

THESIS

RELATIONAL SATISFACTION AND TELOMERE LENGTH: EXPLORING THE
MODERATORS OF DYADIC COPING AND MINDFUL PARTNERING

Submitted by

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ABSTRACT

RELATIONAL SATISFACTION AND TELOMERE LENGTH: EXPLORING THE MODERATORS OF DYADIC COPING AND MINDFUL PARTNERING

This study aimed to address the gaps in the literature surrounding dyadic coping, mindful partnering, relationship satisfaction, and telomere length. We examined the association between relationship satisfaction and telomere length. Hypothesizing (H1) that relationship satisfaction would be positively and significantly associated with longer telomere length. We then analyzed mindful partnering and dyadic coping as moderators of this association. Next, we predicted (H2, H3) that mindful partnering and dyadic coping would strengthen the association between relationship satisfaction and telomere length. However, our analyses showed hypothesis one is insignificant, meaning there is no significant association between relationship satisfaction and telomere length. The insignificance of our main effect inhibited us from testing our moderators, dyadic coping, and mindful partnering. One notable limitation of our study was that the data was self-reported, creating more room for social desirability. Future researchers could collect data on these variables through observational research to minimize the amount of social desirability bias. Although the findings from this study were insignificant, it presents the field with opportunities for future research.

TABLE OF CONTENTS

ABSTRACT.....	ii
LITERATURE REVIEW.....	1
Romantic Relationships.....	1
Relationship Satisfaction.....	1
Romantic Relationship Stress.....	2
Stress Buffering Hypothesis.....	3
Health Impacts from Stress.....	4
Telomere Length.....	4
Relationship Satisfaction and Telomere Length.....	5
Dyadic Coping.....	6
Support.....	7
Mindful Partnering.....	8
Dyadic Coping Versus Mindful Partnering.....	9
Mindfulness and Dyadic Processes Impact Telomere Length.....	10
Dyadic Moderators of Relationship Satisfaction and Telomere Length.....	11
Hypotheses.....	12
METHODS.....	13
Participants.....	13
Procedure.....	13
Measures.....	13
Dyadic Coping Inventory.....	13
Mindful Partnering Measure.....	14
Relationship Satisfaction Measure.....	14
Telomere Length.....	15
RESULTS.....	15
DISCUSSION.....	18
LIMITATIONS.....	21
FUTURE DIRECTIONS.....	23
CONCLUSION.....	25

LITERATURE REVIEW

Romantic Relationships

Researchers have established that those in healthy romantic relationships often experience better mental health (Braithwaite & Holt-Lunstad, 2016). Romantic relationship quality is also related to physiological health and health outcomes (Bühler et al., 2021). For example, positive marital adjustment has been associated with healthier blood pressure indicators (Kiecolt-Glaser & Newton, 2001). However, researchers have also found poor romantic relationship quality to be linked to poor immune and endocrine functioning, as well as depression, anxiety, and problem behavior (Kiecolt-Glaser & Newton, 2001). Many researchers have studied the links between marital adjustment and morbidity and mortality (Gallo et al., 2003; Kulik & Mahler, 2006; Rohrbaugh et al., 2006). Baker et al. found that married or cohabitating couples who reported more satisfaction in their marriages had lower indexed left ventricular mass three years later, lowering their risk of uncontrolled high blood pressure (2000). Overall, the health and well-being of many individuals seem to be significantly impacted by the quality of romantic relationship involvement.

Relationship Satisfaction

Researchers have defined romantic relationship satisfaction as the positive subjective evaluation of one's relationship (Keizer, 2014). Relationship satisfaction is often made up of experiences and opinions, so partners of the same couple may differ in how satisfied they are with their relationship (Keizer, 2014). Relationship satisfaction is also viewed as an interpersonal process co-created between partners (Vajda, 2015). Importantly, relationship satisfaction is similar to, but importantly distinct from, other related constructs. Relationship quality is defined

as types of interactional patterns and characteristics of a romantic relationship (Cepukiene, 2019). Romantic relationship adjustment is a continuous and changing process that can be defined as the ability of partners to solve problems, accept different roles based on the development of the family life cycle, and manage relational developmental tasks (Lampis et al., 2018). Importantly, relationship satisfaction differs from similar constructs of relationship adjustment and relationship quality in that relationship satisfaction is a subjective evaluation of those interactional patterns that reflect each partner's degree of fulfillment, contentment, and enjoyment of the relationship (Cepukiene, 2019). Ultimately, the authors of this study selected relationship satisfaction as the predictor variable due to past literature supporting the association between emotional fulfillment/enjoyment and longevity (Diener & Chan, 2011).

Relationship satisfaction is influenced by positive and negative experiences and experiences between partners or within oneself. For example, researchers have found mindfulness to be positively associated with one's use of compromise which in turn positively influences one's relationship satisfaction (Harvey et al., 2019). One example of a negative experience that may impact relationship satisfaction is jealousy. Elphinston et al. research found cognitive jealousy to be directly associated with relationship dissatisfaction (2013). Ultimately, various experiences influence relationship satisfaction levels, and some experiences may create greater romantic relationship stress.

Romantic Relationship Stress

Stress is a common experience and can be conceptualized as a cognitive, emotional, and psychological reaction to adverse events (Fink, 2010). Stress is any type of change that causes physical, emotional, or psychological strain and our body's response to anything that requires attention or action (Scott, 2021). Ample research demonstrates the role stress has on an

individual's mental health, and on possible romantic relationship behaviors (Ogan et al., 2021). Stress external to a couple, such as job stress, is often considered an individual stressor (Ogan et al., 2021). Individual stressors can weigh heavily on partners and may lead to romantic relationship stress (Ogan et al., 2021). Typical relationship stressors include finances, children, trust, sex drives, health issues, family and friend intrusion, and poor communication (Byrne, 2000). Less common stressors may be, homelessness, loss of a child, long distance, terminal illness, and infidelity. Romantic relationship stress can also be closely related to the development of the relationship over time (Nieder & Krenke, 2002). In other words, the progression of a relationship over time creates more space for romantic relationship stress. For instance, at the start of a relationship (the honeymoon phase), partners may not have much to be stressed about, but over the months and years, partners may have more factors to deal with together, such as adding in the influence of in-laws or combining households. Importantly, not all couples deal with stress the same way, some couples are better than others at dealing with their stressors (Story & Bradbury, 2014). How couples cope with stressors can increase or decrease the impact on the quality of the relationship.

Stress Buffering Hypothesis

Individuals cope with stress in various ways; however, one of the most coherent theories of stress coping is the stress-buffering hypothesis. The stress-buffering hypothesis refers to the perceived availability of social support, which is assumed to eliminate or weaken the negative relationship between perceived stress and health and quality of life (Gellert et al., 2018).

Researchers have also studied the stress-buffering hypothesis from a dyadic angle, suggesting that taking the complex interdependence between romantic partners into account may buffer the effects of stress (Cohen & Wilson, 1985; Graham & Barnow, 2013). For example, partners may

engage in support-seeking, advice-giving, or coregulation of emotions to ease the impact of stress (Gellert et al., 2018). Ultimately, greater understanding is needed about the specific stress-buffering processes that occur in romantic relationships that may impact negative outcomes such as poor physical health.

Health Impacts from Stress

Stress can be experienced as emotional, psychological, or cognitive and can impact one's physiological system (Ogan et al., 2021). Research has illuminated ways in which stress and health are related to each other. One pathway to explain how stress and health are connected is through health-related behaviors. For example, when someone is highly stressed, they might engage in high alcohol use, which can negatively impact their health (Rehm & Roerecke, 2017). However, stress does not always lead to negative impacts, as some people engage in positive health-related behaviors such as meditation or good sleep hygiene (Morone et al., 2016). Stress can affect one's physical health outcomes, wherein stress is associated with an increased risk of developing asthma, rheumatoid arthritis, cardiovascular diseases, chronic pain, HIV/AIDS, stroke, and cancer (Slavich, 2016). The mental health and emotional well-being consequences of stress are more commonly discussed in current research, including an increased risk of anxiety disorders and depression (Slavich, 2016). If couples can minimize stress, they may have a higher likelihood of greater relationship satisfaction and in return, may experience better physical health.

Telomere Length

There are many indicators of physical health and health outcomes and one of those indicators is telomere length. Telomere length is one representation of cellular aging, which can indicate how quickly an individual may be aging, their physical health quality, and possible

current and future negative health conditions (Shutte et al., 2020). Telomeres are the protective caps on the end of the strands of DNA called chromosomes (Conger, 2015). Telomere length shortens with each cell division; however, they stop dividing or die when they reach a critical length (Conger, 2015). Telomere length is commonly associated with the onset and worsening of health and early death (Schutte et al., 2020).

Researchers have found that the speed in which telomere length shortens varies greatly and is impacted by a variety of health and interpersonal behaviors (Schutte et al., 2022). For example, individuals who engage in well-balanced sleep, eating, and physical activity health behavior have been found to have longer telomere lengths (Puterman et al., 2015). This association may be due to the benefits of engaging in healthy behaviors which serve as protective factors for aging. Importantly, telomere length can also be impacted by relational factors and processes. For example, individuals who report greater loneliness have been found to have relatively shorter telomere lengths (Wilson et al., 2018). Loneliness may add stress, which could affect one's physiology or the lack of interpersonal may reduce protective factors against cellular aging.

Relationship Satisfaction and Telomere

The quality of one's romantic relationship has been shown to affect one's physical health (Story & Bradbury, 2003). Many pathways could explain this association. One common pathway between relational processes and physical health is exhibited in the research that has shown that married couples often help each other take care of themselves by ensuring they exercise, have a good diet, and go to the doctor (Story & Bradbury, 2003). With regard to relationship satisfaction, happier couples can often have fewer stressors like lower conflict, violence, and instability (Wang & Amato, 2004). Lower stress and higher relationship satisfaction can

influence stress hormones, like lowering cortisol, therefore reducing the impact of stress on the body (Cabeza de Baca et al., 2017). Partners in more satisfying romantic relationships, therefore, likely have lower stress physiology and likely better cellular aging (Cabeza de Baca et al., 2017). The evidence outlined here shows a connection between relationship satisfaction and physical health, but the specific health indicator of telomere length has not been connected to relationship satisfaction. Relationship satisfaction, and therefore telomere length, are likely influenced by the degree to which couples can cope effectively with stress.

Dyadic Coping

The ways in which one manages stress is referred to as coping, which can exist in an individual and in a dyad. Coping is the attempt to deal with or overcome problems and difficulties (Carver & Connor-Smith, 2009). Individual coping is the thoughts and behaviors used to manage the internal and external demands of situations that are appraised as stressful (Carver & Connor-Smith, 2009). For example, when an individual begins to feel overwhelmed or anxious, they may partake in a meditation exercise such as breath work, physical exercise, or nap. When a couple experiences stress, they may engage in coping together. Dyadic coping is not only one partner providing support to the other partner but also problem solving together and experiencing and processing the stress as a unit (Papp & Witt, 2010). This can also look like trying to help one another put the problem in perspective, see it in a new light, and provide supportive affection to each other (Papp & Witt, 2010). Stressors can turn partners toward each other or push them apart (Story & Bradbury, 2004). Couples who turn towards each other to cope with a stressor can be said to be engaging in dyadic coping. For example, researchers examined couples dealing with breast cancer over a long period of time and found that couples who engaged in dyadic coping expressed higher relationship quality and fewer depressive symptoms

for both partners (Rottmann et al., 2015). Individuals and couples likely cope in a variety of ways, including engaging in mindfulness.

Dyadic coping has been shown to have implications for the functioning of stress symptoms (Seiter & Lucas-Thompson, 2020; Bodenmann & Randall, 2012). Seiter and Lucas-Thompson measured diurnal cortisol during novel stressors for couples and found greater positive behavior for men was associated with men's and women's greater cortisol awakening levels, indicating healthy physiological functioning (Seiter & Lucas-Thompson, 2020). This study found couple's communication quality during novel stressors may serve as a protective factor for physiological stress dysregulation (Seiter & Lucas-Thompson, 2020). Another study found heart rates to increase when emotional experiences such as sadness and loneliness became more intense, but when couples engaged in dyadic coping, there was an increase in positive emotions like relief and joy, while their heart rate decreased (Bodenmann & Randall, 2011). Lastly, Meuwly et al. found that stressed individuals recovered faster from stress the more positive dyadic coping they received from their partner (2012). Dyadic coping with one's partner can look like a form of support between partners.

Support

Support is essential in understanding couples functioning and partners' mental and physical health outcomes. Social support describes the number of resources intended to benefit a receiver's ability to cope in times of need (Lücher et al., 2019). Two common types of support are emotional, such as comforting, and instrumental, such as practical assistance (Lücher et al., 2019). Support provided by a romantic partner for a receiver who is battling an illness has been shown to be beneficial for their health management (Lücher et al., 2019). Receiving social support may encourage one to use problem-focused coping (taking control, information seeking,

or generating alternative solutions) and reduce the use of avoidant emotion-focused coping (avoidance, minimization, or positive reappraisal), which in turn have been associated with higher positive and negative affect, respectively (Casu et al., 2019). Ultimately, social support may help us understand how couples cope with stress and how this influences individual partners' mental and physical health, however, mindful dyadic processes may additionally bolster our understanding of couple coping processes.

Mindful Partnering

Mindfulness is a practice used by individuals as well as partners to increase calm, present attention, and work through challenges and difficulties. Mindfulness can be described as a non-judgmental, present-moment awareness (Karremans et al., 2017). To practice mindfulness individually, a person needs the will to practice an open and curious attitude to the experience of the presence (Shapiro et al., 2006). Practicing mindfulness can look like an individual focusing their attention on a specific object, such as breath (Winter et al., 2021). Mindfulness can also be used dyadically, known as mindful partnering. Mindful partnering is a form of interpersonal mindfulness with one's romantic partner (Seiter et al., 2021). Interpersonal mindfulness is conceptualized as awareness toward others that is nonjudgmental, attentive, and present-focused (Pratscher et al., 2018). Seiter et al. conceptualizes mindful partnering as, “including mindful awareness in attention and action toward one’s partner, nonreactivity in conflict, emotional awareness of one’s partner, intentional acceptance and compassion of one’s partner, and self-compassion in the partnership” (2021). For example, if one is experiencing a significant work stressor, they may find themselves being more critical of themselves, causing them to be less compassionate towards themselves as a partner. They may also be distracted or dysregulated, influencing lower levels of nonreactivity in the relationship and lowering their propensity to pick

up on their partner's emotional cues, thus reducing mindful partnering. Mindful partnering may help both partners when stressors present to communicate and connect effectively and presently. Researchers have studied how these characteristics can impact the quality of relationships like friendship or parent-child relationships but have rarely examined how they may impact romantic relationships and physical health (Kiecolt-Glaser & Newton, 2001). Individuals and dyads who successfully engage in protective factors, like coping and mindfulness, may buffer the effects of stress on shortening telomere length.

Dyadic Coping versus Mindful Partnering

This study argues that dyadic coping and mindful partnering are separate from relationship satisfaction because they do not necessarily impact relationship satisfaction, rather they buffer our main effect, that relationship satisfaction impacts telomere length. In this study, relationship satisfaction is the independent variable because it is more universal than dyadic coping and mindful partnering. There is more research on relationship satisfaction, and any partner in a romantic relationship can identify their level of satisfaction in their relationship. It is more likely for someone in a romantic relationship to think about their level of satisfaction in their relationship rather than if they are using dyadic coping and mindful partnering. This is likely because only some people know what dyadic coping and mindful partnering are.

Although this study's argument has relationship satisfaction first, it is possible to have dyadic coping and mindful partnering as independent variables, relationship satisfaction as a moderator, and telomere length as a dependent variable. In order to test relationship satisfaction as a moderator, there would need to be a significant main effect. Current findings suggest that dyadic coping can predict greater relationship satisfaction and mindfulness (Falconier et al., 2015; McGill et al., 2016). However, there is limited research on how dyadic coping and mindful

partnering impact telomere length, making it unlikely to find a significant effect. Given the state of the current literature around relationship satisfaction and its direct and indirect impacts on telomere length, this study has relationship satisfaction as their independent variable to increase the likelihood of having a significant main effect.

Mindfulness and Dyadic Processes Impact Telomere Length

Mindfulness and dyadic coping are two protective factors that have the potential to influence telomere length positively. Research has shown that mindfulness, practiced individually or dyadically, may impact physical health indicators such as telomere length (Winter et al., 2021). Evidence indicates that mindfulness is associated with better physical health (Carlson et al., 2007; Creswell & Lindsay, 2014; Grossman et al., 2004). Furthermore, Cocklin et al. recently found meditation training to be associated with positive indicators of telomere length (2018). Another researcher, Mediorozo et al., also found it to be true that greater engagement in mindfulness was associated with longer telomere length (2020). A meta-analysis examining four randomized control trials found a significant positive relationship between engagement in mindful practices and telomere lengthening (Schutte & Malouff, 2014). These data highlight that presenting focused attention coupled with nonreactive activity and breath work may lightly impact one's physiological system, including telomere length (Schutte & Malouff, 2014).

Researchers have found evidence that several dyadic factors are associated with telomere length. For example, researchers have identified a connection between sexual satisfaction and telomere length, such that individuals who report high sexual satisfaction over their lifetime exhibited longer telomere length on average (Cabeza de Baca et al., 2017). Negative interpersonal romantic processes also have been shown to be associated with telomere length.

For example, individuals who reported ever having experienced a divorce or a separation showed statistically significantly shorter telomere length (Whisman et al., 2016). Ultimately, there is a great deal more to know and unpack about interpersonal experiences and how they are associated with telomere length. Given the central role of romantic relationships in most individuals' lives, this interpersonal realm is an excellent area to focus on identifying influential factors related to telomere length. Although research is beginning to show evidence for the connection between relational processes and physical health, there is much more to be understood about the moderators of these simple associations.

Dyadic Moderators of Relationship Satisfaction and Telomere Length

The way in which partners interact mindfully is a potential moderator for the association between relationship satisfaction and telomere length. Mindful partnering has been shown to influence relationship satisfaction by boosting relationship functioning and stress-coping skills, emotional closeness, acceptance of one another, and less emotional distress (Whiting et al., 2020). Cellular aging is likely even more positively impacted when partners are satisfied in their relationship *and* can connect mindfully. In this way, mindful partnering can be thought of as an enhancing factor in romantic relationship functioning and health outcomes. If couples were to engage in mindful partnering when facing a stressor, their physiological processes will likely be benefitted, potentially impacting their cellular aging. It is not yet known the extent to which mindful partnering moderates the association between telomere lengths and relationship satisfaction.

Dyadic coping may also be a moderator of the association between relationship satisfaction and telomere length. A study conducted in 2011 found a positive correlation between dyadic coping and relationship satisfaction, in which dyadic coping was found to be positively

associated with higher relationship quality (Bodenmann et al.) Although minimal research directly studies the link between dyadic coping and telomere length, we can make assumptions based on current knowledge that there is a connection between the two. For example, if we know dyadic coping increases relationship quality and relationship quality predicts telomere length (Cabeza de Baca et al., 2017), it is appropriate to predict some direct correlation between dyadic coping and telomere length. However, current research has not yet studied how dyadic coping may moderate relationship satisfaction and telomere length.

Based on current literature centered on mindful partnering and dyadic coping, empirical evidence suggests that both variables may be moderators of relationship satisfaction and telomere length. However, which variable is more impactful on this association is still unknown. Based on the present knowledge, it is likely that mindful partnering may play a larger moderating role as there is a great deal of research connecting mindfulness to physical health indicators (Wang et al., 2017). Unlike mindfulness and telomere length, researchers have not yet linked dyadic coping to telomere length. Due to the lack of research on the association between dyadic coping and telomere length, it is likely mindfulness practice will likely have a greater impact on an individual's telomere length.

Hypotheses

The current study addressed gaps in the literature surrounding dyadic coping, mindful partnering, relationship satisfaction, and telomere length. We hypothesized (H1) that relationship satisfaction will be positively and significantly associated with longer telomere length. (H2) Mindful partnering will strengthen the association between relationship satisfaction and telomere length. (H3) Lastly, dyadic coping will strengthen the association between relationship satisfaction and telomere length.

METHODS

Participants

A total of 41 couples (43 identified as women, 38 identified as men, and 1 chose not to respond) were recruited from the community to participate in a more extensive study about stress, its biomarkers, families, and romantic relationships. The subjects were recruited nationally through emailing and mailing lists, internet groups, flyers, and online platforms. To be eligible for participation, participants had to be 18 years old, currently cohabiting, and in a serious committed relationship. Slightly over half (58.50%) of the participants were married. All subjects had to be capable of completing measures and tasks in English. The couples were not required to be heterosexual, and 12 participants identified as lesbian or bisexual (6 couples). The average age of participants was 40 years old ($M = 39.56$, $SD = 13.80$). The sample self-reported their race/ethnicity as 84.10% White, 12.20% Hispanic/Latinx, 4.90% Black, 4.90% Asian/Pacific Islander, and 7.30% as another race. Based on the self-report, the median yearly household income of the sample was between \$50,000 and \$100,000. Participants were educated on average, with a bachelor's and a graduate degree level.

Procedure

First, couples completed questionnaires online, providing their demographic information and relationship-related variables: mindfulness, dyadic coping, and relationship satisfaction. Lastly, couples provided saliva samples via oral swabs, which were later analyzed to identify telomere length. All procedures were approved by a university Institutional Review Board.

Measures

Dyadic Coping Inventory

The 37-item Dyadic Coping Inventory (DCI; Bodenmann, 2008) assesses how couples handle stress. Individuals rate how often they and their partner engage in certain coping and communication behaviors on a scale of 1 (very rarely) to 5 (very often). Subscales tap into supportive dyadic coping, delegated dyadic coping, common dyadic coping, and negative dyadic coping. This study focused on the overall total score of the inventory. Cronbach's alpha for the current study was .794.

Mindful Partnering Measure

The Mindful Partnering Measure (MPM; Seiter et al., 2021) consists of 22 items related to interpersonal mindfulness within romantic relationships. All items on the MPM are rated based on a 5-point Likert-type scale ranging from 1 (Never true) to 5 (Always true). An example item is "I listen carefully to my partner's ideas, even when I disagree with them." Negatively-worded items will be reverse-scored. This measure has five sub-scales: compassion/acceptance, mindful awareness, nonreactivity, emotional awareness, and self-compassion. Once negatively-worded items are reversed scored, scores for each subscale will have compiled, and then the subscales are summed to create a total score for mindful partnering. For the purpose of this study, only the total mindful partnering score was used. Cronbach's alpha for the current study was .878

Relationship Satisfaction Measure

Relationship satisfaction was assessed using the Dyadic Adjustment Scale (DAS-32). The DAS-32 is a 32-item questionnaire designed to assess the relationship quality of intact. There are four subscales which are dyadic consensus, the degree to which the couple agrees on matters of importance to the relationship, dyadic satisfaction; how satisfied the couple is with their relationship, dyadic cohesion; the degree of closeness and shared activities experienced by the

couple, and affective expression; the degree of demonstration of affection and sexual relationships (Spanier, 1976). Participants were asked to answer the questions based on to what extent the items are characteristics of themselves. They encouraged them, whenever possible, to answer some of the questions with their current partner in mind, their most recent partner, or if they have never had a sexual relationship, then what they think their responses would most likely be. The ordinal scale's response options are 5-point scales from 'Not at all a characteristic of me' to 'very characteristic of me.' The total score of the DAS-32 was used to measure marital satisfaction. Cronbach's alpha for the total scale in this study was .765.

Telomere Length

Participants provided 200 ul saliva to be assayed for telomere length, which is an indicator of cellular and biological aging. Samples were assayed at a university biochemical laboratory. Using the DNeasy Blood and Tissue Kit (QIAGEN®, Valencia, CA), DNA was isolated from each saliva sample, and multiplexed quantitative polymerase chain reaction measurements of telomere length were performed using a Bio-Rad CFX96 Real-Time PCR analysis machine (Hercules, CA).

RESULTS

To explore the variables outlined above, a bivariate correlation was first conducted to examine the interrelationships between the constructs (see *Table 1*). Next, a multiple regression was conducted to evaluate the proposed hypotheses with telomere length as the dependent variable. First, we sought to establish a relationship between the independent and the dependent variables (the main effect) with three control variables. Of the control variables (BMI, age, and

income), only age was significant, in a negative direction ($b = -.335^*$, $SE = .004$, $p < .05$). This means the older an individual is, the shorter their telomere. To be thorough we wanted to test a subscale of satisfaction. The most theoretical subscale to test would be physical affection as it relates to physical health outcomes. This subscale was found to be insignificant ($b = .009$, $SE = .111$, $p = .42$). Next, we examined the main effect, which is the association between relationship satisfaction and telomere length, which was found to be insignificant ($b = -.037$, $SE = .119$, $p = .808$), thus not supporting hypothesis one. Secondly, we tested the association between mindful partnering and telomere length, which was found to be insignificant ($b = -.176$, $SE = .006$, $p = .343$). Third, we analyzed the association between dyadic coping and telomere length, which was insignificant ($b = .167$, $SE = .073$, $p = .330$). Lastly, we looked at mindful partnering and dyadic coping as moderators. The presence of mindful partnering did not have an impact on our main effect ($b = .131$, $SE = .014$, $p = .25$). The presence of dyadic coping also did not have an impact on our main effect ($b = .021$, $SE = .011$, $p = .31$).

Table 1

Descriptive Statistics for and Correlations between Main Variables of Interest

	1	2	3	4
1. Dyadic Coping	X			
2. Relationship Satisfaction	.478**	X		
3. Telomere Length	.018	.043	X	
4. Mindful Partnering	.600**	.487**	-.101	X

<i>M</i>	3.87	4.64	1.29	82.93
<i>SD</i>	.78	.54	.32	9.80

* $p < .05$ ** $p < .01$ *** $p < .001$ Note: “dyadic coping refers to the variable dyadic coping”, “relationship satisfaction refers to the variable relationship satisfaction”, “telomere length refers to the variable telomere length”, “mindful partnering refers to the variable mindful partnering”.

Table 2
Linear Regression Predicting Telomere Length

	Telomere Length			
	<i>b</i>	<i>SE</i>	<i>r_{sp}</i>	<i>p</i>
Relationship Satisfaction	-.037	.119	-.030	.808
Dyadic Coping	.167	.073	.121	.330
Mindful Partnering	-.176	.006	-.117	.343
Body Mass Index	-.052	.011	-.051	.678
Age	-.335*	.004	-.277	.028
Income	.131	.031	.107	.387

* $p < .05$ ** $p < .01$ *** $p < .001$ $R^2 = .110$ Note: “dyadic coping refers to the variable dyadic coping”, “relationship satisfaction refers to the variable relationship satisfaction”, “telomere length refers to the variable telomere length”, “mindful partnering refers to the variable mindful partnering”.

DISCUSSION

Research has demonstrated that the quality of one's romantic relationships is linked to physical and mental health (Braithwaite & Holt-Lunstad, 2016; Bühler et al., 2021). In an attempt to explore greater nuance in these associations, we sought to examine understudied relational variables in the context of one physical health indicator, telomere length. Our study found no significant association between relationship satisfaction and telomere length, such that there is not enough evidence to indicate that higher relationship satisfaction is associated with longer telomere. This study also tested physical affection as a subscale of satisfaction and its impact on physical health outcomes and found no statistical significance. These results contradict past findings focused on the relationship between relational variables and physical well-being. For example, Kiecolt-Glaser and Newton (2001) found poor romantic relationship quality to be linked to poor immune and endocrine functioning. It is possible that because relationship satisfaction increases and decreases at certain ages and relationship durations, the inconsistency of an individual's relationship satisfaction may not significantly impact their telomere length (Bühler et al., 2021). Although shorter telomere length has been found to be associated with physical determinants like smoking cigarettes, BMI, and lack of exercise, the results of the present study do not indicate this is true with the physical health measure of telomere length (Puterman et al., 2014; Shammass, 2011; Schutte et al., 2022; Song et al., 2010). The insignificant findings may be due to the difficulty in measuring the relational processes' impacts on telomere length compared to physical health determinants on telomere length.

This study hypothesized that mindful partnering would strengthen the association between relationship satisfaction and telomere length. If this moderator were found to be significant in the analyses, this would mean mindful partnering acts as a buffer that lessens the negative impacts on telomere length that would have been found from lower reported relationship satisfaction. It is possible that when partners engage in mindful partnering, they may be engaging in small processes that are reflective of staying present centered and attuned to one another (Pratscher et al., 2018). Although this is a positive relational process, it may be more reflective of effective communication amidst a stressor, while the stressor may still illicit a physiological response, which in turn may negatively impact telomere length (Barnes et al., 2007). If this moderator were found to be insignificant in the analyses, this would mean mindful partnering was not able to act as a buffer for the negative impacts on one's telomere length that would have been found from their relationship satisfaction levels.

Interestingly, the current study showed a positive association between relationship satisfaction and mindful partnering, such that individuals who are more satisfied in their relationship are more likely to exhibit awareness that is nonjudgmental, attentive, and present-focused toward their partner. However, no matter the level of mindful partnering there was no impact on the association between relationship satisfaction and telomere length. Our results are expected based on Barnes et al. finding that showed trait mindfulness is positively correlated with relationship satisfaction (2007). However, the results showed no significant correlation between mindful partnering and telomere length. This finding is consistent with past literature in that mindful partnering does not directly correlate with cellular aging. Although Epel et al. (2009) found that mindfulness acts as a stress buffer which may, in turn, slow down the rate of cellular aging, future research could focus on the impacts of interpersonal mindfulness.

Lastly, this study hypothesized that dyadic coping would strengthen the association between relationship satisfaction and telomere length. If this moderator were found to be significant in the current study's analysis, this would mean dyadic coping acts as a buffer that lessens the negative impacts on telomere length that would have been found from lower reported relationship satisfaction. It may be that partners engaging in dyadic coping are engaging in processes more consistent with problem-solving, which is a positive relational process, but it may not significantly reduce one's stress physiology (Papp & Witt, 2010). In this way, partners may be effectively managing stressors in practical ways, but partners may still experience the physiological effects of stress, and thereby their telomeres may continue to be impacted (Cabeza de Baca et al., 2017). Although these results were not significant it's important to consider that mindful partnering and dyadic coping were nearly the same in terms of their magnitude of their influence, and although they were statistically insignificant, it is interesting to interpret the directionality of both given they are the same strength. Dyadic coping was positive and mindful partnering was negative, so this means more dyadic coping is associated with longer telomere, and greater mindful partnering is associated with shorter telomere length. It is likely that mindful partnering can be stressful and challenging for people to engage in, thus causing an impact on one's cellular aging. Interestingly, although dyadic coping and mindful partnering were not significantly associated with telomere length, they were showing a strong association relatively with socioeconomic status and telomere length. Socioeconomic status has consistently been shown in the literature to be a predictor of telomere length given it is an indicator of nutrition, health care, etc. Although these 3 were not statistically significant it is still with noting and continuing to investigate mindful partnering and dyadic coping as predictors of telomere length. If dyadic coping were found to be insignificant in our analyses, this would mean it was not able

to act as a buffer for the negative impacts on one's telomere length that would have been found from their relationship satisfaction levels. We could have chosen dyadic coping or mindful partnering as the independent variables, but, guided by the current theories present in the literature, relationship satisfaction seems to set the stage for ongoing prosocial processes such as dyadic coping and mindful partnering.

However, this study showed a positive association between relationship satisfaction and dyadic coping. This finding was expected based on the findings in the current literature stating a positive association between dyadic coping and relationship satisfaction (Bodenmann et al., 2011; Falconier et al., 2015). However, the results of the current study did not show a significant correlation between dyadic coping and telomere length. This finding does not align with past research in that positive and negative interpersonal romantic processes have been associated with longer and shorter telomeres, respectively (Cabeza de Baca et al., 2017; Whisman et al., 2016). One caveat in understanding the results of this study is considering sample size and power. Given the sample size, we would expect a small effect. Although they are insignificant levels in our results this doesn't mean they are not important associations, they are just not detectable. Future research is needed on how the impacts of dyadic coping, in turn, buffer an individual's telomere length.

LIMITATIONS

Although this study presents compelling arguments and future lines of work, the results must be understood in the context of limitations. Although recruitment for this study did not exclude any form of a romantic relationship or demographic beyond age, most of the participants

in this study were highly educated, middle class, and White. This means the study is not representative of a diversified population making it difficult to generalize the findings to all populations. Had our sample been more diversified, the results may have shown patterns in how racial and socioeconomic status impact one's relationship satisfaction and telomere length. The current literature states that social discrimination, racial discrimination, and implicit bias may interact with several variables and contribute to shortened telomere lengths (Chae et al., 2014; Coimbra et al., 2020).

The participants provided self-reported data regarding their relationship functioning. The variables used in this study, relationship satisfaction, dyadic coping, and mindful partnering, are all socially desirable, thus creating room for social desirability bias in this study's findings. It is likely that when the participants answered the items on the questionnaires, they feared judgment about their answers, leading them to possibly answer in more acceptable ways rather than the ways true to their relationship. Social desirability bias can compromise the validity of scores on a measure. Although self-reported data leaves room for biases, it also may be the most direct representation of how the participant experiences processes in their relationship.

Saliva samples were used to assay telomere length in this study; however, there are other methods used to collect telomere length that has been researched. Research has been done studying the accuracy of venous whole blood, dried finger prick blood spot, and saliva samples used to measure telomere length. It was found that measures of telomere length done with blood samples produce a more accurate measure of telomere length in comparison to saliva samples (Stout et al., 2017). The results may have differed if this study used blood samples to measure telomere length.

FUTURE DIRECTIONS

Although this study did not reveal significant results, conclusions drawn from the insignificant findings may outline future pathways for this line of research. Future researchers could gather self-reported data from both partners to provide a dyadic data set. This may be beneficial for measuring relationship satisfaction and giving a complete picture of dyadic coping and mindful partnering. This study did not have a diversified participant population which was a limitation. In order to make findings more generalizable to the population, future researchers could recruit participants for the study nationwide or globally.

Collecting the data on these socially desirable variables through questionnaires left a lot of room for social desirability bias in our data. Future researchers should consider conducting observational research to minimize the amount of social desirability bias. This would be beneficial as observers could measure how and if partners are engaging in dyadic coping and mindful partnering. Researchers would have the choice to use qualitative or quantitative observations. It would be important for the researchers to create a standard scale for quantitative observational research; otherwise, for qualitative observational research, the observers would describe the quality of the partner's mindful partnering and dyadic coping.

Dyadic coping, mindful partnering, and relationship satisfaction are positive variables, and more literature supports how negative variables impact an individual's telomere length. Future researchers could compare negative and positive variables to study which impacts telomere length more. This would benefit the field in knowing what types of variables to study based on the severity of their impact on telomere length.

The data used for this study were collected at one time. Future research should conduct a longitudinal study. A longitudinal study would allow researchers to detect changes in characteristics for a targeted population over a period of time, providing more data from multiple time points. This would also allow researchers to use a control group and treatment in their study. A control group would help ensure the internal validity of the research. A control group would help create a clear picture of the difference over time in the dependent variable in the treatment group. Without a control group, it is difficult to see if the change was due to treatment.

For example, researchers could conduct a longitudinal study with two-time points to which the participants could respond. The first time-point would be before receiving any education about what the variables are and how to engage in them. Then the second time point would be after the treatment group receives a 1-hour session on what dyadic coping and mindful partnering are and how to engage in them as a couple. The control group would not receive a 1-hour session educating them on the moderators, dyadic coping, and mindful partnering. This longitudinal study will show the researchers if the participants are actually engaging in mindful partnering and dyadic coping, unlike the current study. Conducting a longitudinal study may show the field if dyadic coping and mindful partnering positively or negatively impact relationship satisfaction.

Future researchers should account for the type of stress couples are experiencing. Past literature has shown the impact stress has on one's telomere; however, we do not know as much about the difference between individual and relational stressors (Cabeza de Baca et al., 2017). For example, work stress is different from the stress caused by an affair. We know that relationship injuries like infidelity would have a greater impact on an individual's relationship satisfaction level and telomere length (Shrout & Weigel, 2017). Shrout and Weigel also found

that women who were cheated on reported greater mental health impacts and engagement in health-compromising behaviors (2017). An individual's engagement in health-compromising behaviors likely has a negative impact on their cellular aging (Schutte et al., 2022).

If this study found significance in the main effect, future researchers would know that relationship satisfaction is positively and significantly associated with telomere length. This means higher relationship satisfaction is associated with longer telomere length, and lower relationship satisfaction is associated with shorter telomere length. Researchers could then use this knowledge and study different variables that may moderate or mediate this main effect to expand the findings within the field.

CONCLUSION

In an attempt to explore nuance in our current understanding of relational processes associated with telomere length, we examined the dyadic variables of relationship satisfaction, dyadic coping, and mindful partnering. Relationship satisfaction was found to be insignificantly related to telomere length, thus preventing a planned moderation analysis. Mindful partnering and dyadic coping were also found to be insignificantly related to telomere length. Although these results are disappointing, questions are raised about the ways in which these data were collected, calling for the use of dyadic data collection and analyses in the future, as well as longitudinal data collection approaches. In addition, dyadic coping and mindful partners are relatively underexplored variables in the context of physical health outcomes. Given the insignificant findings outlined here, we suggest more diverse research methods be utilized to

better educate romantic partners about how they interpret and answer questions about these variables, which may allow for significant findings to be identified.

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