

Role of Intimacy, Rumination, and Sleep Quality on Psychological and Physical Health

by

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ABSTRACT

A sense of closeness (or intimacy) is important in nearly every relationship in life, whether it is within friendships, family, or romantic relationships. In the current thesis, intimacy is measured within four specific dimensions: emotional, physical, intellectual and spiritual. Research shows that intimate relationships have been linked to mental and physical health outcomes. In addition, there is a novel explanation for the link between intimacy and health through rumination and sleep quality. The current study examined 2 primary aims: 1) to examine the relationship between intimacy and depression ; 2) to assess the role of intimacy, rumination and sleep quality on mental and on physical health. Results for Aim 1 suggest that there is a link between intimacy and both depression and physical health; where the higher the intimacy the lower the depression and the better physical health. For Aim 2, results indicated that there was a significant serial relationship between intimacy, rumination, sleep quality and both depression and physical health; where in the first model, higher intimacy predicted less rumination, better sleep quality, and lower depression; and, in the second model higher intimacy predicted less rumination, better sleep quality and higher physical health. The current study suggests that intimacy does have its own distinct contributions to health outcomes and that rumination and sleep quality do have a implication on intimate relationships.

Keywords: intimacy, rumination, sleep quality, health

TABLE OF CONTENTS

	Page
LIST OF TABLES	iv
LIST OF FIGURES	v
CHAPTER	
1 INTRODUCTION	1
Overview	1
Intimacy Defined.....	2
Intimacy and Health	3
Sleep Quality as a Mediator	5
Thesis Study	8
2 METHODS	10
Participants	10
Procedures	11
Measures.....	11
Proposed Analysis Section.....	14
3 RESULTS	16
Sample Descriptives.....	16
Linear Regression-Covariates.....	17
Intimacy and Health	18
Role of Rumination and Sleep Quality	20
4 DISCUSSION	23
Intimacy and Health	23

CHAPTER	Page
Role of Rumination and Sleep Quality	24
Limitations and Future Directions	25
Conclusion.....	26
REFERENCES	27
APPENDIX	
A MEASURES USED IN STUDY	31
B ASU IRB CORRESPONDENCE	46

LIST OF TABLES

Table		Page
1.	Complete Participants Demographics	11
2.	Descriptive Statistics of Major Study Variables	15
3.	Main Study Correlations	17
4.	Intimacy on Mental and Physical Health	18
5.	Serial Mediation Path Coefficients	21

LIST OF FIGURES

Figure		Page
1.	Serial Mediation with Depression.....	19
2.	Serial Mediation with Physical Health	20

CHAPTER 1

INTRODUCTION

Our relationships have an impact both good and bad on our health; one common way of assessing this effect is being in a relationship versus not being in a relationship. When comparing married and single people on various health outcomes, Horwitz, White, and White (1996) found that depression in both groups decreased over the span of seven years. However, among married participants, depression decreased at a faster rate than among single participants. Married individuals have also been shown to live longer, healthier lives and have better health than their non-married counterparts (Wood, Goesling, & Avellar, 2007). Additionally, cohabiting has been associated with an increase in happiness as compared to those who either do not have a partner or couples who live separately (Finkbeiner, Epsteinm, & Falconier, 2013). A study conducted by Waite, Luo, and Lewin (2009) found similar results as Horwitz et al. (1996), such that marriage predicted higher overall well-being. Moreover, there is strong association between married partners' health (Falba and Sindelar, 2008; Meyler et al., 2007).

Aside from relationship status, another way of examining the effect relationships have on health is by looking at relationship satisfaction or relationship quality (August, Kelly, & Markey, 2016). Coyne, Rohrbaugh, Shoham, Sonnega, Nicklas, and Cranford (2001) demonstrated people in happier relationships were less likely to die in a four-year period following a congestive heart diagnosis than people with lower relationship quality, which they argue suggests that not only does relationship status matter but so does relationship quality.

One primary aspect of relationship quality is intimacy (i.e., the sense of closeness one has with another person). Intimacy has been identified as a primary reason for relationship formation, maintenance, and dissolution (Clinebell & Clinebell, 1981). Additionally, developing intimacy with a romantic partner, in particular, has been shown to be essential for individual and relational well-being (Robles, Slatcher, Trombello, & McGinn, 2014). Conversely, a lack of intimacy is one of the most frequently reported reasons that couples seek counseling (Doss, Simpson, & Christensen, 2004), and is related to numerous negative physical and mental health outcomes (Burns, Sayers, & Moras, 1994; Finkbeiner, Epstein, & Falconier, 2013). Intimacy occurs most strongly in the context of a committed relationship; as shown above (Soons, & Liefbroer, 2008). Less clear is the process by which intimacy impacts an individual's health. For the current thesis, I examined a serial mediation model that tests both a cognitive and a behavioral mechanism linking intimacy to health. Furthermore, I examined a multidimensional operationalization of intimacy to understand whether the different components of intimacy show differential direct and mediational patterns with health.

Intimacy Defined

While the lay population typically defines intimacy as sexual intercourse or physical contact, researchers argue that intimacy consists of more than just physical affection or sex (Bradbury & Karney, 2010). Although sexual intimacy is an important component of overall intimacy for a couple, intimacy has been further differentiated into up to 61 additional subcomponents, including emotional, intellectual, spiritual, experiential, crisis, work, recreational, creative, social, and aesthetic to name a few (e.g., Moss and Schwebel, 1993; Bradbury & Karney, 2010). The most frequently researched

types of intimacy are emotional, physical/sexual, intellectual/cognitive, and spiritual. Thus, for the purposes of my thesis, I have utilized these four distinct types of intimacy in order to explore my research questions.

Clinebell and Clinebell (1981) provided a comprehensive set of definitions for each of these four types of intimacy. *Emotional intimacy* is known as the foundation of all other types of intimacy and is defined as the sharing of feelings between two people and the empathy associated with those feelings. Because emotions are a large part of everyday life, emotional intimacy is a significant component of all types of relationships. *Physical/sexual intimacy* covers a broad range from affectionate touching to sexual activity (Clinebell & Clinebell, 1981). Sexual intimacy has been the most studied form of intimacy (Greeff & Malherbe, 2001) and has been shown to be the strongest predictor of relationship satisfaction (Schaefer & Olson, 1981). Additionally, emotional and sexual intimacy are strongly connected, such that partners who score high on emotional intimacy also score high on sexual intimacy (Greeff & Malherbe, 2001). The other two dimensions of intimacy are less studied. *Intellectual intimacy* is the exchange of thoughts and ideas while still enjoying differences in opinions (Clinebell & Clinebell, 1981). Finally, *spiritual intimacy* deals with exploring religion, meaning of life and purpose together.

Intimacy and Health

For many years, researchers have found that intimate relationships are beneficial for our overall psychological and physical health (August, Kelly, & Markey, 2016). A meta-analysis by Stadler, Snyder, Horn, Shrout, and Bolger (2012) investigated whether changes in physical intimacy (i.e., being affectionate) had a subsequent effect on somatic symptom (i.e., pain, nausea, dizziness, and fainting) intensity change. Results indicated

that when intimacy levels were changing there was also a change in somatic symptoms; an increase in intimacy was associated with an overall decrease in symptoms. Moreover, when examining pain response, there is evidence that intimate relationships predict unconscious natural responses to pain (Reis & Franks, 1994). In one study, an individual's reaction to an electric shock was assessed when their hand was being held by a partner, a stranger, or no one at all (Coan, Schaefer, & Davidson, 2006). They found that the part of the brain that activates emotional and behavioral responses (i.e., the right anterior insula) reacted less when participants were holding the hand of their romantic partner. Also, the more satisfied they reported they were in their intimate relationship, the less that brain region was activated. Finally, Hale, Hannum, and Espelage (2005) examined the importance of social intimacy (i.e., the degree of emotional closeness a person felt toward another person) to perceived physical health; overall women reported a higher level of social intimacy than men and social intimacy predicted better health perceptions in women but not in men.

With respect to mental health, low levels of intimacy have also been linked to negative outcomes such as depression and anxiety (e.g., Burns, Sayers, & Moras, 1994). When trying to understand the role of intimacy in mental health and relationship quality, Finkbeiner et al. (2013) found that intimacy mediated the association between depression and relationship satisfaction. Interestingly, other research shows relationship satisfaction only weakly predicts depression (Burns, Sayers, & Moras, 1994), suggesting that intimacy may have a unique predictive relationship with depression over and above relationship satisfaction. Delaney (2019) found that there was a bi-directional relationship

between intimacy and depression, where depressive symptoms led to more uncertainty within the relationship and lower levels of intimacy.

To conclude, although previous research has shown a connection with intimacy and both physical health and depression, it is unclear how the various dimensions of intimacy (emotional, physical, intellectual, and spiritual) are related to physical health and depression. In other words, do all aspects of intimacy show similar strength in their association with depression and physical health outcomes? The first aim of the current thesis is to examine the association of these four dimensions of intimacy on depression and physical health outcomes (*Aim 1*).

Sleep Quality as a Mediator

In addition to the lack of research on the four intimacy dimensions and health, there is little understanding of the process by which intimacy impacts health (Troxel, Robles, Hall, & Buysse, 2007; Robles, Slatcher, Trombello, & McGinn, 2014). One particularly promising and novel explanatory mechanism is *sleep quality*. Although research consistently shows the importance of sleep (e.g., Lockley & Foster, 2012), people still undervalue it. According to the National Sleep Foundation's *Sleep in America Poll 2018*, less than 10% of Americans prioritize sleep over other aspects of daily living (i.e., fitness, nutrition, work, hobbies and social life). Sleep duration, and thus sleep quality, are progressively getting pushed to the side for other daily tasks. The National Sleep Foundation (2017) defines good sleep quality as sleeping 85% of the time while in bed, falling asleep in 30 minutes or less, waking up no more than once per night, and being awake 20 minutes or less after the initial falling asleep phase. Sleep quality has been linked to many different outcomes, such as general daily effectiveness,

psychological health outcomes (e.g., posttraumatic stress disorder, depression, anxiety), overall daily mood, conflict resolution, general emotion regulation, physical health outcomes (e.g., cardiovascular disease, asthma, cancer) and recovery from health issues (Gordon & Chen, 2014; Lockley & Foster, 2012; National Sleep Foundation, 2018; Nowack, 2017; Vargas & Robles, 2018).

Aside from the physical and mental health consequences of poor sleep, it also impacts our work life and professional relationships. A large national survey assessing sleep, sleep disorders, health and functioning in police officers showed a high prevalence of poor sleep and found that poor sleep correlated with depression and burnout (National Sleep Foundation, 2018). Additionally, police officers who suffered from sleep disorders were at an increased risk for work accidents (Grandner & Pack, 2011). Nowack (2017) added to this research by investigating the role sleep had on leadership ratings (both from workers and through self-assessment). When leaders suffered from poor sleep quality, they were rated as less inspiring, less competent, and less charismatic by workers, and were shown to have a diminished sense of emotional expressivity and impaired emotional regulation.

The relation between sleep and emotional intelligence and how individuals are perceived extend beyond the workplace. Specifically, personal relationships also suffer as a consequence of poor sleep quality. Research has established a link between sleep quality and intimacy by way of emotion regulation and cognitive resources (i.e., resources can help influence an individual's reactions to stressful situations; Nowack, 2017). For example, Gordon and Chen (2014) investigated through two studies whether poor sleep quality predicts more conflict in interpersonal relationships. In their first study

(a two-week daily experience study designed to investigate the link between sleep and conflict in daily life), poor sleep quality was associated with greater conflict across a two-week period. Their studies also showed that poor sleep was a hindrance to conflict resolution in relationships, such that poor sleep quality predicted worse and lengthier fights with one's partner, whereas good sleep quality predicted shorter, less intense fights. Additionally, when the association of couples' relationship functioning and sleep concordance was examined, Hassler and Troxel (2010) found a bi-directional relationship between sleep and interpersonal relationships. Specifically, for men, higher sleep efficiency predicted less negative partner interactions, whereas for women, less negative partner interaction during the day predicted better sleep efficiency.

But, how might low intimacy impact one's sleep quality? Surprisingly, no specific studies have examined the lack of intimacy on rumination; however, other studies have suggested the potential for such a relationship. Reynolds, Searight, and Ratwik (2014) looked at the role of interpersonal attachment with rumination; they found that rumination was related to anxious or avoidant relationships. Similarly, Senkans et al. (2015) found that relational rumination was highly correlated with anxious attachment; they suggest that there is a third variable that can explain the relationship between anxious attachment and relational rumination. Rumination is when a person dwells excessively on negative emotional experiences and it can impact sleep quality (Guastella, & Moulds, 2007; Segerstrom, Tsao, Alden, & Craske, 2000). Thomsen, Mehlsen, Christensen, and Zachariae (2003) found that as rumination and stress increased, sleep quality decreased. Further, Tousignant, Taylor, Suvak, and Fireman (2019) found that there was a significant relationship between stress and rumination on pre-sleep arousal

and overall sleep quality. Additionally, rumination has been shown to increase depressive symptoms in intimate relationships (Calmes & Roberts, 2008).

In this thesis, I examined a serial mediation model, such that poor intimacy predicts greater rumination which predicts decreased sleep quality and, in turn, negatively predict physical health and depression (*Aim 2*). Additionally, I explored whether the four dimensions of intimacy show differential associations in this serial mediation (*Research Question*).

Current Thesis

Intimacy is an important factor of close relationships and health but there are gaps in the literature with regard to intimacy; specifically, intimacy is not clearly studied in relation to health. In the current thesis, I focus on the association between intimacy and depression and physical health (*Aim 1*). I hypothesize that low intimacy within a relationship will be a predictor of worse physical health and depression, whereas high intimacy within a relationship will predict better overall physical health and depression (*Hypothesis 1*). However, it is less clear is whether different dimensions of intimacy will show different types of associations with health. Thus, I have examined whether the four dimensions (emotional, physical, intellectual, spiritual) differ in the strength of their associations with physical health and depression.

Two consequences of poor intimacy are rumination and poor sleep quality. Thus, I also proposed a serial mediation model with rumination and sleep quality between sequentially mediating the relationship between intimacy and depression and physical health (*Aim 2*). An excessive amount of rumination has been shown to have a negative impact on sleep quality (Reynolds, Searight, & Ratwik, 2014; Thomsen, et al., 2003).

And, poor sleep quality has been shown to have a negative impact on health (Nowack, 2017; Vargas & Robles, 2018). Therefore, I predicted that low intimacy would predict greater rumination which would predict poor sleep quality, which, in turn, would predict poorer physical health and depression (*Hypothesis 2*). Finally, I have examined whether the four dimensions of intimacy (emotional, sexual/physical, intellectual, spiritual) show similar associations in the serial mediation model (*Research Question*).

CHAPTER 2

METHODS

Participants

A power analysis was conducted using G*Power (Faul et al., 2009) to determine an ideal sample size for the study to be adequately powered. A meta-analysis by Richard, Bond Jr., and Stokes-Zoota (2003) reported an average effect size for relationship research in social psychology to be $r = .21$, which converts to an effect size of $f^2 = .05$. Therefore, a power analysis was conducted where I set the effect size to $f^2 = .05$, alpha to 0.05, power to .90 and entered 4 tested predictors and a total of 7 predictors (accounting for the three covariates). The power analysis yielded a required total sample size of 313 for 4 tested predictors. Six hundred participants from Amazon's Mechanical Turk (Mturk) were recruited. Individuals who indicated they were single ($n = 96$), did not complete the survey in its entirety ($n = 68$), or missed both attention checks ($n = 58$) were excluded from the analyses reported here, yielding a final sample of 378 participants. Participants' ages ranged from 18-56 and a majority were White (60.8 %). The final sample did reach the recommended sample size for adequate power. See Table 1 for additional sample characteristics.

Table 1
Complete Participant Demographics (N=378)

	<i>M</i>	<i>SD</i>	<i>Range</i>
Age	36.36	11.86	56
Relationship Status			
In a relationship		31.7%	
Cohabiting		8.4%	
Married/engaged		59.7%	
Other		0.3%	
Sexual Orientation			
Heterosexual		86.2%	
Bisexual		11.1%	
Homosexual		2.6%	
Race/ Ethnicity			
White		60.8%	
Hispanic		8.5%	
Black/African American		6.9%	
Asian		20.1%	
Native American/Alaska Native		0.5%	
Other		3.2%	
Education			
Less than high school		1.2%	
High school graduate		7.3%	
Some college		22.9%	
College degree		57.3%	
Post college degree		11.3%	
Household Income			
Less than \$10,000		7.3%	
\$10,000-\$19,999		6.7%	
\$20,000-\$29,999		11.7%	
\$30,000-\$39,999		12.5%	
\$40,000-\$49,999		10.1%	
\$50,000- \$59,999		12.1%	
\$60,000-\$69,999		8.3%	
\$70,000-\$79,999		7.5%	
\$80,000-\$89,999		7.1%	
\$90,000-\$99,999		4.7%	
\$100,000- \$149,999		8.3%	
\$150,000 or more		2.6%	

Procedure

Participants were recruited through Amazon Mechanical Turk and were compensated \$1 for their time. After obtaining informed consent, participants completed an online survey asking about demographic information, their relationships and their health habits. The survey took about 30 minutes to complete.

Measures

Participant demographics were assessed, including relationship status, gender, age, sexuality, and race/ethnicity. *Relationship status* was categorized as: single, in a

relationship (but not married or cohabiting), cohabiting (but not married), married, or other: please specify. *Gender* was assessed as a covariate consisting of six possible categories: cismale, cisfemale, transgender male, transgender female, non-binary or other: please specify. *Age* in this sample was measured as a continuous variable. *Sexuality* was categorized as heterosexual, homosexual, bi-sexual or other: please specify. For the purpose of analysis this was coded as 2 separate dichotomous variables: Homosexual (with a 0 meaning other and 1 meaning homosexual) and Bisexual (with a 0 meaning other and 1 meaning bisexual). *Race/ethnicity* was a self-report measure of non-Hispanic White, African American, Hispanic, Asian, Middle Eastern, Alaskan Native, Native, Pacific Islander or other: please specify. *Education* consisted of five categories: some high school, high school, some college, college, or an advanced degree. *Household income* was assessed by total household income at the time of the survey (less than 10,000, 10,001- 19,999, 20,000 - 29,999, 30,000 – 39,999, 40,000 – 49,999, 50,000 – 59,999, 60,000 - 69,999, 70,000 – 79,999, 80,000 - 89,999, 90,000 – 99,999, 100,000 - 149,999, or more than 150,000)

Intimacy was assessed by using a modified version of the Personal Assessment of Intimacy in Relationships (PAIR) questionnaire, which is a well-validated and reliable measure (Cronbach's $\alpha = .93$; Schaefer & Olson, 1981) (see Appendix for all study measures). The PAIR questionnaire includes subscales (with 6 items each for a total of 18 items) measuring emotional intimacy (e.g. "My partner listens to me when I need someone to talk to"; Cronbach's $\alpha = .81$), physical/sexual intimacy (e.g. "I feel our sexual activity is just routine"; Cronbach's $\alpha = .76$), and intellectual intimacy (e.g. "When it comes to having a serious discussion it seems that we have little in common";

Cronbach's $\alpha = .76$). As spiritual intimacy is not included in the PAIR, I created a measure of spiritual intimacy adapted from the Spiritual Disclosure Scale (Brelsford & Mahoney, 2008) (e.g., "I feel safe being completely open and honest with my partner about my faith"), participants rate each item on a 5-point scale from 1 = *does not describe me* to 5 = *describes me*. A mean score of the 6 items was created, with higher scores indicating greater spiritual intimacy (Cronbach's $\alpha = .70$).

Rumination was assessed using a modified version of the Co-Rumination Questionnaire (CRQ; Rose, 2002). The CRQ questions were modified to relate to an intimate partner (e.g., Original item: "When I have a problem, my friend always tries really hard to keep me talking about it"; Modified item: "When I have a problem, my partner always tries really hard to keep me talking about it") that participants rated on a 5-point scale from 1 = *not at all true* to 5 = *really true*. A mean score of the 27 items was created, with higher scores indicating greater rumination (Cronbach's $\alpha = .96$). In this study, the scale was adapted to ask questions relating to an intimate partner.

Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds III, Monk, Berman, & Kupfer, 1989). The PSQI has seven subscales including subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleep medication and daytime functioning. It is scored using a standardized scoring algorithm with a set cut off point for good and bad sleep quality. The subscales are scored using 0 (no difficulty) to 3 (severe difficulty) and then are summed to produce a final global score with a total of 19 items (range 0 to 21), where higher scores indicated worse sleep quality (Cronbach's $\alpha = .91$).

Depression was assessed by using the Center for Epidemiologic – Depression Inventory (CES-D), which is a well-validated and reliable measure (Radloff, 1977). Scores of the 20 items are summed (range 0 to 60 with 16 being the clinical cutoff for depression), with higher scores indicating greater depression (Cronbach’s $\alpha = .93$). Participants answered questions assessing their mood over the past week. Example items include “I felt depressed,” and “I felt that everything I did was an effort.” Responses ranged from 0 = *none/rarely (<1 day)* to 3 = *most (5-7 days)*.

Physical health was assessed using the RAND SF-36 (Cronbach’s alpha of .93) (Gandek, Sinclair, Kosinski, & Ware, 2004) survey. The survey examines eight different aspects of physical health, physical functioning, role physical, bodily pain, social functioning, psychological health, emotional, vitality, and general health perceptions. The survey was utilized in this study by assessing the score for the physical health subsection only. It is scored using a standardized scoring algorithm, with higher scores indicating better physical health (Cronbach’s $\alpha = .91$). Example items include: “Compared to one year ago, how would you rate your health in general now?” with responses ranging from 1 = *much better than a year ago* to 5 = *much worse than a year ago*) and “How much bodily pain have you had during the past 4 weeks?” with responses ranging from 1 = *none* to 6 = *very severe*).

Overview of Analysis

Prior to examining my hypotheses, I examined any demographic covariates. Multiple linear regression analyses were conducted to determine whether covariates should be added to the overall mediation model. To test my first hypothesis, I looked at the relationship between intimacy and psychological and physical health using a linear

regression model in which intimacy was entered as a predictor of psychological health and as a predictor of physical health in separate models. For my second hypothesis, I utilized Hayes (2017) PROCESS macro for SPSS to analyze a serial mediation model in which intimacy (with the combination of the 4 components) was entered as a predictor of physical and psychological health (in separate serial mediation models) and rumination and sleep quality were entered as the first and second serial mediators, respectively. To explore the research question, I utilized PROCESS (Hayes, 2017) and analyzed four separate models with the four different dimensions of intimacy as individual predictors.

Table 2
Descriptive Statistics of Major Study Variables

			Males (N= 216)		Females (N= 162)	
	M	SD	M	SD	M	SD
Intimacy (PAIR)	2.62	0.72	2.64	0.69	2.58	0.74
<i>Emotional Intimacy</i>	2.69	0.89	2.73	0.83	2.63	0.94
<i>Physical Intimacy</i>	2.61	0.83	2.64	0.83	2.55	0.82
<i>Intellectual Intimacy</i>	2.51	0.87	2.51	0.85	2.51	0.89
<i>Spiritual Intimacy</i>	2.82	0.72	2.80	0.72	2.86	0.73
Rumination	3.07	0.87	3.19*	0.79	2.92*	0.94
Sleep Quality (PSQI)	6.40	3.29	0.79*	0.68	1.02*	0.76
Physical Health (RAND SF-36)	60.53	10.94	60.53	11.05	60.56	10.85
Depression (CESD)	19.16	13.79	19.75	13.76	18.43	13.87

* indicates a significant difference

CHAPTER 3

RESULTS

Sample Descriptives

Descriptive statistics for major study variables are provided in Table 2. When looking at both a composite measure of intimacy and the four separate dimensions of intimacy, there were no significant differences between men and women. There was also no gender difference for depression or physical health. Subjective sleep quality did show gender differences, $F(1, 376) = 9.82, p = .002$, such that women ($M = 1.02, SD = 0.76$) had overall worse sleep quality than men ($M = 0.79, SD = 0.68$). Additionally, there was a gender difference for rumination, $F(1, 376) = 9.83, p = .002$, with men ($M = 3.20, SD = 0.80$) reporting more rumination in general on average than women ($M = 2.92, SD = 0.94$). Based on the lack of gender differences, analyses were conducted on the whole sample collapsed across gender. Gender was controlled for in analyses with sleep quality and rumination. Bivariate correlations for all major study variables for the overall population are summarized on Tables 3. Although the four dimensions of intimacy (emotional, physical, intellectual and spiritual) are highly correlated, the lack of significant multicollinearity (i.e., all VIF's were less than 4 and all tolerance scores were greater than .20) allows me to conduct regression analyses with the four dimensions simultaneously.

Table 3: Main Study Correlations

	1	2	3	4	5	6	7	8	9
1. Intimacy	1								
2. <i>Emotional</i>	.921**	1							
3. <i>Physical</i>	.858**	.739**	1						
4. <i>Intellectual</i>	.905**	.831**	.715**	1					
5. <i>Spiritual</i>	.794**	.653**	.602**	.687**	1				
6. Sleep Quality	-.055	-.005	-.074	.046	-.010	1			
7. Depression	-.546**	-.530**	-.477**	-.567**	-.462**	.041	1		
8. Rumination	.127*	.070	.117*	-.006	.052	-.231**	.273**	1	
9. Physical Health	.388**	.343**	.322**	.442**	.348**	-.057	-.670**	-.283**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Linear Regression- Covariates

Prior to the main analyses, I first examined whether any covariates should be added to the models. Using multiple linear regression, I entered the sample demographics of gender, age, and sexual orientation (both dummy variables created for bisexual and homosexual individuals were included as simultaneous predictors of depression and physical health. Gender was not related to either depression or physical health. Sexual orientation was significantly related to both depression, $b = 6.47$, $SE = 2.08$, $t(376) = 3.10$, $p = .002$, and physical health, $b = -4.95$, $SE = 1.74$, $t(376) = -2.84$, $p = .005$. Specifically, heterosexual individuals were less depressed than bisexual individuals. Additionally, age was significantly related to both depression, $b = -0.45$, $SE = 0.06$, $t(376) = -7.97$, $p < .001$, and physical health, $b = 0.23$, $SE = 0.05$, $t(376) = 4.91$, $p < .001$, such that older individuals reported less depression and worse physical health. Therefore, for both psychological and physical health, sexual orientation (both dummy variables

created for bisexual and homosexual individuals were included), and age were included as covariates in all subsequent analyses.

Table 4:
Intimacy on Mental and Physical Health

<i>Variable</i>	<i>b</i>	<i>SE</i>	<i>Beta</i>	<i>R</i> ²
<i>Mental Health</i>				
Step 1				.18***
Bisexuality	6.37**	2.08	.15	
Homosexuality	3.45	4.02	.04	
Age	-.44***	.06	-.38	
Step 2				.41***
Bisexuality	4.81**	1.76	.11	
Homosexuality	.77	3.42	.01	
Age	-.36***	.05	-.31	
Intimacy	-9.41***	.77	-.49	
<i>Physical Health</i>				
Step 1				.09***
Bisexuality	-4.84**	1.74	-.14	
Homosexuality	-3.31	3.37	-.05	
Age	.22***	.05	.24	
Step 2				.21***
Bisexuality	-3.96*	1.63	-.11	
Homosexuality	-1.79	3.16	-.03	
Age	.18***	.04	.19	
Intimacy	5.31***	.72	.35	

*** $p < .001$ level

** $p < .01$ level

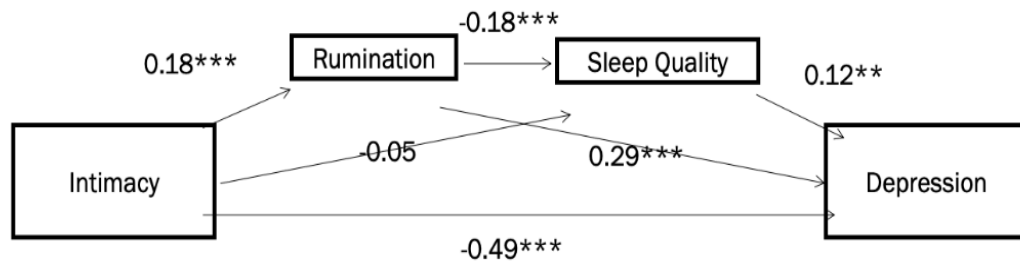
* $p < .05$ level

Intimacy & Health

To examine the first hypothesis, I used multiple linear regression analyses with the composite intimacy measure as a predictor of physical health, while controlling for age and sexual orientation. There was a significant linear relationship such that higher overall intimacy, predicted better their physical health, $b = 5.31$, $SE = 0.72$, $t(377) = 7.49$, $p < .001$ (see Table 5). Similarly, there was a significant relationship between overall intimacy and depression, such that greater reported overall intimacy predicted lower levels of depression, $b = -9.41$, $SE = 0.77$, $t(377) = -12.21$, $p < .001$.

I also conducted a series of exploratory analyses with the four separate dimensions of intimacy. In a hierarchical linear regression, sexual orientation and age were entered in the first step and the four dimensions of intimacy were entered simultaneously in the second step; two models were conducted for depression and physical health as the outcomes. Physical intimacy was related to both less depression ($b = -2.41, SE = 1.02, t(377) = -2.37, p = .018$) and better physical health ($b = 0.81, SE = 0.94, t(377) = 0.86, p = .039$). Similarly, intellectual intimacy was related to both less depression ($b = -3.97, SE = 1.22, t(377) = -3.25, p = .001$) and better physical health ($b = 5.09, SE = 1.13, t(377) = 4.51, p < .001$). Emotional intimacy was a borderline marginal significant predictor of depression ($b = -1.97, SE = 1.19, t(377) = -1.65, p = .099$), but not physical health. Finally, spiritual intimacy was not related to depression or physical health.

Figure 1:
A serial mediation model with rumination and sleep quality as proposed mediators of Intimacy on Depression (see Table 5 for detailed estimates).



Displayed are the main path coefficients in the serial mediation model.

*** is significant at the $p < .001$ level

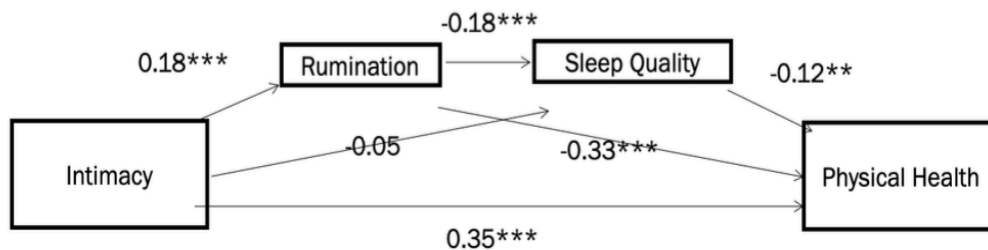
** is significant at the $p < .01$ level

Role of Rumination & Sleep Quality

In order to examine the second hypothesis, two serial mediation analyses (controlling for sexual orientation and age) were conducted using the SPSS macro PROCESS model 6 bootstrapping procedure (with 5,000 bias corrected samples) to calculate the confidence intervals of the indirect effect (see Hayes, 2017). In the first analysis, I examined whether lower levels of intimacy predicted higher rumination which in turn would predict lower sleep quality and greater depression. As shown in Figure 1 (with corresponding coefficients in Table 6), there was evidence of mediation, but only through rumination. There was no indirect effect through sleep quality. However, the test of serial mediation was significant ($b = -0.07$, $SE = 0.05$; 95% CI = -0.19, -0.01). In other words, intimacy predicted rumination, which predicted lower sleep quality, which in turn predicted greater depression.

Figure 2:

A serial mediation model with rumination and sleep quality as proposed mediators of Intimacy on Physical Health (see Table 5 for detailed estimates).



Displayed are the main path coefficients in the serial mediation model.

**** is significant at the $p < .001$ level*

*** is significant at the $p < .01$ level*

In the second model, I examined whether lower levels of intimacy predicted higher rumination which in turn would predict lower sleep quality and thus worse

physical health. As shown in Figure 2 (with corresponding coefficients in Table 6), there was evidence of mediation, but again only through rumination (and not sleep quality). However, the test of serial mediation was significant ($b = 0.06$, $SE = 0.04$; 95% CI = 0.01, 0.17). In other words, intimacy predicted rumination, which predicted lower sleep quality, which in turn predicted lower physical health.

Table 5:
Path coefficients, indirect effects, and the 95% bias-corrected confidence interval predicting mental and physical health scores (N=378)

Path	Effect	BootLLCI	BootULCI	SE
<i>Mental Health</i>				
Total effect (C)	-10.24*	-11.68	-8.79	.73
Direct effect (C')	-9.42*	-10.94	-7.90	.77
a ₁	0.21*	0.09	0.33	.06
a ₂	-0.05	-0.15	0.06	.05
a ₃	-0.15*	-0.24	-0.06	.04
b ₁	4.65*	3.39	5.91	.64
b ₂	2.21*	0.77	3.65	.73
Indirect effects				
Total indirect effect	0.82*	0.19	1.50	.34
a ₁ b ₁	0.99*	0.39	1.65	.33
a ₂ b ₂	-0.10	-0.37	0.14	.13
a ₁ a ₃ b ₂	-0.07*	-0.19	-0.01	.05
<i>Physical Health</i>				
Total effect (C)	6.07*	4.73	7.41	.68
Direct effect (C')	5.33*	3.93	6.74	.71
a ₁	0.21*	0.09	.33	.06
a ₂	-0.05	-0.15	.06	.05
a ₃	-0.15*	-0.24	-0.06	.04
b ₁	-4.15*	-5.32	-2.98	.59
b ₂	-1.87*	-3.21	-0.53	.68
Indirect effects				
Total indirect effect	-0.74*	-1.37	-0.14	.31
a ₁ b ₁	-0.88*	-1.49	-0.34	.30
a ₂ b ₂	0.09	-0.11	0.35	.11
a ₁ a ₃ b ₂	0.06*	0.01	0.17	.04

Note: Models control for sexuality and age; Coefficient names correspond with Figure 1.

* is significant at $p < .05$

Finally, in an exploratory analysis, I examined if the four separate dimensions of intimacy (in eight separate models) show similar associations in the serial mediation model. First, I looked at the two serial mediation models with emotional intimacy as the predictor with physical health and depression as the outcomes. Emotional intimacy, rumination and sleep quality did show evidence for a serial mediation model as predictors for physical health. I found evidence for a partial mediation through rumination only. The test of serial mediation was significant ($b = 0.04$, $se = .03$; CI's = 0.0006; 0.1158). Additionally, emotional intimacy did show a similar association on depression. Similarly, I found that there was mediation through rumination only. When testing serial multiple mediation, the specific indirect effect of emotional intimacy on depression through both rumination and sleep quality was significant, ($z = -0.05$, $se = .04$; CI's = -0.14; -0.002).

Further, I looked at the serial mediation model with physical intimacy, rumination and sleep quality as predictors for physical health. The specific indirect effect through rumination only was significant. However, when testing serial multiple mediation, the specific indirect effect of physical intimacy on physical health through both rumination and sleep quality was significant, ($z = 0.04$, $se = .03$; CI's = 0.0023; 0.12). Additionally, there was a direct effect of physical intimacy on depression. The specific indirect effect through rumination only was significant. However, when testing serial multiple mediation, the specific indirect effect of physical intimacy on depression through both rumination and sleep quality was significant, with a ($b = 0.05$, $se = .03$; CI's = -0.13; -0.002). Finally, intellectual intimacy and spiritual intimacy did not show a significant serial mediation with both mental and physical health.

CHAPTER 4

DISCUSSION

This thesis examined the role of intimacy through rumination and sleep quality on mental and physical health. The first hypothesis examined the relationship between intimacy and depression and physical health. The second hypothesis examined the role of intimacy, rumination, and sleep quality on mental and physical health within a serial mediation model. Finally, I examined two post hoc exploratory analyses to look at whether the different dimensions of intimacy showed different strengths within my initial hypotheses. I found partial support for my hypotheses; the main findings will be discussed below with future directions and limitations of the study.

Intimacy and Health

There was evidence that intimacy was a significant predictor of both depression and physical health. When participants perceived their intimacy within their relationship as low, they were also more likely to report higher levels of depression and lower physical health than those with higher intimacy in their relationship. This is in line with previous research showing that personal relationships have an effect on our health (both mental and physical; August, Kelly, & Markey, 2016). To expand on this hypothesis, a post hoc analysis was conducted where the strength of the four different dimensions of intimacy (emotional, physical, intellectual and spiritual) were looked at separately in relation to health. Interestingly, I found evidence that both physical and intellectual intimacy showed a significant relationship to both mental and physical health. However, there was no evidence for this relationship between emotional intimacy or spiritual intimacy with health. These results suggest that physical and intellectual intimacy have a

unique relationship with mental and physical health. This is interesting because often lay people focus on the emotional aspect of intimacy; these results suggest that general communication about ideas within a relationship may matter more for health than the emotional factor behind those conversations.

Role of Rumination and Sleep Quality

I found evidence supporting my second hypothesis, that rumination and sleep quality play a mediating role between intimacy and mental and physical health. To clarify, low intimacy is associated with greater rumination; together low intimacy and high rumination were associated with lower sleep quality, which, in turn, predicted greater depression. The results indicated a similar serial mediation with perceived physical health. While the current research is specifically looking at intimacy, the results are consistent with previous research where personal relationships are shown to have a relationship with rumination (Reynolds, Searight, & Ratwik, 2014), as well as rumination as a predictor of sleep quality (Thomsen, Mehlsen, Christensen, & Zachariae, 2003). Previous research also linked sleep quality to health outcomes, which is consistent with sleep quality directly impacting mental and physical health (Lockley & Foster, 2012; Vargas & Robles, 2018). I found evidence that intimacy within a relationship is related to health directly, as well as indirectly through rumination and sleep quality. The evidence of serial mediation may suggest a domino effect, where how we feel about our relationship impacts our cognitive processes (i.e. rumination), which in turn impacts our daily functioning (i.e. sleep quality) and that impacts our health both mentally and physically. Past research does show that there is a bi-directional relationship where sleep quality impacts relationships (Hassler & Troxel, 2010).

To further explore this serial mediation model, I looked at the four dimensions of intimacy separately in a post hoc analysis. Interestingly, emotional and physical intimacy were the only two dimensions of intimacy that showed significant results; they play a unique role on the amount of rumination which relates to sleep quality and mental and physical health. In order to further explore the relationship between intimacy and health, we need more literature on intimacy and its different dimensions. The different dimensions of intimacy need to be systematically examined for their unique relationship to health and relationship outcomes. Out of the four dimensions I examined in my exploratory analysis, two had significant unique direct relationships with health and two had indirect relationships through rumination and sleep quality. This means that the different dimensions of intimacy have the potential of being unique predictors of one's health.

Limitations & Future Directions

There are several limitations within this study; Additionally, the sample was recruited through Mturk sample, thus, the surveys were completed online. This is a potential strength and limitation that come with using an Mturk sample; all participants are anonymous and all surveys are done online, therefore the surveys were not completed in a controlled environment. To control for the potential lack of attention, several attention checks were included in the survey and participants that failed the checks were removed. Finally, all data is cross-sectional instead of longitudinal or experimental, so causal inferences could not be made. A potential future direction may be to look at couples within a relationship in a longitudinal study, and analyze which dimension of intimacy is considered most important at the beginning as compared to the end of a

relationship. Another future direction may be to explore the different dimensions of intimacy and their unique relationship to health and relationship outcomes.

The current thesis examined how intimacy affects mental and physical health. I also looked at how intimacy, rumination, and sleep quality were associated with a person's mental and physical health. I found partial support for my hypotheses; intimacy did in fact have an association with physical and mental health.

REFERENCES

- August, K. J. & Kelly, C. S. & Markey, C. N. (2016). Marriage, romantic relationships, and health. *Encyclopedia of Mental Health*, 3, 46-52. doi:10.1016/B978-0-123970459.000744
- Bradbury, T. N., & Karney, B. R. (2010). *Intimate relationships*. New York: W.W. Norton & Co.
- Brelsford, Gina M., and Annette Mahoney. 2008. Spiritual disclosure between older adolescents and their mothers. *Journal of Family Psychology*, 22, 62–70.
- Burns, D. D., Sayers, S. L., & Moras, K. (1994). Intimate relationships and depression: Is there a causal connection? *Journal of Consulting and Clinical Psychology*, 62, 1033-1043. doi:10.1037/0022-006X.62.5.1033
- Buysse, D.J., Reynolds III, C.F., Monk, T.H., Berman, S.R., & Kupfer, D.J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Journal of Psychiatric Research*, 28, 193-213.
- Calmes, C.A., & Roberts, J.E. (2008). Rumination in interpersonal relationships: Does co-rumination explain gender differences in emotional distress and relationship satisfaction among college students? *Cogn. Ther. Res.* 32: 577–90
- Clinebell, H. J., & Clinebell, C. H. (1981). *The intimate marriage. Sydney: Family Life Movement of Australia.*
- Coan, J. A., Schaefer, H. S., & Davidson, R. J. (2006). Lending a hand: Social regulation of the neural response to threat. *Psychological Science*, 17, 1032-1039. doi:10.1111/j.1467-9280.2006.01832.x
- Coyne, J. C., Rohrbaugh, M. J., Shoham, V., Sonnega, J., Nicklas, J. M., & Cranford, J. A., (2001). Prognostic importance of marital quality or survival of congestive heart failure. *The American journal of cardiology*, 88, 526-529. doi:10.1016/S0002-9149(01)01731-3.
- Delaney, A. L. (2019). Sexual intimacy challenges as markers of relational turbulence in couples with depression. *Journal of Social and Personal Relationships*, 36, 3075–3097. <https://doi.org/10.1177/0265407518809488>
- Derogatis, L.R. (1992) SCL-90-R: Administration, scoring & procedures manual-II, for the (revised) version and other instruments of the psychopathology rating scale series. 2nd Edition, *Clinical Psychometric Research*, Towson.
- Doss, B. D., Simpson, L. E., & Christensen, A. (2004). Why do couples seek marital therapy? *Professional Psychology: Research and Practice*, 35, 608–614.
- Faul, Franz & Erdfelder, Edgar & Buchner, Axel & Lang, Albert-Georg. (2009). Statistical Power Analyses Using G*Power 3.1: Tests for Correlation and Regression Analyses. *Behavior Research Methods*. 41, 1149-1160. 10.3758/BRM.41.4.1149.

- Falba, T.A., Sindelar, J.L., 2008. Spousal concordance in health behavior change. *Health Services Research*, 43, 96–116.
- Finkbeiner, N. M., Epstein, N. B., & Falconier, M. K. (2013). Low intimacy as a mediator between depression and clinic couple relationship satisfaction. *Personal Relationships*, 20, 406-421. doi:10.1111/j.1475-6811.2012.01415.x
- Gable, S. L., Reis, H. T., Impett, E. A., & Asher, E. R. (2004). What do you do when things go right? The intrapersonal and interpersonal benefits of sharing positive events. *Journal of Personality and Social Psychology*, 87, 228-245. <http://dx.doi.org/10.1037/0022-3514.87.2.228>
- Gandek, B., Sinclair, S. J., Kosinski, M., & Ware, J. E., Jr (2004). Psychometric evaluation of the SF-36 health survey in Medicare managed care. *Health Care Financing Review*, 25, 5–25.
- Gordon, A. M., & Chen, S. (2014). The role of sleep in interpersonal conflict: Do sleepless nights mean worse fights? *Social Psychological and Personality Science*, 5, 168-175. doi:10.1177/1948550613488952
- Grandner, Michael & Pack, Allan. (2011). Sleep disorders, public health, and public safety. *JAMA : The Journal of the American Medical Association*, 306, 2616-2617. doi:10.1001/jama.2011.1833.
- Greeff, A. P., & Malherbe, H. L. (2001). Intimacy and marital satisfaction in spouses. *Journal of Sex & Marital Therapy*, 27, 247–257.
- Guastella, A. J., & Moulds, M. L. (2007). The impact of rumination on sleep quality following a stressful life event. *Personality and Individual Differences*, 42, 115–162 doi: 10.1016/j.paid.2006.04.028
- Hale, C. J., Hannum, J. W., & Espelage, D. L. (2005). Social support and physical health: The importance of belonging. *Journal of American College Health*, 53, 276-284. doi:<http://dx.doi.org.ezproxy1.lib.asu.edu/10.3200/JACH.53.6.276-284>
- Hasler, B. P., & Troxel, W. M. (2010). Couples' nighttime sleep efficiency and concordance: Evidence for bidirectional associations with daytime relationship functioning. *Psychosomatic Medicine*, 72, 794-801.
- Hayes, A. F. (2017). *Methodology in the social sciences. Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY, US: Guilford Press.
- Horwitz, A. V., White, H. R., & Howell-White, S. (1996). Becoming married and mental health: A longitudinal study of a cohort of young adults. *Journal of Marriage and the Family*, 58, 895-907. doi:10.2307/353978
- Lockley, S. W., & Foster, R. G. (2012). *Sleep: a very short introduction (Vol. 295)*. New York: *Oxford University Press*.
- Meyler, D., Stimpson, J.P., Peek, M.K., 2007. Health concordance within couples: A systematic review. *Social Science and Medicine*, 64, 2297–2310.

- Miller, R. S. (2012). *Intimate relationships*. New York: McGraw-Hill.
- Nowack, K. (2017). Sleep, emotional intelligence, and interpersonal effectiveness: Natural bedfellows. *Consulting Psychology Journal: Practice and Research*, 69, 66-79. doi:10.1037/cpb0000077
- Radloff, Lenore S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385-401. doi:10.1177/014662167700100306
- Reis, H. T., & Franks, P. (1994). The role of intimacy and social support in health outcomes: Two processes or one? *Personal Relationships*, 1, 185-197. doi:10.1111/j.1475-6811.1994.tb00061.x
- Reynolds, S., Searight, H. R., & Ratwik, S. (2014). Adult attachment styles and rumination in the context of intimate relationships. *North American Journal of Psychology*, 16, 495-506.
- Richard, F. D., Bond, C. F., & Stokes-Zoota, J. J. (2003). One Hundred Years of Social Psychology Quantitatively Described. *Review of General Psychology*, 7, 331–363. <https://doi.org/10.1037/1089-2680.7.4.331>
- Robles T. F. (2014). Marital quality and health: Implications for marriage in the 21st century. *Current directions in psychological science*, 23, 427–432. doi:10.1177/0963721414549043
- Robles, T. F., Slatcher, R. B., Trombello, J. M., & McGinn, M. M. (2014). Marital quality and health: A meta-analytic review. *Psychological Bulletin*, 140, 140-187. doi:10.1037/a0031859
- Rose, A. (2002). Co-rumination in the friendships of girls and boys. *Child Development*, 73, 1830-1843. Retrieved from <http://www.jstor.org/stable/3696420>
- Sanderson, C. A., & Evans, S. M. (2001). Seeing one's partner through intimacy-colored glasses: an examination of the processes underlying the intimacy goals-relationship satisfaction link. *Personality and Social Psychology Bulletin*, 27, 463–473. doi:10.1177/0146167201274007
- Schaefer, M. T., & Olson, D. H. (1981). Assessing intimacy: The PAIR inventory. *Journal of Marital and Family Therapy*, 7, 47–60.
- Segerstrom, S. C., Tsao, J. C., Alden, L. E., & Craske, M. G. (2000). Worry and rumination: Repetitive thought as a concomitant and predictor of negative mood. *Cognitive therapy and Research*, 24, 671-688.
- Senkans, Svenja & McEwan, Troy & Skues, Jason & Ogloff, James. (2016). Development of a Relational Rumination Questionnaire. *Personality and Individual Differences*. 90. 27-35. 10.1016/j.paid.2015.10.032.
- Siegel, J. M. (2005). Clues to the functions of mammalian sleep. *Nature*, 437, 1264-1271. doi:10.1038/nature04285

- Soons, J. P. M., & Liefbroer, A. C. (2008). Together is better? Effects of relationship status and resources on young adults' well-being. *Journal of Social and Personal Relationships*, 25, 603–624. <https://doi.org/10.1177/0265407508093789>
- Stadler, G., Snyder, K. A., Horn, A. B., Shrout, P. E., & Bolger, N. P. (2012). Close relationships and health in daily life: A review and empirical data on intimacy and somatic symptoms. *Psychosomatic Medicine*, 74, 398-409. doi:10.1097/PSY.0b013e31825473b8
- Sternberg, R. J. (1986). A triangular theory of love. *Psychological Review*, 93,119-135. doi:10.1037/0033-295X.93.2.119
- Thomsen, D. K., Mehlsen, M. Y., Christensen, S., & Zachariae, R. (2003). Rumination--relationship with negative mood and sleep quality. *Personality and Individual Differences*, 34, 1293-1301. doi: 10.1016/S0191-8869(02)00120-4
- Tousignant, O. H., Taylor, N. D., Suvak, M. K., & Fireman, G. D. (2019). Effects of rumination and worry on sleep. *Behavior Therapy*, 50, 558–570. doi: 10.1016/j.beth.2018.09.005
- Troxel, W. M., Robles, T. F., Hall, M., & Buysse, D. J. (2007). Marital quality and the marital bed: Examining the covariation between relationship quality and sleep. *Sleep Medicine Reviews*, 11, 389-404.
- Vargas, Perla A. & Robles, Elias (2018): Asthma and allergy as risk factors for suicidal behavior among young adults, *Journal of American College Health*, 67, 97-112. doi: 10.1080/07448481.2018.1462822
- Waite, L. J., Luo, Y., & Lewin, A. C. (2009). Marital happiness and marital stability: Consequences for psychological well-being. *Social Science Research*, 38, 201-212. doi:10.1016/j.ssresearch.2008.07.001
- Wood, R.G., Goesling, B., Avellar, S., 2007. The effects of marriage on health: a synthesis of recent research evidence. Washington, DC: *Mathematica Policy Research*.
- What is Good Quality Sleep? (2018, January 23). Retrieved August 20, 2018, <https://sleepfoundation.org/press-release/what-good-quality-sleep/page/0/1>

APPENDIX A
MEASURES USED IN STUDY

Demographic Questions

1. What is your age
2. What is your date of birth? (mm/dd/yyyy)
3. What is your race? (Non-Hispanic White, African American, Hispanic, Asian, Middle eastern or other)
4. Which of the following best describes your sexual orientation? (Heterosexual, Homosexual, Bi-sexual or other)
5. What is your sex? (Male, Female, Transgender male, Transgender female, non-binary or other)
6. What is your current relationship status? (Single, In a relationship, Cohabiting, Married)
7. How long have you been in a relationship/cohabiting/married? (Months)
8. How much education have you completed? (some high school, high school, some college, college, or an advanced degree)
9. What answer best shows your entire household income before taxes? (less than 10,000, 10,001- 19,999, 20,000 - 29,999, 30,000 – 39,999, 40,000 – 49,999, 50,000 – 59,999, 60,000 - 69,999, 70,000 – 79,999, 80,000 - 89,999, 90,000 – 99,999, 100,000 - 149,999, or more than 150,000)

Rumination (Not At All True, A Little True, Somewhat True, Mostly True, or Really True)

1. We spend most of our time together talking about problems that my friend or I have. If one of us has a problem, we will talk about the problem rather than talking about something else or doing something else.
2. After my friend tells me about a problem, I always try to get my friend to talk more about it later.
3. When I have a problem, my friend always tries really hard to keep me talking about it.
4. When one of us has a problem, we talk to each other about it for a long time.
5. When we see each other, if one of us has a problem, we will talk about the problem even if we had planned to do something else together.
6. When my friend has a problem, I always try to get my friend to tell me every detail about what happened.
7. After I've told my friend about a problem, my friend always tries to get me to talk more about it later.
8. We talk about problems that my friend or I are having almost every time we see each other.
9. If one of us has a problem, we will spend our time together talking about it, no matter what else we could do instead.
10. When my friend has a problem, I always try really hard to keep my friend talking about it.
11. When I have a problem, my friend always tries to get me to tell every detail about what happened.

When we talk about a problem that one of us has....

12. we will keep talking even after we both know all of the details about what happened.
13. we talk for a long time trying to figure out all of the different reasons why the problem might have happened.
14. we try to figure out every one of the bad things that might happen because of the problem.
15. we spend a lot of time trying to figure out parts of the problem that we can't understand.
16. we talk a lot about how bad the person with the problem feels.
17. we'll talk about every part of the problem over and over.
18. we talk a lot about the problem in order to understand why it happened.
19. we talk a lot about all of the different bad things that might happen because of the problem.
20. we talk a lot about parts of the problem that don't make sense to us.
21. we talk for a long time about how upset is has made one of us with the problem.
22. we usually talk about that problem every day even if nothing new has happened.
23. we talk about all of the reasons why the problem might have happened.
24. we spend a lot of time talking about what bad things are going to happen because of the problem.
25. we try to figure out everything about the problem, even if there are parts that we may never understand.
26. we spend a long time talking about how sad or mad the person with the problem feels.

Spiritual Intimacy Questionnaire (Strongly Disagree, Disagree, Neutral, Agree, or Strongly Agree)

1. I feel safe being completely open and honest with my partner about my faith.
2. I tend to keep my spiritual side private and separate from my relationship.
(reverse scored)
3. I try not to be judgmental or critical when my partner shares his/her ideas about spirituality.
4. I try to be supportive when my partner discloses spiritual questions or struggles.
5. My partner shares his/her spiritual questions or struggles with me.
6. My partner doesn't disclose his/her thoughts or feelings about spirituality with me.
(reverse scored)
7. My partner really knows how to listen when I talk about my spiritual needs, thoughts, and feelings.
8. My partner is supportive when I reveal my spiritual questions or struggles to him/her.

Pittsburgh Sleep Quality Index

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions. During the past month,

1. When have you usually gone to bed? _____
2. How long (in minutes) has it taken you to fall asleep each night? _____
3. When have you usually gotten up in the morning? _____
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed) _____

5. During the past month, how often have you had trouble sleeping because you...	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times a week (3)
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s):				
6. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)
9. During the past month, how would you rate your sleep quality overall?				

- Component 1 #9 Score..... C1 _____
- Component 2 #2 Score (≤ 15 min=0; 16-30 min=1; 31-60 min=2, >60 min=3) + #5a Score (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3)..... C2 _____
- Component 3 #4 Score ($> 7=0$; 6-7=1; 5-6=2; $< 5=3$)..... C3 _____
- Component 4 (total # of hours asleep)/(total # of hours in bed) x 100
 $> 85\%=0$, $75\%-84\%=1$, $65\%-74\%=2$, $< 65\%=3$ C4 _____
- Component 5 Sum of Scores #5b to #5j (0=0; 1-9=1; 10-18=2; 19-27=3)..... C5 _____
- Component 6 #6 Score C6 _____
- Component 7 #7 Score + #8 Score (0=0; 1-2=1; 3-4=2; 5-6=3)..... C7 _____

Add the seven component scores together _____ **Global PSQI Score** _____

Buysse, D.J., Reynolds III, C.F., Monk, T.H., Berman, S.R., & Kupfer, D.J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Journal of Psychiatric Research*, 28(2), 193-213.

Reprinted with permission from copyright holder for educational purposes per the University of Pittsburgh, Sleep Medicine Institute, Pittsburgh Sleep Quality Index (PSQI) website at <http://www.sleep.pitt.edu/content.asp?id=1484&subid=2316>.

Center of Epidemiologic Studies Depression Scale

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

During the past week...

	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. I did not feel like eating; my appetite was poor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I felt that I could not shake off the blues even with help from my family or friends.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I felt I was just as good as other people.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I had trouble keeping my mind on what I was doing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I felt depressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I felt that everything I did was an effort.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I felt hopeful about the future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I thought my life had been a failure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I felt fearful.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. My sleep was restless.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. I was happy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I talked less than usual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. I felt lonely.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. People were unfriendly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. I enjoyed life.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I had crying spells.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. I felt sad.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I felt that people dislike me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. I could not get "going."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SCORING: zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed. Possible range of scores is zero to 60, with the higher scores indicating the presence of more symptomatology.

36-Item Short Form Survey Instrument (SF-36)

Choose one option for each questionnaire item.

1. In general, would you say your health is:

- 1 - Excellent
 - 2 - Very good
 - 3 - Good
 - 4 - Fair
 - 5 - Poor
-

2. Compared to one year ago, how would you rate your health in general now?

- 1 - Much better now than one year ago
 - 2 - Somewhat better now than one year ago
 - 3 - About the same
 - 4 - Somewhat worse now than one year ago
 - 5 - Much worse now than one year ago
-

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
3. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
4. Moderate activities, such as moving a table, pushing a vacume cleaner, bowling or playing golf	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
5. lifting or carrying groceries	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
6. Climbing several flights of stairs	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
7. Climbing one flight of stairs	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
8. Bending, kneeling or stooping	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
9. Walking more than a mile	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
10. Walking several blocks	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
11. Walking one block	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3
12. Bathing or dressing yourself	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

- | | Yes | No |
|--|----------------------------|----------------------------|
| 13. Cut down the amount of time you spent on work or other activities | <input type="radio"/>
1 | <input type="radio"/>
2 |
| 14. Accomplished less than you would like | <input type="radio"/>
1 | <input type="radio"/>
2 |
| 15. Were limited in the kind of work or activities | <input type="radio"/>
1 | <input type="radio"/>
2 |
| 16. Had difficulty performing the work or other activities (for example, it took extra effort) | <input type="radio"/>
1 | <input type="radio"/>
2 |
-

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

- | | Yes | No |
|---|----------------------------|----------------------------|
| 17. Cut down the amount of time you spent on work or other activities | <input type="radio"/>
1 | <input type="radio"/>
2 |
| 18. Accomplished less than you would like | <input type="radio"/>
1 | <input type="radio"/>
2 |
| 19. Didn't do work or other activities as carefully as usual | <input type="radio"/>
1 | <input type="radio"/>
2 |
-

20. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

- 1 - Not at all
 - 2 - Slightly
 - 3 - Moderately
 - 4 - Quite a bit
 - 5 - Extremely
-

21. How much bodily pain have you had during the past 4 weeks?

- 1 - None
 - 2 - Very mild
 - 3 - Mild
 - 4 - Moderate
 - 5 - Severe
 - 6 - Very severe
-

22. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

- 1 - Not at all
 - 2 - A little bit
 - 3 - Moderately
 - 4 - Quite a bit
 - 5 - Extremely
-

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

- | | All of the time | Most of the time | A good bit of the time | Some of the time | A little of the time | None of the time |
|---|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| 23. Did you feel full of pep? | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 | <input type="radio"/> 6 |
| 24. Have you been a very nervous person? | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 | <input type="radio"/> 6 |
| 25. Have you felt so down in the dumps that nothing could cheer you up? | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 | <input type="radio"/> 6 |
| 26. Have you felt calm and peaceful? | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 | <input type="radio"/> 6 |
| 27. Did you have a lot of energy? | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 | <input type="radio"/> 6 |
| 28. Have you felt downhearted and blue? | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 | <input type="radio"/> 6 |
| 29. Did you feel worn out? | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 | <input type="radio"/> 6 |
| 30. Have you been a happy person? | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 | <input type="radio"/> 6 |
| 31. Did you feel tired? | <input type="radio"/> 1 | <input type="radio"/> 2 | <input type="radio"/> 3 | <input type="radio"/> 4 | <input type="radio"/> 5 | <input type="radio"/> 6 |

32. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

- 1 - All of the time
 - 2 - Most of the time
 - 3 - Some of the time
 - 4 - A little of the time
 - 5 - None of the time
-

How TRUE or FALSE is each of the following statements for you.

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
33. I seem to get sick a little easier than other people	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
34. I am as healthy as anybody I know	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
35. I expect my health to get worse	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
36. My health is excellent	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

APPENDIX B
IRB CORRESPONDENCE



EXEMPTION GRANTED

[Kristin Mickelson](#)
[NCIAS: Social and Behavioral Sciences, School of \(SSBS\)](#)
607/543-1632
Kristin.Mickelson@asu.edu

Dear [Kristin Mickelson](#):

On 1/14/2020 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Role of Intimacy, Rumination and Sleep Quality on Psychological and Physical Health
Investigator:	Kristin Mickelson
IRB ID:	STUDY00011317
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none">• Shehadeh_IRB, Category: IRB Protocol;• Shehadeh_Mturk_Consent, Category: Consent Form;• Shehadeh_Qualtrics_Survey, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);• Shehadeh_Qualtrics_Survey-SONA, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);• Shehadeh_SONA_Consent, Category: Consent Form;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 on 1/14/2020.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,