged in sleep length that is less than recommended. On top of sleeping outside the recommended number of hours, research also indicates that college students engage in irregular sleeping habits, such as going to sleep later and rising later on weekends than on weekdays (Buboltz et al., 2009; Lund et al., 2010). In fact, Buboltz et al. (2009) found that college students, on average, sleep one hour longer on weekends than on weekdays. While Lund et al. (2010) found that underclassmen and male college students are more likely than upperclassmen and females to engage in these practices. Unfortunately, poor sleep quantity can negatively impact college student's learning abilities, academic performance, and driving abilities (Hershner & Chervin, 2014), as well as increase symptoms of depression (Brooks, Girgenti, & Mills, 2009).

In addition to irregular sleep schedules and poor sleep length, college students also nap throughout the day. In fact, Ye et al. (2015) surveyed college students and found that approximately 43% of students reported napping during the previous week, typically between the hours of noon and 6 PM. Research indicates that napping to compensate for sleep loss is associated with negative sleep quality the following night (Ye et al., 2015). For example, college students who nap later (i.e., between the hours of 6 PM and 9 PM) also reported sleeping fewer hours during the week and reported a higher frequency of arriving to class late the following day than those who did not nap (Ye et al., 2015).

Studies have found that college students are at risk for poor sleep quality. In fact, research indicates poor sleep quantity is significantly associated with poor sleep quality (Lund et al., 2010). Lund et al. (2010) surveyed college students and found that 38% reported experiencing poor sleep quality. Particular barriers to sleep quality reported by college students include sleep time restriction, long sleep latencies, noise, stress, low enthusiasm, and co-sleeping arrangements (Lund et al., 2010). Buboltz et al. (2009) also explored barriers to college students' sleep quality and found that a significant portion of their sample required more than 30 minutes to fall asleep, woke throughout the night most nights, woke too early numerous nights a week, experienced disrupted sleep multiple nights a week, and used medications to aid sleep on a weekly basis. Additionally, college student reporting poor sleep quality have significantly higher levels of negative moods (i.e., confusion, depression, fatigue, anger, and tension) (Lund et al., 2010) and lower levels of academic performance (Gilbert & Weaver, 2010). Lund et al. (2010) found that the most significant predictor of poor sleep quality was stress. Because the available evidence suggests college students often experience less than adequate sleep length and quality, which can lead to negative effects, variables related to and interventions that may alleviate this significant issue should be studied.

Learning Motivation

As noted, research indicates that poor sleep quantity is associated with poor sleep quality among college student (Lund et al., 2010), which in turn is associated with poor academic performance (Gilbert & Weaver, 2010). Motivation is being *moved* to do something (Ryan & Deci, 2000). It is related to performance, curiosity, persistence, and learning (Deci & Ryan, 1985). Learning motivation, in particular, involves the

willingness to attend and learn material (Noe, 1986). It is important to distinguish motivation and academic ability. An individual's ability accounts for what he or she is capable of learning, while motivation accounts for an individual's decision-making, which in turn determines that individual's level of focus and effort that they will apply to a learning endeavor (Noe, Wilk, Mullen, & Wanek, 2014). Many researchers measure motivation to learn using the approach of self-efficacy. Measures of self-efficacy focus on an individual's subjective perceptions of their ability to perform a task and predict academic performance (Mathieu & Martineau, 1997).

Research indicates that GPA and self-efficacy are positively related to academic performance in college students (Strage & Brandt, 1999). Additionally, self-efficacy and intrinsic motivation have been found to predict academic performance in college students (Turner, Chandler, & Heffer, 2009). Intrinsic motivation is "the act of doing an activity for itself, and the pleasure and satisfaction derived from participation (Vallerand et al., 1992)." An experimental study conducted on high school and college students by Vansteenkiste, Simons, Lens, Sheldon, and Deci (2004) found that those with intrinsic learning goals had more academic success and better test performance than students with extrinsic learning goal.

Research indicates a significant, positive relationship between learning motivation and learning (e.g., Colquitt & Simmering, 1998; Colquitt et al., 2000; Mathieu, Tannenbaum, & Salas, 1992; Noe & Schmitt, 1986). Colquitt et al. (2000) conducted a meta-analysis to explore learning motivation using 106 research studies. These researchers found that dispositional, attitudinal, and situational characteristics all significantly predict learning motivation. Specifically, the dispositional variable of

anxiety was strongly negatively correlated with learning motivation, declarative knowledge, skill acquisition, and reactions to training (Colquitt et al., 2000). As such, it is not surprising Fisher's (1998) survey of members of the American Society of Training and Development found that 80% of respondents reported having greater than normal anxiety prior to training, and 90% reported believing that their anxiety interfered with their ability to learn. In addition, Cole et al. (2004) found that depression was also significantly negatively related to learning motivation. Further, Brackney and Karabenick (1995) found depression to be negatively related to time management and effort level. Given that physical stress (Gilbert & Weaver, 2010) and psychological distress both undermine learning motivation (Brackney & Karabenick, 1995; Cole et al., 2004; Fisher, 1998) among college students, it is important to further flesh out these relationships, as well as interventions that may decrease dysfunction, in order to increase learning motivation in this population.

Emotional Expression

Countless studies have reinforced the finding that psychotherapy is beneficial to both mental and physical health (for a review, see Smith & Glass, 1977; Smith et al., 1980). Virtually all forms of psychotherapy, from psychoanalysis to cognitive behavioral therapy, result in patient improvement (Ahn & Wampold, 2001; Mumford et al., 1983; Smith et al., 1980; Wampold, 2015). A common factor that is foundational in most all forms of therapy involves the process of a patient acknowledging the existence of a problem, discussing and labeling the problem, and discussing the problem's causes and consequences (Pennebaker, 1997). In other words, it is expected that when a patient enters a therapeutic relationship he or she will indicate an issue to be discussed, with the

goal of therapy being symptom reduction (Mumford et al., 1983; Smith et al., 1980).

The origins of psychotherapy can be traced to the simple act of disclosing difficult experiences to another. Emotional expression is the act of disclosing an emotional experience and is an important mechanism of change within the therapeutic relationship (Pennebaker & Smyth, 2016). Pennebaker (1997) reports that a significant amount of the variance in the healing process is accounted for by the mere act of disclosure.

Interestingly, emotional disclosure is a common component among the schools of psychotherapy (Beck, 1976; Ellis, 1962; Perls, 1969; Rogers, 1951). However, Murray and Segal (1994) note that discussing issues in and of itself is not sufficient for change. It has been hypothesized that in addition to disclosing information, one must reexperience the emotions regarding the issue in order to modify related cognitions, which in turn will lead to behavioral symptom reduction (Nichols & Efran, 1985; Safran & Greenberg, 1987). One can also conceptualize this reexperiencing of emotions as a form of extinction of emotional aspects regarding the issue (Gewirtz & Davis, 2000; Pavlov, 1927; Pennebaker, 1997).

Given the fact that emotional expression to a therapist is an integral component in the process of psychotherapy (Smith et al., 1980; Wampold, 2015), it seems likely that this concept would also apply to the written expression of emotions. In fact, numerous studies over the past 30 years have revealed plentiful benefits due to written emotional disclosure involving physical health, mental health, and academic performance (Frattaroli, 2006; Lepore & Smyth, 2002; Pennebaker, 1990; Smyth, 1998; Smyth & Pennebaker, 2001). Furthermore, studies comparing written disclosure to verbal disclosure typically find that the physical, emotional, and cognitive benefits of the two

forms of expression are comparable (Donnelly & Murray, 1991; Esterling et al., 1994; Murray et al., 1989).

Inhibition Model of Psychosomatics

One theory that may explain the benefits of emotional disclosure concerns inhibition and expression. In fact, initial studies exploring the benefits of written expression utilized this theory as a basis, with the assumption that an individual's failure to disclose important experiences is a form of inhibition (Pennebaker, 1989). The theory posits that the act of inhibition can result in chronic low-level stress on the autonomic and central nervous system. This long-term stress may, in turn, trigger or intensify psychosomatic symptoms. Given this information, the theory suggests that disclosing experiences tied to psychological issues should reduce the stress caused by inhibition (Pennebaker, 1989).

Research exploring this theory suggests that inhibition may result in long-term compromised health. Interestingly, individuals who are labeled by others as inhibited or shy exhibit more health problems than those who are considered less shy or inhibited (e.g., Kagan, Reznick, & Snidman, 1988). Furthermore, research indicates that individuals who conceal their gay status (Cole, Kemeny, Taylor, & Visscher, 1996) and those who conceal traumatic past experiences (Pennebaker, 1993a) also exhibit more health problems.

While research indicates the adverse effects of inhibiting negative experiences, there is little research concerning the other half of the equation, the catharsis an individual may attain from finally letting go of inhibition (Pennebaker, 1997). For instance, Greenberg and Stone's (1992) findings indicated that individuals writing about

inhibited traumas and individuals writing about previously disclosed traumas benefit comparably. Furthermore, during written disclosure experiments pre-and post-self-report measures of inhibition have not consistently correlated with health changes (Pennebaker, 1997).

Research indicates that written expression of a trauma does more for an individual than just reduce inhibition and related issues. Krantz and Pennebaker (1996) randomly assigned college students to either a kinesthetic (body movement) expression of trauma group, a group consisting of kinesthetic expression followed by written expression, or a control group consisting of 3 days of exercise for 10 minutes per day. Results indicated that compared to participants in the control group, participants in the two expressions through body movement groups reported feeling happier and emotionally healthier during the months following the study. Furthermore, in addition to the aforementioned benefits, physical health and grade point average (GPA) significantly improved for participants in the movement-plus-writing group (Krantz & Pennebaker, 1996).

Writing about Distress

Pennebaker and Beall (1986) developed a theory of emotional inhibition and confrontation which concerns the written expression of trauma. Pennebaker (1993a) has found that individuals experienced significant improvements in physical health after writing or talking about experiences that were personal and upsetting in nature. Furthermore, analyses of participants' transcripts indicated that those whose health improved were more likely to use more negative emotion words than positive emotion words. Pennebaker (1993a) also found that beyond the benefit of talking about upsetting experiences, participants who wrote about experiences had the benefit of the increased

use of insight and cognitive words over several days of writing, which in turn was linked to health improvement. In other words, therapeutic writing results when an individual is able to construct a clear story while also expressing negative emotions.

Pennebaker (1997) notes that the standard procedures of his writing technique involve randomly assigning participants to one of two or more groups. Participants in all groups are assigned to write about specific topics for 3 to 5 days in a row, for a total of 15 to 30 minutes per day. Typically, participants write in a laboratory and are given no feedback after each session. Participants assigned to the control conditions are assigned to write about trivial topics while participants in experimental groups are asked to discuss more serious topics. An example of an instruction for an experimental group is as follows:

“For the next 3 days, I would like for you to write about your very deepest thoughts and feeling about an extremely important emotional issue that has affected you and your life. In your writing, I'd like you to really let go and explore your very deepest emotions and thoughts. You might tie your topic to your relationships with others, including parents, lovers, friends, or relatives; to your past, your present, or your future; or to who you have been, who you would like to be, or who you are now. You may write about the same general issues or experiences on all days of writing or on different topics each day. All of your writing will be completely confidential. Don't worry about spelling, sentence structure, or grammar. The only rule is that once you begin writing, continue to do so until your time is up (Pennebaker, 1997, p. 162).”

Pennebaker (1997) reports that this prompt typically results in a powerful range and

depth of disclosure regarding traumatic experiences regardless of age, sex, socioeconomic status, education level, or ethnicity. “If nothing else, the paradigm demonstrates that when individuals are given the opportunity to disclose deeply personal aspects of their lives, they readily do so (Pennebaker, 1997, p. 162).” It is important to note that a large proportion of participants report crying or being deeply upset by the writing experience. However, most of these individuals also report that the writing experience was valuable and meaningful.

Findings indicate that writing about traumatic experiences may work by decreasing inhibition (i.e., decreasing stress caused by not disclosing) and facilitating the making of meaning regarding the trauma (i.e., integrating trauma into the person’s already existing meaning schema) (Pennebaker, 1997; Pennebaker, Colder, & Sharp, 1990). Research indicates that writing about trauma may also result in the processing of emotion, mirroring the effects of psychotherapy (Murray & Segal, 1994), the connection between memories and distress deteriorating (Bootzin, 1997), give writers a sense of meaning (Park & Blumberg, 2002), and a sense of control over their emotions (Greenberg, Wortman, & Stone, 1996). Taken together, research suggests writing about distressing memories helps an individual to process emotions, but what remains unclear is whether similar benefits are associated with writing about non-trauma-based stressful events using various modalities, such as text messaging.

Language and Disclosure

Translating experiences into language may be a requirement for health benefits. Pennebaker (1993b) was interested in analyzing the language used by individuals writing about emotional topics. He began this thread of research by finding a way to predict

which participants may benefit the most from writing by having numerous raters independently analyze the overall content of participants' written disclosures and comparing this data with participants' outcome data. Participants who benefited the most from written disclosure had writing styles that were rated to be more intelligent, thoughtful, and emotional (Pennebaker, 1993b). Unfortunately, this study failed to show high inter-rater reliability. As a result, Pennebaker chose to develop a computerized text-analysis system.

The Linguistic Inquiry and Word Count (LIWC) was developed to systematically analyze text essays. Findings suggest that three factors concerning linguistics can reliably predict improved physical health. The first factor is that the more positive emotion words an individual uses the more positive health. The second factor indicates that individuals who use very high and very low levels of negative emotion words report poorer health. Lastly, the third and most important linguistic factor found was that as individuals' use of causal and insight words increases, health is significantly likely to improve as well (Pennebaker, Mayne, & Francis, 1997). Also, individuals who gain benefit from written disclosure typically start an intervention by writing in a disorganized manner and gradually progress to writing coherent stories (Pennebaker, 1997).

Benefits of Written Disclosure

Many studies show the numerous benefits of emotional disclosure. In fact, Smyth (1998) reports writing increases reported physical health ($d = .42$). Additionally, a few studies found that the immune system benefits from disclosure. Pennebaker, Kiecolt-Glaser, and Glaser (1988) measured the benefits of emotional disclosure on immune functioning. Researchers collected data from fifty healthy college students. Students were

assigned to write about traumatic experiences or to write about superficial material for four days in a row. The researchers then stimulated white blood cells with a substance that induces cell division. By stimulating cell division and looking at the number of health center visits, they were able to provide a global measure of immune functioning. Results indicated that students in the trauma disclosure group had significant improvements in immune functioning compared to students in the superficial disclosure group. These findings are similar to Pennebaker and Beall's (1986) study indicating that compared to a control group, participants in an emotional disclosure group had significantly less physician visits, as well as research indicating a significant decrease in physician visits lasting 2 months after writing (Cameron & Nicholls, 1996; Greenberg et al., 1996; Greenberg & Stone, 1992; Krantz & Pennebaker, 1996; Pennebaker & Francis, 1996; Richards, Pennebaker, & Beal, 1995), 6 months after writing (Francis & Pennebaker, 1992); Pennebaker et al., 1990), and 1.4 years after writing (Pennebaker, Barger, & Tiebout, 1989).

Esterling et al. (1994) also studied emotional disclosure and immune functioning. These researchers hypothesized that compared to healthy college students in a vocal emotional disclosure group, healthy college students in a written expression group would have more antibodies to the Epstein-Barr virus (an indicator of reduced immune function). Three groups were compared: written disclosure, vocal disclosure, and a control-writing group. After writing twenty minutes a week for three weeks, participants in the written expression group gave a blood sample. Results indicated that compared to participants in the written disclosure group, participants in the vocal disclosure group who disclosed a traumatic situation had lower levels of the Epstein-Barr virus's antibody

titers. However, compared to the written control group, blood samples from the written disclosure group indicated significant reductions in the antibody titers. Thus, both vocal and written forms of disclosure were effective in improving immune system response, with vocal disclosure the more effective (Esterling et al., 1994). Similar results were found by Lutgendorf, Antoni, Kumar, and Schneiderman (1994). Their findings indicate that utilizing confrontation by means of emotional disclosure as a coping strategy may result in improvements in immune functioning for individuals dealing with significant stressors.

Research has also suggested that written expression affects long-term immune and other serum measures, including Blastogenesis ($d = .42$; Pennebaker et al., 1988), Hepatitis B antibody levels ($d = .61$; Petrie, Booth, Pennebaker, Davison, & Thomas, 1995), natural killer cell activity (Christensen et al., 1996), CD-4 (t-lymphocyte) levels (Booth, Petrie, & Pennebaker, 1997), and liver enzyme levels ($d = .34$; Francis & Pennebaker, 1992). Individuals who engage in written expression also see immediate changes in autonomic and muscular activity to include corrugator activity (Pennebaker, Hughes, & O'Heeron, 1987), skin conductance, and heart rate (Dominguez, 1995; Hughes, Uhlmann, & Pennebaker, 1994; Pennebaker et al., 1987; Petrie et al., 1995).

In addition to physiological benefits, individuals who engage in written disclosure see improvements in grade point average (GPA; Cameron & Nicholls, 1996; Krantz & Pennebaker, 1996; Pennebaker et al., 1990; Pennebaker & Francis, 1996). Improvements have also been noted regarding reemployment following the loss of a job (Spera, Buhrfeind, & Pennebaker, 1994) and decreases in work absenteeism (Francis & Pennebaker, 1992). Individuals also benefit from decreased physical symptoms ($d = .26$;

Greenberg & Stone, 1992; Pennebaker & Beall, 1986; Richards et al., 1995), decreased levels of distress, negative affect, and depression (Greenberg et al., 1996; Greenberg & Stone, 1992; Murray & Segal, 1994; Spera et al., 1994), and increased psychological well-being ($d = .66$; Smyth, 1998). Lastly, research indicates that individuals who engage in written disclosure concerning bereavement may see benefits concerning the grieving process (Lichtenthal & Cruess, 2010).

Specifics of Written Expression

Smyth's (1998) meta-analysis reached conclusions regarding procedures of written expression. With regard to length of days writing, studies have ranged from having participants write for 1 to 5 days, typically for 15 to 30 minutes at a time. These writing sessions have ranged from consecutive days to over the course of weeks. Overall, Smyth (1998) found that number of writing sessions and length of writing sessions were not related. Additionally, stronger effects occurred the longer the period of time over which the writing sessions were spaced (e.g., $d (\beta = .76, p < .02)$). Smyth (1998) suggests that their findings may indicate that writing one entry per week over the course of a month may be more effective than writing four entries over the course of a single week. Additionally, Sharp and Hargrove (2004) found that length of entry, or word count is unrelated to outcomes. Meaning, benefit may not be the result of the length of entry or amount of time spent writing each session, but a result of the writing processes over time.

Research concerning written expression typically involves an individual disclosing emotional material to be turned in anonymously to a researcher. Furthermore, participants are usually assured that personal information will not be linked to the written piece. However, participants still assume that someone will be reading these works. In

other words, the participant, on some level, believes that he or she is writing for an audience. In other words, the individual is still engaging in emotional disclosure to another individual, like psychotherapy, just in another format. To control for this social aspect, Czajka (1987) had participants either write on paper that would be turned in to an experimenter or write on a “magic pad” which erased written information when a plastic cover was lifted. This study aimed to explore and compare the effects of written expression for an audience and written expression for the self only. Czajka wanted to replicate previous studies by controlling the social aspect of written exposure. Findings indicated no autonomic or self-report differences. In summary, the benefits of disclosure may not be contingent upon sharing experiences with an audience.

Research exploring personality differences that may affect the benefits one attains through written expression have shown no consistent personality or individual difference measures distinguishing those who do and do not benefit. The most common variables that have been found not to relate to benefit outcome include gender, age, anxiety symptoms, and inhibition or constraint (Pennebaker, 1997). With regard to educational differences affecting written expression, individuals typically benefit at a comparable rate. For instance, research indicates that individuals ranging in education from senior professionals with advanced degrees to maximum-security prisoners with sixth-grade educations benefit similarly (Richards et al., 1995; Spera et al., 1994). Furthermore, research indicates no differences in degree of benefit among college related to the ethnicity or native language of the writer (Dominguez, 1995; Petrie et al., 1995; Rime, 1995). Research may indicate that some personality traits do not influence the effects of journaling interventions, however, many traits have yet to be explored. For example, at

present, it is unclear whether positive personality characteristics such as resiliency and hardiness influence the effectiveness of journaling interventions. As such, it is important to study personality traits that may affect the relationship between journaling and outcomes in order to better parse out these interactions.

College Students and Technology

The Pew Research Center (2016) has been tracking Internet and technology use via online surveys for more than 15 years. Their 2016 survey indicates that approximately eight out of ten adults living in the United States owns a desktop or laptop computer, and 73% of Americans have broadband service in their homes. Interestingly, college graduates are three times more likely to have home broadband service than individuals who have not graduated from high school (91% vs. 34%). In addition, 69% of adults in the United States utilize some form of social media, and 86% of these social media users are between 18 and 29 years of age (Pew Research Center, 2017).

In addition to the vast majority of American adults owning computers and having home access to the Internet, 90% of individuals living in developing countries own a cell phone. In fact, it is expected that by 2020 there will be 4.78 billion cell phone subscribers worldwide (Statista, 2018). In 2016, an estimated 63% of the population owned a mobile phone, while 95% of adults living in the United States fell into this category. In fact, 50.8% of American households have no landline telephone, with over two-thirds of 18 to 29-year olds living in households with only a mobile phone (FCC, 2016). Additionally, it is estimated that 50-77% of mobile phone users are smartphone users (Pew Research Center, 2017; Statista, 2018). Smartphones appear to be especially popular for individuals aged 18 to 29, who make up 92% of smartphone users (Pew Research Center, 2017). In

addition, 12% of Americans (typically young, non-white, and lower-income) have no Internet service in their homes and rely solely on their smartphone for home Internet access (FCC, 2016).

One of the most common practices among cell phone users is a form of communication called short message service (SMS) or text messaging. With text messaging, individuals are able to create alphanumeric messages of 160 characters or fewer that can be exchanged with others (Kohut, et al., 2011). Research indicates that young adults actually prefer text messaging over other forms of communication (Madell & Muncer, 2007; Pierce, 2009; Reid & Reid, 2007; Skierkowski & Wood, 2012; Van Cleemput, 2010). In the United States, 71% of adults report using SMS text at least once per day. In fact, Americans sent an astonishing 1.939 trillion messages in 2016 (FCC, 2016). Furthermore, 99% of received mobile text messages are opened and 90% of text messages are read within three minutes of being received (Johnson, 2013).

Roberts et al. (2014) conducted an online survey of 164 college students to explore time spent utilizing smartphone devices. Findings indicated that females spent an average of 10 hours a day on their cell phones, and males spent approximately 8 hours a day on their cell phones. Roberts et al. (2014) note that females may spend more time messaging due to the fact that females are more apt to use cell phones for socializing. Interestingly, these researchers also found that males sent about as many messages as females; they just tended to spend less time doing so. This may suggest that males are sending shorter, more practical messages than females. Overall, participants reported that the majority of cell phone time was spent texting (94.6 minutes), followed by emailing (48.5 minutes), checking Facebook (38.6 minutes), Internet surfing (34.4 minutes), and

listening to music (26.9 minutes) (Roberts et al., 2014). Internet and wireless connection are clearly central and very important in the lives of American citizens, especially young Americans.

Computer-Based Journals

Given the rise in technology, many researchers have utilized typing as a format for written expression. However, research indicates that writing by hand has distinct benefits compared to typing. For instance, Brewin and Lennard (1999) studied the differences between hand-writing and typing, keeping in mind that most adults at the time were used to writing in longhand format. These researchers hypothesized that typing may involve additional cognitive load that hand-written disclosures do not require. Furthermore, they hypothesized that compared to typing, adults who engaged in hand-written disclosure would exhibit greater stimulation of negative feelings, more disclosure, and higher levels of perceived benefit. Findings suggested that, indeed, hand writing about a stressful experience, as opposed to typing, was significantly correlated with more negative feelings, more disclosure, and participants overall finding more benefit (Brewin & Lennard, 1999). These results indicate that the format of the written disclosure may be an important variable when considering written disclosure as a form of treatment.

On the other hand, Sharp and Hargrove (2004) believed no differences would emerge between hand-writing and typing about stressful experiences. These researchers hypothesized that participants writing in both formats would report similar emotional arousal and would exhibit similar content in their writing samples. The participants were college students. Results indicate students describing emotional experiences, compared to their respective controls who disclosed neutral experiences, reported greater negative

feelings and used more emotional words following the writing task. These students also produced essays that contained significantly more personal and psychological content. In addition, Sharp and Hargrove (2004) found that as they hypothesized, hand-writing and typed writing formats showed no difference in participant benefit. These findings may suggest that college students have become more comfortable using electronic devices for communication and, as a result, are more inclined to disclosing emotional experiences on a computer. Given this information, the researchers note that newer generations may be more receptive and gain more benefit using computer-mediated communications devices. Furthermore, the shift toward the newer generation becoming more familiar with typing, as opposed to hand-writing over the 16 years since this study was published, may result in different findings today. Regardless, these findings suggest hand-written journaling and electronic journaling are comparably beneficial in terms of negative affect, perceived benefit, and level of disclosure in college students (Sharp & Hargrove, 2004).

Given previous findings that newer generations and college students may gain more benefit from written disclosure through computer-mediated communications devices, researchers have explored aspects concerning electronic disclosure. Joinson (1998) found that participants communicating by means of computer-mediated communications, compared to those communicating face to face, were more likely to reveal more private or uncomfortable information. In other words, when a computer mediates communication, individuals may be less inhibited (Joinson, 1998).

Pennebaker and Harber (1993) note that people may be more likely to disclose emotions via computer-mediated communications because today's society lacks cultural norms for defining emotional talk. These researchers note that it is often challenging for

an individual to stay engaged while listening to another discuss their emotions and thoughts and may even downplay the speaker's problem. Computer-mediated methods of disclosure circumvent this awkward encounter by allowing individuals to have a degree of separation in which a "speaker" can freely express himself or herself uninhibited by immediate negative social consequences (Pennebaker & Harber, 1993).

Hoyt and Pasupathi (2008) note that between the increasing presence of the Internet in individual's lives and the rapid changes in technology, Internet blogs have become a potential forum for written disclosure of emotional topics. Baker and Moore (2008) found that individuals who engaged in blogging, on average, reported more psychological stress than individuals engaging in social media but not blogging. In fact, individuals who blog tend to score high on traits such as neuroticism and openness (Guadagno, Okdie, & Eno, 2008). Similarly, Clarke and Van Amerom (2008) found that bloggers were more likely than non-bloggers to openly discuss ongoing psychological or pharmacological intervention. However, it is important to note that too much of a good thing can be bad. For example, Adler and Adler (2008) found that Internet support does not always result in an individual engaging in problem behavior changing. In addition, Van den Eijnden, Meerkerk, Vermulst, Spijkerman, and Engels (2008) found that individuals who rely too much on Internet communication may develop greater depression and compulsive Internet use.

Hoyt and Pasupathi (2008) studied the linguistic patterns of Internet bloggers using The Linguistic Inquiry and Word Count (LIWC) program. Researchers found no longitudinal group changes in blogger's use of language reflecting cognitive processing, emotional valence, or reference to the self. However, when they looked at individual

bloggers, they found significant variability in individual linguistic changes. This finding suggests that for some individual bloggers change did occur in use of language reflecting cognitive processing, emotional valence, and reference to the self. Hoyt and Pasupathi (2008) noted that these individual bloggers who showed major changes in linguistics would be classified as “recovered” after blogging. In other words, Internet blogging may be beneficial to particular individuals, but not others (Hoyt & Pasupathi, 2008).

Baker and Moore (2008) hypothesized that individuals who were drawn to blog journaling would show greater levels of psychological distress than individuals not seeking this outlet. In addition, they hypothesized that an individual’s purpose for blogging would be associated with a particular coping style (planning, positive reframing, venting, self-blame). Intending bloggers indeed scored higher on psychological distress (depression, anxiety, and stress). They also scored lower on social assimilation and satisfaction with the number of friends (online and face-to-face) and were more likely to seek out social support as a coping strategy. With regard to coping style, intending bloggers engaged in self-blame and venting more than non-bloggers. The researchers believed that this combination of coping styles may result in a blogger’s engagement in a confession of negative self-thoughts (Baker & Moore, 2008). Given the ease of access to computers for college students and the research available concerning social internet-based journaling, it is important to further explore the effects of computer-based journaling for this population.

SMS Text-Based Interventions

Given the fact that 71% of adults report using SMS text at least once per day, resulting in 1.939 trillion text messages being sent in 2016, 90% of adults reporting

reading text messages within minutes, and 18 to 29-year olds making up 92% of smartphone users (FCC, 2016), text-messaging interventions (TMIs) seem an ideal resource for treatment. In fact, TMIs have been the subject of recent research. TMIs are simple, effective, convenient, and can reach large groups of people at low cost. In addition, TMIs can be personalized and interactive, qualities associated with more effective health communication interventions (Parvanta, Nelson, Parvanta, & Harner, 2010). TMIs have the benefit of targeting specific groups such as individuals living in rural areas, individuals entering specific life stages, and individuals living with or at risk for mental illnesses (Konrath, 2015). Interestingly, Weinschenk (2014) notes that text messaging interventions may actually result in the receiver experiencing the unconscious pleasure of dopamine release associated with the reward of receiving a message.

Text messaging has been utilized as a supplemental intervention in many physical and psychological treatments. For instance, it has been especially useful in behavioral interventions as text messages can be in the moment, personally tailored interventions (Cole-Lewis & Kershaw, 2010), by means of immediate reminders (Bort-Roig, Gilson, Puig-Ribera, Contreras, & Trost, 2014), immediate feedback, (Bartlett, Lukk, Butz, Lampros-Klein, & Rand, 2002; Stone, Shiffman, Schwartz, Broderick, & Hufford, 2003) and immediate reinforcement (Shetty, Chamukuttan, Nanditha, Raj, & Ramachandran, 2011). Furthermore, many individuals carry their mobile phones everywhere they go, and, as a result, they are a convenient conduit for journaling interventions. Additionally, research indicates that text-message based interventions based on cognitive social learning theory (Bandura, 2004) promote physical activity (Bort-Roig, Gilson, Puig-Ribera, et al., 2014; Fjeldsoe, Miller, & Marshall, 2013; Fukuoka, et al., 2011; Newton,

Wiltshire, & Elley, 2009), the self-management of diabetes (Cho, Lee, Lim, Kwon, & Yoon, 2009; Kouris et al., 2010; Newton et al., 2009; Wangberg, Arsand, & Andersson, 2006), increasing healthy eating patterns (Kerr, et al., 2012), weight loss (Haapala, Barengo, & Biggs, 2009; Patrick et al., 2009), smoking cessation (Haug, Meyer, Schorr, Bauer, & John, 2009; Obermayer, Riley, Asif, & Jean-Mary, 2004), promotion of primary care appointment attendance (Fairhurst & Sheikh, 2008), and sunscreen application (Armstrong et al., 2009).

With regard to college student preferences for text message-based interventions, Yan et al. (2015) surveyed college students and found, overall, that they were very excited about the idea of a text message-based intervention. Furthermore, they noted interest in positive and supportive, personally-tailored messages. As for timing, these students indicated a preference for not receiving messages at inconvenient times, for instance, “too early in the morning,” “too late at night,” or “on weekends.” Specifically, they indicated a preference for text messages sent between the hours of 9:00 AM and 9:00 PM (Yan et al., 2015). Additionally, Shapiro and colleagues (2012) found that young people may actually prefer text message monitoring as opposed to paper diaries. In sum, text-messaging interventions may be not only practical for college students, but also enjoyable and beneficial.

Aguilera and Muñoz (2011) found text-messages to be a beneficial intervention used alongside therapy. These researchers used an SMS-based intervention for 12 low-income patients with depression enrolled in group cognitive behavior therapy. In addition to group therapy, participants received 2 text messages per day inquiring about their mood and asking a brief therapy-based homework question. An example homework

question is: How many positive social interactions did you have today? Findings indicated that the majority of participants enjoyed the addition of text messages to their group therapy. In fact, results hinted at a decrease in depressive symptoms. However, this change was non-significant. The researchers note that in the future a larger sample size and control group is required to flesh out the benefits of the intervention (Aguilera & Muñoz, 2011). Pijnenborg et al. (2010) also conducted a study utilizing a text-message based supplemental intervention. The participants in this study included 62 patients diagnosed with schizophrenia. These researchers found that participants receiving text messages in addition to treatment were more likely to achieve their treatment goals. Interestingly, when text messages stopped, the increase in goal attainment subsequently decreased.

Controlling Variables

The relationship between journaling and various measures of psychological distress have been studied and the findings indicate negative relationships. While it is important to consider additional variables in college student populations that may also be negatively related to journaling, it is also important to consider variables that may affect these relationships. By identifying additional variables, a more comprehensive understanding can be attained. For example, some individuals may benefit more than others from the intervention of journaling depending on personality, intelligence, etc.

In order to conduct a proper investigation, one must set up a study that is as controlled as possible. In any study, it can be nearly impossible to account for all variables that may affect the outcome, this is why control groups are utilized, to provide a baseline measurement. As such, a control group was used in this study. However, in

addition to using a control group, control variables were also used. Control variables are factors in an experiment which are held constant to prevent confounding with the independent variables. Gentry and Kobasa (1984) note that therapy-related intervening factors may be categorized as either vulnerability or resiliency variables. Vulnerability factors place an individual at increased risk of developing physical and psychological dysfunction and are related to lower and weaker levels of resilience (Bonanno, 2004; Campbell-Sills, Cohan, & Stein, 2006). Resiliency factors, on the other end of the continuum, provide a protective barrier to decrease the risk for developing physical and psychological dysfunction. Werner and Smith (1982) note that the likelihood of an individual developing physical or psychological dysfunction depends on that individual's balance of vulnerability factors and resiliency factors. In this research, resiliency factors were explored as controlling variables.

Metatheory of Resilience and Resiliency

The word resilience can be traced back to the Latin verb *resilire*, meaning “to leap back” or “spring back” and can be defined as the ability “to recover quickly or easily from, or resist being affected by, a misfortune, shock, illness, etc.” (Resilience, 2010). In fact, Lazarus (1993) analogizes resilience to elasticity in metals when stressed (e.g., resilient metal bends but bounces back). Richardson (2002) notes that research concerning resilience represents a “paradigm shift from looking at risk factors that led to psychosocial problems to the identification of strengths of an individual” (p. 309).

Numerous theories of resilience have been proposed over the years (e.g., Agaibi & Wilson, 2005; Denz-Penhey & Murdoch, 2008; Dunn, Iglewicz, & Moutier, 2008; Leipold & Greve, 2009), all similarly suggesting that resilience is a dynamic process that

changes over time. The general theory of resilience that was emphasized in this study is the metatheory of resilience and resiliency (Richardson, 2002; Richardson, Neiger, Jensen, & Kumpfer, 1990).

Literature concerning resiliency has moved through three waves. The first wave describes resilience as a set of characteristics. This research concerned identifying attributes found in resilient individuals (i.e., developmental assets and protective factors) and resulted in a plethora of “resilient qualities.” In other words, resiliency researchers were interested in finding characteristics found in those who thrive in the face of adversity rather than succumb to destructive behaviors (Richardson, 2002). This wave of resiliency research marked a paradigm shift from looking at risk factors resulting in psychosocial problems to identifying strengths within an individual (Benson, 1997).

The second wave views resiliency as a dynamic process and involves research on the process of attaining identified resilience qualities or protective factors. Lastly, the third wave entails understanding resilience as an innate force that drives a person to grow through adversity and disruptions. Some form of motivational energy is required for the process of regaining homeostasis following life disruptions. Resilience is described as the motivational force within everyone driving us to pursue knowledge and self-actualization, while being in harmony with a transcendent, or divine source of strength (Richardson, 2002).

The metatheory of resilience and resiliency (Richardson, 2002; Richardson et al., 1990) describes resiliency as a process beginning with a state of homeostasis, where a person is in balance physically, mentally, and spiritually. An individual becomes discrepant from this homeostatic state if there are insufficient resources to buffer against

stressors. Over time, a disrupted state will begin an adjustment process resulting in one of four outcomes: homeostatic reintegration, reintegration with a loss, dysfunctional reintegration, or resilient reintegration. Homeostatic reintegration occurs when disruption results in an individual remaining in their comfort zone as a means of getting through the disruption. Reintegration with loss occurs when disruption results in the loss of protective factors and, as a result, a decreased level of homeostasis. Dysfunctional reintegration occurs when disruption results in an individual resorting to destructive behaviors (e.g., substance abuse). Lastly, resilient reintegration occurs when disruption results in the attainment of additional protective factors and, as a result, an increased level of homeostasis. The outcome of resilience is more than simple recovery, resilience leads to positive growth or adaptation following the period of homeostatic disruption (Richardson, 2002). As such, Richardson and colleagues' (1990) metatheory of resilience and resiliency was used as a theoretical foundation for the control variables in this study.

In 1955, Emmy Werner and Ruth Smith (1982, 1992) began a seminal, 30-year longitudinal study that would serve as a foundation of resiliency research. This study began looking at multiracial children labeled as high risk due to environmental factors; approximately 200 of the 700 children were deemed at risk due to perinatal stress, poverty, daily instability, and serious parental mental health problems. Interestingly, results indicated that despite multiple risk factors, 72 of the 200 children were doing very well as adults. Qualities found in these "resilient" participants included robustness, social responsibility, adaptability, tolerance, being female, achievement orientation, good communication abilities, and having good self-esteem. Additionally, this research

indicated that exposure to a caregiving environment, both within and outside the family, resulted in participants thriving in the face of adversity (Werner, & Smith, 1982).

Research concerning the relationship among resilience, psychological well-being, psychological distress, depression, anxiety, and general health among college students indicates that resiliency has a positive correlation with psychological well-being and negative correlation with psychological distress, depression, and anxiety (Haddadi & Besharat, 2010).

Hardiness

A major characteristic of resiliency is hardiness (Connor & Davidson, 2003), which is defined as the “capability of enduring hardship, discomfort, or harsh conditions” (Hardiness, 2010). The concept of hardiness was developed by Kobasa (1979) to explain the relationship between stress and health within resilient individuals. This construct was originally derived from the idea of courage from existential psychology. Courage helps individuals construct meaning in their lives when choosing stimulating, but unfamiliar and anxiety-provoking paths rather than familiar ones when faced with a decision (Maddi, 1998). Kobasa (1979) proposed that specific personality characteristics make up hardiness, which in turn is a resource of resilience during stressful life events. This personality aspect makes hardiness a trait that develops early in life and is relatively enduring over time (Maddi & Kobasa, 1984).

Bonanno (2004) notes that, to many people, the term hardiness most denotes resilience. However, hardiness is considered a personality trait and resilience is not (Bonanno, 2004). Additionally, a central difference between the constructs of resilience and hardiness is that resilience produces an improved adaptive outcome, whereas

hardiness does not necessarily result in a positive change (Earvolino-Ramirez, 2007).

Importantly, however, research indicates hardiness may actually help buffer an individual's exposure to extreme stress (Kobasa, Maddi, & Kahn, 1982).

Initial research concerning hardiness highlighted three factors that make up this construct: the attitudes of commitment, control, and challenge. *Commitment* is the "tendency to involve oneself in (rather than experience alienation from) whatever one is doing or encounters" (Kobasa et al., 1982, p. 169). Individuals scoring high in commitment experience a generalized sense of purpose that allows them to find meaning in their lives (Maddi, 1998). *Control* is the "tendency to feel and act as if one is influential (rather than helpless) in the face of the varied contingencies of life" (Kobasa et al., 1982, p. 169). Those who feel they have some control over their lives believe they can use imagination, knowledge, skill, and choice to influence outcomes (Kobasa et al., 1982). The attitude of control provides an individual with a sense of self-efficacy and encourages individuals to develop an inventory of stress responses (Maddi, 1998). Lastly, the word *challenge* is the "belief that change rather than stability is normal in life and that the anticipation of changes is interesting incentives to growth rather than threats to security" (Kobasa et al., 1982, p. 169). Bartone, Ursano, Wright, and Ingraham (1989) related hardiness to optimism, i.e., perceiving challenges in a positive light.

Research concerning hardiness shows that hardiness, along with other resources (i.e., social support and exercise), are protective factors against physical and mental health problems. In fact, Kobasa, Maddi, Puccetti, and Zola (1985) studied the various combinations of a few of the major resiliency factors in the literature (exercise, nutrition, social support, hardiness attitude) and found that hardiness was the most effective buffer

against illnesses. For example, Dolbier, Soderstrom, and Steinhardt (2001) found that individuals higher in hardiness have better immune responses. In fact, Manning and Fusilier's (1999) research indicates that individuals scoring high in hardiness have fewer health problems as shown by lower health care costs and health insurance claims.

Furthermore, findings indicate that individuals experiencing the three interrelated attitudes of commitment, control, and challenge are less likely to experience physical illness as a reaction to stressful life events, while individuals lacking these attitudes are at increased risk for experiencing physical illness (Kobasa et al., 1982). For example, Kobasa (1979) conducted a 12-year research study of hardiness at Illinois Bell Telephone and found that executives who experience high levels of stress, but low levels of physical illness, interestingly scored higher in the attitudes of commitment, control, and challenge than did executives experiencing physical illness in response to stress. Additionally, Kobasa et al.'s (1982) 3.5-year research study of hardiness suggested that during stressful life events, the attitude of hardiness predicts both current and future well-being and decreases the likelihood of detrimental effects due to stress. This is in line with research indicating that in response to stress, individuals scoring high in hardiness have less physiological arousal (Allred & Smith, 1989; Contrada, 1989) and lower heart rates (Solcova & Sykora, 1995) than individuals scoring low in hardiness.

With regard to psychological health Nowack (1989) reports that hardiness and psychological distress have a negative relationship such that individuals scoring higher in hardiness score lower in psychological distress. Additional research indicates greater levels of hardiness are positively related to increased overall happiness and adjustment (McNeil, Kozma, Stones, & Hannah, 1986) as well as marital happiness (Barling, 1986).

Beasley, Thompson, and Davidson (2003) researched general health, somatization, anxiety, and depression in college students with stressful and traumatic life experiences, looking at the moderating variables of cognitive hardiness and coping style. These researchers found that cognitive hardiness directly impacted measures of psychological and somatic distress. Additionally, several cases indicated that cognitive hardiness moderated the effects of emotional coping or stressful and traumatic life events on psychological distress, supporting the buffering model of resilience.

Furthermore, Pengilly and Dowd (2000) found hardiness correlated negatively with scores on the Beck Depression Inventory (BDI), such that as hardiness decreases, scores on the BDI increase. These researchers also found that hardiness, as well as commitment and control were significantly correlated with stress. Additionally, findings indicated that stress significantly predicted depression, and hardiness moderated this relationship. Specifically, individuals scoring high in stress and low in hardiness had higher scores on the BDI than individuals scoring low in stress and low in hardiness. Interestingly, these researchers also found that individuals scoring high in hardiness had similarly low scores on the BDI regardless of their stress scores (Pengilly & Dowd, 2000). Similarly, Rhodewalt and Zone (1989) also found that individuals scoring low in hardiness displayed increased symptoms of depression, while other researchers have also found anxiety and psychological distress to be consequences of low hardiness (Rhodewalt & Agustsdottir, 1984; Shepperd & Kashani, 1991).

In addition to buffering against the negative effects of stress on physical and mental health, hardiness relates to students' motivation and commitment to learning. Sansone, Wiebe, and Morgan's (1999) findings show that individuals high in hardiness

are more likely to monitor and intentionally adjust their reactions when given the chance to delay or avoid exposure to an unpleasant experience such as a boring task. Thus, students who are hardy may be especially mindful of the value of prolonged exposure (e.g., attending class, studying for an exam) and will purposely engage in strategies to transform the activity into something perceived as more positive. This change in perception allows these individuals to maintain motivation to perform (Sansone & Harackiewicz, 1996; Sansone et al., 1999). In summary, prior research suggests hardiness is an adaptive trait that is associated with a variety of positive outcomes and also may influence how certain experiences influence individuals. However, to my knowledge no prior research has examined the influence of hardiness on journaling interventions.

Positive Psychology

In the past, the view dominating the mental health community has been that mental health problems are a form of pathology. Pathology is derived from the Greek word *Patho*, meaning suffering, disease, or an emotion-evoking sympathy (Keyes, 2007). This pathological approach views health as the “absence of disability, disease, and premature death (Keyes, 2007, p. 96).” Gable and Haidt (2005) note three main reasons for this emphasis on pathogenesis. “The first is compassion...those who are suffering should be helped before those who are already doing well” (Gable & Haidt, 2005, p. 105). However, Gable and Haidt (2005) argue that a better understanding of protective factors such as environmental conditions, optimism, personal strengths, and a sense of personal control may help us understand and explore buffers against mental illness, which in turn will actually lead to better outcomes for helping those who are suffering (Gable & Haidt, 2005).

The second reason has historical roots (i.e., World War II), which has resulted in a focus on the medical model of diagnoses and treatment (Maddux, 2002). Over the years, our society has invested a lot of resources toward identifying causes of mental illnesses and creating effective treatments for those who are suffering from mental health disorders. However, once again we fall short in identifying buffers to mental illness (e.g., personal strengths, social connections) (Keyes, Lopez, & Snyder, 2002). This is ironic given the fact that resources could be saved if we also focused them towards protective factors that would result in avoiding negative mental health, to begin with, by exploring the strengths and conditions that contribute to resilience and well-being (Gable & Haidt, 2005).

Another reason that psychology researchers have tended to focus on the negative may dwell in our own human nature and our theories about psychological processes (Gable & Haidt, 2005). For example, Baumeister, Bratslavsky, Finkenauer, and Vohs's (2001) review of literature pertaining to whether or not negative events tend to have greater impact indicates that individuals do, in fact, report negative events having more impact than positive events. Specifically, negative events, more than positive events, have more impact on health, well-being, marital satisfaction, cognitive processing, affect regulation, etc. (Baumeister et al., 2001). Additionally, information about negative things is processed more thoroughly than information about positive (Baumeister et al., 2001). This may be due to the fact that it is more adaptive, from an evolutionary perspective, to recognize potential threats more quickly than potential rewards (Gable & Haidt, 2005).

It was not until 2004 that the World Health Organization first reported on the importance of promoting mental health, beyond the absence of negative affect. This

report conceptualized mental health as “a state of well-being in which the individual realizes his or her own abilities can cope with the normal stresses of life, can work productively and fruitfully, and are able to make a contribution to his or her community” (World Health Organization, 2004, p. 12). This new shift corresponds with Jahoda (1958), who originally coined the term *mental health*, and brought up years prior the view of mental health as not merely the absence of mental illness but the presence of something positive.

Positive psychology has a long history. Dating back prior to its formal development as a field there have been many authors and researchers that have emphasized positive psychological constructs. In 1902, William James discussed “healthy-mindedness.” In 1958, Allport was interested in positive human characteristics. In 1968, Maslow advocated for studying healthy individuals rather than sick ones, and more recently, Cowan has been researching the concept of human resiliency (Gable & Haidt, 2005).

Seligman and Csikszentmihalyi (2000) describe positive psychology as simply an umbrella term for theories and research concerning what makes life worth living, while Gable and Haidt (2005) define positive psychology as “the study of the conditions and processes that contribute to the flourishing or optimal functioning of people, groups, and institutions” (p. 104). On the other hand, Sheldon and King (2001) define it as “nothing more than the scientific study of ordinary human strengths and virtues,” one that “revisits the average person” (p. 216). This suggests that positive is actually typical. In fact, Myers (2000) found that 9 out of 10 American citizens report being *pretty happy* or *very happy*.

We see that most individuals experience well-being; however, can we induce “well-being?” Sin and Lyubomirsky (2009) conducted a meta-analysis of 51 studies utilizing positive psychology interventions with 4,266 participants and found that positive psychology interventions significantly decrease depressive symptoms (mean $r = .31$) and increased well-being (mean $r = .29$). Given that hardiness is based on the buffering model of resiliency, and positive psychology interventions decrease negative affect and increase well-being, a positive journaling intervention may result in more benefit than a simple journaling intervention.

Broaden-and-Build Theory of Positive Emotions

Positive psychology research has emphasized the study of positive emotions. Negative emotions tend to narrow an individual’s scope of attention and, as a result, their thought-action repertoires (e.g., fight or flight responses) (Derryberry & Tucker, 1994; Easterbrook, 1959). Additionally, research indicates that individuals who report experiencing and expressing more positive emotions are better able to cope effectively with chronic stress and negative experiences (Aspinwall, 1998; Bonanno & Keltner, 1997; Folkman, 1997; Keltner & Bonanno, 1997). Fredrickson’s (1998, 2001) *broaden-and-build theory* suggests that experiencing positive emotions results in momentarily broadening an individual’s attention and thought-action repertoire, which encourages the discovery of creative lines of thought or action. This, in turn, results in that individual building upon personal resources, including physical (Boulton & Smith, 1992; Danner, Snowdon, & Friesen, 2001), intellectual (Csikszentmihalyi & Rathunde, 1998; Panksepp, 1998), social (Aron, Norman, Aron, McKenna, & Heyman, 2000) and psychological (Folkman & Moskowitz, 2000; Fredrickson, Tugade, Waugh, & Larkin, 2003).

Additionally, research indicates that positive emotions and the resulting broadened thought-action repertoire influence one another reciprocally and, over time, result in an upward spiral of positive emotions, coping ability, and ability to appreciate experiences (Fredrickson & Joiner, 2002). In other words, one can think of positive emotions as an adaptive personal resource (Fredrickson & Branigan, 2005).

In addition to the benefits associated with positive emotions, experiencing positive emotions can actually undo the harmful effects correlated with negative emotions. Specifically, positive emotions can return an individual's body to a homeostatic state after the experience of physiological arousal associated with negative emotion. This interaction has been termed the *undoing hypothesis* (Fredrickson & Levenson, 1998; Fredrickson, Mancuso, Branigan, & Tugade, 2000). Fredrickson and Levenson (1998) conducted an experiment with 60 undergraduate students. The experiment involved participants initially watching a fear-eliciting film, which resulted in negative emotion and high-arousal or sympathetic reactivity (e.g., increased heart rate, vasoconstriction, increased blood pressure). After this, participants were randomly assigned to view a second emotionally evocative film (i.e., contentment, amusement, neutrality, or sadness). Results indicated that participants who viewed positive films exhibited faster returns to pre-film levels of sympathetic activity compared to participants watching sad or neutral films. Fredrickson et al. (2000) had similar results when they replicated Fredrickson and Levenson's (1998) study with 170 undergraduates. Results showed that positive emotion evoking films resulted in faster cardiovascular recovery than neutral and sad films.

Positive Emotional Disclosure

Given the research on the benefits of experiencing positive emotions, related research indicates disclosing positive emotions can lead to health benefits. In fact, research shows that when disclosure is positive in nature, the benefit does indeed increase (Emmons & McCullough, 2003; King & Miner, 2000; Pennebaker & Francis, 1996). Pennebaker and Francis (1996) demonstrated this with 72 undergraduate students engaging in written disclosure concerning their thoughts and feelings about entering college or a superficial topic for three days straight. They found that participants using more positive emotion words when writing about a mildly stressful experience developed fewer illness-related physician visits over the following couple of months compared to control participants. Additionally, King and Miner (2000) observed that participants instructed to write about perceived benefits associated with a traumatic experience (i.e., positive emotional experiences) had fewer health center visits.

Emmons and McCullough (2003) conducted a study utilizing 192 undergraduate participants randomly assigned to one of three 10-week interventions: 1) count your blessings (i.e., listing things for which one is grateful or thankful), 2) list daily hassles (i.e., listing daily hassles in one's life), or 3) control (i.e., listing events or circumstances that impacted you). Those participating in the "count your blessings" group had better subjective health outcomes, fewer physical complaints, increased time exercising, increased hours of sleep, better sleep quality, greater levels of positive affect, reduced levels of negative affect, greater optimism and connectedness to others, and were more altruistic (Emmons & McCullough, 2003). In fact, benefits occur the most in those who write a moderate amount of negative emotion words and a high number of positive emotion words (Pennebaker, 1997; Pennebaker et al., 1997; Pennebaker & Seagal, 1999),

while poorer outcomes are found in those who focus largely on negative emotion (Ullrich & Lutgendorf, 2002).

Stanton, Danoff-Burg, Cameron, Snider, and Kirk (1999) studied 60 patients diagnosed with breast cancer, randomly assigning them to write expressively about their diagnosis, write only positively on their experience with their diagnosis, or write about facts concerning their experience with their diagnosis. Participants who wrote expressively or positive thoughts about their diagnosis reported fewer physical symptoms and had fewer medical appointments for cancer-related issues compared to participants assigned to write about facts. Together, findings from these studies suggest there are health benefits associated with writing about positive emotions.

Combining the convenience of technology with the known benefits of journaling and positive emotions may make for a valuable intervention. Of particular interest for this paper is a study conducted by Isaacs et al. (2013) concerning a smartphone application they built for recording everyday experiences and reflecting on them later, called Echo. This custom-built application allowed participants to log about daily activities using pictures, text descriptions, and self-report emotional states tied to the activities. Participants were 33 individuals recruited through social media forums. Participants were randomly assigned to either record and emotionally rate three events per day for 28 days or record three events per day and reflect on three previously recorded entries each day for 28 days. Findings indicated participants in both groups experienced increased overall well-being, with neither group improving significantly more. Researchers then hand-coded 996 randomly selected posts, which represented 40% of each participant's posts. Posts were coded into four categories of emotional depth: report (no emotional content),

mention (mention or suggestion of an emotional response), express (description or expression of an emotion), or analyze (rich explanation or analysis of an emotion, self-coaching on how to behave or feel). Those in the reflection group were more positive in their emotional disclosure. It is interesting to note that eight months later, six participants chose to continue utilizing the smartphone application outside of the study (Isaacs et al., 2013). It appears that combining positive emotions and technology may benefit individuals engaging in written disclosure.

Positive Emotion and Resiliency

In addition to the benefits of positive emotions, those who benefit from the broaden-and-build theory of positive emotions (Fredrickson, 1998, 2001) also benefit from the trait of resilience (Tugade & Fredrickson, 2002, 2004; Tugade, Fredrickson, & Feldman Barrett, 2004). As noted, the metatheory of resilience and resiliency (Richardson, 2002; Richardson et al., 1990) conceptualizes resiliency as an individual's ability to regain homeostasis after a lack of resources to buffer against stressors causes discrepancy from a homeostatic state. In other words, resiliency is the ability to bounce back from negative emotional experiences as well as flexibly respond to changing situational demands. In fact, resilient individuals are more effective in regulating their emotions (Lazarus, 1993) and are more likely to experience positive emotions, even during stressful events. This skill may explain resilient individual's ability to rebound successfully despite adversity (Tugade & Fredrickson, 2002, 2004).

Tugade et al. (2004) studied positive emotions in relation to resilient individuals' ability to rebound from negative emotions. Specifically, similar to studies concerning the undoing hypothesis, these researchers hypothesized that individuals high in resiliency

would have a faster recovery following a cardiovascular stressor (i.e., preparing to give a speech) compared to participants low in resiliency. Additionally, they hypothesized that faster cardiovascular recovery from negative emotional arousal would be due to positive emotional experiences. Results indicated that trait resilience was positively correlated with positive mood ($r = .38, p < .01$), and not correlated with negative mood.

Additionally, participants scoring higher in resilience demonstrated faster cardiovascular recovery from negative emotional arousal ($r = .26, p < .05$). Lastly, positive emotions did, in fact, mediate the effect of resilience on the duration of cardiovascular reactivity following negative emotion arousal (Tugade et al., 2004). Given these findings, positive emotions may fuel psychological resilience. Individuals high in resiliency may actually be experts of the undoing effect of positive emotions.

The Present Study

The purpose of this study was to determine if college students would benefit from written emotional disclosure. Specifically, would students assigned to SMS text-based written expression interventions (daily SMS text-based journaling and bi-weekly SMS text-based journaling) benefit more than a group engaging in traditional journaling, and would all written expression groups benefit more than a control group receiving no intervention. To my knowledge, no studies to date have explored the benefits of SMS text-based written expression with college students, even though research indicates this may be an effective form of intervention for this population. The outcome variables included in this study were psychological distress, sleep, and learning motivation. Additionally, resilience and hardiness were examined as potential control variables in the

relationship between the interventions and the outcome variables. Specific hypotheses for the present study are as follows:

Hypotheses

Hypothesis 1. College students engaged in traditional and SMS text-based written expression interventions will report decreased psychological distress and improvements in sleep and learning motivation over time, above and beyond participants in a control group receiving no intervention.

Justification for hypothesis 1. Research indicates that emotional expression through written expression results in psychological benefits (see Smyth, 1998, for a meta-analysis). This hypothesis is replicative of previous research and will help validate the present findings data.

Hypothesis 2. Compared to college students in the traditional journaling intervention group, those engaging in the SMS text-based written expression interventions will report less psychological distress and greater improvements in sleep and learning motivation.

Hypothesis 3. There will be a difference in benefit between the two SMS text-based written expression intervention groups (daily SMS text-based journaling group and bi-weekly SMS text-based journaling group). Specifically, those engaged in the daily SMS text-based written expression intervention will report less psychological distress and greater improvements in sleep and learning motivation compared to those engaged in bi-weekly SMS text-based written expression.

Justification for hypothesis 2 and 3. Research indicates that 95% of adults in the United States own a cell phone (Pew Research Center, 2017), and there are expected to

be 4.78 billion mobile phone subscriptions worldwide by the year 2020 (Statista, 2018). As a result of the wide-reaching prevalence of technology, college-aged students may feel more comfortable typing journal entries via familiar mobile devices. In fact, research indicates young people may actually prefer text message-based interventions to paper and pencil (Shapiro et al., 2012). Additionally, the most popular activity conducted on cell phones is text messaging (Pew Research Center, 2017), which entails typically short messages being sent via the device. Findings indicate that the length of an individual written expression entry is not correlated with self-report values of writing (Smyth, 1998). Given that written expression is beneficial, and length of the entry is not of great importance, newer generations may be more receptive and gain more benefit using cellular devices as a format of written expression. This could advance the frontier of knowledge by providing college students with an effective, enjoyable, and convenient intervention.

Hypothesis 4. For all intervention groups, after controlling for resilience and hardiness the effects of written expression on psychological distress, sleep, and learning motivation, will still show significant change over time.

Justification for hypothesis 4. Resiliency factors provide a protective barrier to decrease the risk for developing physical and psychological dysfunction (Werner & Smith, 1982). The metatheory of resilience and resiliency (Richardson, 2002; Richardson et al., 1990) defines resiliency as a dynamic process in which an individual adjusts back to an increased level of homeostatic state following a disrupted state. Resilience works as a buffer from stressful life events. Hardiness is a personality trait (Bonanno, 2004) and is a major characteristic of resiliency (Connor & Davidson, 2003). As such, hardiness

develops early in life, is relatively enduring over time, and is a source of resilience during stressful life events (Kobasa, 1979; Maddi & Kobasa, 1984). Hardiness is a protective factor against physical problems (Allred & Smith, 1989; Contrada, 1989; Dolbier et al., 2001; Kobasa, 1979; Kobasa et al., 1982; Manning & Fusilier, 1999; Solcova & Sykora, 1995) and mental health problems (Barling, 1986; McNeil et al., 1986; Nowack, 1989; Pengilly & Dowd, 2000; Rhodewalt & Agustsdottir, 1984; Rhodewalt & Zone, 1989; Shepperd & Kashani, 1991), as well as a factor contributing to motivation (Sansone & Harackiewicz, 1996; Sansone et al., 1999). Additionally, individuals benefitting from the broaden-and-build theory of positive emotions (Fredrickson, 1998, 2001) also benefit from the trait of resilience, or the ability to bounce back from negative emotional experiences, as well as flexibly respond to changing situational demands (Tugade & Fredrickson, 2002, 2004; Tugade et al., 2004). Many traits have yet to be explored in relation to journaling interventions. Specifically, the buffering and adaptive trait of hardiness, to my knowledge, has yet to be explored in relation to journaling among college students.

CHAPTER III

Method

Participants

Power analysis. In order to determine the minimum sample size needed to maximize power while minimizing the probability of Type I and Type II errors a priori, a power analysis was conducted using G*Power software 3.1.9.3 (Faul & Erdfelder, 1998). In order to maximize the probability of finding a significant effect, power was set at .80 (Cohen, 1977). Results of the analysis indicated a total sample size of 97 participants would be required in order to detect moderate effect sizes ($f = .25$) with 80% power ($\alpha = .05$) utilizing four groups and five measurements (five dependent variables) using a repeated measures MANOVA within-between interaction.

Participants. Participants were recruited from a mid-sized southeastern university in the United States. A total of 388 subjects agreed to participate in this study by giving informed consent and completing the baseline surveys. Volunteers were randomly assigned by drawing randomized slips of paper containing instructions for one of the four conditions, such that 119 participants were assigned to the traditional journal entry group, 95 to the daily SMS text-based journal entry group, 88 to the bi-weekly SMS text-based journal entry group, and 86 to the control condition. As recommended in the literature (e.g., Peng, Harwell, Liou, & Ehman, 2006), subjects who completed fewer than 80% of the study items on one or more scales at one or more time points were removed from the sample.

Of the initial sample ($N = 388$), data from 4 17-year-old participants were removed, as one of the two criteria for participating in the study required participants to be 18 years of age or older (with the other inclusion criterion being that students were enrolled in a university). Journals and text-messages were screened for blank and missing responses. Only participants who completed at least 80% of the journaling interventions as well as the posttest were included. Accordingly, 200 participants completed the posttest surveys, with 51 participants failing to complete the minimum number of entries for intervention compliance. This reduced the sample to a final sample size 149 participants who completed all parts of the study.

Out of the 149 total participants, 32 participants were in the traditional journal entry group, 40 were in the daily SMS text-based journal entry group, 45 were in the bi-weekly SMS text-based journal entry group, and 32 were in the control condition. Given this information, we can see that 77% of participants dropped out of the traditional journal entry group, 62% of participants dropped out of the daily SMS text-based journal entry group, 52% of participants dropped out of the bi-weekly SMS text-based journal entry group, and 66% of participants dropped out of the control group.

It is important to note that only 23 participants in the traditional journal entry group, 15 in the daily SMS text-based journal entry group, 9 in the bi-weekly SMS text-based journal entry group, and 9 in the control condition met all criteria for inclusion and completed the follow-up survey. Due to such noncompliance, follow-up data was not included in the final analyses.

The majority of participants were female (71.8%; $n = 107$), 28.2% ($n = 42$) were male, and 0% ($n = 0$) identified as transgender. The ages of participants ranged from 18 to 60 years old ($M = 20.34$, $SD = 5.08$) with the majority of the participants' ages (87.3%; $n = 130$) ranging from 18-21 years old. The majority of participants in the study (81.2%; $n = 107$) identified as White/Caucasian. The remaining participants identified as Black/African American (10.1%; $n = 15$), Hispanic or Latino/a (2.7%; $n = 4$), Asian/Asian American (2.7%; $n = 4$), Bi-Racial/Multi-Racial (1.3%; $n = 2$), American Indian/Alaskan Native (1.3%; $n = 2$), and Native Hawaiian/Pacific Islander (.7%; $n = 1$). The demographics on race and ethnicity are similar to those at the university with the majority of students at the university identifying as White. Regarding academic classification, freshmen comprised 31.5% ($n = 47$) of the final sample, sophomores comprised 31.5% ($n = 47$), juniors comprised 21.5% ($n = 32$), and seniors comprised 15.5% ($n = 23$). The demographic characteristics of participants in each experimental group are presented in Table 1.

Table 1

Frequencies of Demographic Variables Sorted by Experimental Condition

Demographic Variables	Traditional Journal		Daily Text		Bi-Weekly Text		Control	
	N	%	N	%	N	%	N	%
Total N (%)	32	21.5%	40	26.8%	45	30.2%	32	21.5%
Gender								
Male	13	40.6%	9	22.0%	14	13.1%	6	18.8%
Female	19	59.4%	31	75.6%	31	68.9%	26	81.3%
Transgender	-	-	-	-	-	-	-	-
Ethnicity								
White/Caucasian	26	81.3%	32	78.0%	35	77.8%	28	87.5%
Black/African American	2	6.3%	5	12.2%	5	11.1%	3	9.4%
Hispanic/Latino	-	-	2	4.9%	2	4.4%	-	-
Biracial/Multiracial	1	3.1%	-	-	1	2.2%	-	-
Asian/Asian-American	1	3.1%	1	2.4%	1	2.2%	1	3.1%
American Indian/ Alaskan Native	2	4.9%	-	-	-	-	-	-
Native Hawaiian/ Pacific Islander	-	-	-	-	1	2.2%	-	-
Relationship Status								
Single	20	62.5%	21	51.2%	23	51.1%	160	87.5%
Dating	9	28.1%	18	43.9%	21	46.7%	15	9.4%
Married	1	3.1%	-	-	1	2.2%	-	-
Partnered	1	3.1%	-	-	-	-	1	3.1%
Divorced	1	3.1%	-	-	-	-	-	-
Separated	-	-	-	-	-	-	-	-
Widowed	-	-	-	-	-	-	-	-
Other	-	-	1	2.4%	-	-	-	-
Academic Classification								
Freshman	7	21.9%	11	27.8%	18	40.0%	11	34.4%
Sophomore	11	34.4%	11	27.8%	12	26.7%	13	40.6%

Junior	8	25%	11	27.8%	8	17.8%	5	15.6%
Senior	6	18.8%	7	17.5%	7	15.5%	3	9.4%
College Major								
Education	17	53.1%	17	41.5%	15	33.3%	16	50.0%
Business	1	3.1%	1	2.4%	1	2.2%	-	-
Engineering and Science	2	6.3%	4	9.8%	6	13.3%	4	12.5%
Liberal Arts	3	9.4%	2	4.9%	4	8.9%	4	12.5%
Applied and Natural Sciences	9	28.1%	15	36.6%	19	42.2%	8	25.0%

Measures

Demographics. Table 1 displays the results of the demographic questionnaire that was included in the online survey (see Appendix B). Some of the characteristics the questionnaire assessed included participants' age, sex, ethnicity, relationship status, academic classification, household income, college that housed one's academic major (e.g., College of Liberal Arts), GPA, daily time spent on cell phone, and preferred mode of communication.

The General Health Questionnaire (GHQ-28; Goldberg & Williams, 1988). The GHQ-28 is a 28-item self-report measure of psychological distress (Appendix C). The instrument contains four subscales, with seven items each. The subscales concern (1) somatic symptoms, (2) anxiety and insomnia symptoms, (3) social dysfunction, and (4) extreme depression. An example question from the extreme depression subscale is: "Have you been feeling perfectly well and in good health?" Scores can be obtained for overall psychological distress, as well as each subscale. The instrument is scored by adding raw scores. Higher scores indicate elevated psychological distress, as well as elevated subscale symptoms.

This assessment has been widely used with both clinical (e.g., Henkel et al., 2003; Sampson, Kinderman, Watts, & Sembi, 2003) and nonclinical populations, including college students (e.g., Hamilton & Schweitzer, 2000; O'Connor & O'Connor, 2003). This scale has good construct validity (Berwick, Budman, Damico-White, Feldstein, & Klerman, 1987; Huppert & Garcia, 1991) and good predictive validity (Bowling, Farquhar, Grundy, & Formby, 1992). In addition, Bowling (1997) indicates this scale has acceptable split-half reliability ($\alpha = .95$). For the purposes of this study, the total scale

score was utilized. In the present study, the Cronbach's alpha coefficients for the GHQ-28 were good, with .86 for the pre-intervention time point and .93 for the post-intervention time point.

Adult Sleep Wake Scale (ADSWS; Fortunato, LeBourgeois, & Harsh, 2008).

The ADSW is a 25-item self-report measure of overall sleep quality (Appendix C). The measure is for adults and refers to the past week's sleep behaviors. Overall, the items load on to five behavioral factors: going to bed, falling asleep, maintaining sleep, reinitiating sleep, and returning to wakefulness. These five factors explain a significant portion of the variance (69% - 73%) as it relates to sleep quality (Fortunato et al., 2008). The Going to Bed factor includes the transition from wakefulness to sleep. A sample item from this subscale is: "When it is time to go to bed, I want to stay up and do other things." The Falling Asleep factor involves sleep initiation at the beginning of the sleep period. A sample item from this subscale is: "When I'm in bed and it is time to fall asleep, I am not sleepy." The Maintaining Sleep factor entails the maintenance of sleep. A sample item from this subscale is: "After I fall asleep, during the night I toss and turn in bed." The Reinitiating Sleep factor occurs when an individual returns to sleep after an awakening during the sleep period. A sample item from this subscale is: "After waking up during the night, I have a hard time going back to sleep." Lastly, the Returning to Wakefulness factor includes the transition from sleep to wakefulness. A sample item from this subscale is: "In the morning, I wake up and feel ready to get up for the day."

All but five of the items on the ADSW are rated along a 6-point Likert scale concerning the frequency of certain behaviors related to sleep. These response options include: Never (has not happened), Once in a while (happened 20% of the time),

Sometimes (happened 40% of the time), Quite Often (happened 60% of the time), Frequently, if not always (happened 80% of the time), and Always (happened 100% of the time). The other five items are also rated along a 6-point Likert-type scale. However, the response options for these items range from *< 15 minutes* to *> 90 minutes*. Each subscale consists of five questions. A total score of overall sleep quality can be determined by summing all scores, ranging from 25 to 150. Subscale scores can be determined by adding all scores within subtests; these scores range from 5 to 30. Higher scores indicate poorer sleep quality (Fortunato et al., 2008). For the purposes of this study, only the total scale score was utilized.

This measurement has been used multiple times with college populations (Campsen & Buboltz, 2017; Fortunato et al., 2008). Fortunato et al. (2008) found this measure to have a high level of internal consistency ($\alpha = .83$ to $.90$) as well as good test-retest reliability ($\alpha = .67$ to $.82$). These researchers also found this measure to have high internal reliability estimates for each of the five behavioral dimensions: going to bed ($\alpha = .89$), falling asleep ($\alpha = .88$), maintaining sleep ($\alpha = .87$), reinitiating sleep ($\alpha = .93$), and returning to wakefulness ($\alpha = .86$). Additionally, this measure has been established to be a valid indicator of sleep wake patterns (Fortunato et al., 2008). In the present study, the Cronbach's alpha coefficient for the ASWS was good, with $.87$ for the pre-intervention time point and acceptable, with $.70$ for the post-intervention time point.

Academic Motivation Scale College Version (AMS-C 28; Vallerand et al., 1992). The AMS-C 28 is a 28-item self-report measure of academic motivation (Appendix C). Participants rate themselves on each statement along a continuum ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*) concerning how much the

statement corresponds to their reasons for attending college. This scale consists of seven subscales of academic motivation, to include three Intrinsic Motivation Orientation subscales (toward knowledge, towards achievement, and towards stimulating experience), three Extrinsic Motivation Orientation subscales (identified regulation, introjected regulation, and external regulation), and an Amotivation subscale. Each subscale consists of four items, with each subscale score ranging from 4 to 28.

Additionally, a motivation score can be calculated for each category (intrinsic, extrinsic, and amotivation) by averaging the score of all items in the subscales within the category. Higher scores indicate a high endorsement of that particular academic motivation. An example item from this scale is: "Because I want to have "the good life" later on." For the purposes of this study, the total score for the intrinsic motivation category was used because research indicates that intrinsic motivation is positively related to self-efficacy and academic performance in college populations (Strage & Brandt, 1999; Turner, et al., 2009). Additionally, within college populations, intrinsic motivation as opposed to extrinsic motivation and amotivation, has been found to result in more academic success and better test performance (Vansteenkiste et al., 2004).

Fairchild, Horst, Finney, and Barron, (2005) collected data from 1,406 college students and found adequate Cronbach's alphas for all subscales: to know ($\alpha = .86$), toward accomplishment ($\alpha = .90$), to experience stimulation ($\alpha = .86$), identified regulation ($\alpha = .77$), introjected regulation ($\alpha = .85$), external regulation ($\alpha = .85$), and amotivation ($\alpha = .85$). Additionally, these researchers found good convergent and discriminative validity (Fairchild et al., 2005). In the present study, the Cronbach's alpha coefficient for the AMS-C 28 was .92 for the pre-intervention time point and .77 for the

post-intervention time point.

The Brief Resilience Scale (BRS; Smith et al., 2008). The BRS is a 6-item scale measuring the ability to bounce back or recover from stress on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*) (Appendix C). A sample item is: “I usually come through difficult times with little trouble.” A total score can be determined by first reverse coding questions 2, 4, and 6, and then summing all scores. Higher scores indicate higher levels of resilience.

This scale has been validated in the college population with loadings ranging from .69 to .90 (Smith et al., 2008). In addition, internal consistency was found to be good ($\alpha = .84 - .87$; Smith et al., 2008). Test-retest reliability among college students was found to be .69 (Smith et al., 2008). The BRS showed good concurrent validity as it was found to be significantly and positively correlated with the Connor-Davidson Resilience Scale ($r = .59$; CD-RISC; Connor & Davidson, 2003) and the Ego-Resiliency Scale ($r = .51$; E-RS; Block & Kremen, 1996) (Smith et al., 2008), showing evidence of convergent validity. In the present study, the Cronbach’s alpha coefficient for the BRS was good, with .89 for the pre-intervention time point and acceptable, with .77 for the post-intervention time point.

Dispositional Resilience Scale (DRS-15; Bartone, 1995). The DRS-15 is a 15-item scale measuring hardiness (Appendix C). Funk (1992) critically reviewed hardiness theory and research and deemed the Dispositional Resilience Scale to be the best available measurement of hardiness. This scale was developed from the original Hardiness Scale (Bartone, 1989), and as such over 25 years of research have gone into the development of the DRS-15 (Bartone, 1995).

Participants are instructed to indicate how true or untrue positive and negative statements are about their life in general, along a four-point Likert scale (0 = *not at all true*, 3 = *completely true*). A sample item is: “Changes in routine are interesting to me.” This scale contains three subscales with five items each. The subscales are control, commitment, and challenge, all dimensions of hardiness. Subscale scores can be derived by reverse coding six items and adding the five scores pertaining to each subscale. Subscale scores range from 0 to 15. Additionally, by adding all scores one can calculate a total hardiness score. Total hardiness scores range from 0 to 45, with higher scores indicating higher levels of hardiness. Research has confirmed this three-facet structure, as well as the measurement of a general hardiness structure (Sinclair & Tetrick, 2000).

This measure has been used with college students (Bartone, 2007; Hystad, Eid, Laberg, Johnsen, & Bartone, 2009) and has been found to have an internal consistency of .71 (Hystad et al., 2009). Additionally, Bartone (2007) reported scores on the DRS-15 correlating well with the 30-item version ($r = .84$) with a group of undergraduates. He also found high reliability, with an overall 3-week test-retest reliability coefficient of .78, as well as high test-retest reliability for commitment (.75), control (.58), and challenge (.81). In the present study, the Cronbach’s alpha coefficient for the DRS-15 was poor, with .64 for the pre-intervention time point and .64 for the post-intervention time point.

Post-Intervention Questions. Additional questions were included at the end of the post-test questionnaire for participants in the traditional journaling group (Appendix D) and the text messaging groups (Appendix E). Questions for the traditional journaling group involved perceived benefit of the intervention, preferences for timing, and strengths and weaknesses of online journaling. These participants were also asked how

they typically accessed the intervention (i.e., computer or cell phone). Questions included for the SMS text-based expression group participants involved perceived benefit of the intervention, preferences for timing, and strengths and weaknesses of text message formatting.

Procedure

Prior to collecting data, approval was obtained from the Institutional Review Board (IRB) at the author's university. Participants were recruited through convenience sampling methodology through means of class and e-mail announcements. The researcher contacted class instructors and asked their permission to visit classes to describe the study and request research participation. Some instructors chose to offer students extra credit for participation. If extra credit was offered, the instructor was asked to offer an alternative extra credit assignment for students who chose not to participate. Additionally, participants who completed the entire study were entered to win one of two \$25 gift cards. There were risks associated with this study. Specifically, some questions pertained to distress and the potential for processing emotional issues that may cause some participants discomfort. As a result, contact information for the university counseling center and the national crisis hotline phone number were included during the informed consent. Furthermore, participants were reminded in the informed consent that they could choose to withdraw from the study at any time, without penalty, if they experienced discomfort and wished to not participate.

Instructions and URL links to pre-intervention measures for each of the four groups were printed on slips of paper. The slips of paper were randomly combined and students who chose to participate in the study were passed a slip of instructions by

chance. Instruction slips included group-specific web links directed to baseline measures tied to the assigned intervention, or lack thereof. The surveys began with an informed consent and once participants indicated consent, they were directed to complete the demographic questionnaire and five assessments. These measures assessed psychological distress (Goldberg & Williams, 1988; Ware & Sherbourne, 1992), sleep (Fortunato et al., 2008), learning motivation (Vallerand et al., 1992), resilience (Smith et al., 2008), and hardiness (Bartone, 1995). To control for order effects, the order of the measurements was randomized. This survey took approximately 15-20 minutes to complete.

Participants' university email addresses were used to categorize survey responses without the use of the participants' names. The lead investigator and dissertation chair had access to a document listing participants' email addresses and information concerning the corresponding intervention that participant was engaged in to aid with the organization and data analysis. At the end of the pre-intervention survey, depending on what intervention they are assigned to, participants were asked to provide their preferred email address or cell phone numbers. Email addresses or cell phone numbers were used to send messages over the course of approximately ten weeks to remind participants to engage in the assigned intervention and complete study measures at the two additional time points (post-test and follow-up).

After completing the baseline measures, students were contacted via email or text message with unique instructions concerning the intervention they would complete. An online data collection website (PsychData[®]) was used to collect pre- and post-intervention data as well as follow-up data. PsychData[®] was also used for the traditional journaling group to enter journal entries into blank entry boxes. In addition, a program to

send and receive mass text messages was utilized (TellMyCell[®] Short Message Services (SMS) software). This program has been used in research with college students (Wasco, 2017) and offers confidentiality of participant contact information and data. Participants in the control group were not contacted again until it was time to complete the post-intervention measures. The post-test survey was completed immediately after the intervention ended (4-weeks after baseline). The follow-up survey was completed 6-weeks after the intervention ended (10-weeks after baseline).

Email addresses and cell phone numbers were only kept until data analysis was complete and were only accessible to the lead investigator and dissertation chair in a password-protected file on a password-protected hard drive.

Traditional journal entry group. Participants in the traditional journal entry group were instructed to spend roughly 5-10 minutes writing a journal entry concerning a positive event from that week, one evening a week for four weeks (one month; 4 total entries). These participants received emails from the lead investigator which included an embedded survey link (a separate link for each week of the intervention) from which participants could directly access an open-ended response box on PsychData[®]. The prompt for first journal entry was:

I would like for you to write about your thoughts and feelings about a positive event from the past week. All of your writing will be completely confidential.

Don't worry about spelling, sentence structure, or grammar. The only rule is that once you begin writing, continue to write for 10-15 minutes.

For each subsequent journal entry, the prompt was simply: Please use the following link to complete this week's 10-15 minute journal entry about a positive event from the past week.

Daily SMS text-based journal entry group. Participants in the daily SMS text-based journal entry group were instructed to spend approximately one minute a day, Monday through Friday, sending a brief SMS text message journal entry concerning a positive event from that day for four weeks (one month; 20 total texts). These participants were prompted to engage in the intervention through a SMS text message from the lead investigator each day of the intervention (i.e., *Please text me about a positive event from today*). All SMS text messages were sent and received using TellMyCell[®] Short Message Service (SMS) software.

Bi-weekly SMS text-based journal entry group. Participants in the bi-weekly SMS text-based journal entry group were instructed to spend approximately one minute a day, on Tuesdays and Thursdays, sending a brief SMS text message journal entry concerning a positive event from that day for four weeks (one month; 8 total texts). These participants were also prompted via SMS text message from the lead investigator each day of the intervention (i.e., *Please text me about a positive event from today*).

Control group. Participants in the control group did not engage in the intervention portion of the study. These participants only received emails from the lead investigator to complete the pre-intervention, post-intervention, and follow-up surveys.

Post-intervention. After the four-week intervention time period, all participants received a message through either email or SMS text messaging containing a group-specific link to PsychData[®] in order to complete a post-intervention survey containing

the same measures they completed for the baseline and a few additional questions pertaining to the specific intervention they completed. Six-weeks after the intervention time period ended participants received an additional message through email or SMS text messaging containing a group-specific link to a third, follow-up, survey. Participants who adequately completed all portions of the study completed a total of three online surveys, over a 10-week period, in addition to completing any assigned journal entries.

CHAPTER IV

Results

This study was a mixed design consisting of three waves of data collection. However, due to poor compliance, only two waves of data collection were analyzed. A longitudinal (repeated measures), quasi-experimental design was employed. There were two categorical, independent variables: The first was a within-subjects factor: time (with two levels: pre-intervention and post-intervention) and the second was a between-subjects factor, intervention (with four levels: traditional journaling, daily SMS text-based journaling, bi-weekly SMS text-based journaling, and a control group). The continuous, dependent variables were psychological distress, sleep, and learning motivation, as well as a continuous, controlling variables of resilience and hardiness.

Repeated measures are ideal when participants are measured multiple times to examine potential score changes due to interventions. Repeated measures are ideal in experimental conditions because this design requires fewer participants, allows the ability to partial out variability due to individual differences, and can track effect over time (Howitt & Cramer, 2011). Multiple analysis of variance (MANOVA) is used to analyze the difference between group means when there are multiple continuous, dependent variables. Furthermore, a factorial MANOVA can be used to examine the main effects of every variable, as well as every possible interaction among all variables. This is an ideal statistic because treatments can affect participants in

complex ways. Additionally, running a MANOVA rather than multiple analyses of variance (ANOVAs) reduces experiment-wise error (i.e., the probability of committing type I error) as it examines a single omnibus test with all variables included in a single model. Further, repeated measures MANOVAs can be more powerful to reveal significant differences that cannot be detected by separate ANOVAs (Tabachnick & Fidell, 2013). Additionally, MANOVAs can include control variables, thus allowing for the relationship between the independent and dependent variables to be better understood. A repeated measures MANOVA was used since this study had multiple dependent variables with means compared over time (time 1 and time 2).

Data Screening and Missing Values

Prior to conducting the primary analyses of the study, the data was cleaned, and preliminary data analyses were conducted to determine whether there were any issues with the data (e.g., missing values, outliers). The final sample of this study included 149 college students, resulting in a 61.6% attrition rate. Research indicates attrition rates of 30% to 83% (Franzini & Grimes, 1980; Harris & Bruner, 1971; Vanicelli, Pfau, & Ryback, 1976). All participants completed each part of the intervention and completed at least 80% of the questions on pre-intervention and post-intervention surveys. Missing data were handled using the person mean substitution method. Prior empirical research supports the use of person mean substitution over competing options such as listwise deletion or item mean substitution (Hawthorne & Elliott, 2005), and evidence also suggests it is an effective and valid method for removing missing data for participants with missing data values of 20% or less

(Downey & King, 1998). Participants who did not meet the criteria of completing over 80% of items were subsequently eliminated from the data set.

Preliminary Analyses

Descriptive statistics were computed for each of the study variables and reliability coefficients (i.e., Cronbach's alpha) were conducted to determine whether the instruments used in the present study had adequate internal consistency. Tables 2 and 3 report the Cronbach's alpha coefficients, means, standard deviations, and bivariate correlations among the predictor, control, and dependent variables at each time point included in this study.

Table 2

Means, Standard Deviations, Cronbach's Alphas, and Bivariate Correlations Among the Predictor, Control, and Dependent Variables at the Pre-Intervention Time Point

Pre-Intervention								
Variable	1	2	3	4	5	<i>M</i>	<i>SD</i>	α
1. GHQ	-	-.522**	.158	-.595**	-.055	49.82	12.28	.92
2. ADSWS		-	-.035	.440**	.071	92.87	17.48	.87
3. AMS-C			-	-.078	.254**	49.19	14.69	.92
4. BRS				-	.165*	19.57	4.94	.89
5. DRS					-	34.55	5.52	.64

Note. $N = 149$. GHQ = the General Health Questionnaire Total Scale, ADSWS = the Adult Sleep Wake Scale Total Scale, AMS-C = the Academic Motivation Scale College Version Intrinsic Motivation Scale, BRS = the Brief Resilience Scale Total Scale, and DRS = Dispositional Resilience Scale Total Scale.

* $p < .05$. ** $p < .001$.

Table 3

Means, Standard Deviations, Cronbach's Alphas, and Bivariate Correlations Among the Predictor, Control, and Dependent Variables at the Post-Intervention Time Point

Post-Intervention								
Variable	1	2	3	4	5	<i>M</i>	<i>SD</i>	α
1. GHQ	-	-.513**	.065	-.127	.012	47.68	12.62	.93
2. ADSWS		-	-.028	.115	.039	93.97	12.32	.70

3. AMS-C	-	.129	.389**	53.29	12.12	.77
4. BRS		-	.199*	18.90	4.69	.77
5. DRS			-	31.47	6.43	.64

Note. $N = 149$. GHQ = the General Health Questionnaire Total Scale, ADSWS = the Adult Sleep Wake Scale Total Scale, AMS-C = the Academic Motivation Scale College Version Intrinsic Motivation Scale, BRS = the Brief Resilience Scale Total Scale, and DRS = Dispositional Resilience Scale Total Scale.

* $p < .05$. ** $p < .001$.

Preliminary analyses were conducted prior to testing the hypotheses, although it has been established that random assignment promotes equity between treatment groups (R.A. Fisher, as cited in Krauth, 2000), ANOVAs were performed to evaluate if any differences existed between the groups on psychological distress, sleep, learning motivation, resilience, and hardiness.

First, five separate one-way analyses of variance (ANOVA) were conducted to determine whether participants had significant differences in terms of pre-intervention (i.e., baseline) psychological distress, sleep, and learning motivation by treatment group. The results of the one-way ANOVA comparing groups on pre-intervention psychological distress indicated there were no statistically significant differences between treatment groups, $F(1, 43) = 1.031, p = .439$. Similarly, the results of the one-way ANOVA comparing treatment groups on pre-intervention sleep $F(1, 59) = 1.389, p = .080$, pre-intervention learning motivation $F(1, 59) = 1.297, p = .132$, pre-intervention resilience $F(1, 22) = .794, p = .728$, and pre-intervention hardiness $F(1, 23) = .941, p = .545$ were not statistically significantly different. Taken together, these results show no statistically significant differences in baseline levels of psychological distress, sleep, learning motivation, resilience or hardiness between the treatment groups.

Next, a one-way ANOVA was conducted to determine whether there were significant gender differences in baseline psychological distress, sleep, learning motivation, resilience, and hardiness. Results indicated there were significant differences in baseline psychological distress, $F(1, 147) = 6.705, p = .011$, between males ($M = 45.738, SD = 9.415, n = 42$) and females ($M = 51.420, SD = 12.93, n = 107$), with females exhibiting higher rates of baseline psychological distress. This finding is consistent with previous research which has found females to consistently report more depressive symptoms than males, with females being about twice as likely to develop depression (Nolen-Hoeksema, 1990; Weissman et al., 1996). Additionally, there were significant differences in baseline sleep, $F(1, 147) = 5.495, p = .020$, between males ($M = 98.143, SD = 15.212, n = 42$) and females ($M = 90.794, SD = 17.931, n = 107$), with males reporting poorer sleep quality. This finding is interesting because previous research indicates somewhat inconsistent findings concerning gender differences of sleep quality. For instance, research has indicated both no gender differences in sleep quality (Lindberg et al., 1997; Park et al., 2001) and females reporting poorer quality of sleep than males (Coren, 1994; Doi, Minowa, Uchiyama, & Okawa, 2001; Tsai & Li, 2004). There were no significant gender differences in baseline learning motivation $F(1, 147) = 3.656, p = .058$. Again, this finding is inconsistent with previous research which has found females to report higher levels of intrinsic learning motivation (Vallerand, 1997; Vecchione, Alessandri, & Marsicano, 2014). There were no significant gender differences in baseline resilience, $F(1, 147) = 2.135, p = .146$. Interestingly, prior research is inconsistent, indicating that both females report higher levels of resilience (Sun & Stewart, 2007), and males report higher levels of resilience

(Stratta et al., 2013). However, there were significant differences in baseline hardiness, $F(1, 147) = 9.696, p = .002$, between males ($M = 21.524, SD = 4.180, n = 42$) and females ($M = 18.804, SD = 5.016, n = 107$), with males reporting higher rates of baseline hardiness. Previous research does not indicate gender differences in hardiness, but does, however, suggest that hardiness acts as a buffer for males, but not for females (Benishek & Lopez, 1997).

As a follow-up to the significant gender differences found, an exploratory MANOVA was run controlling for gender within groups. Results indicated significant gender differences within all groups, for psychological distress, $F(1, 12190.26) = 121, p = .000$, partial $\eta^2 = .500$, sleep, $F(1, 89997.260) = 390.857, p = .000$, partial $\eta^2 = .764$, learning motivation, $F(1, 12368.864) = 68.592, p = .000$, partial $\eta^2 = .362$, resilience, $F(1, 4159.393) = 218.864, p = .000$, partial $\eta^2 = .644$, and hardiness, $F(1, 7797.928) = 272.540, p = .000$, partial $\eta^2 = .693$.

Primary Analyses

Prior to the primary analysis, the assumptions of a multivariate analysis of variance (MANOVA) were tested and addressed using the recommendations outlined in the literature (Tabachnick & Fidell, 2013). The data were assessed for univariate outliers within each level of the independent factors (i.e., intervention and time), standardized scores were computed. An evaluation of these values indicated there were four standardized scores greater than 3.29 or less than -3.29 ($p < .001$, two-tailed test); therefore, plots were analyzed for univariate outliers and as such four cases were identified and removed (Tabachnick & Fidell, 2013). Multivariate outliers were then assessed using Mahalanobis Distance. Maximum Mahalanobis Distance values for each

level of the independent variables (intervention type) were compared to the χ^2 critical value for five degrees of freedom (determined by the number of predictors). The highest Mahalanobis Distance value was $30.298 > 20.515$, this tells us there may be multivariate outliers (Stevens, 2002; Tabachnick & Fidell, 2013). The highest Cook's Distance value was .105. Previous literature suggests this value should be below one (Tabachnick & Fidell, 2013). The highest Centered Leverage value was .210, more than the Maximum Value = .121. Overall, results indicated the possibility of multivariate outliers. As a result, 19 cases met criteria to be considered significant multivariate outliers and were deleted, bringing the total sample size to 126. Both Tables 4 and 5 portray the Cronbach's alpha coefficients, means, standard deviations, and bivariate correlations among the predictor, control, and dependent variables at each time point included in this study after removing univariate and multivariate outliers.

Table 4

Means, Standard Deviations, Cronbach's Alphas, and Bivariate Correlations Among the Predictor, Control, and Dependent Variables at the Pre-Intervention Time Point

Variable	Pre-Intervention					<i>M</i>	<i>SD</i>	α
	1	2	3	4	5			
1. GHQ	-	-.468**	.132	-.630**	-.065	48.53	12.28	.86
2. ADSWS		-	.028	.357**	.079	95.03	17.48	.87
3. AMS-C			-	-.051	.291**	48.26	14.69	.92
4. BRS				-	.259**	20.07	4.94	.89
5. DRS					-	34.40	5.52	.64

Note. $N = 126$. GHQ = the General Health Questionnaire Total Scale, ADSWS = the Adult Sleep Wake Scale Total Scale, AMS-C = the Academic Motivation Scale College Version Intrinsic Motivation Scale, BRS = the Brief Resilience Scale Total Scale, and DRS = Dispositional Resilience Scale Total Scale.

* $p < .05$. ** $p < .001$.

Table 5

Means, Standard Deviations, Cronbach's Alphas, and Bivariate Correlations Among the Predictor, Control, and Dependent Variables at the Post-Intervention Time Point

Variable	Post-Intervention					<i>M</i>	<i>SD</i>	α
	1	2	3	4	5			
1. GHQ	-	-.492**	-.008	-.448**	-.277**	46.53	12.62	.93
2. ADSWS		-	.006	.365**	.158	96.92	12.32	.70
3. AMS-C			-	-.022	.461**	50.95	12.12	.77
4. BRS				-	.372**	20.00	4.69	.77
5. DRS					-	33.86	6.43	.64

Note. $N = 126$. GHQ = the General Health Questionnaire Total Scale, ADSWS = the Adult Sleep Wake Scale Total Scale, AMS-C = the Academic Motivation Scale College Version Intrinsic Motivation Scale, BRS = the Brief Resilience Scale Total Scale, and DRS = Dispositional Resilience Scale Total Scale.

* $p < .05$. ** $p < .001$.

The normality assumption was examined within each level of the independent factors and indicated no violations to this assumption. Histograms were analyzed for an approximately normal curve. In addition, skewness, kurtosis, whisker plot, Q-Q plots, and detrended q-q plots were assessed for normal distribution. The Shapiro-Wilk test was also analyzed. Linearity among the dependent variables with respect to each group was examined using scatterplot matrices. Multicollinearity was assessed using variance inflation factors (VIFs). No values exceeded the value of 5, indicating the assumption was met. Homogeneity of variance and covariance was assessed for each dependent variable using Levene's test and Box's M test (Tabachnick & Fidell, 2013). Levene's Test of Equality of Error Variances and Box's Test of Equality of Covariance Matrices were nonsignificant, indicating these assumptions are met.

Repeated Measures MANCOVA. Prior to running the analyses of the present study, a repeated Measures MANCOVA was performed to control for the possible effects of gender on psychological distress, sleep, and learning motivation, given the fact that

gender was seen to significantly impact baseline measures. The between-subjects variable was the group (traditional journaling, daily SMS text-based journaling, bi-weekly SMS text-based journaling, and control), the within-subjects factor was time period (pre-intervention and post-intervention), and the covariate was gender. Results indicated a statistically significant interaction between test scores over time and gender, Wilks's $\Lambda = .932$, $F(2, 117) = 4.289$, $p = .016$, partial $\eta^2 = .068$, however, no significant interaction effect was found between test scores over time, gender, and group assignment, Wilks's $\Lambda = .990$, $F(3, 118) = .388$, $p = .762$, partial $\eta^2 = .010$. Further, no significant findings were found between groups, gender, or group by gender. Due to the lack of significance when controlling for gender, analyses were run, as planned, excluding gender as a control variable.

Repeated measures MANOVA. A 3 X 2 (group X time periods) repeated measures MANOVA was performed to investigate post-intervention group (traditional journaling, daily SMS text-based journaling, bi-weekly SMS text-based journaling, and control) differences in psychological distress, sleep, and learning motivation. The between-subjects variable was the group (traditional journaling, daily SMS text-based journaling, bi-weekly SMS text-based journaling, and control), and the within-subjects factor was time period (pre-intervention and post-intervention). The means and standard deviations of psychological distress, sleep quality, learning motivation, resilience, and hardiness scores at each level of the independent factors are presented in Table 6.

Table 6

Means and Standard Deviations at Each Level of the Independent Factors

Variable	<i>n</i>	Pre- Intervention		Post- Intervention		Marginal Mean Estimates
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
<i>Traditional Journaling</i>						
Psychological Distress	26	47.62	9.98	43.46	9.66	45.54 (1.87)
Sleep Quality	26	97.31	14.95	97.15	15.00	97.23 (2.94)
Learning Motivation	26	52.00	15.60	56.23	15.54	54.11 (2.56)
Resilience	26	20.54	4.79	20.85	5.71	20.96 (0.82)
Hardiness	26	33.85	4.92	35.15	5.68	34.92 (0.96)
<i>Daily Text Journaling</i>						
Psychological Distress	32	49.41	12.14	46.91	10.00	48.16 (1.68)
Sleep Quality	32	96.25	16.92	97.09	16.17	96.67 (2.65)
Learning Motivation	32	48.56	11.98	52.66	12.58	50.61 (2.31)
Resilience	32	19.94	4.29	19.38	5.55	19.65 (0.74)
Hardiness	32	34.50	4.67	33.94	5.35	34.76 (0.87)
<i>Bi-Weekly Text Journaling</i>						
Psychological Distress	42	46.19	9.92	45.19	9.21	45.69 (1.47)
Sleep Quality	42	95.14	17.20	94.40	16.15	96.27 (2.31)
Learning Motivation	42	45.45	14.79	47.38	15.26	46.41 (2.02)
Resilience	42	20.45	4.52	20.40	5.24	20.43 (0.64)
Hardiness	42	34.24	3.74	33.29	5.45	33.76 (0.76)
<i>Control</i>						
Psychological Distress	26	49.58	12.17	48.42	12.31	49.00 (1.87)
Sleep Quality	26	94.50	15.29	95.08	12.60	94.79 (2.94)
Learning Motivation	26	49.85	11.42	47.65	10.31	48.75 (2.56)
Resilience	26	19.81	4.31	20.04	4.61	-19.92 (0.64)
Hardiness	26	34.50	4.36	33.35	5.05	33.92 (0.96)

Note. Variables consist of the total scale scores. The estimated marginal means are in the far-right column and the standard error for these means are in the parentheses. The pairwise comparisons suggested there were no statistically significant estimated marginal means.

Results of the one-way repeated measures MANOVA indicated statistically significant differences in psychological distress over time, Wilks's $\Lambda = .948$, $F(1, 122) = 6.659$, $p = .011$, partial $\eta^2 = .052$, and learning motivation over time, Wilks's $\Lambda = .945$, $F(1, 122) = 7.087$, $p = .009$, partial $\eta^2 = .055$, and nonsignificant differences for sleep over time, Wilks's $\Lambda = .992$, $F(1, 122) = .937$, $p = .335$, partial $\eta^2 = .008$. Figure 1

displays the overall mean differences between pre and post-intervention scores of psychological distress, sleep quality, learning motivation, resilience, and hardiness.

Results indicated Mauchly's Test of Sphericity were significant, indicating that variances are not equal. As such, this assumption was not met and Greenhouse-Geisser was used instead. Tests of within-subjects effects indicated statically significant patterns of change over time for scores of psychological distress [$F(1, 293.885) = 6.659, p = .011$, partial $\eta^2 = .052$], sleep [$F(1, 47.173) = .937, p = .335$, partial $\eta^2 = .008$], and learning motivation [$F(1, 244.702) = 7.087, p = .009$, partial $\eta^2 = .055$].

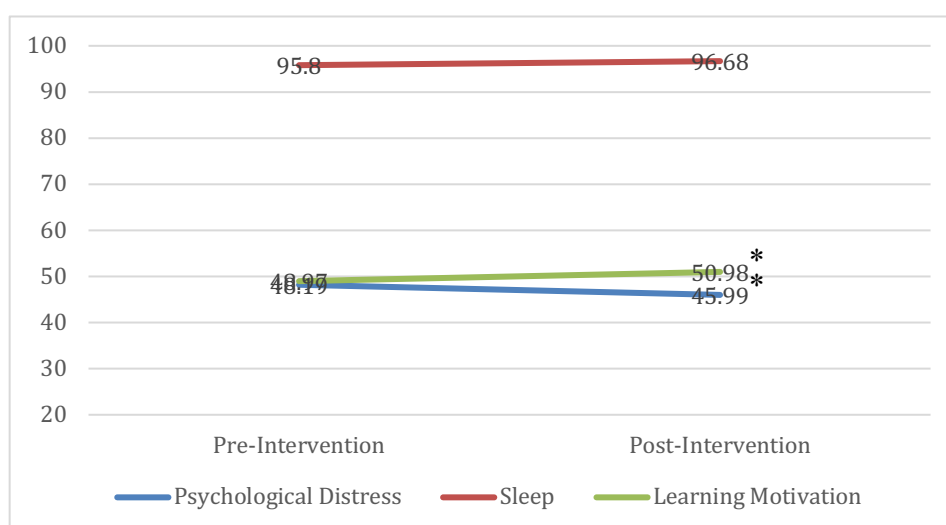


Figure 1. Estimated Marginal Means of Psychological Distress, Sleep, and Learning Motivation

The line represents the estimated marginal means for psychological distress, sleep, and learning motivation pre and post-intervention conditions. Notice, psychological distress decreases over time, while sleep quality and learning motivation increase over time.

* $p < .05$.

Psychological distress. Results of the repeated measures MANOVA indicated significant differences between pre-intervention psychological distress ($M = 48.197$) and

post-intervention psychological distress ($M = 45.995$), $p = .011$. However, results indicated no significant differences between groups.

Sleep. Results indicated nonsignificant ($p = .335$) differences between pre and post-intervention sleep quality, as well as nonsignificant group differences in sleep.

Learning motivation. Furthermore, results indicated significant differences between pre-intervention learning motivation ($M = 48.965$) and post-intervention learning motivation ($M = 50.975$), $p = .009$. Additionally, significant differences were found ($p = .020$) between the traditional journal group and the bi-weekly text message group for learning motivation.

In other words, overall, participant's psychological distress and learning motivation scores significantly changed over time, while sleep quality scores did not significantly change over time, meaning participants in all groups had relatively equal changes in sleep quality over time. Meanwhile, there were significant group differences for learning motivation between the traditional journal group and the bi-weekly text message group. Figures 2 through 4 indicate mean differences between pre and post-intervention scores of psychological distress, sleep quality, learning motivation by group.

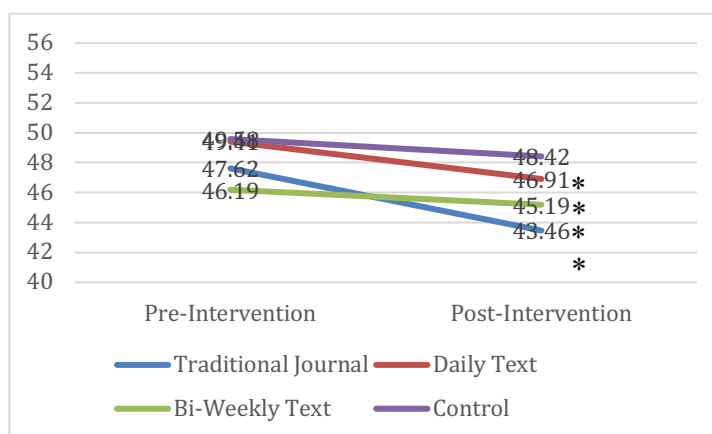


Figure 2. Estimated Marginal Means of Psychological Distress

The line represents the estimated marginal means for psychological distress following the intervention conditions. Notice that all interventions resulted in significant pre and post intervention effects, however, no significant differences were found between groups. * $p < .05$.

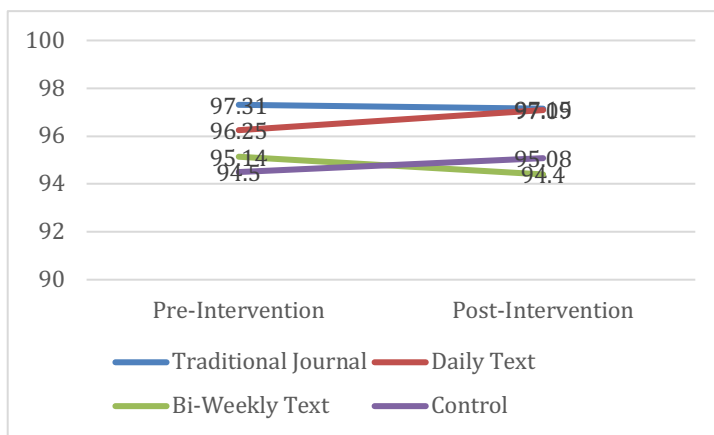


Figure 3. Estimated Marginal Means of Sleep

Note. The line represents the estimated marginal means for sleep quality following the intervention conditions. Notice that no interventions resulted in significant pre and post intervention effects, further, no significant differences were found between groups.

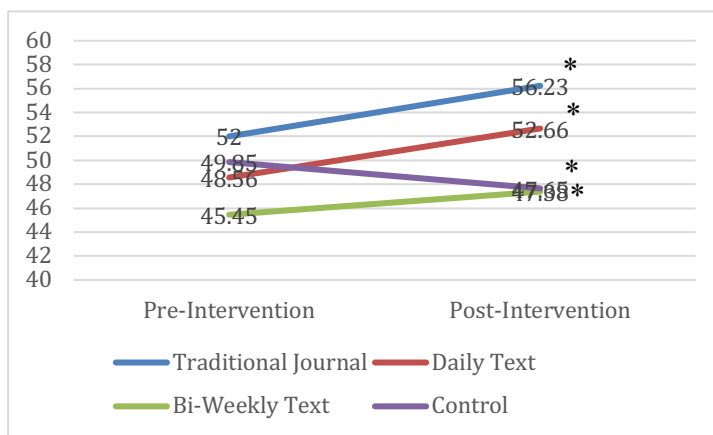


Figure 4. Estimated Marginal Means of Learning Motivation

Note. The line represents the estimated marginal means for learning motivation following the intervention conditions. Notice that all interventions resulted in significant pre and post intervention effects, however, only the traditional journaling group and bi-weekly text message journaling group differed significantly. * $p < .05$.

Hypothesis 1. Hypothesis 1 postulated that all students engaged in written expression interventions would benefit above and beyond participants in the control group receiving no intervention. Results of the repeated measures MANOVA indicated no significant group differences between intervention groups and the control group, Wilks's $\Lambda = .926$, $F(9, 292.199) = 1.041$, $p = .408$, partial $\eta^2 = .025$.

Hypothesis 2. Hypothesis 2 postulated that students engaged in SMS text-based written expression interventions would benefit above and beyond participants in the traditional journaling intervention group. Results of the repeated measures MANOVA indicated significant differences between the SMS bi-weekly text message group and the traditional journaling intervention for learning motivation ($p = .020$). Specifically, those engaged in the traditional written expression intervention benefitted significantly more than those engaged in the SMS bi-weekly text message written expression intervention for learning motivation. However, this did not work out for psychological distress and sleep.

Hypothesis 3. Hypothesis 3 postulated that students engaged in the daily SMS text-based written expression intervention would benefit, above and beyond participants in the bi-weekly SMS text-based written expression intervention group. Results of the repeated measures MANOVA indicated no significant group differences between students engaged in the daily SMS text-based written expression intervention and

students engaged in the bi-weekly SMS text-based written expression intervention, meaning no change in psychological distress, sleep, and learning motivation.

Follow up Analysis. As a follow-up to the significant interaction effects, Scheffe's mixed model post hoc comparison tests were performed. Scheffe-type procedure allows one to test many sub-effects without increasing the chance that a Type I error will occur (O'Brien & Kaiser, 1985). The results from the Scheffe tests were insignificant.

Repeated Measures MANCOVA. A repeated Measures MANCOVA was performed to control for the possible effects of resilience and hardiness on psychological distress, sleep, and learning motivation. The between-subjects variable was the group (traditional journaling, daily SMS text-based journaling, bi-weekly SMS text-based journaling, and control), the within-subjects factor was time period (pre-intervention and post-intervention), and the covariates were hardiness and resilience.

Hypothesis 4. Hypothesis 4 postulated that for all active intervention groups, that when controlling for resilience and hardiness, participants who engaged in written expression activities would exhibit significantly decreased levels of psychological distress, and increased levels of sleep quality and learning motivation. The results of the repeated measures MANCOVA indicated Mauchly's Test of Sphericity was significant, indicating that variances are not equal. As such, this assumption was not met and Greenhouse-Geisser was used instead.

Resilience. Tests of within-subjects effects indicated statistically significant patterns of change over time for scores of psychological distress when controlled for by pre-intervention resilience Wilks's $\Lambda = .896$, $F(1, 121) = 14.032$, $p < .001$, partial $\eta^2 = .104$, $F(1, 559.523) = .883$, $p < .001$, partial $\eta^2 = .104$, and learning motivation when

controlled for by pre-intervention resilience Wilks's $\Lambda = .996$, $F(1, 121) = .513$, $p = .475$, partial $\eta^2 = .004$, $F(1, 17.793) = .513$, $p = .475$, partial $\eta^2 = .004$. Pairwise comparisons indicated nonsignificant group differences between pre and post-intervention psychological distress and sleep, when controlled for by pre-intervention resilience. Additionally, tests of within-subjects effects indicated, while approaching significance, no actual statistically significant patterns of change over time for sleep controlled for by pre-intervention resilience Wilks's $\Lambda = .969$, $F(1, 121) = 3.899$, $p = .051$, partial $\eta^2 = .031$, $F(1, 191.819) = 3.899$, $p = .051$, partial $\eta^2 = .031$. However, significant group differences ($p = .019$) were found in learning motivation between the traditional journaling group and the bi-weekly SMS text-based journaling group, with the traditional journaling group scoring significantly higher than the bi-weekly SMS text-based journaling group on learning motivation overtime when controlling for pre-intervention resilience.

Hardiness. Tests of within-subjects effects indicated no significant patterns of change over time for scores of psychological distress controlling for pre-intervention hardiness Wilks's $\Lambda = .992$, $F(1, 121) = .963$, $p = .328$, partial $\eta^2 = .008$, $F(1, 42.502) = .963$, $p = .328$, partial $\eta^2 = .008$, and sleep controlling for pre-intervention hardiness Wilks's $\Lambda = .997$, $F(1, 121) = .378$, $p = .540$, partial $\eta^2 = .003$, $F(1, 19.152) = .378$, $p = .540$, partial $\eta^2 = .003$. However, tests of within-subjects effects also indicated significant patterns of change over time for scores of learning motivation controlling for pre-intervention hardiness Wilks's $\Lambda = .956$, $F(1, 121) = 5.600$, $p = .020$, partial $\eta^2 = .044$, $F(1, 186.340) = 5.600$, $p = .020$, partial $\eta^2 = .044$. Pairwise comparisons indicated nonsignificant group differences between pre and post-intervention psychological distress

and sleep, when controlling for pre-intervention hardiness. However, when controlling for pre-intervention hardiness, significant group differences ($p = .011$) were found in learning motivation between the traditional journaling group and the bi-weekly SMS text-based journaling group, with the traditional journaling group scoring significantly higher than the bi-weekly SMS text-based journaling group on learning motivation overtime when controlling for hardiness.

Follow-up questionnaires. Additional follow-up questions were asked of the students engaged in interventions in order to better understand their subjective experiences. A theme for all students engaged in journaling interventions was most liking the positive reflection piece of the intervention. For example, one student noted “it makes you pause and remember something that made you smile, which usually makes you smile again,” while another wrote “it made me realize that something good can come out of every day.” The majority of traditional journalers (75%) and SMS text-based journalers (63%) reported feeling that they benefitted from the intervention. Further, most traditional journalers (87%) and SMS text-based journalers (78%) did not find the intervention to be annoying or bothersome.

Most traditional journalers rated *time* (77%) as the aspect they liked most about the intervention, while most SMS text-based journalers rated *ease* (58%) as their most liked aspect. Meanwhile, most traditional journalers rated *difficulty* (55%) as the aspect they liked the least, while most SMS text-based journalers rated *time* (46%) as the aspect they liked the least. Text-based journalers also struggled with finding something positive, “Sometimes I didn't know what to write about,” but also the inconvenience of the intervention. One student commented, “sometimes was annoying and I didn't want to do

it,” another stated, “thought I got a text but it's just this,” and another wrote “Timing. Sometimes it asked too early in the day. Luckily I get up early.”

Interestingly, 32% of traditional journaling participants reported engaging in the intervention via their cellphone rather than their laptop. Furthermore, 18% of students engaged in the SMS text-based interventions used a smart-watch device at least some of the time throughout the intervention. Most traditional journals reported wanting to receive notifications between the hours of 9:00 AM and 12:00 PM (32%) or between 3:00 PM and 6:00 PM (19%). Interestingly, SMS text-based journalers reported wanting to receive notifications between the hours of 6:00 PM and 9:00 PM (31%), between 3:00 PM and 6:00 PM (25%), or between 12:00 PM and 3:00 PM (21%). This indicates that, on average, students engaged in SMS text-based interventions preferred to receive prompts in the evening and later in the day, while traditional journalers preferred to receive prompts earlier in the day.

It is important to address the high attrition rate of the present study. Specifically, the fact that the study was unable to adhere to the original plan of analyzing data through follow-up. When running statistics on only those individuals who were retained from the post-test survey through the follow-up survey, it is interesting to see that the only significant difference between participants who completed the entire intervention, and those who dropped out, was group assignment, $F(1, 378.13) = 1839.84, p = .000$. Further, post-hoc comparisons using Scheffe's mixed model post hoc comparison tests indicate significant differences between the traditional journaler's likelihood of dropping out compared to the other intervention groups. In particular, it appears that participants assigned to the traditional journaling group were less likely than other participants to

drop out of the study. This may have contributed to some of the significant findings of the present study.

CHAPTER V

Discussion

Numerous studies over the past 30 years have revealed various physical and mental benefits of written emotional expression (Frattaroli, 2006; Lepore & Smyth, 2002; Pennebaker, 1990; Smyth, 1998; Smyth & Pennebaker, 2001). Psychological distress (Geisner et al., 2004; Kushner & Sher, 1993; McDermott et al., 1989; Pritchard et al., 2007; Reetz et al., 2013; Rickinson & Rutherford, 1995; Upcraft & Gardner, 1989) and sleep problems (Buboltz et al., 2006; Buboltz et al., 2009; Lund et al., 2010; Pilcher & Walters, 1997; Ye et al., 2015) are prevalent among college students and psychological distress has been linked to poor learning motivation (Brackney & Karabenick, 1995; Cole et al., 2004; Colquitt et al., 2000; Fisher, 1998). However, many college students fail to get treatment (Blanco et al., 2008; Eisenberg et al., 2007). As such, it is important to explore more accessible interventions to aid this population which is clearly in need of services. Therefore, the purpose of this study was to determine if college students would benefit from engaging in written expression. Specifically, would college students assigned to SMS text-based written expression interventions (daily SMS text-based journaling and bi-weekly SMS text-based journaling) benefit more than students engaging in traditional journaling, and would resilience or hardiness control for any benefits attained.

Preliminary Analyses

It is important to note that no significant pre-intervention differences were found

for baseline psychological distress, sleep, learning motivation, resilience, and hardiness for all participants, indicating an even distribution for comparison. Interestingly, preliminary analyses did indicate that females had significantly higher levels of baseline psychological distress. Furthermore, males reported significantly poorer baseline sleep quality and significantly higher baseline hardiness. However, when data was examined using multivariate statistics, no significant interaction effect was found between test scores over time, gender, and group assignment. These results may have been due to the distribution of gender within each group. For example, the bi-weekly SMS text-based group had 8 male participants and 24 female participants, and the control group had 5 males and 21 females.

Results indicated significant differences between pre-intervention and post-intervention psychological distress and learning motivation, but no significant differences in sleep quality. Indicating that, overall, all intervention participants, regardless of group intervention, saw a decrease in psychological distress and an increase in learning motivation over time. Further, participants in the control group saw a decrease in psychological distress over time and decrease in learning motivation over time.

Hypothesis 1. Hypothesis 1 posited that participants in all written expression intervention groups would benefit more than participants not engaging in an intervention. Results indicated only partial support for hypothesis 1. College students engaged in traditional journaling, bi-weekly SMS text-based journaling, and daily SMS-text based journaling all saw significant improvements in psychological distress and learning motivation, and no change in sleep, after engaging in four weeks of journaling. Furthermore, significant differences between the traditional journal group and the bi-

weekly text message group ($p = .020$) were found for learning motivation. Interestingly, participants in the control group, receiving no intervention, also saw improvements in psychological distress over time, but reported poorer learning motivation over time.

These results are important because they confirm the research indicating that written expression is effective (see Smyth, 1998, for a meta-analysis). However, it is interesting that these findings indicate that written expression only impacted psychological distress and learning motivation, while not impacting sleep quality. Research in the past has indicate that traditional journaling does impact sleep (Emmons & McCullough, 2003). This lack of significant results may be due to the significant baseline differences in sleep quality between males and females. Due to these extreme pre-intervention differences, scores may have averaged out when the two genders were combined for the present study. Furthermore, given the significant baseline differences between males and females on psychological distress, the fact that traditional journaling had a significant impact for the genders combined, this may be an especially useful intervention across the board. Further, it is interesting the participants also saw improvements in psychological distress over time, indicating that the passage of time may result in improvements. Although, the fact that participants engaged in no treatment had poorer learning motivation over time, while those engaged in written expression had improvements in learning motivation over time, speaks to the efficacy of written expression for learning motivation.

The truly interesting finding with hypothesis 1, is the significant impact bi-weekly SMS text-based journaling had on learning motivation. I am unaware of any study

looking at the effects of bi-weekly SMS text-based journaling on psychological distress, learning motivation, or sleep. As such, the results add to the literature by informing us that bi-weekly SMS text-based journaling may help college students increase intrinsic learning motivation over time. This could be an effective, cost-effective intervention for college students who are struggling academically.

Once again, it would be interesting to see the impact of SMS text-based journaling on psychological distress and sleep quality for females and males, separately, given the significant baseline differences between the genders. Again, there may be significant results here that are being averaged out due to the polarization of the genders on these two constructs. A larger sample size with equal distribution of gender would be needed to analyze differences.

Hypothesis 2. Hypothesis 2 posited that compared to participants in the traditional journaling intervention, those in the two SMS text-based journaling interventions would benefit more than those engaged in the traditional written expression intervention. As noted, results indicated participants in the traditional journaling group, daily SMS text-based journaling group, bi-weekly SMS text-based group, and the control group all experienced significant improvements in psychological distress over time. Further, all but those in the control group saw significant improvements in learning motivation over time, with the control group experiencing significant decreases in learning motivation over time. However, the present findings contrast with hypotheses 2, as we found that traditional journalers benefited significantly more than bi-weekly SMS text-based journalers. In particular, participants in the traditional journaling group, on average, scored significantly higher on post-intervention learning motivation than

participants in the bi-weekly SMS text-based journaling group. This may be due to effort. The students who chose to stick with the traditional journaling intervention may have experienced more benefit in intrinsic learning motivation because they worked harder as a result of the increased load of the traditional journaling intervention, as opposed to short text messaging.

These results, again, confirm the efficacy of journaling for college students, and in particular, traditional journaling (Emmons & McCullough, 2003; Esterling et al., 1994; Krantz & Pennebaker, 1996; Pennebaker & Francis, 1996; Pennebaker et al., 1988). Furthermore, it appears that, when it comes to choosing effective journaling intervention modalities, traditional journaling remains the most effective mode of journaling for college students. This is an interesting finding because past research has found young people to actually prefer text message monitoring as opposed to paper diaries (Shapiro et al., 2012). The present results indicate that for college students struggling with intrinsic learning motivation, and as a result, academic achievement, traditional journaling may be the superior choice. It is important to note, again, that journaling efficacy and, further, modality success, when it comes to psychological distress and sleep quality may differ when the two genders are analyzed separately, due to significant baseline gender differences in these variables.

Hypothesis 3. Hypothesis 3 posited that participants engaging, specifically, in daily SMS text-based journaling would see more benefit than those engaging in bi-weekly SMS text-based journaling. However, results indicated no significant group differences between daily SMS text-based journalers and bi-weekly SMS text-based journalers.

Research has indicated that 71% of adults in the United States text at least one time per day (FCC, 2016), with college students spending an average of 8-10 hours per day on their cell phones (Roberts et al., 2014). Findings concerning hypothesis 2 did find that participants in both the daily SMS text-based journaling group and the bi-weekly SMS text-based journaling group experienced significant changes in learning motivation over time. Yet, results of the present study also indicate that how often college students are prompted to journal per week, and as a result, how often they engage in journaling is not significant. These findings speak to dosage. Lyubomirsky and Layous (2013) address dosage (i.e., frequency and timing) of engaging in positive psychology interventions and concluded that “when people are free to choose their...activities, they do not view the activities as cumbersome and gladly perform them for longer and more often.” In other words, they determined that optimal dosage is dependent on person–activity fit.

It is important to consider that these results may also be due to the sample. College students who chose to complete the entire intervention may have been similar, and the number of texts per week may have been irrelevant as most students are on their phone much of the day, regardless.

Hypothesis 4. Hypothesis 4 posited that after controlling for resilience and hardiness, effects of written expression would still show significant change over time. Results of the repeated measures multiple analysis of covariance (MANCOVA) indicated statically significant patterns of change over time for scores of psychological distress and learning motivation when controlling for pre-intervention resilience. Additionally, pre-intervention resilience only significantly controlled for learning motivation between the

traditional journaling group and the bi-weekly SMS text-based journaling group, with the traditional journaling group scoring significantly higher than the bi-weekly SMS text-based journaling group on learning motivation overtime when controlling for resilience.

Resilience means “to recover quickly or easily from, or resist being affected by, a misfortune, shock, illness, etc.” (Resilience, 2010). Research indicates that, among college students, resilience is negatively correlated with psychological distress, depression, and anxiety (Haddadi & Besharat, 2010). Furthermore, a quality of resilient individuals is achievement orientation (Werner, & Smith, 1982). Given this information, the present studies’ findings of statically significant patterns of change over time for psychological distress, sleep, and learning motivation associated with pre-intervention resilience align with past research. Interestingly, when it comes to intervention modality, traditional journalers significantly outperformed bi-weekly SMS text-based journalers when controlling for pre-intervention resilience. This is in line with hypotheses 1 and 2. Again, effort may come in to play with these findings, as individuals who chose to follow through with the more complex intervention modality of nightly journaling may be more resilient.

When controlling for pre-intervention hardiness, significant patterns of change over time were only found for scores of learning motivation. Additionally, when exploring group differences over time, significant group differences were found in learning motivation between the traditional journaling group and the bi-weekly SMS text-based journaling group, when controlling for pre-intervention hardiness. Specifically, the traditional journaling group scored significantly higher than the bi-weekly SMS text-

based journaling group on learning motivation over time when controlling for hardiness. These results indicate that college students engaged in traditional journaling as opposed to those engaged in bi-weekly SMS text-based journaling were significantly more likely to have affected learning motivation over time above and beyond the effects that could be attributed to pre-intervention hardiness.

A major characteristic of resiliency is hardiness (Connor & Davidson, 2003), which is considered a personality trait while resilience is not (Bonanno, 2004). Past research has found that individuals higher in hardiness are lower in psychological distress (Nowack, 1989), even among college students (Beasley et al., 2003). Given this information, it is surprising that there were no significant patterns of change over time for psychological distress and sleep when controlling for hardiness. However, it is not surprising that learning motivation was significant, as research indicates that college students high in hardiness have been found to maintain more motivation (Sansone & Harackiewicz, 1996; Sansone et al., 1999). It is important to keep in mind that the measure of hardiness used for this study had poor internal consistency, and this may have affected the scores. Once again, when it came to intervention modality, traditional journalers significantly outperformed bi-weekly SMS text-based journalers when controlling for pre-intervention hardiness. This, again, is in line with hypotheses 1 and 2, which again, may be affected by selection bias. may come in to play with these findings, as individuals who chose to follow through with the more complex intervention modality of nightly journaling may be more resilient.

Practical Implications and Strengths

College is a time of change, stress, and pressure; and marks the beginning of a new chapter in life. Many college students are at increased risk for psychological distress (Geisner et al., 2004; Kushner & Sher, 1993; McDermott et al., 1989; Pritchard et al., 2007; Reetz et al., 2013; Rickinson & Rutherford, 1995; Upcraft & Gardner, 1989) and poor sleep (Buboltz et al., 2006; Buboltz et al., 2009; Lund et al., 2010; Pilcher & Walters, 1997; Ye et al., 2015). Additionally, research indicates that many college students perceive barriers to treatment (Blacklock et al., 2003; Eisenberg et al., 2007; Givens & Tjia, 2002; Hunt & Eisenberg, 2010; Komiya et al., 2000; Megivern et al., 2003; Mowbray et al., 2006) and as a result do not receive treatment from college counseling centers (ACHA-NCHA, 2017; Eisenberg et al., 2007). Given this information, researching interventions aimed at improving these factors for college students is beneficial, and journaling is a simple and effective intervention. This study gives us a better understanding of whether SMS text-based journaling is beneficial for college students. Overall, we found college students engaged in traditional journaling and bi-weekly SMS text-based journaling had significantly different pre-intervention and post-intervention scores, indicating efficacy of these interventions. Specifically, traditional journaling was found to significantly improve psychological distress, learning motivation, and resilience, while bi-weekly SMS text-based journaling was found to significantly improve learning motivation. This information indicates that journaling is an effective and practical intervention for college students, increasing the accessibility of treatment for college populations.

A strength of this study is the longitudinal and experimental study design. This structure allows a degree of causality to be inferred. This, in turn, provides helpful

information about the impact of journaling on psychological distress, sleep quality, and learning motivation. Additionally, including the control variables of resilience and hardiness adds information to the literature concerning other factors contributing to college students' maladaptation. Results indicated that when controlled for by resilience, significant change took place over time for scores of psychological distress, sleep, and learning motivation. Furthermore, participants in the traditional journaling group scored significantly higher than participants in the bi-weekly SMS text-based journaling group on learning motivation, overtime, when controlling for resilience. In other words, college students high in baseline resilience may benefit significantly more in learning motivation when engaged in traditional journaling than those engaged in bi-weekly SMS text-based journaling over time. Meanwhile, when controlled for by hardiness, significant patterns of change over time were found for scores of learning motivation only, with the traditional journaling group scoring significantly higher than the bi-weekly SMS text-based journaling group on learning motivation overtime when controlling for hardiness. In other words, college students engaged in traditional journaling are significantly more likely to benefit in learning motivation than those engaged in bi-weekly SMS text-based journaling, over time above and beyond the effects that could be attributed to baseline hardiness. These results suggest that baseline hardiness may contribute to the benefits of journaling, meaning this aspect of students' lives could potentially be a source of intervention as well. This information can help to inform clinicians in college counseling centers to work towards building resiliency factors with this population. Specifically, resiliency training may be an option for implementation. Richardson and Waite (2002) note that resilience is a "self-righting force within everyone that drives him/her to pursue

self-actualization, altruism, wisdom, and harmony with a spiritual source of strength” (p.1). This means that the trait of resiliency, and thus hardiness is within everyone’s reach.

Limitations and Suggestions for Future Research

This study is not without limitations. All participants were recruited from a single southeastern public university in the United States. Therefore, findings may not generalize to all college students, and even further, findings may not generalize to other populations. Follow-up studies with more diverse samples should be conducted to determine if the findings are generalizable. Another limitation of this study is that self-report measures were utilized. Future studies may consider using clinical interviews to obtain information.

It is important to note that poor internal consistency may have hurt the results of the present study. The present measures of pre-intervention and post-intervention psychological distress, sleep quality, academic motivation, and resilience all displayed internal consistency ranging from acceptable to good. However, the measures of pre-intervention and post-intervention hardiness displayed poor internal consistency. Due to the poor internal consistency of the present study’s measure of hardiness, it appears that there are items which are not correlating well with each other, and thus, may not be measuring the construct of hardiness. This may be due to the hardiness scale being a short scale of only 15 questions. Research indicates that short versions of scales inevitably exhibit lower internal consistency (Nunnally & Bernstein, 1994), because “the reliability of a scale is proportional to its length” (Streiner, 2003). However, DeVellis (1991) notes that while alphas of .60 are not desirable, they are not unacceptable.

Another major limitation to this study is threat to internal validity. Although we attempted to recruit ample participants, only the minimum number of required participants were able to be analyzed. Unfortunately, due to experimental mortality and low intervention compliance, the overall sample size was not as large as would have been preferred. Additionally, due to these problems, statistics on the six-week follow-up data could not be run. It would be interesting to run further analyses to find any similarities between participants who chose to complete the study and those who chose to drop out. For instance, individuals assigned to certain groups may have dropped out due to inconvenience, which may have skewed the current results. Further, participants may have dropped out due to course demands, depending on college major, academic classification, or current GPA.

An additional limitation is that due to the use of convenience sampling, the sample was not randomly selected. This may have impacted the internal validity of the study. For instance, students with specific characteristics may have trended in participation (i.e., only students who are experiencing high levels of symptoms or, conversely, very low levels, or students striving for extra credit). This may have resulted in low variability in the scores. It may be interesting to use effort as a moderator variable in future studies.

Another limitation concerns intervention. The intervention relied on participant self-report and responsibility. During the intervention, participants had the responsibility to complete surveys and journal entries as they received prompts to do so. However, many participants failed to answer survey questions or left blank journal entries. Further, many students failed to complete journal entries all together, but took the time to

complete the post-intervention survey. These attempts at partial participation may have been in effort to reach the final page which served as proof of participation for class extra credit. As a result, the variability of engagement in journaling may have influenced the outcomes. Due to this, it is difficult to flesh out whether results were due to the intervention. Future studies may want to employ a more structured intervention to ensure participants are truly engaged in the activity and do not drop out over time.

Lastly, the present study used all self-report measures and contained one measure per variable. This methodology threatened construct validity, specifically self-report bias and mono-method bias (i.e., when only a single method of measurement is used). Only having one measure of each variable may have biased what was truly being measured. All these biases may have threatened the internal validity of the present study.

In summary, this study found that females had significantly higher levels of baseline psychological distress, and males reported significantly poorer baseline sleep quality and significantly higher baseline hardiness. Further, results indicated significant differences for all participants in psychological distress and learning motivation over time, with all participants experiencing benefit on these variables, except control group participants experiencing poorer sleep over time. With regard to hypotheses testing, college students engaged in traditional journaling saw significant improvements in psychological distress and learning motivation and students engaged in daily SMS text-based journaling saw significant improvements in learning motivation. Furthermore, participants engaged in traditional journaling saw significant improvement in learning motivation above and beyond the control group receiving no intervention and the bi-weekly text message group. Further, no significant group differences were found between

students engaged in daily SMS text-based journaling and bi-weekly SMS text-based journaling. Lastly, when resilience was controlled for, scores on psychological distress and learning motivation significantly changed over time, with the traditional journaling group scoring significantly higher than the bi-weekly SMS text-based journaling group on learning motivation overtime. Additionally, when controlling for hardiness, scores on learning motivation changed significantly over time, with traditional journalers scoring significantly higher than bi-weekly SMS text-based journalers over time on learning motivation.

REFERENCES

- Adler, P. A., & Adler, P. (2008). The cyber worlds of self-injurers: Deviant communities, relationships, and selves. *Symbolic Interaction, 31*(1), 33-56.
- Agaibi, C. E., & Wilson, J. P. (2005). Trauma, PTSD, and resilience: A review of the literature. *Trauma, violence and abuse, 6*, 195-216.
doi:10.1177/1524838005277438
- Aguilera, A., & Muñoz, R. F. (2011). Text messaging as an adjunct to CBT in low-income populations: A usability and feasibility pilot study. *Professional Psychology: Research and Practice, 42*(6), 472-478.
<http://dx.doi.org/10.1037/a0025499>
- Ahn, H. N., & Wampold, B. E. (2001). Where oh where are the specific ingredients? A meta-analysis of component studies in counseling and psychotherapy. *Journal of Counseling Psychology, 48*(3), 251.
- Allred, K. D., & Smith, T. W. (1989). The hardy personality: Cognitive and physiological responses to evaluative threat. *Journal of personality and social psychology, 56*(2), 257.
- American College Health Association. (2014). *American College Health Association National College Health Assessment II*. Spring 2014. Linthicum, MD: American College Health Association.

- American College Health Association. (2017) *American College Health Association–National College Health Assessment: Reference Group Data Report*. Fall 2017. American College Health Association, Baltimore, MD.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing
- American Sleep Association (n.d.). What is sleep?. Retrieved March 15, 2018, from: <https://www.sleepassociation.org/patients-general-public/what-is-sleep/>
- Armstrong, A. W., Watson, A. J., Makredes, M., Frangos, J. E., Kimball, A. B., & Kvedar, J. C. (2009). Text-message reminders to improve sunscreen use: a randomized, controlled trial using electronic monitoring. *Arch Dermatol.* 145(11):1230–6.
- Aron, A., Norman, C. C., Aron, E. N., McKenna, C., & Heyman, R. E. (2000). Couple's shared participation in novel and arousing activities and experienced relationship quality. *Journal of Personality and Social Psychology.* 78, 273–284.
- Aspinwall, L. G. (1998). Rethinking the role of positive affect in self-regulation. *Motivation and Emotion.* 22, 1–32.
- Baker, J. R., & Moore, S. M. (2008). Distress, coping, and blogging: Comparing new Myspace users by their intention to blog. *CyberPsychology & Behavior*, 11(1), 81-85.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Educ Behav.* 31, 143–164.
- Barling, J. (1986). Interrole conflict and marital functioning amongst employed fathers. *Journal of Organizational Behavior*, 7(1), 1-8.

- Bartlett, S. J., Lukk, P., Butz, A., Lampros-Klein, F., & Rand, C. S. (2002). Enhancing medication adherence among inner-city children with asthma: results from pilot studies. *J Asthma*, *39*(1), 47–54.
- Bartone, P. T. (1989). Predictors of stress-related illness in city bus drivers. *J Occup Med*, *31*, 657– 63.
- Bartone, P. T. (1995, June). A short hardiness scale. Paper presented at the American Psychological Society Annual Convention, New York.
- Bartone, P. T. (2007). Test-retest reliability of the Dispositional Resilience Scale-15, a brief hardiness scale. *Psychological Reports*, *101*, 943-944.
doi:10.2466/PRO.101.7.943-944
- Bartone, P. T., Ursano, R. J., Wright, K. M., & Ingraham, L. H. (1989). The impact of a military air disaster on the health of assistance workers. *Journal of Nervous and Mental Disease*, *177*(6), 317-328.
- Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, *5*(4), 323.
- Beasley, M., Thompson, T., & Davidson, J. (2003). Resilience in response to life stress: The effects of coping style and cognitive hardiness. *Personality and Individual Differences*, *34*(1), 77-95.
- Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York: International Universities Press.
- Benishek, L. A., & Lopez, F. G. (1997). Critical evaluation of hardiness theory: Gender differences, perception of life events, and neuroticism. *Work & Stress*, *11*(1), 33-45.

- Benson, P. L. (1997). All kids are our kids. Minneapolis: Search Institute.
- Berwick, D. M., Budman, S., Damico-White, J., Feldstein, M., & Klerman, G. L. (1987). Assessment of psychological morbidity in primary care: explorations with the General Health Questionnaire. *Journal of Chronic Diseases, 40*, 71S-79S.
- Blacklock, B., Benson, B., Johnson, D., & Bloomberg, L. (2003). Needs assessment project: Exploring barriers and opportunities for college students with psychiatric disabilities. *Unpublished manuscript, University of Minnesota*.
- Blanco, C., Okuda, M., Wright, C., Hasin, D. S., Grant, B. F., Liu, S. M., & Olfson, M. (2008). Mental health of college students and their non-college-attending peers: results from the national epidemiologic study on alcohol and related conditions. *Archives of General Psychiatry, 65*(12), 1429-1437.
- Block, J., & Kremen, A. M. (1996). IQ and ego-resiliency: conceptual and empirical connections and separateness. *Journal of Personality and Social Psychology, 70*(2), 349.
- Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist, 59*, 20-28.
- Bonanno, G. A., & Keltner, D. (1997). Facial expressions of emotion and the course of conjugal bereavement. *Journal of Abnormal Psychology, 106*, 126-137.
- Booth, R. J., Petrie, K. J., & Pennebaker, J. W. (1997). Changes in circulating lymphocyte numbers following emotional disclosure: Evidence of buffering? *Stress Medicine, 13*(1), 23-29. [http://dx.doi.org/10.1002/\(SICI\)1099-1700\(199701\)13:1<23::AID-SMI714>3.0.CO;2-E](http://dx.doi.org/10.1002/(SICI)1099-1700(199701)13:1<23::AID-SMI714>3.0.CO;2-E)

- Bootzin, R. R. (1997). Examining the theory and clinical utility of writing about emotional experiences. *Psychological Science*, 8, 167–169.
- Bort-Roig, J., Gilson, N. D., Puig-Ribera, A., Contreras, R. S., & Trost, S. G. (2014). Measuring and influencing physical activity with smartphone technology: a systematic review. *Sports Med*, 44(5), 671–686.
- Boulton, M. J., & Smith, P. K. (1992). The social nature of play fighting and play chasing: Mechanisms and strategies underlying cooperation and compromise. In: Barkow J. H., Cosmides, L., Tooby, J., editors. *The adapted mind: Evolutionary psychology and the generation of culture*. New York: Oxford University Press. pp. 429–444.
- Bowling, A. (1997). *Measuring health: A review of quality of life measurement scales* (2nd ed.). Buckingham, England: Open University Press.
- Bowling, A., Farquhar, M., Grundy, E., & Formby, J. (1992). Psychiatric morbidity among people aged 85+ in 1987. A follow-up study at two and a half years: Associations with changes in psychiatric morbidity. *International Journal of Geriatric Psychiatry*, 7(5), 307-321.
- Brackney, B. E., & Karabenick, S. A. (1995). Psychopathology and academic performance: The role of motivation and learning strategies. *Journal of Counseling Psychology*, 42(4), 456.
- Brewin, C. R., & Lennard, H. (1999). Effects of mode of writing on emotional narratives. *Journal of Trauma and Stress*, 12(2), 255-261.
doi:10.1023/A:1024736828322

- Brooks, P. R., Girgenti, A. A., & Mills, M. J. (2009). Sleep patterns and symptoms of depression in college students. *College Student Journal, 43*, 464-472.
- Bryde, J. F., & Milburn, C. M. (1990). Helping to make the transition from high school to college. *Understanding Undergraduate Education, 203-213*.
- Buboltz, W. C., Loveland, J., Jenkins, S. M., Brown, F., Soper, B., & Hodges, J. (2006). College student sleep: Relationship to health and academic performance. In M. V. Landow (Ed.), *College students: Mental health and coping strategies* (pp. 1-39). Hauppauge, NY: Nova Science Publishers.
- Buboltz, W., Jr., Jenkins, S. M., Soper, B., Woller, K., Johnson, P., & Fans, T. (2009). Sleep habits and patterns of college students: An expanded study. *Journal of College Counseling, 12*, 113-124. doi:10.1002/j.2161-1882.2009.tb00109.x
- Cameron, L. D., & Nicholls, G. (1996). Expression of stressful experiences through writing: A self-regulation approach. Manuscript submitted for publication.
- Campbell-Sills, L., Cohan, S. L., & Stein, M. B. (2006). Relationship of resilience to personality, coping, and psychiatric symptoms in young adults. *Behaviour Research and Therapy, 44*, 585-599.
- Campsen, N., & Buboltz, W. (2017). Lifestyle Factors' Impact on Sleep of College Students. *Austin Journal of Sleep Disorders, 4*(1), 1028.
- Cho, J. H., Lee, H. C., Lim, D. J., Kwon, H. S., & Yoon, K. H. (2009). Mobile communication using a mobile phone with a glucometer for glucose control in type 2 patients with diabetes: as effective as an Internet-based glucose monitoring system. *J Telemed Telecare, 15*(2), 77-82.

- Christensen, A. J., Edwards, D. L., Wiebe, J. S., Benotsch, E. G., McKelvey, L., Andrews, M., & Lubaroff, D. M. (1996). Effect of verbal self-disclosure on natural killer cell activity: Moderation influence on cynical hostility. *Psychosomatic Medicine*, *58*, 150-155.
- Clarke, J., & Van Amerom, G. (2008). A comparison of blogs by depressed men and women. *Issues in mental health nursing*, *29*(3), 243-264.
- Coren, S. (1994). The prevalence of self-reported sleep disturbances in young adults. *International Journal of Neuroscience*, *79*(1-2), 67-73.
doi:10.3109/00207459408986068
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Cole-Lewis, H., & Kershaw, T. (2010). Text messaging as a tool for behavior change in disease prevention and management. *Epi Reviews*, *32*, 56-69.
- Cole, M. S., Feild, H. S., & Harris, S. G. (2004). Student learning motivation and psychological hardiness: Interactive effects on students' reactions to a management class. *Academy of Management Learning & Education*, *3*(1), 64-85.
doi:10.5465/amle.2004.12436819
- Cole, S. W., Kemeny, M. E., Taylor, S. E., & Visscher, B. R. (1996). Elevated health risk among gay men who conceal their homosexual identity. *Health Psychology*, *15*, 243-251. doi:10.1037/0278-6133.15.4.243
- Colquitt, J. A., & Simmering, M. J. (1998). Conscientiousness, goal orientation, and motivation to learn during the learning process: A longitudinal study. *Journal of applied psychology*, *83*(4), 654.

- Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: a meta-analytic path analysis of 20 years of research. *Journal of applied psychology, 85*(5), 678. doi:10.1037/0021-9010.85.5.678
- Colten, H. R., & Altevogt, B. M. (2006). Institute of Medicine Committee on sleep medicine and research. *Sleep disorders and sleep deprivation: an unmet public health problem. Washington, DC: Institute of Medicine: National Academies Press, 47-54.*
- Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and Anxiety, 18*(2), 76-82. doi:10.1002/da.10113
- Contrada, R. J. (1989). Type A behavior, personality hardiness, and cardiovascular responses to stress. *Journal of personality and social psychology, 57*(5), 895. doi:10.1037/0022-3514.57.5.895
- Csikszentmihalyi, M., & Rathunde, K. (1998). The development of the person: An experiential perspective on the ontogenesis of psychological complexity. In: Damon, W., Lerner, R. M., editors. *Handbook of child psychology: Vol. 1. Theoretical models of human development. 5.* New York: Wiley; 1998. pp. 635–684.
- Czajka, J. A. (1987). Behavioral inhibition and short term physiological responses. Unpublished master's thesis, Southern Methodist University, Dallas, TX. De Koninck, J, Lorrain, D., Christ, G., Proulx, G., & Coulombe, D. (1989). Intensive language learning and increases in rapid eye movement sleep evidence of a

performance factor. *International Journal of Psychophysiology*, 8, 43-48.

doi:10.1016/0167-8760(89)90018-4

Danner, D. D., Snowdon, D. A., & Friesen, W. V. (2001). Positive emotions in early life and longevity: Findings from the nun study. *Journal of Personality and Social Psychology*, 80, 804–813.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

De Koninck, J., Lorrain, D., Christ, G., Proulx, G., & Coulombe, D. (1989). Intensive language learning and increases in rapid eye movement sleep evidence of a performance factor. *International Journal of Psychophysiology*, 8, 43-48.

doi:10.1016/0167-8760(89)90018-4default/files/SleepWakeCycle.pdf

Denz-Penhey, H., & Murdoch, J. C. (2008). Personal resiliency: Serious diagnosis and prognosis with unexpected quality outcomes. *Qualitative Health Research*, 18, 391-404. doi:10.1177/1049732307313431

Derryberry, D., & Tucker, D. M. (1994). Motivating the focus of attention. In: Neidenthal P. M., Kitayama, S., editors. *The heart's eye: Emotional influences in perception and attention*. San Diego, CA: Academic Press. pp. 167–196.

DeVellis, R. R. (1991). *Scale development: Theory and applications*. Thousand Oaks, CA: Sage

Division of Sleep Medicine: Harvard Medical School (n.d.). Sleep and disease risk.

Retrieved October 22, 2017, from: <http://healthysleep.med.harvard.edu/healthy/matters/consequences/sleep-and-disease-risk>

- Doi, Y., Minowa, M., Uchiyama, M., & Okawa, M. (2001). Subjective sleep quality and sleep problems in the general Japanese adult population. *Psychiatry and Clinical Neurosciences*, *55*(3), 213-215.
- Dolbier, C. L., Soderstrom, M., & Steinhardt, M. A. (2001). The relationships between self-leadership and enhanced psychological, health, and work outcomes. *The Journal of Psychology*, *135*(5), 469-485.
- Dominguez, B. (1995). The roles of disclosure and emotional reversal in clinical practice. *Emotion, Disclosure, and Health*, 255-270.
- Donnelly, D. A., & Murray, E. J. (1991). Cognitive and emotional changes in written essays and therapy interviews. *Journal of Social and Clinical Psychology*, *10*, 334-350.
- Downey, R. G., & King, C. V. (1998). Missing data in Likert ratings: A comparison of replacement methods. *The Journal of General Psychology*, *125*(2), 175-191.
- Dunn, L. B., Iglewicz, A., & Moutier, C. (2008). A conceptual model of medical student well-being: Promoting resilience and preventing burnout. *Academic Psychiatry*, *32*, 44-53. doi:10.1176/appi.ap.32.1.44
- DuPaul, G. J., Weyandt, L. L., O'Dell, S. M., & Varejao, M. (2009). College students with ADHD: Current status and future directions. *Journal of Attention Disorders*, *13*(3), 234-250.
- Earvolino-Ramirez, M. (2007, April). Resilience: A concept analysis. In *Nursing forum* (Vol. 42, No. 2, pp. 73-82). Malden, USA: Blackwell Publishing Inc.
- Easterbrook, J. A. (1959). The effect of emotion on cue utilization and the organization of behavior. *Psychological Review*, *66*, 183-201.

- Eisenberg, D., Golberstein, E., & Gollust, S. E. (2007). Help-seeking and access to mental health care in a university student population. *Medical Care*, *45*(7), 594-601.
- Eisenberg, D., Hunt, J., & Speer, N. (2013). Mental health in American colleges and universities: variation across student subgroups and across campuses. *The Journal of Nervous and Mental Disease*, *201*(1), 60-67.
- Eisenberg, D., Nicklett, E. J., Roeder, K., & Kirz, N. E. (2011). Eating disorder symptoms among college students: Prevalence, persistence, correlates, and treatment-seeking. *Journal of American College Health*, *59*(8), 700-707.
- Ellis, A. (1962). Reason and emotion in psychotherapy.
- Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: an experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology*, *84*(2), 377.
- Esterling, B. A., Antoni, M. H., Fletcher, M. A., Margulies, S., & Schneiderman, N. (1994). Emotional disclosure through writing or speaking modulates latent Epstein-Barr virus antibody titers. *Journal of Consulting and Clinical Psychology*, *62*, 130-140.
- Fairchild, A. J., Horst, S. J., Finney, S. J., & Barron, K. E. (2005). Evaluating existing and new validity evidence for the Academic Motivation Scale. *Contemporary Educational Psychology*, *30*(3), 331-358.
- Fairhurst, K., & Sheikh, A. (2008). Texting appointment reminders to repeated non-attenders in primary care: randomized controlled study. *Qual Saf Health Care*. *17*(5), 373-6.

- Faul & Erdfelder (1998). G*Power (3.1.9.2) [Computer software]. Retrieved from <http://www.gpower.hhu.de/en.html>
- FCC, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Nineteenth Report, DA 16-1061 (2016), FCC and Mosaik data <https://www.fcc.gov/document/19th-mobile-wireless-competition-report>
- Fisher, T. (1998). High anxiety: Preparing trainees to learn. *Training & Development, 52*(12), 14-16.
- Fjeldsoe, B., Miller, Y., & Marshall, A. (2013). Social cognitive mediators of the effect of the MobileMums intervention on physical activity. *Health Psychology, 32*(7), 729-738.
- Folkman, S. (1997). Positive psychological states and coping with severe stress. *Social Science Medicine, 45*, 1207-1221.
- Folkman, S., & Moskowitz, J. T. (2000). Positive affect and the other side of coping. *American Psychologist, 55*, 647-654.
- Fortunato, V. J., LeBourgeois, M. K., & Harsh, J. (2008). Development of a five-dimensional measure of adult sleep quality. *Educational and Psychological Measurement, 68*(3), 488-514.
- Francis, M. E., & Pennebaker, J. W. (1992). Putting stress into words: The impact of writing on physiological, absentee, and self-reported emotional well-being measures. *American Journal of Health Promotion, 6*(4), 280-287.
- Franzini, L. R., & Grimes, W. B. (1980). Contracting and Stuart's three-dimensional program in behavior modification of the obese. *Psychotherapy: Theory, Research & Practice, 17*(1), 44.

- Fratraroli, J. (2006). Experimental disclosure and its moderators: A meta-analysis. *Psychological Bulletin*, *132*(6), 823-865. <http://dx.doi.org/10.1037/0033-2909.132.6.823>
- Fredrickson, B. L. (1998). What good are positive emotions?. *Review of General Psychology*, *2*(3), 300.
- 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., & Branigan, C. (2005). Positive emotions broaden the scope of attention and thought-action repertoires. *Cognition & Emotion*, *19*(3), 313–332. <http://doi.org/10.1080/02699930441000238>
- Fredrickson, B. L., & Joiner, T. (2002). Positive emotions trigger upward spirals toward emotional well-being. *Psychological Science*, *13*(2), 172-175.
- Fredrickson, B. L., Mancuso, R. A., Branigan, C., & Tugade, M. M. (2000). The undoing effect of positive emotions. *Motivation and Emotion*, *24*(4), 237-258.
- Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. (2003). What good are positive emotions in crises?: A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology*, *84*, 365–376.
- Fukuoka, Y., Komatsu, J., Suarez, L., Vittinghoff, E., Haskell, W., Noorishad, T., & Pham, K. (2011). The mPED randomized controlled clinical trial: applying mobile persuasive technologies to increase physical activity in sedentary women protocol. *BMC Public Health*, *11*, 933.

- Funk, S. C. (1992). Hardiness: A review of theory and research. *Health Psychology, 11*, 335-345.
- Gallagher, R. P. (2015). *National Survey of College Counseling Centers 2014*. Project Report. The International Association of Counseling Services (IACS).
- Gable, S. L., & Haidt, J. (2005). What (and why) is positive psychology?. *Review of General Psychology, 9*(2), 103. doi:10.1037/1089-2680.9.2.103
- Geisner, I. M., Larimer, M. E., & Neighbors, C. (2004). The relationship among alcohol use, related problems, and symptoms of psychological distress: Gender as a moderator in a college sample. *Addictive Behaviors, 29*(5), 843-848.
- Gentry, W. D., & Kobasa, S. C. (1984). Social and psychological resources mediating stress-illness relationships in humans. *Handbook of Behavioral Medicine, 1*, 87-116.
- Gewirtz, J. C., & Davis, M. (2000). Using pavlovian higher-order conditioning paradigms to investigate the neural substrates of emotional learning and memory. *Learning and Memory, 7*, 257-266
- Gilbert, S. P., & Weaver, C. C. (2010). Sleep quality and academic performance in university students: A wake-up call for college psychologists. *Journal of College Student Psychotherapy, 24*, 295-306.
- Givens, J. L., & Tjia, J. (2002). Depressed medical students' use of mental health services and barriers to use. *Academic medicine, 77*(9), 918-921.
- Goldberg, D., & Williams, P. (1988). A user's guide to the General Health Questionnaire. Windsor, UK: NFER-Nelson.

- Greenberg, M. A., Wortman, C. B., & Stone, A. A. (1996). Emotional expression and physical health: Revising traumatic memories or fostering self-regulation? *Journal of Personality and Social Psychology*, *71*(3), 588–602. doi:10.1037/0022-3514.71.3.588
- Greenberg, M. A., & Stone, A. A. (1992). Writing about disclosed versus undisclosed traumas: Immediate and long-term effects on mood and health. *Journal of Personality and Social Psychology*, *63*, 75-84.
- Guadagno, R. E., Okdie, B. M., & Eno, C. A. (2008). Who blogs? Personality predictors of blogging. *Computers in human behavior*, *24*(5), 1993-2004.
- Haapala, I., Barengo, N. C., & Biggs, S. (2009). Weight loss by mobile phone: a 1-year effectiveness study. *Public Health Nutrition*. *12*(12), 2382–2391.
- Haddadi, P., & Besharat, M. A. (2010). Resilience, vulnerability and mental health. *Procedia-Social and Behavioral Sciences*, *5*, 639-642.
- Hamilton, T. K., & Schweitzer, R. D. (2000). The cost of being perfect: Perfectionism and suicide ideation in university students. *Australian and New Zealand Journal of Psychiatry*, *34*(5), 829-835.
- Hardiness. Entry 3. (2010). In *Oxford English dictionary online* (3rd ed.), Retrieved from <http://www.oed.com>
- Harris, M. B., & Bruner, C. G. (1971). A comparison of a self-control and a contract procedure for weight control. *Behaviour Research and Therapy*, *9*(4), 347-354.
- Harvard Health Publishing (2009). Sleep and mental health. Retrieved March 12, 2018, from: https://www.health.harvard.edu/newsletter_article/sleep-and-mental-health
- Haug, S., Meyer, C., Schorr, G., Bauer, S., & John, U. (2009). Continuous individual

- support of smoking cessation using text messaging: a pilot experimental study. *Nicotine Tobacco Research*, 11(8), 915–23.
- Hawthorne, G., & Elliott, P. (2005). Imputing cross-sectional missing data: Comparison of common techniques. *Australian and New Zealand Journal of Psychiatry*, 39(7), 583-590.
- Henkel, V., Mergl, R., Kohlen, R., Maier, W., Möller, H. J., & Hegerl, U. (2003). Identifying depression in primary care: a comparison of different methods in a prospective cohort study. *Bmj*, 326(7382), 200-201.
- Hershner, S. D., & Chervin, R. D. (2014). Causes and consequences of sleepiness among college students. *Nature and Science of Sleep*, 6, 73.
- Hirshkowitz, M., Moore, C. A., & Minhoto, G. (1997). The basics of sleep. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders*. Washington, D.C.: American Psychological Association.
- Hoyt, T., & Pasupathi, M. (2008). Blogging about trauma: Linguistic markers of apparent recovery. *E-Journal of Applied Psychology*, 4(2), 56-62.
doi:10.7790/ejap.v4i2.106
- Howitt, D., & Cramer, D. (2011). Introduction to Research Methods in Psychology. (3rd ed.). (pp. 164, 179-181). Harlow, Essex: Pearson Education Limited
- Hughes, C. F., Uhlmann, C., & Pennebaker, J. W. (1994). The body's response to psychological defense. *Journal of Personality*, 62, 565-585.
- Hunt, J., & Eisenberg, D. (2010). Mental health problems and help-seeking behavior among college students. *Journal of Adolescent Health*, 46(1), 3-10.

- Huppert, F. A., & Garcia, A. W. (1991). Qualitative differences in psychiatric symptoms between high risk groups assessed on a screening test (GHQ-30). *Social psychiatry and psychiatric epidemiology*, *26*(6), 252-258.
- Hystad, S. W., Eid, J., Johnsen, B. H., Laberg, J. C., & Bartone, P. (2010). Psychometric properties of the revised Norwegian Dispositional Resilience (hardiness) Scale. *Scand J Psychol*, *51*, 237-45.
- Hystad, S. W., Eid, J., Laberg, J. C., Johnsen, B. H., & Bartone, P. T. (2009). Academic stress and health: exploring the moderating role of personality hardiness. *Scand J Educ Res*, *53*, 421-9. doi:10.1111/j.1467-9450.2009.00759.x
- International Telecommunication Union. (2014). The World in 2014: ICT Facts and Figures. Geneva: International Telecommunication Union.
<http://www.itu.int/en/ITU/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf>
- Irwin, M., McClintock, J., Costlow, C., Fortner, M., White, J., & Gillin, J. C. (1996). Partial night sleep deprivation reduces natural killer and cellular immune response in humans. *The FASEB Journal*, *10*, 643-653.
- Isaacs, E., Konrad, A., Walendowski, A., Lennig, T., Hollis, V., & Whittaker, S. (2013, April). Echoes from the past: how technology mediated reflection improves well-being. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 1071-1080). ACM. doi:10.1145/2470654.2466137
- Jahoda, M. (1958). Current concepts of positive mental health.
- Johnson, D. (2013). SMS open rates exceed 99%. Tatango, April 10.
<http://www.tatango.com/blog/smsopen-rates-exceed-99>

- Joinson, A. (1998). Causes and implications of disinhibited behavior on the Internet. In J. Gackenbach (Ed.), *Psychology and the Internet: Intrapersonal, interpersonal, and transpersonal implications* (pp. 43-60). San Diego, CA, US: Academic Press.
- Kagan, J., Reznick, J. S., & Snidman, N. (1988). Biological bases of childhood shyness. *Science*, 240, 167-171.
- Keltner, D., & Bonanno, G. A. (1997). A study of laughter and dissociation: Distinct correlates of laughter and smiling during bereavement. *Journal of Personality and Social Psychology*, 73, 687–702.
- Kerr, D. A., Pollard, C. M., Howat, P., Delp, E. J., Pickering, M., Kerr, K. R., ... & Boushey, C. J. (2012). Connecting Health and Technology (CHAT): protocol of a randomized controlled trial to improve nutrition behaviors using mobile devices and tailored text messaging in young adults. *BMC Public Health*, 12, 477.
- Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & Ustun, T. B. (2007). Age of onset of mental disorders: a review of recent literature. *Current Opinion in Psychiatry*, 20(4), 359.
- Keyes, C. L. (2007). Promoting and protecting mental health as flourishing: A complementary strategy for improving national mental health. *American psychologist*, 62(2), 95.
- Keyes, C. L., Lopez, S. J., & Snyder, C. R. (2002). Handbook of positive psychology.
- King, L. A., & Miner, K. N. (2000). Writing about the perceived benefits of traumatic events: Implications for physical health. *Personality and social psychology bulletin*, 26(2), 220-230.

- Kobasa, S. C. (1979). Stressful life events, personality, and health: an inquiry into hardiness. *Journal of Personality and Social Psychology*, 37(1), 1.
- Kobasa, S. C. O., Maddi, S. R., Puccetti, M. C., & Zola, M. A. (1985). Effectiveness of hardiness, exercise and social support as resources against illness. *Journal of Psychosomatic Research*, 29(5), 525-533. doi:10.1016/0022-3999(85)90086-8
- Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982). Hardiness and health: a prospective study. *Journal of Personality and Social Psychology*, 42(1), 168.
doi:10.1037/0022-3514.42.1.168
- Kohut, A., Wike, R., Horowitz, J. M., Simmons, K., Poushter, J., Barker, C., ... & Gross, E. M. (2011). *Global digital communication: Texting, social networking popular worldwide*. Pew Research Centre.
- Konrath, S. (2015). Positive technology: Using mobile phones for psychosocial interventions. In *Encyclopedia of mobile phone behavior* (pp. 871-897). IGI Global. doi:10.4018/978-1-4666-8239-9.ch072
- Komiya, N., Good, G. E., & Sherrod, N. B. (2000). Emotional openness as a predictor of college students' attitudes toward seeking psychological help. *Journal of Counseling Psychology*, 47(1), 138. doi:10.1037/0022-0167.47.1.138
- Kouris, I., Mougiakakou, S., Scarnato, L., Iliopoulou, D., Diem, P., Vazeou, A., & Koutsouris, D. (2010). Mobile phone technologies and advanced data analysis towards the enhancement of diabetes self-management. *International Journal of Electronic Healthcare*, 5(4), 386-402.
- Krantz, A., & Pennebaker, J. W. (1996). Bodily versus written expression of traumatic experience. Manuscript submitted for publication.

- Krauth, J. (2000). *Experimental design: a handbook and dictionary for medical and behavioral research* (Vol. 14). Elsevier.
- Kushner, M. G., & Sher, K. J. (1993). Comorbidity of alcohol and anxiety disorders among college students: Effects of gender and family history of alcoholism. *Addictive Behaviors, 18*(5), 543-552. doi:10.1016/0306-4603(93)90070-p
- Lazarus, R. S. (1993). From psychological stress to emotions: A history of changing outlooks. *Annual Review of Psychology, 44*, 1-21. doi: 10.1146/annurev.ps.44.
- Leipold, B., & Greve, W. (2009). Resilience: A conceptual bridge between coping and development. *European Psychologist, 14*, 40-50. doi : 10.1027/1016-9040.14.1.40
- Lepore, S. J., & Smyth, J. M. (Eds.). (2002). *The writing cure: How expressive writing promotes health and emotional well-being*. Washington, DC, US: American Psychological Association. <http://dx.doi.org/10.1037/10451-000>
- Levitz, R. S., Noel, L., & Saluri, D. (1985). *Increasing student retention: Effective programs and practices for reducing the dropout rate*. Jossey-Bass.
- Lichtenthal, W. G., & Cruess, D. G. (2010). Effects of directed written disclosure on grief and distress symptoms among bereaved individuals. *Death Studies, 34*(6), 475-499.
- Lindberg, E., Janson, C., Gislason, T., Björnsson, E., Hetta, J., & Boman, G. (1997). Sleep disturbances in a young adult population: can gender differences be explained by differences in psychological status?. *Sleep, 20*(6), 381-387.

- Lund, H. G., Reider, B. D., Whiting, A. B., & Prichard, J. R. (2010). Sleep patterns and predictors of disturbed sleep in a large population of college students. *Journal of Adolescent Health, 46*, 124-132. doi:10.1016/j.jadohealth.2009.06.016
- Lutgendorf, S. K., Antoni, M. H., Kumar, M., & Schneiderman, N. (1994). Changes in cognitive coping strategies predict EBV-antibody titre change following a stressor disclosure induction. *Journal of Psychosomatic Research, 38*, 63-78.
- Lyubomirsky, S., & Layous, K. (2013). How do simple positive activities increase well-being?. *Current directions in psychological science, 22*(1), 57-62.
- Maddi, S. (1998). Dispositional hardiness in health and effectiveness. *Encyclopedia of mental health, 323-335*.
- Maddi, S. R., & Khoshaba, D. M. (2001). Personal views survey III-R: Internet instruction manual. *Newport Beach, CA: Hardiness Institute*.
- Maddi, S. R., & Kobasa, S. C. (1984). *Hardy executive*. Dow Jones-Irwin.
- Maddux, J. E. (2002). Stopping the “madness”. *Handbook of Positive Psychology, 3-9*.
- Madell, D. E., & Muncer, S. J. (2007). Control over social interactions: an important reason for young people’s use of the Internet and mobile phones for communication? *Cyber Psychol Behav, 10*(1):137–140.
- Manning, M. R., & Fusilier, M. R. (1999). The relationship between stress and health care use: an investigation of the buffering roles of personality, social support and exercise. *Journal of Psychosomatic Research, 47*(2), 159-173.
- Mathieu, J. E., & Martineau, J. W. (1997). Individual and situational influences on training motivation. *Improving training effectiveness in work organizations, 193, 221*.

- Mathieu, J. E., Tannenbaum, S. I., & Salas, E. (1992). Influences of individual and situational characteristics on measures of training effectiveness. *Academy of management journal*, 35(4), 828-847.
- McDermott, R. J., Hawkins, W. E., Littlefield, E. A., & Murray, S. (1989). Health behavior correlates of depression among university students. *Journal of American College Health*, 38(3), 115-119.
- McNeil, K., Kozma, A., Stones, M. J., & Hannah, E. (1986). Measurement of psychological hardiness in older adults. *Canadian Journal on Aging/La Revue canadienne du vieillissement*, 5(1), 43-48.
- Megivern, D., Pellerito, S., & Mowbray, C. (2003). Barriers to higher education for individuals with psychiatric disabilities. *Psychiatric Rehabilitation Journal*, 26(3), 217.
- Mowbray, C. T., Megivern, D., Mandiberg, J. M., Strauss, S., Stein, C. H., Collins, K., ... & Lett, R. (2006). Campus mental health services: recommendations for change. *American Journal of Orthopsychiatry*, 76(2), 226.
- Mumford, E., Schlesinger, H. J., & Glass, G. V. (1983). Reducing medical costs through mental health treatment: Research problems and recommendations. In A. Broskowski, E. Marks, & S.H. Budman (Eds.), *Linking health and mental health* (pp. 257-273). Beverly Hills, CA: Sage.
- Murray, E. J., & Segal, D. L. (1994). Emotional processing in vocal and written expression of feelings about traumatic experiences. *Journal of Traumatic Stress*, 7(3), 391-405.

- Murray, E. J., Lamnin, A. D., & Carver, C. S. (1989). Emotional expression in written essays and psychotherapy. *Journal of Social and Clinical Psychology, 8*, 414-429.
- Myers, D. G. (2000). The funds, friends, and faith of happy people. *American Psychologist, 55*, 56 – 67.
- National Sleep Foundation (2006). Sleep-wake cycle: Its physiology and impact on health. Retrieved October 21, 2017, from: <https://sleepfoundation.org/sites/>
- National Sleep Foundation (2015). National sleep foundation recommends new sleep times. Retrieved September 12, 2017, from website: <https://sleepfoundation.org/press-release/national-sleep-foundation-recommends-new-sleep-times>
- National Sleep Foundation (2016). Sleptionary: Definitions of common sleep terms. Retrieved August 24, 2017, from website: <https://sleepfoundation.org/sleptionary>
- National Sleep Foundation (n.d.). Sleep drive and your body clock. Retrieved March 15, 2018, from: <https://sleepfoundation.org/sleep-topics/sleep-drive-and-your-body-clock/>
- National Sleep Foundation (n.d.). Sleep drive and your body clock. Retrieved October 21, 2017, from: <https://sleepfoundation.org/sleep-topics/sleep-drive-and-your-body-clock/>
- National Sleep Foundation. (2013). International bedroom poll first to explore sleep differences among six countries. Retrieved from <http://sleepfoundation.org/media-center/press-release/national-sleep-foundation-2013-international-bedroom-poll>
- Newton, K. H., Wiltshire, E. J., & Elley, C. R. (2009). Pedometers and text messaging to increase physical activity: randomized controlled trial of adolescents with type 1

- diabetes. *Diabetes Care*, 32(5), 813–815.
- Nichols, M. P., & Efran, J. S. (1985). Catharsis in psychotherapy: A new perspective. *Psychotherapy: Theory, Research, Practice, Training*, 22(1), 46.
- Noe, R. A. (1986). Trainees' attributes and attitudes: Neglected influences on training effectiveness. *Academy of Management Review*, 11(4), 736-749.
- Noe, R. A., & Schmitt, N. (1986). The influence of trainee attitudes on training effectiveness: Test of a model. *Personnel Psychology*, 39(3), 497-523.
- Noe, R. A., Wilk, S. L., Mullen, E. J., & Wanek, J. E. (2014). Employee Development: Issues in Construct Definition and Investigation of Antecedents. *Improving Training Effectiveness in Work Organizations*, ed. JK Ford, SWJ Kozlowski, K. Kraiger, E. Salas, and MS Teachout (Mahwah, NJ: Lawrence Erlbaum, 1997), 153-189.
- Nolen-Hoeksema, S. (1990). Sex differences in depression. Stanford, CA: Stanford University Press.
- Nowack, K. M. (1989). Coping style, cognitive hardiness, and health status. *Journal of Behavioral Medicine*, 12(2), 145-158.
- Nunnally, J., & Bernstein, L. (1994). Psychometric theory. New York: McGraw-Hill Higher, Inc.
- Obermayer, J. L., Riley, W. T., Asif, O., & Jean-Mary, J. (2004). College smoking-cessation using cell phone text messaging. *Journal of American College Health*. 53(2), 71–8.
- O'Brien, R. G., & Kaiser, M. K. (1985). MANOVA method for analyzing repeated measures designs: an extensive primer. *Psychological bulletin*, 97(2), 316.

- O'Connor, R. C., & O'Connor, D. B. (2003). Predicting hopelessness and psychological distress: The role of perfectionism and coping. *Journal of Counseling Psychology, 50*(3), 362.
- Panksepp, J. (1998). Attention deficit hyperactivity disorders, psychostimulants, and intolerance of childhood playfulness: A tragedy in the making? *Current Directions in Psychological Science, 7*, 91–98.
- Park, C. L., & Blumberg, C. J. (2002). Disclosing trauma through writing: Testing the meaning-making hypothesis. *Cognitive Therapy and Research, 26*(5), 597-616.
- Park, Y. M., Matsumoto, K., Shinkoda, H., Nagashima, H., Kang, M. J., & Seo, Y. J. (2001). Age and gender difference in habitual sleep–wake rhythm. *Psychiatry and Clinical Neurosciences, 55*(3), 201-202.
- Parvanta, C., Nelson, D. E., Parvanta, S. A., & Harner, R. N. (2010). *Essentials of Public Health Communication*. Sudbury, MA: Jones & Bartlett Publ.
- Patrick, K., Raab, F., Adams, M. A., Dillon, L., Zabinski, M., Rock, C. L., ... & Norman, G. J. (2009). A text message–based intervention for weight loss: randomized controlled trial. *Journal of Medical Internet Research, 11*(1).
- Pavlov, I. P. (1927). *Conditional reflexes: an investigation of the physiological activity of the cerebral cortex*.
- Peng, C. Y. J., Harwell, M., Liou, S. M., & Ehman, L. H. (2006). Advances in missing data methods and implications for educational research. *Real Data Analysis, 3178*.
- Pengilly, J. W., & Dowd, E. T. (2000). Hardiness and social support as moderators of stress. *Journal of Clinical Psychology, 56*(6), 813-820.

- Pennebaker, J. W. (1989). Confession, inhibition, and disease. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 22, pp. 211-244). New York: Academic Press.
- Pennebaker, J. W. (1990). *Opening up: The healing power of confiding in others*. New York: W. Morrow
- Pennebaker, J. W. (1993a). Putting stress into words: Health, linguistic, and therapeutic implications. *Behaviour Research and Therapy*, *31*(6), 539-548.
- Pennebaker, J. W. (1993b). Mechanisms of social constraint. In D.M. Wegner & J.W. Pennebaker (Eds.), *Handbook of mental control* (pp. 200-219). Englewood Cliffs, NJ: Prentice Hall.
- Pennebaker, J. W. (1997). Writing about emotional experiences as a therapeutic process. *Psychological Science*, *8*(3), 162-166.
- Pennebaker, J. W., Barger, S. D., & Tiebout, J. (1989). Disclosure of traumas and health among Holocaust survivors. *Psychosomatic Medicine*, *51*, 577-589.
- Pennebaker, J. W., & Beall, S. K. (1986). Confronting a traumatic event: Toward an understanding of inhibition and disease. *Journal of Abnormal Psychology*, *95*, 274- 281.
- Pennebaker, J. W., Colder, M., & Sharp, L. K. (1990). Accelerating the coping process. *Journal of Personality and Social Psychology*, *58*, 528-537.
- Pennebaker, J. W., & Francis, M. E. (1996). Cognitive, emotional, and language processes in disclosure. *Cognition and Emotion*, *10*, 601-626.

- Pennebaker, J. W., & Harber, K. D. (1993). A social stage model of collective coping: The Loma Prieta earthquake and the Persian Gulf War. *Journal of Social Issues, 49*(4), 125-145.
- Pennebaker, J. W., Hughes, C. F., & O'Heeron, R. C. (1987). The psychophysiology of confession: Linking inhibitory and psychosomatic processes. *Journal of Personality and Social Psychology, 52*, 781-793.
- Pennebaker, J. W., Kiecolt-Glaser, J., & Glaser, R. (1988). Disclosure of traumas and immune function: Health implications for psychotherapy. *Journal of Consulting and Clinical Psychology, 56*, 239-245.
- Pennebaker, J. W., Mayne, T. J., & Francis, M. E. (1997). Linguistic predictors of adaptive bereavement. *Journal of Personality and Social Psychology, 72*(4), 863-871. <http://dx.doi.org/10.1037/0022-3514.72.4.863>
- Pennebaker, J. W., & Seagal, J. D. (1999). Forming a story: The health benefits of narrative. *Journal of clinical psychology, 55*(10), 1243-1254.
- Pennebaker, J. W., & Smyth, J. M. (2016). *Opening up by writing it down: How expressive writing improves health and eases emotional pain*. Guilford Publications.
- Petrie, K. J., Booth, R. J., Pennebaker, J. W., Davison, K. P., & Thomas, M. G. (1995). Disclosure of trauma and immune response to a hepatitis B vaccination program. *Journal of Consulting and Clinical Psychology, 63*, 787-792.
- Perls, F. S. (1969). Ego, hunger and aggression: The beginning of Gestalt therapy.
- Pew Research Center. Cell phone ownership hits 91% of adults. 2013. Available at <http://www.pewresearch.org/fact-tank/2013/06/06/cell-phone-ownership-hits-91->

of-adults/.

Pew Research Center. Record shares of Americans now own smartphones, have home broadband. 2017. Available at <http://pewinternet.org/fact-sheet-mobile/>

Pew Research Center. Texting is nearly universal among young adult cell phone owners. 2012. Available at <http://www.pewresearch.org/daily-number/texting-isnearly->

Pierce, T. (2009). Social anxiety and technology: face-to-face communication versus technological communication among teens. *Computers in Human Behavior*, 25, 1367–1372.

Pijnenborg, G. H. M., Withaar, F. K., Brouwer, W. H., Timmerman, M. E., Van den Bosch, R. J., & Evans, J. J. (2010). The efficacy of SMS text messages to compensate for the effects of cognitive impairments in schizophrenia. *British Journal of Clinical Psychology*, 49(2), 259-274.

Pilcher, J., & Walters, A. (1997). How sleep deprivation affects psychological variables related to college students' cognitive performance. *Journal of American College Health*, 46, 121-126. doi:10.1080/07448489709595597

Pritchard, M. E., Wilson, G. S., & Yamnitz, B. (2007). What predicts adjustment among college students? A longitudinal panel study. *Journal of American College Health*, 56(1), 15-22.

Reetz, D. R., Bershad, C., LeViness, P., & Whitlock, M. (2016). The association for university and college counseling center directors annual survey (Survey).

Retrieved from

<https://taucccd.memberclicks.net/assets/documents/aucccd%202016%20monograph%20-%20public.pdf>

- Reetz, D. R., Barr, V., & Krylowicz, B. (2013). The association for university and college counseling center directors annual survey (Survey). Retrieved from http://files.cmcglobal.com/AUCCCD_Monograph_Public_2013.pdf
- Reid, D. J., & Reid, F. J. M. (2007). Text or talk? Social anxiety, loneliness, and divergent preferences for cell phone use. *CyberPsychol Behav*, *10*(3), 424–435.
- Resilience. Entry 5. (2010). In *Oxford English dictionary online* (3rd ed.), Retrieved from <http://www.oed.com>
- Rhodewalt, F., & Agustsdottir, S. (1984). On the relationship of hardiness to the Type A behavior pattern: Perception of life events versus coping with life events. *Journal of Research in Personality*, *18*(2), 212-223.
- Rhodewalt, F., & Zone, J. B. (1989). Appraisal of life change, depression, and illness in hardy and nonhardy women. *Journal of Personality and Social Psychology*, *56*(1), 81.
- Richards, J. M., Pennebaker, J. W., & Beal, W. E. (1995, May). The effects of criminal offense and disclosure of trauma on anxiety and illness in prison inmates. Paper presented at the annual meeting of the Midwest Psychological Association, Chicago.
- Richardson, G. E. (2002). The metatheory of resilience and resiliency. *Journal of clinical psychology*, *58*(3), 307-321.
- Richardson, G. E., & Waite, P. J. (2002). Mental health promotion through resilience and resiliency education. *International Journal of Emergency Mental Health*, *4*(1), 65-76.

- Richardson, G. E., Neiger, B. L., Jensen, S., & Kumpfer, K. L. (1990). The resiliency model. *Health education, 21*(6), 33-39.
- Rickinson, B., & Rutherford, D. (1995). Increasing undergraduate student retention rates. *British Journal of Guidance & Counselling, 23*(2), 161-172.
- Rime, B. (1995). Mental rumination, social sharing, and the recovery from emotional exposure. In J.W. Pennebaker (Ed.), *Emotion, disclosure, and health* (pp. 271-292). Washington, DC: American Psychological Association.
- Selye, H. (1976). *The stress of life*. New York: McGraw-Hill.
- Roberts, J., Yaya, L., & Manolis, C. (2014). The invisible addiction: Cell-phone activities and addiction among male and female college students. *Journal of Behavioral Addictions, 3*(4), 254-265.
- Rogers, C. R. (1951). *Client-centered therapy*. Oxford, England: Houghton Mifflin.
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54-67.
- Safran, J. D., & Greenberg, L. S. (1987). *Affect and the unconscious: A cognitive perspective*.
- Sampson, M. J., Kinderman, P., Watts, S., & Sembi, S. (2003). Psychopathology and autobiographical memory in stroke and non-stroke hospitalized patients. *International Journal of Geriatric Psychiatry, 18*(1), 23-32.
- Sansone, C., & Harackiewicz, J. M. (1996). I don't feel like it': The function of interest in self-regulation. *Striving and feeling: Interactions among goals, affect, and self-regulation, 203-228*.

- Sansone, C., Wiebe, D. J., & Morgan, C. (1999). Self-regulating interest: The moderating role of hardiness and conscientiousness. *Journal of Personality, 67*(4), 701-733.
- Sax, L. J. (1997). Health trends among college freshmen.
- Seligman, M. E., & Csikszentmihalyi, M. (2000). Special issue on happiness, excellence, and optimal human functioning. *American Psychologist, 55*(1), 5-183.
- Shapiro, J. R., Koro, T., Doran, N., Thompson, S., Sallis, J. F., Calfas, K., & Patrick, K. (2012). Text4Diet: a randomized controlled study using text messaging for weight loss behaviors. *Preventive Medicine, 55*(5), 412-417.
- Shapiro, C. M., & Flanigan, M. J. (1993). Function of sleep. *BMJ: British Medical Journal, 306*, 383- 385. doi:10.1136/bmj.306.6874.383
- Sharp, W. G., & Hargrove, D. S. (2004). Emotional expression and modality: an analysis of affective arousal and linguistic output in a computer vs. paper paradigm. *Computers in Human Behavior, 20*(4): 461-475.
<http://0dx.doi.org.wncln.wncln.org/10.1016/j.chb.2003.10.007>
- Sheldon, K. M., & King, L. (2001). Why positive psychology is necessary. *American Psychologist, 56*, 216–217.
- Shepperd, J. A., & Kashani, J. H. (1991). The relationship of hardiness, gender, and stress to health outcomes in adolescents. *Journal of personality, 59*(4), 747-768.
- Shetty, A. S., Chamukuttan, S., Nanditha, A., Raj, R. K., & Ramachandran, A. (2011). Reinforcement of adherence to prescription recommendations in Asian Indian diabetes patients using short message service (SMS)—a pilot study. *J Assoc Physicians India, 59*(11), 711-4.

- 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.
- Sinclair, R. R., & Tetrick, L. E. (2000). Implications of item wording for hardiness structure, relation with neuroticism, and stress buffering. *J Res Pers, 34*, 1–25.
- Skierkowski, D., & Wood, R. M. (2012). To text or not to text? The importance of text messaging among college-aged youth. *Computer of Human Behavior, 28*(2):744–756.
- Sleep.org (n.d.). Understanding sleep cycles: What happens while you sleep. Retrieved March 7, 2018, from website: <https://sleep.org/articles/what-happens-during-sleep/>
- Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: assessing the ability to bounce back. *International Journal of Behavioral Medicine, 15*(3), 194-200.
- Smith, C., & Lapp, L. (1991). Increases in number of REMS and REM density in humans following an intensive learning period. *Sleep, 14*, 325-330.
- Smith, M. L., & Glass, G. V. (1977). Meta-analysis of psychotherapy outcome studies. *American Psychologist, 32*(9), 752.
- Smith, M. L., Glass, G. V., & Miller, R. L. (1980). The benefits of psychotherapy. Baltimore: Johns Hopkins University Press.
- Smyth, J.M. (1996). Written emotional expression: Effect sizes, outcome types, and moderating variables. Manuscript submitted for publication.

- Smyth, J. M. (1998). Written emotional expression: Effect sizes, outcome types, and moderating variables. *Journal of Consulting and Clinical Psychology, 66*(1), 174-184. <http://dx.doi.org/10.1037/0022-006X.66.1.174>
- Smyth, J. M., & Pennebaker, J. W. (2001). What are the health effects of disclosure? In A. Baum, T. A. Revenson, & J. E. Singer (Eds.), *Handbook of health psychology* (pp. 339–348). Mahwah, NJ : Erlbaum.
- Solcova, I., & Sykora, J. (1995). Relation between psychological hardiness and physiological-response. *Homeostasis in Health and Disease, 36*(1), 30-34.
- Spera, S. P., Buhrfeind, E. D., & Pennebaker, J. W. (1994). Expressive writing and coping with job loss. *Academy of Management Journal, 37*, 722-733.
- Stanford Medicine: The Stanford Center for Sleep and Sciences and Medicine (n.d.). Sleep disorders. Retrieved October 22, 2017, from: <http://sleep.stanford.edu/sleep-disorders/>
- Stanton, A. L., Danoff-Burg, S., Cameron, C. L., Snider, P. R., & Kirk, S. B. (1999). Social comparison and adjustment to breast cancer: An experimental examination of upward affiliation and downward evaluation. *Health Psychology, 18*(2), 151.
- Strage, A., & Brandt, T. S. (1999). Authoritative parenting and college students' academic adjustment and success. *Journal of Educational Psychology, 91*(1), 146.
- Statista. (2018). Number of cell phone users worldwide from 2015-2018 (in billions). *Statistic*. Retrieved from <https://www.statista.com/statistics/274774/forecast-of-mobile-phone-users-worldwide>
- Stevens, J. P. (2002). *Applied multivariate statistics for the social sciences* (4th ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

- Stone, A. A., Shiffman, S., Schwartz, J. E., Broderick, J. E., & Hufford, M. R. (2003). Patient compliance with paper and electronic diaries. *Controlled Clinical Trials*, *24*(2), 182-199.
- Stratta, P., Capanna, C., Patriarca, S., de Cataldo, S., Bonanni, R. L., Riccardi, I., & Rossi, A. (2013). Resilience in adolescence: Gender differences two years after the earthquake of L'Aquila. *Personality and Individual Differences*, *54*(3), 327-331.
- Streiner, D. (2003). Starting at the beginning: an introduction to coefficient alpha and internal consistency. *Journal of personality assessment*. 80:99-103.
10.1207/S15327752JPA8001_18
- Sun, J., & Stewart, D. (2007). Age and gender effects on resilience in children and adolescents. *International Journal of mental health promotion*, *9*(4), 16-25.
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics*, 6th ed. Boston: Allyn and Bacon.
- Tobey, P. E. (1997). Cognitive and noncognitive factors as predictors of retention among academically at-risk college students: A structural equation modeling approach. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, *57*(7-A), 2907.
- Tsai, L. L., & Li, S. P. (2004). Sleep patterns in college students: Gender and grade differences. *Journal of psychosomatic research*, *56*(2), 231-237.
- Tugade, M. M., & Fredrickson, B. L. (2002). Positive emotions and emotional intelligence.

- Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology, 86*(2), 320.
- Tugade, M. M., Fredrickson, B. L., & Feldman Barrett, L. (2004). Psychological resilience and positive emotional granularity: Examining the benefits of positive emotions on coping and health. *Journal of Personality, 72*(6), 1161-1190.
- Turner, E. A., Chandler, M., & Heffer, R. W. (2009). The influence of parenting styles, achievement motivation, and self-efficacy on academic performance in college students. *Journal of College Student Development, 50*(3), 337-346.
- Ullrich, P. M., & Lutgendorf, S. K. (2002). Journaling about stressful events: Effects of cognitive processing and emotional expression. *Annals of Behavioral Medicine, 24*(3), 244-250.
- universal-among-young-adult-cell-phone-owners/. Accessed July 21, 2013.
- Uppcraft, M. L., & Gardner, J. N. (1989). *The Freshman Year Experience. Helping Students Survive and Succeed in College*. Jossey-Bass Inc., Publishers, 350 Sansome St., San Francisco, CA 94104-1310.
- U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Spring 2017, Fall Enrollment component; and Fall 2015, Institutional Characteristics component. See *Digest of Education Statistics 2017*
- U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Mental Health. (2012). College students speak: A survey report on mental health. Retrieved from <https://www.nami.org/About-NAMI/Publications->

Reports/Survey-Reports/College-Students-Speak_A-Survey-Report-on-Mental-H.pdf

- Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In *Advances in experimental social psychology* (Vol. 29, pp. 271-360). Academic Press.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52(4), 1003-1017.
- Van Cleemput, K. (2010). I'll see you on IM, text, or call you: a social network approach of adolescents' use of communication media. *B Sci Technol Soc*, 30(2):75-85.
- Van den Eijnden, R. J., Meerkerk, G. J., Vermulst, A. A., Spijkerman, R., & Engels, R. C. (2008). Online communication, compulsive Internet use, and psychosocial well-being among adolescents: a longitudinal study. *Developmental Psychology*, 44(3), 655.
- Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivating learning, performance, and persistence: The synergistic effects of intrinsic goal contents and autonomy-supportive contexts. *Journal of Personality and Social Psychology*, 87(2), 246.
- Vecchione, M., Alessandri, G., & Marsicano, G. (2014). Academic motivation predicts educational attainment: Does gender make a difference?. *Learning and Individual Differences*, 32, 124-131.

- Wampold, B. E. (2015). How important are the common factors in psychotherapy? An update. *World Psychiatry, 14*(3), 270-277.
- Wampold, B. E., Mondin, G. W., Moody, M., Stich, F., Benson, K., & Ahn, H. (1997). A meta-analysis of outcome studies comparing bona fide psychotherapies: Empirically, "all must have prizes." *Psychological Bulletin, 122*, 203-215
- Wangberg, S. C., Arsand, E., & Andersson, N. (2006). Diabetes education via mobile text messaging. *Journal of Telemed Telecare, 12*(1), 55–6.
- Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36). *Medical Care, 30*(6), 473-483.
- Wasco, J. J. (2017). Don't Go Viral: An Evidence-Based Practice Project for Increasing Seasonal Influenza Vaccine Rates on a College Campus. *Building Healthy Academic Communities Journal, 1*(1), 42-51.
- Weinschenk, S. (2014). Are you addicted to texting? Psychology Today Blog, Aug. 27. <http://www.psychologytoday.com/blog/brain-wise/201408/are-you-addicted-texting>
- Weissman, M. M., Bland, R.C., Canino, G.J., Farav elli, C, Greenwald, S., Hwu, H.-G., Joyce, P.R., Karam, E.G., Lee, C.-K., Lellouch, J., Lepine, J. P., Newman, S.C., Rubio-Stipc, M., Wells, E., Wickramaratne, P.J., Wittchen, H.-U., & Yeh, E. K. (1996). Cross-national epidemiology of major depression and bipolar disorder. *Journal of the American Medical Association, 276*,293-299
- Werner, E. E., & Smith, R. S. (1982). *Vulnerable but invincible: A longitudinal study of resilient children and youth*. New York: McGraw-Hill.

- Werner, E., & Smith, R. (1992). *Overcoming the odds: High risk children from birth to adulthood*. Ithaca, NY: Cornell University Press.
- Wood, J. M., Bootzin, R. R., Kihlstrom, J. F., & Schacter, D. L. (1992). Implicit and explicit memory for verbal information presented during sleep. *Psychological Science*, 3, 236-239. doi:10.1111/j.1467-9280.1992.tb00035.x
- Yan, A. F., Stevens, P., Wang, Y., Weinhardt, L., Holt, C. L., O'Connor, C., ... & Luelloff, S. (2015). mHealth text messaging for physical activity promotion in college students: a formative participatory approach. *American journal of health behavior*, 39(3), 395-408.
- Ye, L., Hutton Johnson, S., Keane, K., Manasia, M., & Gregas, M. (2015). Napping in college students and its relationship with nighttime sleep. *Journal of American College Health*, 63(2), 88-97.

APPENDIX A
HUMAN USE APPROVAL LETTER



LOUISIANA TECH
UNIVERSITY

MEMORANDUM

OFFICE OF SPONSORED PROJECTS

TO: Dr. Walter Buboltz and Dr. Samantha Aarstad Martin

FROM: Dr. Richard Kordal, Director of Intellectual Property & Commercialization
(OIPC) *RJK*
rkordal@latech.edu

SUBJECT: HUMAN USE COMMITTEE REVIEW

DATE: October 9, 2018

In order to facilitate your project, an EXPEDITED REVIEW has been done for your proposed study entitled:

**“Improving Psychological Distress, Sleep, and Learning Motivation through
Different Modalities of Written Expression: Moderated by Hardiness”**

HUC 19-020

The proposed study's revised procedures were found to provide reasonable and adequate safeguards against possible risks involving human subjects. The information to be collected may be personal in nature or implication. Therefore, diligent care needs to be taken to protect the privacy of the participants and to assure that the data are kept confidential. Informed consent is a critical part of the research process. The subjects must be informed that their participation is voluntary. It is important that consent materials be presented in a language understandable to every participant. If you have participants in your study whose first language is not English, be sure that informed consent materials are adequately explained or translated. Since your reviewed project appears to do no damage to the participants, the Human Use Committee grants approval of the involvement of human subjects as outlined.

Projects should be renewed annually. *This approval was finalized on October 9, 2018 and this project will need to receive a continuation review by the IRB if the project continues beyond October 9, 2019. ANY CHANGES* to your protocol procedures, including minor changes, should be reported immediately to the IRB for approval before implementation. Projects involving NIH funds require annual education training to be documented. For more information regarding this, contact the Office of Sponsored Projects.

You are requested to maintain written records of your procedures, data collected, and subjects involved. These records will need to be available upon request during the conduct of the study and retained by the university for three years after the conclusion of the study. If changes occur in recruiting of subjects, informed consent process or in your research protocol, or if unanticipated problems should arise it is the Researchers responsibility to notify the Office of Sponsored Projects or IRB in writing. The project should be discontinued until modifications can be reviewed and approved.

Please be aware that you are responsible for reporting any adverse events or unanticipated problems.

A MEMBER OF THE UNIVERSITY OF LOUISIANA SYSTEM

P.O. BOX 3092 • RUSTON, LA 71272 • TEL: (318) 257-5075 • FAX: (318) 257-5079

AN EQUAL OPPORTUNITY UNIVERSITY

APPENDIX B
INFORMED CONSENT FORM

HUMAN SUBJECTS CONSENT FORM

The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below. You must be of legal age or must be co-signed by parent or guardian to participate in this study.

TITLE OF PROJECT: Improvement Through Different Modalities of Written Expression

PURPOSE OF STUDY/PROJECT: The purpose of this study is to determine whether or not SMS text-based journaling benefits college students above and beyond traditional journaling

SUBJECTS: Participants will consist of undergraduate students from Louisiana Tech University. The only inclusion criterion will be being 18 years old or older.

PROCEDURE: Volunteers will be instructed to complete online pre-test, post-test, and follow-up surveys intended to gather basic demographic information as well as information about life experiences, stress, feelings, sleep, perceptions, and motivations. It should take about 15-20 minutes to complete each survey. Participants will be required to provide student email addresses and personal cellphone numbers as part of the intervention. Data will be kept confidential and volunteers may exit the survey at any time.

BENEFITS/COMPENSATION: There are no direct benefits associated with completing this survey.

RISKS, DISCOMFORTS, ALTERNATIVE TREATMENTS: The participant understands that Louisiana Tech is not able to offer financial compensation nor to absorb the costs of medical treatment should you be injured as a result of participating in this research. There are no foreseeable risks associated with this study. However, some questions pertain to distress and the potential for processing emotional issues that may cause some participants discomfort. Should you experience discomfort or distress, please contact the university counseling center (318-257-2488 and www.latech.edu/students/counseling/) to meet with a mental health professional. Additionally, you can skip any questions that cause discomfort and you can stop completing the survey at any time without penalty.

The following disclosure applies to all participants using online survey tools: This server may collect information and your IP address indirectly and automatically via "cookies".

I, _____ attest with my signature that I have read and understood the following description of the study, "Improvement Through Different Modalities of Written Expression", and its purposes and methods. I understand that my (Or my Child's) participation in this research is strictly voluntary and my (or my child's) participation or refusal to participate in this study will not affect my relationship with Louisiana Tech University or my grades in any way. Further, I understand that I may withdraw (my child) at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of the material will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

Signature of Participant or Guardian _____ Date _____

Name of child if Applicable _____

CONTACT INFORMATION: The principal experimenters listed below may be reached to Answer questions about the research, subjects' rights, or related matters.

PRINCIPAL INVESTIGATOR: Dr. Walter Buboltz: buboltz@latech.edu

CO-INVESTIGATOR: Samantha Aarstad Martin: ska026@latech.edu

Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:

Dr. Richard Kordal, Director, Office of Intellectual Property & Commercialization
Ph: (318) 257-2484, Email: rkordal@latech.edu

APPENDIX C
DEMOGRAPHIC QUESTIONNAIRE

1. What is your age? _____

2. What is your sex? Male Female Transgender

3. Please mark the ethnicity with which you most closely identify.

American Indian/Alaskan Native

Black/African American

Native Hawaiian/Pacific Islander

Asian/Asian American

Hispanic/Latino

White/Caucasian

Biracial/Multiracial

Other _____

4. What is your current relationship status?

Single

Dating

Married

Partnered

Divorced

Separated

Widowed

Other _____

5. What is your current annual household income?

0-\$20,000

\$20,001-35,000

\$35,001-55,000

\$55,001-75,000

\$75,001-100,000

\$100,001-150,000

\$150,001 or above

6. Please indicate your academic classification.

Freshman

Sophomore

Junior

Senior

Master's student

Doctoral student

Other _____

7. Within what college is your major currently housed at the university?

Education

Business

Engineering and Science

Liberal Arts

Applied and Natural Sciences

8. What is your current GPA? _____

9. How often do you use your cell phone each day? (texting, surfing the Internet, apps, etc.)

Once per day

2-3 times per day

3-5 times per day

- Once per hour 2-3 times per hour 3-5 times per hour
 5-10 times per hour 10-20 times per hour Less than once per day
 More than 20 times per hour

10. After a stressful situation, how are you most likely to contact a friend or family member to talk about it?

- Telephone Text Message In person
 Email Letter

APPENDIX D
OTHER SURVEYS

The General Health Questionnaire (GHQ-28; Goldberg & Williams, 1988)

Please read carefully:

We should like to know if you have had any medical complaints, and how your health has been in general, *over the past few weeks*. Please answer ALL the questions on the following pages simply by underlining the answer which you think most nearly applies to you. Remember that we want to know about present and recent complaints, not those that you had in the past.

It is important that you try to answer ALL the questions. Thank you very much for your cooperation.

Have you recently:

1. Been feeling perfectly well and in good health?	Better than usual	Same as usual	Worse than usual	Much worse than usual
2. Been feeling in need of a good tonic?	Not at all	No more than usual	Rather more than usual	Much more than usual
3. Been feeling run down and out of sorts?	Not at all	No more than usual	Rather more than usual	Much more than usual
4. Felt that you are ill?	Not at all	No more than usual	Rather more than usual	Much more than usual
5. Been getting any pains in your head?	Not at all	No more than usual	Rather more than usual	Much more than usual
6. Been getting a feeling of tightness or pressure in your head?	Not at all	No more than usual	Rather more than usual	Much more than usual
7. Been having hot or cold spells?	Not at all	No more than usual	Rather more than usual	Much more than usual
8. Lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
9. Had difficulty staying asleep?	Not at all	No more than usual	Rather more than usual	Much more than usual
10. Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
11. Been getting edgy and bad-tempered?	Not at all	No more than usual	Rather more than usual	Much more than usual
12. Been getting scared or panicky for no good reason?	Not at all	No more than usual	Rather more than usual	Much more than usual
13. Found everything getting on top of you?	Not at all	No more than usual	Rather more than usual	Much more than usual
14. Been feeling nervous and uptight all the time?	Not at all	No more than usual	Rather more than usual	Much more than usual
15. Been managing to keep yourself busy and occupied?	More so than usual	Same as usual	Rather less than usual	Much less than usual

16. Been taking longer over the things you do?	Quicker than usual	Same as usual	Longer than usual	Much longer than usual
17. Felt on the whole you were doing things well?	Better than usual	About the same	Less well than usual	Much less well
18. Been satisfied with the way you've carried out your task?	More satisfied	About same as usual	Less satisfied than usual	Much less satisfied
19. Felt that you are playing a useful part in things?	More so than usual	Same as usual	Less useful than usual	Much less useful
20. Felt capable of making decisions about things?	More so than usual	Same as usual	Less so than usual	Much less capable
21. Been able to enjoy your normal day-to-day activities?	More so than usual	Same as usual	Less so than usual	Much less than usual
22. Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
23. Felt that life is entirely hopeless?	Not at all	No more than usual	Rather more than usual	Much more than usual
24. Felt that life isn't worth living?	Not at all	No more than usual	Rather more than usual	Much more than usual
25. Thought of the possibility that you might do away with yourself.	Definitely not	I don't think so	Has crossed my mind	Definitely have
26. Found at times you couldn't do anything because your nerves were too bad?	Not at all	No more than usual	Rather more than usual	Much more than usual
27. Found yourself wishing you were dead and away from it all?	Not at all	No more than usual	Rather more than usual	Much more than usual
28. Found that the idea of taking your own life kept coming into your mind?	Definitely not	I don't think so	Has crossed my mind	Definitely has

Adult Sleep-Wake Scale (ADSWS; Fortunato, LeBourgeois, & Harsh, 2008)

Using the choices below, circle how often the following things have happened during the past week.

- Never - has not happened
 Once in a while - happened 20% of the time
 Sometimes - happened 40% of the time
 Quite Often - happened 60% of the time
 Frequently, if not always - happened 80% of the time
 Always - happened 100% of the time

Questions 1 - 5 are only about you Going to Bed at bedtime.

When it is time to go to bed ...

1.)... I want to stay up and do other things (for example: read, work, or watch TV).

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

In general...

2.) ...I have to make myself go to bed.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

3.) ... It is very hard for me to go to bed on time.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

4.) ... I “put off” or delay going to bed.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

5.) How long do you usually “put off” or delay going to bed?

(1) < 15 min (2) 15-30 min (3) 30-45 min (4) 45-60 min (5) 60-90 min (6) >90 min

Remember: Think about the past week.

Questions 6 - 10 are only about you falling asleep after “lights out.”

When I’m in bed and it is time to fall asleep...

6.) ... I am not sleepy.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

7.) ... I am unable to settle down.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

In general...

8.) ...I try to make myself go to sleep.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

9.) ... I fall asleep quickly.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

10.) How long does it usually take you to fall asleep after “lights out”?

(1) < 15 min (2) 15-30 min (3) 30-45 min (4) 45-60 min (5) 60-90 min (6) >90 min

Questions 11 - 15 are only about how you Sleep during the night (someone else could have told you these things).

After 1 fall asleep, during the night...

11.)... I toss and turn in bed.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

12.) ...I am very restless.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

13.) ...I awaken more than once.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

In general...

14.) ...I sleep without arousals or awakenings.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

15.) How often do you usually wake up during the night?

(1) Never (2) Once (3) Twice (4) 3 times (5) 4 times (6) More than 4 times

Remember: Think about the past week.

Questions 16 - 20 are only about you Going back to sleep after waking up during the night.

After waking up during the night...

16.)... I have a hard time going back to sleep.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

17.) ... I drift off back to sleep

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

18.)... I am calm and relaxed.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

19.) ...I roll over and go right back to sleep.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

20.) How long does it usually take you to go back to sleep after waking during the night?

(1) < 5 min (2) 5-10 min (3) 10-15 min (4) 15-20 min (5) 20-30 min (6) >30 min

Questions 21-25 are only about you Waking Up in the morning.

In the morning, I wake up...

21.)...and feel ready to get up for the day.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

22.) ...rested and alert.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

23.) ...and just can't get going.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

Always In general...

24.) ...I am slow -to-start in the morning.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

25.) ...I find it difficult to get out of bed in the morning.

1-Never 2-Once in a while 3-Sometimes 4-Quite Often 5-Frequently, if not always 6-Always

Academic Motivation Scale College Version (AMS-C 28; Vallerand et al., 1992)

Directions: Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you go to college.

1	2	3	4	5	6	7
Does not correspond at all	Corresponds a little	Corresponds moderately	Corresponds a lot	Corresponds a lot	Corresponds a lot	Corresponds exactly

1. Because with only a high-school degree I would not find a high-paying job later on.	1	2	3	4	5	6	7
2. Because I experience pleasure and satisfaction while learning new things.	1	2	3	4	5	6	7
3. Because I think that a college education will help me better prepare for the career I have chosen.	1	2	3	4	5	6	7
4. For the intense feelings I experience when I am communicating my own ideas to others.	1	2	3	4	5	6	7
5. Honestly, I don't know; I really feel that I am wasting my time in school.	1	2	3	4	5	6	7
6. For the pleasure I experience while surpassing myself in my studies.	1	2	3	4	5	6	7
7. To prove to myself that I am capable of completing my college degree.	1	2	3	4	5	6	7
8. In order to obtain a more prestigious job later on.	1	2	3	4	5	6	7
9. For the pleasure I experience when I discover new things never seen before.	1	2	3	4	5	6	7
10. Because eventually it will enable me to enter the job market in a field that I like.	1	2	3	4	5	6	7
11. For the pleasure that I experience when I read interesting authors.	1	2	3	4	5	6	7
12. I once had good reasons for going to college; however, now I wonder whether I should continue.	1	2	3	4	5	6	7
13. For the pleasure that I experience while I am surpassing myself in one of my personal accomplishments.	1	2	3	4	5	6	7

14. Because of the fact that when I succeed in college I feel important.	1	2	3	4	5	6	7
15. Because I want to have "the good life" later on.	1	2	3	4	5	6	7
16. For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.	1	2	3	4	5	6	7
17. Because this will help me make a better choice regarding my career orientation.	1	2	3	4	5	6	7
18. For the pleasure that I experience when I feel completely absorbed by what certain authors have written.	1	2	3	4	5	6	7
19. I can't see why I go to college and frankly, I couldn't care less.	1	2	3	4	5	6	7
20. For the satisfaction I feel when I am in the process of accomplishing difficult academic activities.	1	2	3	4	5	6	7
21. To show myself that I am an intelligent person.	1	2	3	4	5	6	7
22. In order to have a better salary later on.	1	2	3	4	5	6	7
23. Because my studies allow me to continue to learn about many things that interest me.	1	2	3	4	5	6	7
24. Because I believe that a few additional years of education will improve my competence as a worker.	1	2	3	4	5	6	7
25. For the "high" feeling that I experience while reading about various interesting subjects.	1	2	3	4	5	6	7
26. I don't know; I can't understand what I am doing in school.	1	2	3	4	5	6	7
27. Because college allows me to experience a personal satisfaction in my quest for excellence in my studies.	1	2	3	4	5	6	7
28. Because I want to show myself that I can succeed in my studies.	1	2	3	4	5	6	7

The Brief Resilience Scale (BRS; Smith et al., 2008)

Please indicate the extent to which you agree with each of the following statements by using the following scale:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	1	2	3	4	5
1. I tend to bounce back quickly after hard times					
2. I have a hard time making it through stressful events					
3. It does not take me long to recover from a stressful event					
4. It is hard for me to snap back when something bad happens					
5. I usually come through difficult times with little trouble					
6. I tend to take a long time to get over set-backs in my life					

Dispositional Resilience Scale (DRS-15; Bartone, 1995)

Instructions: Below are statements about life that people often feel differently about. Please show how much you think each one is true. Give your own honest opinions. There are no right or wrong answers.

Scale Items	Not at all True	A Little True	Quite True	Completely True
	0	1	2	3
1. Most of my life gets spent doing things that are meaningful.				
2. By working hard you can nearly always achieve your goals.				
3. I don't like to make changes in my regular activities.				
4. I feel that my life is somewhat empty of meaning.				
5.				

APPENDIX E

TRADITIONAL JOURNAL GROUP ADDITIONAL POST TEST

QUESTIONS

1. How did you typically access the intervention?

Laptop computer Desktop computer Cell phone

2. Do you feel that you benefitted from this intervention?

Yes No

3. Did you find this intervention to be annoying or bothersome?

Yes No

4. What did you like MOST about this intervention?

Ease
 Time
 Technological aspect
 Other _____

5. What did you like LEAST about this intervention?

Difficulty
 Time
 Technological aspect
 Other _____

6. What time of day would you prefer to RECEIVE notifications?

6:00 AM – 9:00 AM
 9:00 AM – 12:00 PM
 12:00 PM – 3:00 PM
 3:00 PM – 6:00 PM
 6:00 PM – 9:00 PM
 9:00 PM – 12:00 AM
 12:00 AM – 3:00 AM
 3:00 AM – 6:00 AM

7. What time of day would you prefer to REPLY to notifications?

6:00 AM – 9:00 AM
 9:00 AM – 12:00 PM
 12:00 PM – 3:00 PM
 3:00 PM – 6:00 PM
 6:00 PM – 9:00 PM
 9:00 PM – 12:00 AM
 12:00 AM – 3:00 AM
 3:00 AM – 6:00 AM

8. Given the option how likely would you continue with this intervention or an intervention similar?

Not at all likely Somewhat likely Very likely Extremely likely

APPENDIX F

SMS TEXT-BASED GROUPS ADDITIONAL POST TEST

QUESTIONS

1. Do you feel that you benefitted from this intervention?

Yes No

2. Did you find this intervention to be annoying or bothersome?

Yes No

3. What did you like MOST about this intervention?

Ease
 Time
 Technological aspect
 Other _____

4. What did you like LEAST about this intervention?

Difficulty
 Time
 Technological aspect
 Other _____

5. What time of day would you prefer to RECEIVE notifications?

6:00 AM – 9:00 AM
 9:00 AM – 12:00 PM
 12:00 PM – 3:00 PM
 3:00 PM – 6:00 PM
 6:00 PM – 9:00 PM
 9:00 PM – 12:00 AM
 12:00 AM – 3:00 AM
 3:00 AM – 6:00 AM

6. What time of day would you prefer to REPLY to notifications?

6:00 AM – 9:00 AM
 9:00 AM – 12:00 PM
 12:00 PM – 3:00 PM
 3:00 PM – 6:00 PM
 6:00 PM – 9:00 PM
 9:00 PM – 12:00 AM
 12:00 AM – 3:00 AM
 3:00 AM – 6:00 AM

7. Given the option how likely would you continue with this intervention or an intervention similar?

Not at all likely Somewhat likely Very likely Extremely likely

8. Did you use a smart-watch device during this intervention?

Never Some of the time Most of the time All of the time