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THE ROLE OF ATTACHMENT AND COGNITIVE PRE-SLEEP AROUSAL ON ASSOCIATIONS BETWEEN SLEEP CONCORDANCE AND SLEEP QUALITY

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DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Arts and Sciences at the University of Kentucky

By
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ABSTRACT OF DISSERTATION

THE ROLE OF ATTACHMENT AND COGNITIVE PRE-SLEEP AROUSAL ON ASSOCIATIONS BETWEEN SLEEP CONCORDANCE AND SLEEP QUALITY

The amount of time someone spends co-sleeping with their partner, known as sleep concordance, has implications for sleep quality in couples. Attachment security has emerged as an important moderator of the association between sleep concordance and subjective sleep quality (Elsey et al., 2019). The current study tested whether cognitive pre-sleep arousal explains this pattern of moderation. Prior research suggests that these associations between sleep concordance, attachment security, and subjective sleep quality may be stronger for women than men, therefore gender differences in associations were also examined. Participants were 204 (68% female) individuals in an exclusive relationship lasting at least 3 months, recruited through Amazon's Mechanical Turk. Data were analyzed with path analysis using structural equation modeling. Results suggest that women and men may have different needs at bedtime based on attachment security. Specifically, for women with lower attachment anxiety, sleep concordance was associated with greater subjective sleep quality, partly due to lower cognitive pre-sleep arousal. For men, attachment avoidance was associated with greater cognitive pre-sleep arousal and in turn, poorer subjective sleep quality. Results also indicated that depression and greater evening chronotype predicted greater cognitive pre-sleep arousal and thus poorer subjective sleep quality for women. For both men and women, anxiety was associated with decreased subjective sleep quality, in part due to greater cognitive pre-sleep arousal.

KEYWORDS: Couple Sleep, Co-Sleeping, Subjective Sleep Quality, Attachment Insecurity, Gender Differences

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June 16, 2020
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For my dad, whose immense support, love and wisdom made all of this possible.

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INTRODUCTION

A growing body of research examining the impact of co-sleeping in couples has found that sleep concordance can result in both improvements and detriments to sleep quality (Gunn et al., 2015, 2016; Hasler & Troxel, 2010; Richter et al., 2016; Rosenblatt, 2012). Attachment security is one reason sleep concordance may be beneficial for some, but not others (Elsey et al., 2019; Troxel, 2010). The purpose of the current study is to improve understanding of the interaction between sleep concordance and attachment security on subjective sleep quality. Cognitive pre-sleep arousal will be examined as a mediator of the association between sleep concordance and subjective sleep quality. Attachment security will be examined as a moderator of the association between sleep concordance and cognitive pre-sleep arousal.

People with greater attachment avoidance learn to be heavily self-reliant and tend to avoid closeness despite having the same needs for intimacy that all people do (see Mikulincer & Shaver, 2018 for a review). Bedtime, however, is a conspicuously low risk time—especially for individuals with greater attachment avoidance—to meet proximity needs (Simpson & Rholes, 2017). This may help these individuals ease worries, relax and fall asleep. According to previous research, for those with greater attachment avoidance, sleep concordance was associated with better subjective sleep quality (Elsey et al., 2019). Greater sleep concordance may be associated with less cognitive pre-sleep arousal and in turn, greater subjective sleep quality for those with greater attachment avoidance.

People with greater attachment anxiety on the other hand, learn to worry over the availability of those close to them and rely heavily on others for feelings of security and

comfort (see Mikulincer & Shaver, 2018 for a review). Previous research has indicated no association between sleep concordance and subjective sleep quality for those with greater attachment anxiety (Elsey et al., 2019). A partner's presence could increase cognitive pre-sleep arousal for people with attachment anxiety by serving as a reminder of worries in the relationship. Alternatively, these individuals could be comforted by their partner's presence, meeting proximity needs, increasing feelings of closeness and reducing thoughts at bedtime. Thus, exploratory analyses will examine the role of cognitive pre-sleep arousal on the relationship between sleep concordance and subjective sleep quality for people with greater attachment anxiety.

The detailed rationale for these hypotheses is provided below. First, sleep concordance will be defined, including the ways it is measured and what is already known about the topic from previous research. Attachment theory will then be reviewed, paying particular attention to the language used in attachment research and attachment in adulthood. Finally, cognitive pre-sleep arousal and its implications for sleep quality will be addressed.

Sleep Concordance

Sleep concordance, or the amount of time a person co-sleeps with their partner, has become an increasingly common way to study sleep in couples. Some researchers have measured sleep concordance by focusing on the timing of sleep, recording whether individual members of a couple are asleep or awake at the same times throughout the night (Gunn et al., 2015, 2016), or by examining differences in sleep onset and wake time between partners (Hasler & Troxel, 2010). Others have measured sleep concordance by

investigating overlap in physical movements (Meadows et al., 2005; Pankhurst & Horne, 1994) and sleep stages (Drews et al., 2017) between partners during the night. At the most basic level, sleep concordance can be thought of as the percentage of time both members of a couple are in bed together out of the total amount of time either member of the couple is in bed (e.g., Elsey et al., 2019). The current study will use this latter definition of sleep concordance.

The relationship between sleep concordance and sleep quality in couples is complex and varies depending on how sleep quality is defined. Objectively, actigraphy data has shown that people who sleep alone have significantly less movement during the night, an objective measure indicating better sleep quality, than those who sleep beside their partner (Spiegelhalder et al., 2016). This is unsurprising considering around one-third of movements are concordant, or shared, when sleeping with a partner (Pankhurst & Horne, 1994). In other words, one out of every three times a person moves in bed, their partner moves as well. Partners are usually unaware of this concordance in movements, however, and subjectively report better sleep quality when sleeping beside their partner than sleeping alone (Meadows et al., 2009). Further, actigraphy data has revealed that there are significantly longer sleep times for those who typically sleep with their partner than those who are not concordant, or typically sleep apart (Pankhurst & Horne, 1994). Overall, research suggests that greater sleep concordance will be associated with greater subjective sleep quality (Richter et al., 2016).

Proximity to a close partner at night decreases the psychological and physiological responses to potential threats that often impede sleep (Ekirch, 2006).

Additionally, feelings of intimacy and closeness to one's partner at bedtime promote further feelings of security, reducing thoughts and worries, allowing one to fall asleep and stay asleep more easily (Troxel et al., 2009). Not all people need to rely on their partner for such feelings of security, however, and some people may reap more benefits from co-sleeping than others. Attachment security may give some insight into why sleep concordance is beneficial for some and not others (Elsey et al., 2019).

Adult Attachment

Attachment theory began as a conceptual framework for understanding the distress infants experience upon separation from their caregivers (Ainsworth, 1978; Bowlby, 1969, 1973, 1980). Within this framework, attachment is thought of as a behavioral system meant to maintain proximity between a vulnerable infant and their caregiver with the set goal of felt security (Bowlby, 1969, 1982). Felt security is the general belief that the world is a safe place where individuals can explore freely, knowing that attachment figures will respond and help if needed (Mikulincer & Shaver, 2018). Attachment figures are caregivers or important relationship partners who one calls upon for protection and support, especially in times of need or distress (Cassidy & Shaver, 2002).

This behavioral system involves three subjective cognitive appraisals: (1) the appearance of threat in the environment and one's own internal state, (2) the responsiveness of the attachment figure to proximity seeking behaviors, and (3) the effectiveness of those proximity seeking behaviors in the current environment and how to adjust accordingly (Mikulincer & Shaver, 2018). Infants form internal working models,

or mental representations about themselves and others, based upon interactions with their caregivers over time (Bowlby, 1969, 1982). The perception of threat activates the attachment system, initiating proximity seeking behaviors. Then, depending on the responsiveness and sensitivity of caregivers during these times of distress or need, infants create expectations about how other people will attend to them, and how much they are the type of person who will be attended to (Bowlby, 1969, 1982). These early working models canalize over time and set the course for attachment relationships later in life (this will be discussed further below, Hazan & Shaver, 1987).

Individual differences in internal working models about the self and the other are classified into different attachment styles (Bartholomew, 1990). A person's dispositional or dominant attachment style is the one that represents their most accessible working models (Shaver & Mikulincer, 2009). Children who are said to be securely attached have attachment figures who are generally responsive to proximity seeking behaviors and attentive to needs. This creates an overall sense of felt security for the individual over time, informing positive working models of the self and others (Bartholomew, 1990). Two dimensions of attachment insecurity are observed: avoidance and anxiety (Mikulincer & Shaver, 2018). Children who are said to be avoidantly attached have attachment figures who are generally unresponsive to proximity seeking behaviors and insensitive to needs. This encourages an overreliance on the self and avoidance of others over time, especially regarding closeness both physically and emotionally (Behrens, Hesse & Main, 2007; Hazan & Shaver, 1994; 1987). Children who are said to be anxiously attached have attachment figures who are inconsistently responsive to

proximity seeking behaviors and needs. This promotes a sense that the self is not worthy of reliable attentiveness over time, stimulating an overwhelming desire for proximity but an inability to be soothed by others (Bartholomew, 1990; Hazan & Shaver, 1987).

The dominant attachment style a person develops in childhood has implications for how they will form and experience attachment relationships within their lifetime (Bowlby, 1973). For example, both retrospective (Hazan & Shaver, 1987; Mickelson et al., 1997) and longitudinal (Fraley et al., 2013) studies have indicated that secure adults are more likely than insecure adults to have had more stable and supportive parents and home environments. Yet, across adolescence and into adulthood, internal working models about the self and the other continue to be constructed based on social environments and relationship experience (Fraley, 2019). Drawing on the work of Bowlby (1969, 1973, 1980, 1982) and Ainsworth (1978), Hazan and Shaver (1987) applied attachment theory to adult romantic relationships.

One important difference with attachment in adulthood is that both members of the attachment relationship will provide and receive care from one another (Mikulincer & Shaver, 2018). Additionally, physical proximity is no longer the primary way to meet the goal of the attachment system, as adults can experience security just by knowing they have someone to call on if needed (Hazan & Shaver, 1987). For adults, the motivation to seek proximity may stem from the desire to reduce distress and anxiety much like in infancy, but also to comfort or act as a caregiver to one's partner, or to engage in sexual activity (Hazan & Shaver, 1994).

People with greater attachment security have "security based self-representations" or strategies learned from interactions with attachment figures that are then used to comfort and care for themselves (Mikulincer & Shaver, 2004). These representations also allow those with greater attachment security to form stable, lasting relationships in which they feel comfortable being vulnerable and relying on their partner for support when needed (Simpson & Rholes, 2017). People with greater attachment insecurity, alternatively, often have a past of difficult, negative interactions with less attentive attachment figures (Mikulincer & Shaver, 2004). This leads individuals higher in attachment anxiety to excessively monitor their partners and to obsessively seek proximity, love and comfort (Simpson & Rholes, 2017). Those with greater attachment anxiety hyperactively ruminate over their worries, have negative self-representations and rely heavily on their partners for feelings of self-esteem and self-worth (Mikulincer & Shaver, 2018). In contrast, individuals higher in attachment avoidance deny their need for closeness to and comfort from partners, suppressing their vulnerability by relying almost entirely on themselves (Simpson & Rholes, 2017). This self-reliance is often accompanied by self-inflation, yet unrealistic standards of perfection which contribute to negative self-representations, further encouraging the avoidance of close relationships (Mikulincer & Shaver, 2018).

While attachment styles persist and remain fairly stable across the lifespan, they are subject to change as attachment relationships change (Hazan & Shaver, 1987). Throughout development, there are some contexts that promote stability and other contexts that promote change in a person's dominant attachment style (Fraley, 2019). For

example, attachment styles are less stable in adolescence than in adulthood (Jones et al., 2018). This is consistent with the idea that in adolescence, socialization and exploration drive many decisions about who to socialize with and where to spend time. As a person ages, they are more likely to pursue relationships, situations and experiences that are consistent with their dominant attachment strategies (Fraley & Roisman, 2019). For example, adults commonly select partners who fit in with their existing models, further reinforcing their dominant attachment style (Bowlby, 1973). This generally makes changes to attachment styles in adulthood unlikely, however, certain circumstances are commonly accompanied by shifts in attachment style. For example, the initiation of a new romantic relationship (Crowell et al., 2002; Kirkpatrick & Hazan, 1994; Shaver & Mikulincer, 2009) and the transition to parenthood (Feeney et al., 2003; Simpson et al., 2003) are typically associated with increases in attachment security (Mikulincer & Shaver, 2018). Similarly, experiencing relationship conflict (Chow et al., 2016; Green et al., 2011; Kirkpatrick & Hazan, 1994) and ending a romantic relationship (Sbarra & Hazan 2008) have been associated with decreases in attachment security. Often due to complications with cohort effects and age-related social changes, many questions regarding stability and change are still unanswered (Fraley, 2019). More research is needed; however, it is clear that both stability and change occur in the development of attachment styles.

Over time, a particular attachment relationship (or multiple relationships) may alter a person's dominant attachment strategy based on things like responsiveness, warmth and support (Fraley, 2019). For example, although people with greater

attachment security generally have a working model of felt security, when a relationship partner is not available, responsive, and sensitive to their needs, their attachment system functioning is interrupted. This interruption is an indication that their dominant attachment strategy is no longer accomplishing the goal of felt security, and thus secondary attachment strategies must be employed (Mikulincer & Shaver, 2018).

These secondary attachment strategies are indicative of attachment anxiety and avoidance, and include deactivation and hyperactivation of the attachment system respectively (Cassidy & Shaver, 2002; Main, 1990). Deactivation of the attachment system includes the avoidance of perceived and/or real threats so the attachment system will not be activated and needs for attention and security will not arise (Mikulincer & Shaver, 2018). For example, in the event a relationship partner is not available or attentive, people with greater attachment avoidance cease proximity-seeking efforts and turn inward to avoid any possibly painful and/or uncomfortable feelings. In contrast, hyperactivation of the attachment system includes vigilant threat appraisal, often catastrophizing experiences and ruminating over even the possibility of threat. This then continually activates the attachment system, initiating an almost constant need for proximity and attention (Mikulincer & Shaver, 2018). An example in this case would be the persistent and intensified attempts for proximity of individuals with greater attachment anxiety when their relationship partner is not responsive.

In summary, the attachment system is an evolved behavioral drive for felt security, particularly during times of stress and danger. The three typical patterns of security-seeking behavior (security, avoidance and anxiety) are relatively stable and

based on experiences with close others. In adulthood, a person's dominant attachment style cannot be attributed to either their childhood experiences or their current relationships alone. Rather, the dominant attachment style of an individual is based on the successes and failures of security-seeking behavior across time, both in previous and current relationships. Common measures of attachment security in the field therefore assess attachment with respect to how persons view their current relationships and relationships in general (Fraley et al., 2000).

Cognitive Pre-Sleep Arousal

In order for a person to fall asleep, they must be in a relaxed, drowsy state (Ogilvie, 2001). As a person lays down for bed, they do not immediately begin to sleep. The period of time between wakefulness and sleep is known as sleep onset latency (Nicassio et al., 1985). There are a number of factors that determine how long sleep onset latency will be. For example, people who are sleep deprived have especially short sleep onset latency, while people who have insomnia have especially long sleep latency (Altevogt & Colten, 2006). Importantly, extended sleep onset latency has been strongly associated with lower subjective sleep quality (Augner, 2011). One common cause of longer sleep onset latency is pre-sleep arousal (Čapková et al., 2018; Tang & Harvey 2004).

Pre-sleep arousal is a state of arousal at bedtime that inhibits a person from relaxing enough to fall asleep (Nicassio et al., 1985). There are two types of pre-sleep arousal: cognitive and somatic/physiological (Čapková et al., 2018). Cognitive pre-sleep arousal refers to mental arousal and cognitive activity before sleep (Yeh et al., 2015).

This includes being unable to shut off thoughts about: the events of the day, problems and worries, depression and anxiety, distractions, and an inability to sleep (Nicassio et al., 1985). Cognitive pre-sleep arousal (more-so than somatic pre-sleep arousal) is associated with fewer hours of sleep, greater sleep-onset latency, and greater difficulty sleeping overall (Chen et al., 2011; Loft & Cameron, 2014; Tang & Harvey 2004; Wuyts et al., 2012). Indeed, one of the key characteristics of insomnia is greater cognitive arousal compared to normal sleepers at bedtime (Valck et al., 2004; Lichstein & Rosenthal, 1980; Nicassio et al., 1985). Further, recent studies have demonstrated that interventions to reduce cognitive pre-sleep arousal are associated with better sleep quality (Blake et al., 2017; Ong et al., 2014). Cognitive pre-sleep arousal may be one reason why sleep concordance is beneficial to the subjective sleep quality of some more than others.

Bedtime is a particularly vulnerable time when people need to feel safe and secure enough to reduce their thoughts and relax into sleep (Dahl, 1996). Co-sleeping has historically been thought of as a way to increase feelings of security and safety in the darkness of night (Ekrich, 2006). For couples, time spent in bed is about more than just sleep. Couples often use this period to catch up on each other's day, engage in intimacy, and generally ask for or give support and comfort to one another (Rosenblatt, 2012). Partners can serve as important stress-buffers at bedtime, ultimately decreasing thoughts about stress and worries (Troxel, 2010). Thus, sleep concordance may serve to reduce cognitive pre-sleep arousal. People with greater attachment avoidance in particular may benefit from the low-stakes closeness available to them at bedtime (Elsey et al., 2019).

Thus, attachment security may moderate the association between sleep concordance and cognitive pre-sleep arousal.

The Current Study

The current study had 3 primary objectives: (1) to investigate the relationship between sleep concordance and subjective sleep quality, (2) to determine if cognitive pre-sleep arousal mediates this association, and (3) to establish whether or not attachment style is a moderator of the association between sleep concordance and cognitive pre-sleep arousal. Previous research, although mixed, has suggested that these relationships may differ for women and men (Elsey et al., 2019; Lee et al., 2018; Pankhurst & Horne, 1994; Richter et al., 2016), therefore gender differences were examined. Understanding how sleep concordance is associated with sleep quality in couples will give insight into one pathway through which romantic relationships may impact well-being throughout life. See Figure 1 for the conceptual model. It was hypothesized that for those with greater attachment avoidance, sleep concordance would be associated with greater subjective sleep quality, in part due to reduced cognitive pre-sleep arousal. For those with greater attachment anxiety, no specific direction of effect was hypothesized because it is possible that sleep concordance could either increase or decrease cognitive pre-sleep arousal.

METHOD

Procedure

This study was approved by the University of Kentucky's Institutional Review Board. Participants were recruited through Amazon's Mechanical Turk (Mturk), a crowdsourcing platform often used as a participant pool for online human subjects

research (Leeper, 2016). Mturk connects researchers, or "requesters", with participants, or "workers", to complete surveys, or human intelligence tasks known as "HITs", for payment. Workers are able to choose the HITs they would like to complete and requesters are able to review and approve or reject HITs completed by workers (Mason & Suri, 2012). There are a number of methodological concerns regarding survey research and the quality of data collected from Mturk that will be addressed throughout the procedure section.

The first thing to be mindful of when conducting survey research on Mturk is the presence of "bots", "server farms", and other workers from outside the United States, all of which contribute to low quality data collection (Mason & Suri, 2012). Bots are automated programs designed to perform specific tasks, such as HITs, online (sometimes cooperatively with humans). Server farms are physical locations with groups of servers that allow workers from outside the United States to bypass location restrictions (Jia et al., 2017). In addition to server farms, other workers from outside the United States use virtual private networks (VPNs) to similarly bypass location restrictions. They do this by essentially re-routing a worker's actual location to the location of the server farm or VPN (Dennis et al., 2018).

CloudResearch's TurkPrime was used in conjunction with Mturk to reduce the presence of bots and workers from outside the United States. CloudResearch allows requesters to specify the workers a HIT will be available to on Mturk. For the current study, the HIT was only available to workers inside the United States, workers with an approval rating (based on requester ratings after the completion of a HIT) of at least 80%

and workers who have completed between 100 and 100,000 HITs. Additionally, workers with duplicate and/or suspicious geolocations (as determined by CloudResearch) were blocked from seeing the HIT. Beyond CloudResearch, other strategies used to flag bots and/or workers not located in the United States will be discussed below.

To begin the study, Mturk workers would have seen the HIT with the description: "For this study you will first complete a screening survey for 10 cents to determine eligibility. If you are eligible, you will then complete a survey answering several questionnaires that assess sleep and health. The survey will take around 30 minutes to complete. You will receive an additional $2.90 for completion of the survey." Workers who then decided they would like to complete the HIT would have clicked on the link provided, bringing them to the Qualtrics survey for the study.

On Qualtrics, workers were first presented with the cover letter for the study. This informed them of the payment amount for the study (either $3 or 10 cents if eligible or not, respectively), the estimated time it would take to complete the study (~30 minutes), the nature of the study as an online survey (using Qualtrics), and the ability to skip any question, at any time, for any reason. Workers were then given a chance to agree (or disagree) to participate, including a captcha. This captcha was used as another safeguard against bots. Only participants who selected "agree" and successfully completed the captcha continued on with the study.

The first portion of the study was a short screening survey used to determine eligibility (see Appendix A). Another one of the larger concerns with survey research using Mturk is deception and/or misrepresentation by workers in order to meet exclusion

criteria to receive payment for participating (Chandler & Paolacci, 2017; Ford, 2017; Springer et al., 2016). These individuals, often called "spammers," attempt to make the most money possible completing HITs without regard for the instructions (Mason & Suri, 2012). Following the recommended best practice, a short screening survey was used without revealing the characteristics of interest to the participants (in the screening survey itself or in any information given to participants) prior to participation in the study (Chandler & Paolacci, 2017; Sheehan, 2018; Siegel et al., 2015; Sharpe Wessling et al., 2017).

Participants were only eligible if they were a U.S. citizen, between 18 and 60 years of age, not currently involved in night shift-work, currently in an exclusive (i.e. only one partner) romantic relationship (e.g., dating, engaged, married, partnered, etc.) lasting for at least 3 months. Additional eligibility criteria included reporting sleeping beside their partner on average at least 1 night per week and sleeping beside a child on average 0 nights per week. To further address the issue of bots and spammers, one open-ended question and two "trick" questions (i.e., traveling to an unvisitable location, using a fake drug), were included as eligibility criteria.

After completing the screening survey, participants who were not eligible were presented with a screen thanking them for their participation, including a code that participants would then enter on Mturk to receive their payment of 10 cents, ending the study. Participants who were eligible continued on with the remainder of the study survey (see Appendix B). Continuing to place importance on the quality of data collection, attention checks (i.e. choose option number 4) and redundant questions (i.e., asking

relationship exclusivity twice) were included in the survey. After completing the study survey, eligible participants were presented with a screen thanking them for their participation, including a unique code that participants would then enter on Mturk to receive their payment of $3.00, ending the study.

Participants

A total of 208 eligible participants were recruited from an overall total of 404 screened participants through MTurk. Demographic characteristics are presented in Table 1. Participants mostly identified as female (68% female, 32% male) ranging in age from 19 to 60 years old (*M*= 36, *SD*= 11 for both female and male participants). The majority of participants were white (87% of women, 80% of men) and reported themselves as being middle class (43% of women, 46% of men). These demographics are consistent with a study that compiled the demographic information of almost 3,000 Mturk workers across five studies (Mason & Suri, 2012).

Romantic relationship characteristics are included in Table 2. The majority of participants were married (59% of women, 55% of men), living with their current partner (89% of women and men) for an average length of 10 years (*SD*= 9) for women and 8.5 years (*SD*= 9) for men. All relationships were exclusive (i.e. involving only one partner). A total of 15 participants (6% of women and 10% of men) were in a same-gender couple. The majority of participants (58%) and their partners (57%) did not have children.

Participants also reported on their partner's demographics. Partners were an average age of 37 years old (*SD*= 12). The majority of participants reported that their partners identified as male (67%) or female (32%). One participant self-reported their

partner's gender identity as non-binary and one participant did not know the gender identity of their partner. Much like the participants themselves, the majority of partners were reported as white (84%) and middle class (40%).

Measures

Screening Survey

See Appendix A for the screening survey. First, Mturk IDs were collected in order to ensure appropriate payment. Then questions were asked to assess eligibility. This included age, night shift-work, relationship status, relationship length, relationship exclusivity, nights sleeping beside a partner and nights sleeping beside a child. An open-ended question about medication use, and two "trick" questions, one about Heard Island, Australia and one about a fake drug (Melanoxicol) were used as quality checks for eligibility. A total of four bots were flagged based on non-sensical responses to open-ended questions and manually removed from the data. No participants were flagged based on the trick questions. To help mask the characteristics of interest and improve flow, a number of filler questions (not related to eligibility) were included throughout the screening survey.

Study Survey

See Appendix B for the study survey.

Background. A series of background questions about age, race/ethnicity, religion, education, financial/employment status, relationship/living characteristics, nap routines and medication use were first asked. Similar background questions were asked about the participant's partner (all with an "I do not know" option). Emotion regulation

was measured using the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). Stress was measured using the Perceived Stress Scale (PSS; Cohen et al., 1983). Drinking problems were assessed using the Alcohol Use Disorder Identification Test (AUDIT; Saunders et al., 1993). Drug/substance abuse was measured using the Drug Abuse Screening Test (DAST-20; Skinner, 1982). Conflict was measured using the Conflicts and Problem-Solving Scale (CPS; Kerig, 1996).

Attention and Redundancy Checks. Two questions were included as attention checks toward the middle and end of the study survey ("For this question, please select option 4" and "For this question, please select option 2"). No participants failed the attention checks. Additionally, a question about relationship exclusivity was included both in the screening survey and the study survey. Two participants reported that their relationship was not exclusive on the second question so they were manually removed from the data.

Sleep Routines. Participants were asked how many nights a week (7 days) they typically sleep in bed with their partner and how many nights they typically sleep alone. Sleeping location was measured by asking participants if they typically sleep in their own bed, in their partner's bed, or equally between the two. Participants were asked if they typically go to bed before, after, or at the same time as their partner (with a non-applicable option). Participants then reported their typical bed time ("What time do you typically go to bed?") and their partner's typical bedtime ("What time does your partner typically go to bed"). Participants were asked if they typically fall asleep before, after, or at the same time as their partner (with a non-applicable option). Participants then reported

how long it typically takes them to fall asleep ("How long does it typically take you to fall asleep after going to bed?") and how long it typically takes their partner to fall asleep ("How long does it typically take your partner to fall asleep after going to bed?"). Next, participants were asked if they typically wake up before, after, or at the same time as their partner (with a non-applicable option). Participants then reported the time they typically wake up ("What time do you typically wake up?") and the time their partner typically wakes up ("What time does your partner typically wake up?"). Participants were asked if they typically get out of bed before, after, or at the same time as their partner (with a non-applicable option). Participants then reported the time they typically get out of bed ("What time do you typically get out of bed?") and the time their partner typically gets out of bed ("What time does your partner typically get out of bed"). Participants were also asked about pet(s) and whether their pet(s) or their partner's pet(s) typically sleep with them or not. Bedtime behaviors were assessed by asking participants if they typically spend time together in bed with their partner before falling asleep or before getting out of bed. If participants answered yes, they were also asked a series of follow-up questions separately for morning and night indicating the behaviors they engaged in during that time with their partner. These behaviors included: talk about your day, talk about your relationship, talk about your future, talk about work/school, talk about similar interests, talk about friends/family, cuddle, engage in sexual activity, spend individual time on a personal device, and watch tv.

Covariates. Medication use (MEDS) was measured by asking participants if they regularly use medication ("Do you take medication regularly?"), followed by an open-

ended question about the kind(s) of medication. A dummy variable was created such that participants taking medications that are known to interfere with sleep were given a score of 1, while those not taking such medications were given a score of 0. Half of the female participants and 38% of male participants used medication regularly. Depression was measured using the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). This is a 20-item questionnaire that is rated on a scale from 0 (*rarely or none of the time)* to 3 (*most or all of the time*) and summed. Higher scores indicated more depressive symptoms. The average score on the CES-D for women was 18 (*SD*= 13) and men was 13 (*SD*= 10). Anxiety was measured using the Beck Anxiety Inventory (BAI; Beck et al., 1988). This is a 21-item questionnaire that is rated on a scale from 0 (*not at all)* to 3 (*severely*) and summed. Higher scores indicated greater anxiety. The average score on the BAI for women was 14 (*SD*= 12) and men was 8 (*SD*= 10). Chronotype was measured using the Morningness-Eveningness Questionnaire (MEQ; Horne & Östberg, 1976). This is a 19-item questionnaire with a variety of questions that are summed, resulting in scores ranging from 16 to 86. Scores 41 and below indicated "evening types", scores 59 and above indicated "morning types" and scores from 42 to 58 indicated "intermediate types". The majority of participants were intermediate types (57% of women, 62% of men), More women (25%) were evening types than men (11%). More men (27%) were morning types than women (17%).

Sleep Concordance. Sleep concordance (SC) was measured by first calculating a total dyadic rest interval (TDRI), or the total amount of time at least one partner was in bed on a typical day. Specifically, between the two partners, the earliest typical bedtime

and latest typical waketime was identified and the total amount of time between the two provided the TDRI. Next, a sleep concordance interval (SCI), or the total amount of time both partners were in bed together on a typical day, was calculated. Specifically, between the two partners, the latest typical bedtime and earliest typical waketime was identified and the total amount of time between the two provided the SCI. Finally, a sleep concordance percentage score was calculated [(SCI/TDRI) * 100]. Higher scores indicated greater sleep concordance. The average sleep concordance score was 80 (*SD*= 15) for women and 82 (*SD*= 15) for men.

Sleep Quality. Sleep Quality was measured using the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989). This is a 19-item questionnaire comprised of seven "component" scores each ranging from 0 (*no difficulty*) to 3 (*severe difficulty*). The seven component scores (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction) were combined to form one "global" score of sleep quality. Higher scores indicated greater problems with sleep quality. To ease in interpretation of model coefficients, scores on the PSQI will be referred to as "sleep problems" throughout the results. The average PSQI score was 7 (*SD*= 4) for women and 5 (*SD*= 3) for men.

Cognitive Pre-Sleep Arousal. Cognitive Pre-sleep arousal was measured using the cognitive subscale of the Pre-Sleep Arousal Scale (PSAS; Nicassio et al., 1985). This is a 16-item questionnaire split between two subscales: physiological arousal and cognitive arousal. Items are rated on a scale from 1 (*not at all*) to 5 (*extremely*) and summed. An example item from the cognitive arousal subscale (Cognitive PSAS) is,

"Can't shut off your thoughts." Higher scores indicated greater arousal. The average cognitive PSAS score was 18 (*SD*= 8) for women and 15 (*SD*= 6) for men.

Attachment. Attachment was measured using the Experiences in Close Relationships Questionnaire (ECR-R; Fraley et al., 2000). This is a 36-item measure of adult attachment style split between two subscales: avoidance (ECR Avoidance) and anxiety (ECR Anxiety). Participants rated their agreement on a series of statements about how they generally experience relationships (not just in their current relationship) on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*) and those scores were then averaged for an overall subscale score. An example item from the avoidance subscale is, "I prefer not to show a partner how I feel deep down." An example item from the anxiety subscale is, "I'm afraid that I will lose my partner's love." Higher scores indicated greater attachment avoidance or anxiety. The average score on the anxiety subscale was 3 (*SD*= 1) for women and 2 (*SD*= 1) for men. The average score on the avoidance subscale was 2 (*SD*= 1) for both women and men.

Data Analysis

Structural equation modeling was conducted with path analysis using AMOS version 25 (Arbuckle, 2014). Since there were a number of covariates to consider (i.e., age, caffeine use, alcohol use, drug use, emotion regulation, anxiety, depression, stress, medication use, chronotype, naps, relationship length, if partners were living together, number of romantic relationships, relationship conflict, and sleeping location), a tear down approach was used to simplify the models. In the first model, only covariates that were significantly correlated with the dependent variable (sleep problems) or the

mediator (cognitive pre-sleep arousal) were included as covariates of interest. These variables included: anxiety, depression, medication use, chronotype, emotion regulation, stress, and relationship conflict. Based on the results, the variable with the highest nonsignificant p-value was removed and the model was fit again. This continued until only covariates that significantly predicted the dependent variable (sleep problems) and/or the mediator (cognitive pre-sleep arousal) remained. The final model included four covariates: anxiety (BAI), depression (CES-D), medication use (MEDS) and chronotype (MEQ).

None of the variables had any missing data. Multicollinearity was evaluated by running a regression model with all of the variables included in the model and examining the collinearity diagnostic, variance inflation factor (VIF), on SPSS. No problems with multicollinearity were identified using this method (VIF < 10 for all variables).

Multivariate outliers, or cases with an unusual combination of scores, were evaluated using Mahalanobis distances and a Bonferroni corrected alpha level of 0.0002. Four outliers were identified using this method and were removed from the data. The resulting sample size used for analysis was 204. Models were fully saturated (0 df) and therefore power to detect good fitting models is not relevant. Computation of power to detect significant model coefficients in SEM involves making estimates of every model coefficient, as well as additional model parameters, and performing a monte carlo procedure. Given the labor intensiveness and likelihood of misestimating one or more values, power computations were instead approximated based on regression using G*Power version 3.1.9.2. To detect a small effect (as interactions typically are) of f^2 =

0.03, with seven independent variables, a significance level of 0.05, and a desired power level of 80%, a sample size of 264 would be needed. Thus, the current study is underpowered; with the current sample size, power is only 69% to detect an effect of .03. However, the minimum effect size detectable with a sample of 204 and power of 80% is .039, which is also a relatively small effect.

Maximum likelihood estimation was used to estimate the models. This estimation procedure assumes multivariate normality, which is typically evaluated based on univariate normality. A number of variables emerged as having positive skew: attachment anxiety subscale (ECR Anxiety), attachment avoidance subscale (ECR Avoidance), cognitive pre-sleep arousal subscale (Cognitive PSAS), and sleep problems (PSQI). One emerged as having negative skew: sleep concordance (SC). Non-linear transformations were attempted and a log transformation was the most successful to correct or improve the skew of the majority of the variables: ECR Anxiety, ECR Avoidance, Cognitive PSAS, and PSQI. The log transformed version of those variables were used for final analyses. The log transformation worsened the skew of Sleep Concordance, so the original variable was retained for final analyses. All variables (including log transformed variables) were mean centered with exception of the dependent variable, subjective sleep problems. Mean centered variables were used to compute cross-products.

Model Specification

Multi-group models were fit, which allow the same model to be fit simultaneously but separately for women and men. Separate models were run for attachment avoidance and attachment anxiety. See Figure 2 for the specified model for attachment avoidance

and Figure 3 for the specified model for attachment anxiety. The independent variable, sleep concordance, was predicting the mediator, log transformed cognitive pre-sleep arousal, which further predicted the dependent variable, log transformed subjective sleep problems. The moderator, log transformed attachment and the interaction between log transformed attachment and sleep concordance, was predicting log transformed cognitive pre-sleep arousal as well as log transformed subjective sleep problems. All associations controlled for anxiety, depression, medication use, and chronotype. Correlations were estimated between all exogenous variables. Fit indices (i.e. chi square, RMSEA, and CFI) could not be examined because the model was fully saturated, indicating perfect fit. To compare the results across women and men, constraints were added to pathways of interest. Significant interactions were probed using the online utility developed by Preacher and colleagues (2006). To test the significance of indirect effects, a Monte Carlo nonparametric bootstrap using 1000 resamples of data was conducted.

RESULTS

Means, standard deviations, and correlations among study variables are provided in Table 3. Results are separated by attachment avoidance (see Table 4) and attachment anxiety (see Table 5).

Attachment Avoidance for Women

For women, the squared multiple correlations indicated that the model with attachment avoidance accounted for 44% of the variance in log transformed cognitive pre-sleep arousal and 40% of the variance in log transformed subjective sleep problems. The hypothesis that sleep concordance and attachment anxiety would interact to predict

cognitive pre-sleep arousal and in turn, subjective sleep problems was not supported. There were no significant associations between sleep concordance, log transformed attachment avoidance, or the interaction between log transformed attachment avoidance and sleep concordance and either the proposed mediator (log transformed cognitive pre-sleep arousal) or log transformed subjective sleep problems. Several other significant associations of interest were observed, however and are described below.

Depression was significantly associated with greater log transformed cognitive pre-sleep arousal, B= 0.005, p= 0.001 and greater log transformed subjective sleep problems, B= 0.004, p= 0.01. Log transformed cognitive pre-sleep arousal was also significantly associated with increased log transformed subjective sleep problems, B= 0.460, p< 0.001. The test of the indirect effect of depression on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, ab = 0.002, p=0.001.

Chronotype was significantly associated with log transformed cognitive pre-sleep arousal, B= -0.004, p= 0.01. Greater eveningness was related to greater log transformed cognitive pre-sleep arousal. As indicated above, greater log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, B= 0.460, p< 0.001. The test of the indirect effect of chronotype on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, ab = -0.002, p=0.003.

Anxiety was significantly associated with greater log transformed cognitive pre-sleep arousal, B= 0.005, p< 0.001, and marginally associated with lower log transformed

subjective sleep problems, B= -0.003, p= 0.07. As indicated above, greater log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, B= 0.460, p< 0.001. The test of the indirect effect of anxiety on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, ab = 0.002, p=0.001.

Attachment Anxiety for Women

For women, the squared multiple correlations indicated that the model with attachment anxiety accounted for 43% of the variance in log transformed cognitive pre-sleep arousal and 40% of the variance in log transformed subjective sleep problems. There was a marginal association between the interaction of log transformed attachment anxiety and sleep concordance on log transformed cognitive pre-sleep arousal, B= 0.007, p= 0.06. Log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, B= 0.429, p< 0.001. The test of the indirect effect of the interaction between log transformed attachment anxiety and sleep concordance on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, ab= 0.003, p= 0.05.

Follow up analyses were conducted to probe interactions. Results indicated that the association between sleep concordance and log transformed cognitive pre-sleep arousal was only significant for individuals with attachment anxiety scores between -0.713 and -1.626. This region of significance is outside of the range of observed variables (the minimum value of log transformed attachment anxiety was -0.34). Further, tests of the significance of the simple slopes of the association between sleep concordance and

log transformed cognitive pre-sleep arousal at +1 and -1 SD from the mean on log transformed attachment anxiety yielded undefined values. These problems may be due in part to difficulty with estimating the exact variances and covariances of certain effects. Thus, an additional multi-group analysis was conducted using a median split on log transformed attachment anxiety and testing associations between sleep concordance, log transformed cognitive pre-sleep arousal and log transformed subjective sleep problems for each group.

For women below the median on log transformed attachment anxiety, there was a significant association between sleep concordance and lower log transformed cognitive pre-sleep arousal, B= -0.002, p= 0.04. Log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, B= 0.539, p= 0.001. Additionally, the test of the indirect effect of sleep concordance on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, ab= -0.001, p= 0.30.

For women above the median on log transformed attachment anxiety, there were no significant associations between sleep concordance and log transformed cognitive pre-sleep arousal or log transformed subjective sleep problems. There was only a significant association between log transformed cognitive pre-sleep arousal and greater log transformed subjective sleep problems, B= 0.384, p= 0.001. The test of the indirect effect of sleep concordance on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal also was not significant.

To test the significance of the differences between women above and below the median on log transformed attachment anxiety, model constraints were added (a more detailed description of model constraints is provided below). There was a stronger indirect effect of sleep concordance on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal for women below the median on log transformed attachment anxiety (compared to women above the median on log transformed attachment anxiety), $\Delta\chi^2(2) = 23.22$, $p< 0.001$.

Several additional associations of interest were observed in the original model for all women. Depression was significantly related to greater log transformed cognitive pre-sleep arousal, $B= 0.004$, $p= 0.002$ and greater log transformed subjective sleep problems, $B= 0.005$, $p= 0.006$. As indicated above, greater log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, $B= 0.429$, $p< 0.001$. The test of the indirect effect of depression on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, $ab= 0.002$, $p=0.001$.

Chronotype was significantly associated with log transformed cognitive pre-sleep arousal, $B= -0.004$, $p= 0.01$. Increased eveningness was related to greater log transformed cognitive pre-sleep arousal. As indicated above, greater log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, $B= 0.429$, $p< 0.001$. The test of the indirect effect of chronotype on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, $ab= -0.002$, $p=0.001$.

Anxiety was significantly associated with greater log transformed cognitive pre-sleep arousal, B= 0.005, p< 0.001, and marginally associated with lower log transformed subjective sleep problems, B= -0.003, p= 0.07. Again, as indicated above, greater log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, B= 0.429, p< 0.001. The test of the indirect effect of anxiety on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, ab = 0.002, p=0.001.

Attachment Avoidance for Men

For men, the squared multiple correlations indicated that the model with attachment avoidance accounted for 31% of the variance in log transformed cognitive pre-sleep arousal and 63% of the variance in log transformed subjective sleep problems. The hypothesis that sleep concordance and attachment anxiety would interact to predict cognitive pre-sleep arousal and in turn, subjective sleep problems was not supported. However, log transformed attachment avoidance was significantly associated with greater log transformed cognitive pre-sleep arousal B= 0.193, p= 0.05 and greater log transformed subjective sleep problems, B= 0.159, p= 0.04. Log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, B= 0.561, p< 0.001. The test of the indirect effect of log transformed attachment avoidance on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, ab = 0.108, p= 0.03.

Two covariates were also identified as important predictors. Chronotype was significantly associated with log transformed cognitive pre-sleep arousal, B= -0.004, p=

0.04 and log transformed subjective sleep problems, B= -0.007, p< 0.001. Greater eveningness was related to greater log transformed cognitive pre-sleep arousal and greater log transformed subjective sleep problems. As indicated above, greater log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, B= 0.561, p< 0.001. The test of the indirect effect of chronotype on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, ab = -0.002, p= 0.03.

Anxiety was significantly associated with greater log transformed cognitive pre-sleep arousal, B= 0.010, p< 0.001. As indicated above, greater log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, B= 0.561, p< 0.001. The test of the indirect effect of anxiety on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, ab= 0.006, p= 0.01.

Attachment Anxiety for Men

For men, the squared multiple correlations indicated that the model with attachment anxiety accounted for 33% of the variance in cognitive pre-sleep arousal and 64% of the variance in subjective sleep problems. Log transformed attachment anxiety was marginally associated with greater log transformed cognitive pre-sleep arousal, B= 0.162, p= 0.10. Log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, B= 0.586, p< 0.001. The test of the indirect effect of log transformed attachment anxiety on log transformed subjective

sleep problems through log transformed cognitive pre-sleep arousal was marginally significant, *ab*= 0.095, *p*= 0.08.

Anxiety was significantly associated with greater log transformed cognitive pre-sleep arousal, *B*= 0.009, *p*= 0.01. As indicated above, greater log transformed cognitive pre-sleep arousal was significantly associated with greater log transformed subjective sleep problems, *B*= 0.586, *p*< 0.001. The test of the indirect effect of anxiety on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal was significant, *ab*= 0.005, *p*= 0.01.

Chronotype was marginally associated with log transformed cognitive pre-sleep arousal, *B*= -0.003, *p*= 0.09 and significantly associated with log transformed subjective sleep problems, *B*= -0.006, *p*< 0.001. Greater eveningness was associated with marginally greater log transformed cognitive pre-sleep arousal and significantly greater log transformed subjective sleep problems. Although, as noted above, there was a significant association between log transformed cognitive pre-sleep arousal and log transformed subjective sleep problems, *B*= 0.586, *p*< 0.001, there was no significant indirect effect of chronotype on log transformed subject sleep problems through log transformed cognitive pre-sleep arousal.

Model Constraints and Gender Differences

There were a number of differences between women and men based on the multi-group results detailed above. To test the significance of those differences, follow up analyses were conducted by adding model constraints (see Table 4 and Table 5 for attachment avoidance and attachment anxiety results respectively). One at a time, any

pathways that were significant for both genders or only one gender but not the other were constrained to be equal and the significance of the $\Delta\chi^2$ was evaluated. For indirect effects, both pathways involved in the effect were constrained to be the same. Results for models with attachment avoidance will be presented first, followed by results for models with attachment anxiety.

Attachment Avoidance

The following associations were stronger for men than for women: Log transformed attachment avoidance was more strongly related to log transformed cognitive pre-sleep arousal for men than women, $\Delta\chi^2(1) = 5.254$, $p = 0.02$. There was a stronger indirect effect of log transformed attachment avoidance on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal for men than for women, $\Delta\chi^2(2) = 39.42$, $p < 0.001$. Chronotype was more strongly related to log transformed subjective sleep problems for men than for women, $\Delta\chi^2(1) = 5.625$, $p = 0.02$. There was a stronger indirect effect of anxiety on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal for men than for women, $\Delta\chi^2(2) = 50.04$, $p < 0.001$.

There were also several associations that were significantly stronger for women than for men. Depression was more strongly associated with log transformed cognitive pre-sleep arousal for women than for men, $\Delta\chi^2(1) = 3.964$, $p = 0.05$. There was a stronger indirect effect of depression on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal for women than men, $\Delta\chi^2(2) = 51.94$, $p < 0.001$. There was a stronger indirect effect of chronotype on log transformed subjective sleep

problems through log transformed cognitive pre-sleep arousal for women than men, $\Delta\chi^2(2) = 49.27$, $p < 0.001$.

Attachment Anxiety

Similar to the model with log transformed attachment avoidance, chronotype was more strongly related to log transformed subjective sleep problems for men than for women, $\Delta\chi^2(1) = 3.832$, $p = 0.05$. For the rest of the gender differences, however, associations were stronger for women than for men. There was a stronger indirect effect of the interaction between log transformed attachment anxiety and sleep concordance on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal for women than for men, $\Delta\chi^2(2) = 46.67$, $p < 0.001$. There was a stronger indirect effect of depression on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal for women than for men, $\Delta\chi^2(2) = 49.06$, $p < 0.001$. There was a stronger indirect effect of chronotype on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal for women than for men, $\Delta\chi^2(2) = 47.87$, $p < 0.001$. There was a stronger indirect effect of anxiety on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal for women than for men, $\Delta\chi^2(2) = 47.67$, $p < 0.001$.

DISCUSSION

The aim of the current study was to contribute to knowledge about how sleep concordance and attachment security interact in association with subjective sleep quality by including cognitive pre-sleep arousal as a mediator of these associations. Findings did not support hypotheses of interactions between sleep concordance and attachment

avoidance. Findings did partially support hypotheses of interactions between sleep concordance and attachment anxiety. These hypotheses were not directional in nature; it was proposed that sleep concordance may be associated with better subjective sleep quality for persons lower or higher on attachment anxiety. Results indicated that for women with lower attachment anxiety, more sleep concordance was associated with less cognitive pre-sleep arousal and in turn, increased subjective sleep quality. This relationship was not observed for women who reported greater attachment anxiety, or for men. For men, attachment avoidance was associated with increased cognitive pre-sleep arousal and thus poorer subjective sleep quality. There were no associations observed with attachment avoidance for women. These findings suggest that co-sleeping may be especially important for reducing thoughts at bedtime and thereby improving the subjective sleep quality of women with less attachment anxiety. Additionally, cognitive pre-sleep arousal emerged as an important possible explanatory variable for sleep disturbances due to attachment avoidance for men, depression and evening chronotype for women, and anxiety for both men and women.

These findings are inconsistent with previous research indicating no interaction between attachment anxiety and sleep concordance for subjective sleep quality (Elsey et al., 2019). In addition, the current study found no direct association between attachment anxiety and subjective sleep quality, an association that has been documented in prior research (Carmichael & Reis, 2005; Kent de Grey, 2019). These discrepancies from previous research may be due to the inclusion of cognitive pre-sleep arousal in the model. Specifically, the association between attachment anxiety and subjective sleep quality may

be fully mediated by cognitive pre-sleep arousal, resulting in a nonsignificant direct effect. Further, since cognitive pre-sleep arousal is a mediator, the more proximal relation between the interaction of attachment anxiety and sleep concordance, and cognitive pre-sleep arousal (compared to subjective sleep quality), provides greater power for detecting the interaction than in prior research. In summary, cognitive pre-sleep arousal may be a key factor in understanding how sleep concordance and attachment anxiety interact in association with subjective sleep quality for women.

Indeed, recent research has linked attachment insecurity (summed score of attachment anxiety and avoidance) with increased cognitive pre-sleep arousal (Palagini et al., 2018). Cognitive pre-sleep arousal involves high levels of mental activity, especially the types of mental activity that are antithetical to relaxation, such as those centering around problems, conflicts, and uncertainties (Chen et al., 2011). Persons with greater attachment anxiety may be especially prone to cognitive pre-sleep arousal, as attachment anxiety involves working models of the self as unloved and unlovable (Shaver & Mikulincer, 2009). This is accompanied by an intense desire to gain love from partners, seeking validation, yet never really feeling close enough to others (Mikulincer & Shaver, 2018). The result is a cycle of unmet needs for closeness in relationships. It is likely that attachment anxiety is associated with forms of cognitive pre-sleep arousal such as feelings of rejection, worries about the stability of their relationship, and desires for increased closeness. In fact, rumination and worry, predominant characteristics of attachment anxiety, have been shown to predict greater cognitive pre-sleep arousal, which then further predicted diminished sleep quality (Yeh et al., 2015).

Another fundamental characteristic of attachment anxiety is the inability to be comforted and reassured by attachment figures (Mikulincer & Shaver, 2018). For example, early in development, the classic presentation of the anxious-ambivalent attachment style in the strange situation is for toddlers to cling to their mothers during reunion but to maintain high levels of distress (Ainsworth et al., 1978). In adulthood, physical proximity to an attachment figure may have no better analog than time spent lying in bed together. In short, the fears of abandonment and hyperactive worrying characteristic of individuals who have greater attachment anxiety may prevent them from receiving the same benefits from co-sleeping as women with lower attachment anxiety (Robles & Kane, 2014). In the context of lower attachment anxiety, a partner's presence at bedtime may foster feelings of comfort and security that help women relax and settle down to sleep.

As a next direction, future research incorporating attachment theory should work towards identifying the aspects of co-sleeping (e.g., cuddling, communicating, engaging in intimacy) that are the most effective at reducing cognitive pre-sleep arousal. For example, a qualitative study of co-sleeping couples aimed at creating a measure to assess feelings of safety and security at bedtime may help to further elucidate the processes behind these associations. Numerous studies indicate that attachment anxiety is related to poorer sleep quality (Adams et al., 2014; Adams & McWilliams, 2015; Carmichael & Reis, 2005; Hicks & Diamond, 2011; Kent de Grey, 2019; Scharfe & Eldredge, 2001; Sloan et al., 2007; Troxel et al., 2007; Verdecias et al., 2009). A study like the qualitative

one described above may also help reveal the ways in which those higher on attachment anxiety experience co-sleeping at a psychological level.

Contrary to hypotheses, an indirect relation between sleep concordance and subjective sleep quality through cognitive pre-sleep arousal was not observed for attachment avoidance. Additionally, there were no associations between attachment avoidance, sleep concordance, cognitive pre-sleep arousal, and subjective sleep quality for women. For men, however, greater attachment avoidance was associated with decreased subjective sleep quality, in part due to increased cognitive pre-sleep arousal. Previous research to examine the role of attachment avoidance on sleep quality has been mixed (Adams et al., 2014), with some studies finding a negative association between attachment avoidance and sleep quality (Adams & McWilliams, 2015; Elsey et al., 2019) and some studies finding no association (Carmichael & Reis, 2005; Kent de Grey, 2019; Verdecias et al., 2009). The current study adds to this body of research by examining men and women separately and by considering cognitive pre-sleep arousal as a mediator of associations. As was the case with attachment anxiety, it appears that cognitive pre-sleep arousal is an important mechanism in associations between attachment avoidance and subjective sleep quality.

Individuals with greater attachment avoidance are prone to excessive self-reliance (Brennan & Bossom, 1998). Along with this commitment to independence comes a defensive outward expression of self-esteem and self-enhancement that in turn lays the foundation for unachievable self-standards (Mikulincer & Shaver, 2018). At bedtime, men with greater attachment avoidance may dwell on their imperfections, engaging in

self-criticism while reviewing the day's events, making it difficult for them to turn off their thoughts and relax into restful sleep.

Further, increased cognitive pre-sleep arousal for men has been attributed to an exceeding amount of time spent trying to control their sleep (Hantsoo et al., 2013). A common source of sleep problems is worrying about sleep and believing that one does not have control over sleep, known as an external sleep locus of control (Rucas & Miller, 2013). This creates a cycle of arousal at bedtime, where thoughts about one's inability to control sleep actually increases arousal, making it more difficult to ultimately fall asleep (Morin et al., 1993). If men with avoidant attachment, who are prone to high levels of perfectionism (Mikulincer & Shaver, 2018) are concerned about the amount of sleep they are getting, they may go through a similar thought process resulting in sleep disruptions.

Interventions for improving the sleep quality particularly of men with greater attachment avoidance or women with greater attachment anxiety may benefit from concentrating on cognitive pre-sleep arousal. There has been some success in prior research demonstrating the effectiveness of sleep hygiene on both cognitive pre-sleep arousal and sleep quality (Irish et al., 2015). Mindfulness practices that direct a person's awareness towards accepting their current feelings, thoughts and body sensations have also shown reductions in cognitive pre-sleep arousal and improvements in sleep quality (Carlson, 2012; Garland et al., 2016; Howell et al., 2010). Additionally, setting aside time before bed to engage in constructive worry time and/or gratitude time by writing about worries or positive experiences, respectively has been associated with reduced cognitive pre-sleep arousal and improved sleep quality (Digdon & Koble, 2011). Yet many of these

studies did not investigate whether treatment effectiveness was moderated by individual differences. Thus, future research is needed to address whether these interventions may be equally or perhaps especially beneficial for persons with insecure attachment models.

As detailed above, the pattern of results differed between men and women and these gender differences were significant. Attachment avoidance was more strongly associated with cognitive pre-sleep arousal and thus subjective sleep quality for men than for women. This finding is somewhat consistent with research that at bedtime, men are more impacted by thoughts about an inability to control sleep whereas women are more impacted by thoughts about negative emotions from the day (Hantsoo et al., 2013). It is unsurprising then, that in the case of attachment anxiety, sleep concordance was more strongly associated with subjective sleep quality via cognitive pre-sleep arousal for women than men. Women report that they prefer to sleep beside their partner because it gives them a sense of security, whereas men report co-sleeping out of habit (Pankhurst & Horne, 1994). Theoretical papers and other studies that did not directly test gender differences have also suggested that associations between co-sleeping and sleep quality may be stronger for women than men (Elsey et al., 2019; Meadows et al., 2008; Troxel, 2010). Finally, previous research has indicated that with regards to sleep quality, men are less impacted by their partner's presence than women (Dittami et al., 2007; Pankhurst & Horne, 1994).

These gender differences may also reflect patterns from research on sex differences in attachment security. A meta-analysis (Del Giudice, 2011) that examined sex differences in 100 studies where a two-dimensional romantic attachment

questionnaire was used (such as the ECR-R used in the present study) found that a greater proportion of men endorsed attachment avoidance than women. This is in addition to other reviews with the general finding that men report greater attachment avoidance and women report greater attachment anxiety (Scharfe, 2016). Further, when examining facets of attachment insecurity, men were more likely than women to be self-reliant and women were more likely than men to exhibit neediness (Del Giudice, 2016). If there are relatively few men endorsing high levels of attachment anxiety, this restriction in range would account for why no associations were found between attachment anxiety, sleep concordance, and subjective sleep quality for men. The same is the case for relatively few women endorsing high levels of attachment avoidance. The tendency toward different attachment models may therefore lead to different patterns of cognitive pre-sleep arousal, as well as different benefits (or lack therefore) from co-sleeping for men and women, in the population. Clearly, gender differences are an important avenue for future research. Results from the present study suggest that for improvements to sleep quality, women and men may have different needs at bedtime.

The present study also identified gender differences in covariates. For example, increased depression was more strongly associated with subjective sleep quality through cognitive pre-sleep arousal for women than men. Depression is widely known to be twice as likely in women as it is in men (Nolen-Hoeksema, 2001). Further, sleep disruptions and depression have been closely linked (Armitage & Hoffmann, 2001; Benna et al., 1992; Riemann et al., 2001). Cognitive pre-sleep arousal may be one pathway by which depression is associated with sleep problems for women. In addition, eveningness was

more strongly related to greater cognitive pre-sleep arousal which was further associated with lower subjective sleep quality for women. For men on the other hand, eveningness was more strongly associated with lower subjective sleep quality directly. Previous research has supported gender differences based on chronotype. Specifically, eveningness has been associated with greater sleep disruptions for women than for men (Fabbian et al., 2016). Cognitive pre-sleep arousal may explain part of the reason chronotype is such an important factor for the sleep of women. Both women and men who reported increased anxiety also reported increased cognitive pre-sleep arousal and thus worse subjective sleep quality, however these associations were slightly stronger for men. The relationship between anxiety and sleep disturbances is well established in research (Bourdet & Goldenberg, 1994).

Findings from the current study should be interpreted in light of some limitations. First, data was collected in the midst of the global pandemic, Covid-19. The impact of this event on participant mental health, sleep habits, and relationship functioning should be considered when discussing results. Due to the nature of the online survey format, the present study obtained information from only one partner in the relationship, who reported on both the self and the other partner. While partners are useful reporters regarding some sleep habits (e.g., snoring), they may be less skilled at identifying the true bedtimes and waketimes of their partner (Coates et al., 1982). Additionally, there was a lack of data collected on the children of participants and the children of their partner. This study had a correlational research design, so no causal inferences can be made. Other directions of association than the ones proposed in the hypotheses are possible. For

example, it is possible that people with greater attachment security are more interested in sleeping beside their partner, such that attachment is a cause of sleep concordance. It is also possible that persons who have poor sleep quality, perhaps due to a sleep problem such as restless legs or snoring, would be less likely to sleep beside their partner in order to preserve their sleep quality. Therefore, sleep quality may serve as a cause of sleep concordance. It is known that patients with sleep problems begin to worry about those sleep problems, especially when trying to fall asleep (Hantsoo et al., 2013). Therefore, poor sleep quality may be a cause of cognitive pre-sleep arousal. Associations between study variables are as a result likely to be complex, and additional longitudinal research is needed to investigate possible bidirectional associations. Finally, while this study addresses important gaps in knowledge about gender differences in associations, the majority of participants were women. This imbalance in the data may have reduced the ability to examine less robust gender differences.

Despite limitations, the current study contributes considerably to knowledge about the ways in which co-sleeping and attachment security are related to subjective sleep quality. For women with less attachment anxiety, co-sleeping may be an important way to receive feelings of security at bedtime that reduce thoughts and improve sleep. For men who have greater attachment avoidance, their cognitive pre-sleep arousal may be an obstacle to their sleep health. Overall, cognitive pre-sleep arousal was significantly associated with lower subjective sleep quality in all of the specified models. This suggests that cognitive pre-sleep arousal is quite important for subjective sleep quality and may be a potential explanatory variable for other disruptions to sleep (such as

depression, anxiety and evening chronotype). Future research should continue to assess gender differences in patterns of associations between co-sleeping, attachment, and sleep quality.

Table 1

Demographic Characteristics

	Female n=138	Male n=66
Age, years *M* (*SD*)	36 (11)	36 (11)
Race/Ethnicity *n* (*%*)		
Asian or Pacific Islander	8 (6)	6 (9)
Black/African American	6 (4)	3 (5)
Hispanic/Latino	1 (1)	2 (3)
Native American/American Indian	1 (1)	0 (0)
White/Caucasian	120 (87)	53 (80)
Multi-Racial	2 (1)	2 (3)
Financial Status *n* (*%*)		
Poor	14 (10)	2 (3)
Lower middle class	47 (34)	21 (32)
Middle class	59 (43)	30 (46)
Upper middle class	17 (12)	13 (20)
Wealthy	1 (1)	0 (0)
Work Status *n* (*%*)		
Working full-time (>35 hours)	84 (61)	59 (89)
Working part-time (<35 hours)	20 (15)	4 (6)
Student	6 (4)	6 (9)
Unemployed	9 (7)	2 (3)
Unable to work	8 (6)	1 (2)
Other	18 (13)	1 (2)

Note. Total percentages may not add up to 100 because of rounding. In the case of work status, 14 participants selected more than one option.

Table 2

Romantic Relationship Characteristics

	Female *n* (%) 138 (68)	Male *n* (%) 66 (32)
Relationship status		
Married	82 (59)	36 (55)
Relationship, living	41 (30)	23 (35)
Relationship, not living	15 (11)	7 (11)
Living together	123 (89)	59 (89)
Number of romantic relationships		
1	50 (36)	23 (35)
2	19 (14)	13 (20)
3	25 (18)	14 (21)
4	15 (11)	8 (12)
5	13 (9)	6 (9)
6	2 (1)	0 (0)
7	2 (1)	0 (0)
8	2 (1)	1 (2)
9	2 (1)	0 (0)
10	6 (4)	1 (2)
20+	2 (1)	0 (0)

Note. Number of romantic relationships is the number of previous romantic relationships participants have been in that were at least 3 months in length.

Table 3

Correlations Among Study Variables

Measure	M (SD)	1	2	3	4	5	6	7	8	9
1. Gender	0.32 (0.47)	-	-	-	-	-	-	-	-	-
2. Sleep problems	6.53 (3.46)	-0.30**	-	-	-	-	-	-	-	-
3. Sleep concordance	80.77 (15.00)	0.04	-0.13	-	-	-	-	-	-	-
4. Attachment anxiety	2.52 (1.35)	-0.10	0.25**	-0.05	-	-	-	-	-	-
5. Attachment avoidance	2.38 (1.22)	0.06	0.13	-0.10	0.58**	-	-	-	-	-
6. Cognitive PSAS	16.98 (7.40)	-0.19**	0.59**	-0.13	0.33**	0.08	-	-	-	-
7. Medication use	0.46 (0.50)	-0.11	0.31**	0.04	0.07	-0.04	0.22**	-	-	-
8. Depression	16.36 (11.95)	-0.18*	0.49**	-0.12	0.43**	0.24**	0.58**	0.21**	-	-
9. Anxiety	12.29 (11.98)	-0.23**	0.37**	-0.05	0.42**	0.13	0.59**	0.31**	0.71**	-
10. Chronotype	50.31 (10.15)	0.18**	-0.33**	0.11	-0.17*	0.04	-0.31**	-0.04	-0.26**	-0.13

Note. n= 204; **p< 0.01, *p< 0.05; Gender represents the percent of male participants.

Table 4

Study Coefficients and Constraints for models with Attachment Avoidance

Associations from Model with Attachment Avoidance	Female n= 128	Male n= 66	Delta Chi Square	df
Predicting Log(Subjective Sleep Problems)				
Sleep concordance	-0.001	0.000	0.210	1
Log(Attachment avoidance)	0.108	0.159*	0.251	1
Log(Avoidance)*Concordance	-0.001	0.001	0.074	1
Log(Cognitive PSAS)	0.460***	0.561***	0.556	1
Depression	0.004*	0.001	0.928	1
Chronotype	-0.001	-0.007***	5.625*	1
Anxiety	-0.003^{+}	0.001	1.793	1
Predicting Log(Cognitive Pre-Sleep Arousal)				
Sleep concordance	-0.001	0.00	0.103	1
Log(Attachment avoidance)	-0.071	0.193*	5.254*	1
Log(Avoidance)*Concordance	0.003	0.002	0.025	1
Depression	0.005**	-0.002	3.964*	1
Chronotype	-0.004**	-0.004*	0.095	1
Anxiety	0.005***	0.010***	2.450	1
Indirect Effects on Log(Subjective Sleep Problems) through Log(Cognitive Pre-Sleep Arousal)				
Log(Attachment avoidance)	-0.033	0.108*	39.418***	2
Depression	0.002**	-0.001	51.936***	2
Chronotype	-0.002**	-0.002*	49.266***	2
Anxiety	0.002**	0.006**	50.043***	2

Note. ***p<**p<.01, *p<.05; The Female column provides the coefficient estimated for the specified relationship for females while the Male column provides the coefficient estimated for males. The delta chi square statistic tests whether there is a significant difference between the two coefficients.

Table 5

Study Coefficients and Constraints for models with Attachment Anxiety

Associations from Model with Attachment Anxiety	Female n= 128	Male n= 66	Delta Chi Square	df
Predicting Log(Subjective Sleep Problems)				
Sleep concordance	-0.001	0.000	0.049	1
Log(Attachment anxiety)	0.033	0.106	0.505	1
Log(Anxiety)*Concordance	0.004	0.001	0.177	1
Log(Cognitive PSAS)	0.429***	0.586***	1.289	1
Depression	0.005**	0.003	0.441	1
Chronotype	-0.001	-0.006***	3.832*	1
Anxiety	-0.003^{+}	0.000	0.734	1
Predicting Log(Cognitive Pre-Sleep Arousal)				
Sleep concordance	-0.001	-0.001	0.009	1
Log(Attachment anxiety)	-0.006	0.162^{+}	2.134	1
Log(Anxiety)*Concordance	0.007^{+}	0.002	0.369	1
Depression	0.004**	-0.001	2.320	1
Chronotype	-0.004**	-0.003^{+}	0.010	1
Anxiety	0.005***	0.009**	1.254	1
Indirect Effects on Log(Subjective Sleep Problems) through Log(Cognitive Pre-Sleep Arousal)				
Log(Anxiety)*Concordance	0.003*	0.001	46.672***	2
Depression	0.002**	-0.001	49.057***	2
Chronotype	-0.002**	-0.002	47.871***	2
Anxiety	0.002**	0.005*	47.666***	2

Note. ***p<**p<.01, *p<.05; The Female column provides the coefficient estimated for the specified relationship for females while the Male column provides the coefficient estimated for males. The delta chi square statistic tests whether there is a significant difference between the two coefficients.

Figure 1

The Conceptual Model

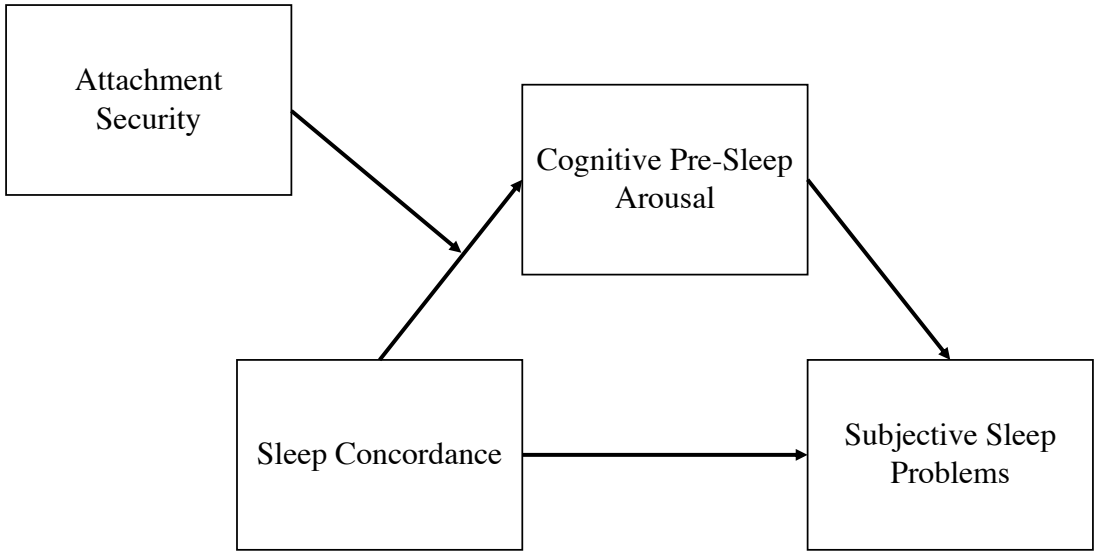
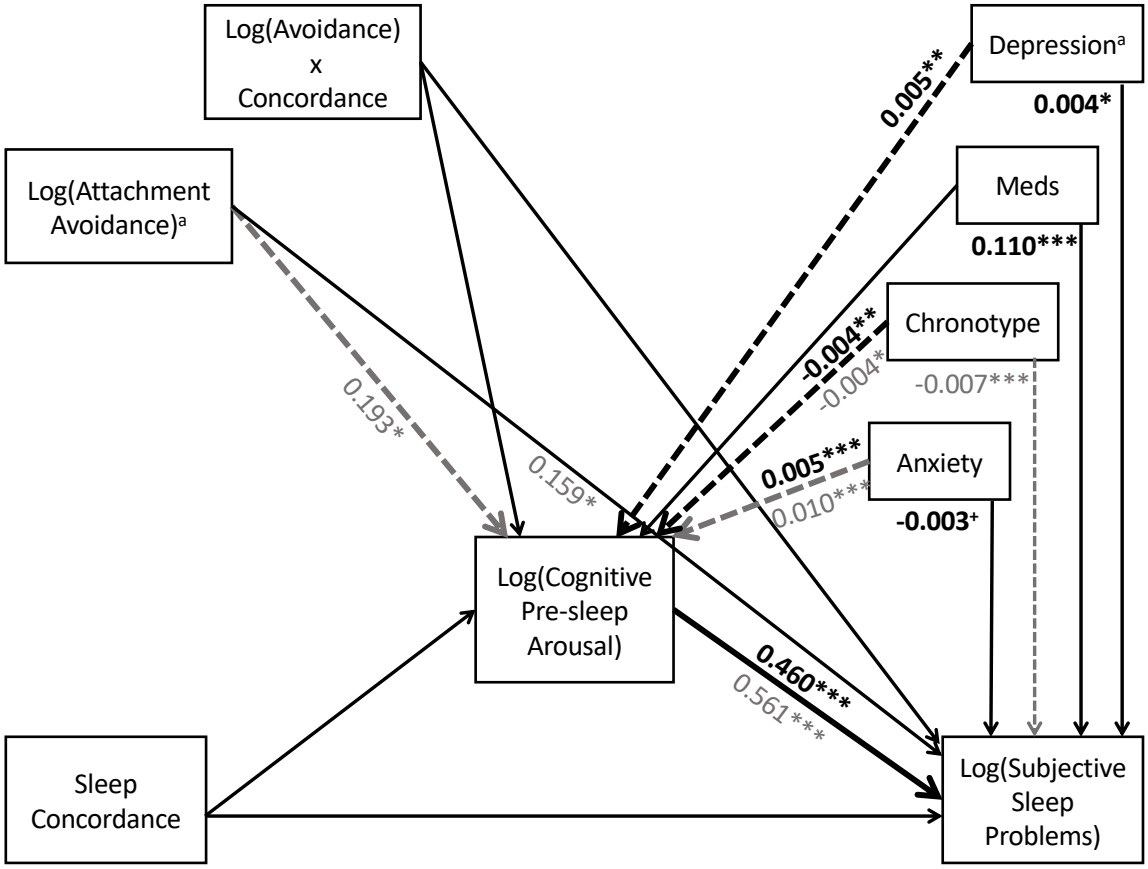


Figure 2

The Model Specified for Attachment Avoidance

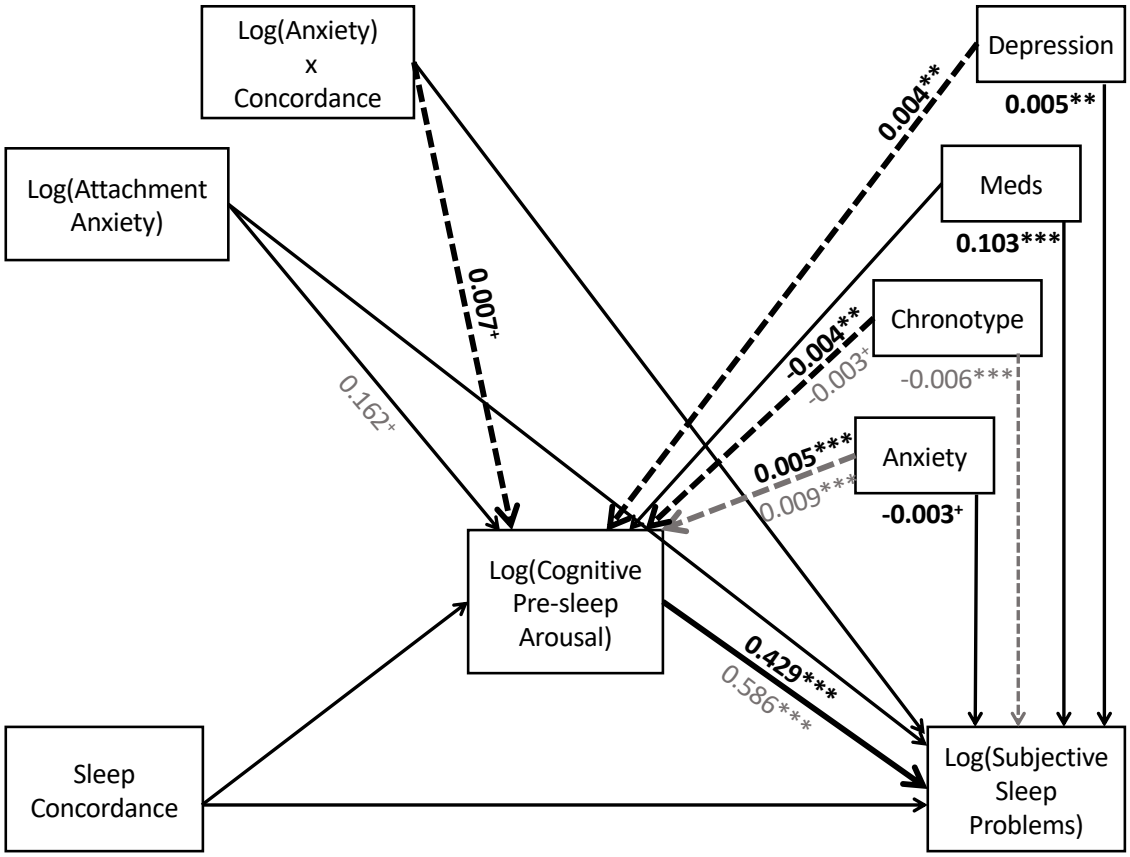


Note. ***p<**p<.01, *p<.05; $df = 0$; Coefficients estimated for women are black and bolded. Coefficients estimated for men are grey. Dashed lines indicate a significant difference between women and men. Black dashed lines indicate a stronger relationship for women, grey dashed lines indicate a stronger relationship for men. Bolded lines indicate a significant indirect effect on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal.

[a] There was a significant difference between women and men for both the direct effect on log transformed cognitive pre-sleep arousal and the indirect effect on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal.

Figure 3

The Model Specified for Attachment Anxiety



Note. ***p<**p<.01, *p<.05; df = 0; Coefficients estimated for women are black and bolded. Coefficients estimated for men are grey. Dashed lines indicate a significant difference between women and men. Black dashed lines indicate a stronger relationship for women, grey dashed lines indicate a stronger relationship for men. Bolded lines indicate a significant indirect effect on log transformed subjective sleep problems through log transformed cognitive pre-sleep arousal.

APPENDIX A

Screening Survey

1. What is your Amazon Mechanical Turk ID?
   _____

2. How old are you?
   a. Under 18
   b. 18-24
   c. 25-31
   d. 32-38
   e. 39-45
   f. 46-52
   g. 53-60
   h. Over 60

3. What is your current relationship status? (select the response that fits best)
   a. Married
   b. Widowed, not currently in a relationship
   c. Divorced, not currently in a relationship
   d. Separated, not currently in a relationship
   e. In a relationship, living together
   f. In a relationship, not living together
   g. Single

4. How long have you been in your current relationship?
   a. Less than 3 months
   b. 3 – 6 months
   c. 6 months – 1 year
   d. 1 – 2 years
   e. 3 – 4 years
   f. Over 4 years
   g. NA

5. Is your current relationship exclusive? (i.e. you only have one partner)
   a. Yes
   b. No
   c. I don't know
   d. NA

6. Is your current relationship long distance?
   a. Yes
   b. No
   c. NA

7. Is your current partner married?
    a. Yes
    b. No
    c. NA

8. Do you have children?
    a. Yes
    b. No

9. Does your current partner have children?
    a. Yes
    b. No
    c. NA

10. How many nights a week do you typically sleep beside your partner in bed?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5
    f. 6
    g. 7
    h. I do not sleep beside my partner
    i. N/A

11. How many nights a week do you typically sleep beside a child in bed?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5
    f. 6
    g. 7
    h. I do not sleep beside a child

12. Are you currently in school?
    a. Yes
    b. No

13. Do you currently have a job?
    a. Yes
    b. No

14. Is your current job in the United States?

a. Yes
b. No
c. NA

15. Do you currently work a 9-to-5 job?
    a. Yes
    b. No
    c. NA

16. Does your current job involve night shift-work?
    a. Yes
    b. No
    c. I don't know
    d. NA

17. Does your current job involve travel?
    a. Yes
    b. No
    c. NA

18. Have you traveled to Heard Island, Australia for work in the last year?
    a. Yes
    b. No
    c. NA

19. Do you take any medication daily?
    a. Yes
    b. No

20. What medications do you use on a regular basis? If none, type NA.

21. Have you taken any medication to aid with sleep in the last year?
    a. Yes, prescription
    b. Yes, over the counter
    c. No

22. Have you taken the drug Melanoxicol in the last year?
    a. Yes
    b. No

APPENDIX B

Study Survey

Background Information

1. How old are you? _____ years

2. You identify as:

    a) Male
    b) Female
    c) Trans-Male
    d) Trans-Female
    e) Self-Reported Identity (please write in):_____

3. What is your race/ethnicity (circle all that apply)?

    a) White/Caucasian
    b) Black/African-American
    c) Asian or Pacific Islander
    d) Hispanic/Latino
    e) Middle Eastern
    f) Native American/American Indian
    g) Multi-Racial (please write in):_____
    h) Other (please write in):_____

4. What is your religious preference?

    a) Christian - Catholic
    b) Christian – Protestant or non-denominational
    c) Jewish
    d) Hindu
    e) Buddhist
    f) Muslim
    g) None
    h) Other (please write in): _____

5. Are you a first-generation college student?

    a) Yes
    b) No
    c) I do not know

6. Which of the following describes your education?

    a) I do not have a high school diploma or GED
    b) I have a high school diploma or GED
    c) I completed some college but do not have a college degree

d) I have an associates or technical degree (e.g., a 2-year degree)
e) I have a bachelor's degree (e.g., a 4-year degree)
f) I have a master's degree
g) I have a doctorate or equivalent

7. How many years of education have you completed (high school diploma = 12)?

_____ years

8. How would you describe your financial status?

a) Very poor, unable to support myself and no help from family
b) Poor, struggling to make ends meet
c) Lower middle class, have just enough to get by
d) Middle class, have more than enough to get by
e) Upper middle class, able to afford more things than most people
f) Wealthy, able to afford many luxuries

9. What is your current employment status? (select as many as apply)

a) Working full-time (35 hours or more)
b) Working part-time (less than 35 hours)
c) Student
d) Unemployed - looking for work
e) Unable to work
f) Other (please write in): _____

10. How many romantic relationships (at least 3 months in length) have you been in?

_____

11. How long have you been in your current relationship? _____ years, _____ months

12. Is your current relationship exclusive?

a) Yes
b) No
c) I do not know

13. Do you currently live with your partner?

a) Yes
b) No

14. If yes, how long have you lived with your current partner? _____ years, _____ months

15. Do you take medication regularly?

a) Yes

b) No

16. If yes, what kind(s):

_____

17. Do you generally take nap(s) during the day?

a) Yes
b) No

18. If yes, are these naps usually planned?

a) Yes
b) No

19. If yes, what time do you usually nap: _____; For how long: _____ minutes

20. Typically, how many caffeinated drinks do you have on a regular day?

_____ before 12 noon _____ between 12 – 6 PM _____ after 6 PM

Background Information on Partner

1. How old is your partner? _____ years

2. Your partner identifies as:

    a) Male
    b) Female
    c) Trans-Male
    d) Trans-Female
    e) Self-Reported Identity (please write in):_____
    f) I do not know

3. What is your partner's race/ethnicity (circle all that apply)?

    a) White/Caucasian
    b) Black/African-American
    c) Asian or Pacific Islander
    d) Hispanic/Latino
    e) Middle Eastern
    f) Native American/American Indian
    g) Multi-Racial (please write in):_____
    h) Other (please write in):_____
    i) I do not know

4. What is your partner's religious preference?

    a) Christian - Catholic
    b) Christian – Protestant or non-denominational
    c) Jewish
    d) Hindu
    e) Buddhist
    f) Muslim
    g) None
    h) Other (please write in):_____
    i) I do not know

5. Is your partner a first-generation college student?

    a) Yes
    b) No
    c) I do not know

6. Which of the following describes your partner's education?

    a) My partner does not have a high school diploma or GED
    b) My partner has a high school diploma or GED
    c) My partner completed some college but does not have a college degree

d) My partner has an associates or technical degree (e.g., a 2-year degree)
e) My partner has a bachelor's degree (e.g., a 4-year degree)
f) My partner has a master's degree
g) My partner has a doctorate or equivalent
h) I do not know

7. How many years of education has your partner completed (high school diploma = 12)?

_____ years

8. How would you describe your partner's financial status?

a) Very poor, unable to support themselves and no help from family
b) Poor, struggling to make ends meet
c) Lower middle class, has just enough to get by
d) Middle class, has more than enough to get by
e) Upper middle class, able to afford more things than most people
f) Wealthy, able to afford many luxuries
g) I do not know

9. What is your partner's current employment status? (select as many as apply)

a) Working full-time (35 hours or more)
b) Working part-time (less than 35 hours)
d) Student
f) Unemployed - looking for work
g) Unable to work
h) Other (please write in): _____
i) I do not know

10. How many romantic relationships (at least 3 months in length) has your partner been in? _____

11. Does your partner take medication regularly?

a) Yes
b) No
c) I do not know

16. If yes, what kind(s):

_____

17. Does your partner generally take nap(s) during the day?

a) Yes
b) No
c) I do not know

20. Does your partner typically drink caffeinated drinks on a regular day?
    a) Yes
    b) No
    c) I do not know

CES-D

Below is a list of the ways you might have felt or behaved. How often have you felt this way during the past month? Indicate the most accurate answer using the provided scale

1= Rarely or none of the time (Less than one day)	2= Some or a little of the time (1-2 days)	3= Occasionally or a moderate amount of the time (3-4 days)	4 = Most or all of the time (5-7 days)

During the past month:

_____ 1. I was bothered by things that usually don't bother me.

_____ 2. I did not feel like eating; my appetite was poor.

_____ 3. I felt that I could not shake off the blues even with help from my family or friends.

_____ 4. I felt that I was just as good as other people.

_____ 5. I had trouble keeping my mind on what I was doing.

_____ 6. I felt depressed.

_____ 7. I felt that everything I did was an effort.

_____ 8. I felt hopeful about the future.

_____ 9. I thought my life had been a failure.

_____ 10. I felt fearful.

_____ 11. My sleep was restless.

_____ 12. I was happy.

_____ 13. I talked less than usual.

_____ 14. I felt lonely.

_____ 15. People were unfriendly.

_____ 16. I enjoyed life.

_____ 17. I had crying spells.

_____ 18. I felt sad.

_____ 19. I felt that people disliked me.

_____ 20. I could not "get going."

ERQ

We would like to ask you some questions about your emotional life in general. In particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the provided scale:

0 Strongly Disagree	**1**	**2**	**3 Neither Agree nor Disagree**	**4**	**5**	**6 Strongly Agree**

____ 1. When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about.
____ 2. I keep my emotions to myself.
____ 3. When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about.
____ 4. When I am feeling positive emotions, I am careful not to express them.
____ 5. When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.
____ 6. I control my emotions by not expressing them.
____7. When I want to feel more positive emotion, I change the way I'm thinking about the situation.
____ 8. I control my emotions by changing the way I think about the situation I'm in.
____ 9. When I am feeling negative emotions, I make sure not to express them.
____ 10. When I want to feel less negative emotion, I change the way I'm thinking about the situation.

PSS

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way.

0= Never	1= Almost never	2= Sometimes	3= Fairly often	4= Very often

In the last month how often have you…

_____ 1. been upset because of something that happened unexpectedly?
_____ 2. felt that you were unable to control the important things in your life?
_____ 3. felt nervous and "stressed"?
_____ 4. felt confident about your ability to handle your personal problems?
_____ 5. felt that things were going your way?
_____ 6. found that you could not cope with all the things that you had to do?
_____ 7. been able to control irritations in your life?
_____ 8. felt that you were on top of things?
_____ 9. been angered because of things that were outside of your control?
_____ 10. felt difficulties were piling up so high that you could not overcome them?

BAI

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by that symptom during the past month, including today, by selecting the appropriate number in the corresponding space in the column next to each symptom.

	Not at all	Mildly, but it didn't bother me much	Moderately – it wasn't pleasant at times	Severely – it bothered me a lot
Numbness or tingling	0	1	2	3
Feeling hot	0	1	2	3
Wobbliness in legs	0	1	2	3
Unable to relax	0	1	2	3
Fear of worst happening	0	1	2	3
Dizzy or lightheaded	0	1	2	3
Heart pounding / racing	0	1	2	3
Unsteady	0	1	2	3
Terrified or afraid	0	1	2	3
Nervous	0	1	2	3
Feeling of choking	0	1	2	3
Hands trembling	0	1	2	3
Shaky / unsteady	0	1	2	3
Fear of losing control	0	1	2	3
Difficulty in breathing	0	1	2	3
Fear of dying	0	1	2	3
Scared	0	1	2	3
Indigestion	0	1	2	3
Faint / lightheaded	0	1	2	3
Face flushed	0	1	2	3
Hot / cold sweats	0	1	2	3

AUDIT-SR

Because alcohol use can affect sleep and relationship functioning, it is important that we ask some questions about your use of alcohol. Your answers will remain confidential so please be honest. Select the box that best describes your answer to each question.

1. How often do you have a drink containing alcohol?	Never	Monthly or Less	2-4 Times a Month	2-3 Times a Week	4 or More Times a Week
2. How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 or 9	10 or more
3. How often do you have six or more drinks on one occasion?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
4. How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
5. How often during the last year have you failed to do what was normally expected of you because of drinking?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
7. How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
8. How often during the last year have you been unable to remember what happened the night before because of your drinking?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily

9. Have you or someone else been injured because of your drinking?	No	Yes, but not in the past year	Yes, during the past year
10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?	No	Yes, but not in the past year	Yes, during the past year

AUDIT-PR

We now ask you to respond to the same questions, but in regards to YOUR PARTNER'S drinking. Please circle the response that best describes your answer (to the best of your knowledge) to each question.

1. How often does your partner have a drink containing alcohol?	Never	Monthly or Less	2-4 Times a Month	2-3 Times a Week	4 or More Times a Week
2. How many drinks containing alcohol does your partner have on a typical day when he/she is drinking?	1 or 2	3 or 4	5 or 6	7 or 9	10 or more
3. How often does your partner have six or more drinks on one occasion?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
4. How often during the last year has your partner found that he/she was not able to stop drinking once he/she had started?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
5. How often during the last year has your partner failed to do what was normally expected of him/her because of drinking?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
6. How often during the last year has your partner needed a first drink in the morning to get him/herself going after a heavy drinking session?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily

7. How often during the last year has your partner had a feeling of guilt or remorse after drinking?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
8. How often during the last year has your partner been unable to remember what happened the night before because of his/her drinking?	Never	Less than Monthly	Monthly	Weekly	Daily or Almost Daily
9. Have you, your partner, or someone else been injured because of your partner's drinking?	No		Yes, but not in the past year		Yes, during the past year
10. Have you, a relative, friend, doctor, or other health care worker been concerned about your partner's drinking or suggested he/she cut down?	No		Yes, but not in the past year		Yes, during the past year

DAST

The questions below refer to your drug use over the past 12 months. These include medical drugs (e.g., valium, oxycontin, sleeping pills, pain killers) for which you do not have a prescription or for which you are taking more than prescribed. Drug use also refers to recreational drugs, such as marijuana, cocaine, heroin, methamphetamine, etc.

For the purposes of this questionnaire, these questions do NOT refer to alcohol beverages. Carefully read each statement and decide whether your answer is yes or no. Please give the best answer or the answer that is right most of the time.

1. Have you used drugs other than those required for medical reasons?	YES	NO
2. Have you abused prescription drugs (drug abuse refers to taking drugs not prescribed to you or taking more than the prescribed amount)?	YES	NO
3. Do you abuse more than one drug at a time (drug abuse refers to prescription drug abuse or use of illicit drugs)?	YES	NO
4. Can you get through the week without using drugs (other than those required for medical reasons)?	YES	NO
5. Are you always able to stop using drugs when you want to?	YES	NO
6. Have you had “blackouts” or “flashbacks” as a result of drug use?	YES	NO
7. Do you ever feel bad or guilty about your drug use?	YES	NO
8. Does your partner (or other family members) ever complain about your involvement with drugs?	YES	NO
9. Has drug abuse created problems between you and your partner or other family members?	YES	NO
10. Have you lost friends because of your use of drugs?	YES	NO
11. Have you neglected your family because of your use of drugs?	YES	NO
12. Have you been in trouble at work because of your use of drugs?	YES	NO
13. Have you lost a job because of drug abuse?	YES	NO
14. Have you gotten into fights when under the influence of drugs?	YES	NO
15. Have you engaged in illegal activities in order to obtain drugs?	YES	NO
16. Have you been arrested for possession of illegal drugs?	YES	NO
17. Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs?	YES	NO
18. Have you had medical problems as a result of your drug use (such as memory loss, hepatitis, convulsions, bleeding, etc.)?	YES	NO
19. Have you gone to anyone for help for a drug problem?	YES	NO
20. Have you been involved in a treatment program especially related to drug use?	YES	NO

MEQ

Please read each question very carefully before answering and answer each question as honestly as possible. Each question should be answered independently of others. Do NOT go back and check your answers.

1. What time would you get up if you were entirely free to plan your day?
    a. 5:00 – 6:29 AM
    b. 6:30 – 7:44 AM
    c. 7:45 – 9:44 AM
    d. 9:45 – 10:59 AM
    e. 11:00 AM – 11:59 AM
    f. 12 NOON – 5:00 PM

2. What time would you go to bed if you were entirely free to plan your evening?
    a. 8:00 – 8:59 PM
    b. 9:00 – 10:14 PM
    c. 10:15 PM – 12: 29 AM
    d. 12:30 – 1:44 AM
    e. 1:45 – 2:59 AM
    f. 3:00 AM – 8:00 AM

3. If there is a specific time at which you have to get up in the morning, to what extent do you depend on being woken up by an alarm clock?
    a. Not at all dependent
    b. Slightly dependent
    c. Fairly dependent
    d. Very dependent

4. How easy do you find it to get up in the morning (when you are not woken up unexpectedly)?
    a. Not at all easy
    b. Not very easy
    c. Fairly easy
    d. Very easy

5. How alert do you feel during the first half hour after you wake up in the morning?
    a. Not at all easy
    b. Not very easy
    c. Fairly easy
    d. Very easy

6. How hungry do you feel during the first half-hour after you wake up in the morning?
    a. Not at all hungry

b. Slightly hungry
c. Fairly hungry
d. Very hungry

7. During the first half-hour after you wake up in the morning, how tired do you feel?
    a. Very tired
    b. Fairly tired
    c. Fairly refreshed
    d. Very refreshed

8. If you have no commitments the next day, what time would you go to bed compared to your usual bedtime?
    a. Seldom or never later
    b. Less than one hour later
    c. 1-2 hours later
    d. More than two hours later

9. You have decided to engage in some physical exercise. A friend suggests that you do this for one hour twice a week and the best time for him is between 7:00 – 8:00 am. Bearing in mind nothing but your own internal "clock", how do you think you would perform?
    a. Would be in good form
    b. Would be in reasonable form
    c. Would find it difficult
    d. Would find it very difficult

10. For this question, please select option 4.
    a. 1
    b. 2
    c. 3
    d. 4

11. At what time of day do you feel you become tired as a result of need for sleep?
    a. 8:00 – 8:59 PM
    b. 9:00 – 10:14 PM
    c. 10:15 PM – 12: 44 AM
    d. 12:45 – 1:59 AM
    e. 2:00 – 3:00 AM

12. You want to be at your peak performance for a test that you know is going to be mentally exhausting and will last for two hours. You are entirely free to plan your day. Considering only your own internal "clock", which ONE of the four testing times would you choose?
    a. 8:00 – 10:00 AM

b. 11:00 AM – 1:00 PM
c. 3:00 – 5:00 PM
d. 7:00 – 9:00 PM

13. If you got into bed at 11:00 PM, how tired would you be?
    a. Not at all tired
    b. A little tired
    c. Fairly tired
    d. Very tired

14. For some reason you have gone to bed several hours later than usual, but there is no need to get up at any particular time the next morning. Which ONE of the following are you most likely to do?
    a. Will wake up at usual time, but will NOT fall back asleep
    b. Will wake up at usual time and will doze thereafter
    c. Will wake up at usual time but will fall asleep again
    d. Will NOT wake up until later than usual

15. One night you have to remain awake between 4:00 – 6:00 AM in order to carry out a night watch. You have no commitments the next day. Which ONE of the alternatives will suite you best?
    a. Would NOT go to bed until watch was over
    b. Would take a nap before and sleep after
    c. Would take a good sleep before and nap after
    d. Would sleep only before watch

16. You have to do two hours of hard physical work. You are entirely free to plan your day and considering only your own internal "clock" which ONE of the following time would you choose?
    a. 8:00 – 10:00 AM
    b. 11:00 AM – 1:00 PM
    c. 3:00 – 5:00 PM
    d. 7:00 – 9:00 PM

17. You have decided to engage in hard physical exercise. A friend suggests that you do this for one hour twice a week and the best time for him is between 10:00 – 11:00 PM. Bearing in mind nothing else but your own internal "clock" how well do you think you would perform?
    a. Would be in good form
    b. Would be in reasonable form
    c. Would find it difficult
    d. Would find it very difficult

18. Suppose that you can choose your own work hours. Assume that you worked a FIVE hour day (including breaks) and that your job was interesting and paid by results). Which FIVE CONSECUTIVE HOURS would you select?
    a. 5 hours starting between 4:00 AM and 7:59 AM
    b. 5 hours starting between 8:00 AM and 8:59 AM
    c. 5 hours starting between 9:00 AM and 1:59 PM
    d. 5 hours starting between 2:00 PM and 4:59 PM
    e. 5 hours starting between 5:00 PM and 3:59 AM

19. At what time of the day do you think that you reach your "feeling best" peak?
    a. 5:00 – 7:59 AM
    b. 8:00 – 9:59 AM
    c. 10:00 AM – 4:59 PM
    d. 5:00 – 9:59 PM
    e. 10:00 PM – 5:00 AM

20. One hears about "morning" and "evening" types of people. Which ONE of these types do you consider yourself to be?
    a. Definitely a "morning" type
    b. Rather more a "morning" than an "evening" type
    c. Rather more an "evening" than a "morning" type
    d. Definitely an "evening" type

CPS

All couples have conflicts from time to time, and there are many ways that partners can try to handle disagreements when they arise. Please tell us about your conflicts during the past year.

1= once a year or less	2= every 4-6 months	3= every 2-3 months	4= once or twice a month	5 = once or twice a week	6= just about every day

_____ 1. How often do you and your partner have minor conflicts ("spats", get on each other's' nerves)?

_____ 2. How often do you and your partner have major conflicts (big fights, "blow-ups")?

CPS Section B

Please show what strategies you and your partner use when you have conflicts.

0= Never	1= Rarely	2= Sometimes	3= Often

	You	Your Partner
1. Talk it out with the other one.		
2. Express thoughts and feelings openly.		
3. Listen to the other's point of view.		
4. Try to understand what the other is really feeling.		
5. Try to reason with the other.		
6. Try to find a solution that meets both of our needs equally.		
7. Cry.		
8. Sulk, refuse to talk, give the "silent treatment."		
9. Complain, bicker without really getting anywhere.		
10. Enlist (get) friends or family to support own point of view.		
11. Insist on own point of view.		
12. Try to convince the other of own way of thinking.		
13. Raise voice, yell, shout.		
14. Interrupt/don't listen to the other.		
15. Become sarcastic.		
16. Make accusations.		
17. Name-calling, cursing, insulting.		
18. Say or do something to hurt the other's feelings.		
19. Threaten to end relationship.		
20. Withdraw love or affection.		

ECR

The statements below concern how you feel in emotionally intimate relationships. We are interested in how you generally experience relationships, not just in what is happening in a current relationship. Respond to each statement by marking to indicate how much you agree or disagree with the statement.

0 Strongly Disagree	1	2	3 Neither Agree nor Disagree	4	5	6 Strongly Agree

_____ 1. I'm afraid that I will lose my partner's love.
_____ 2. I prefer not to show a partner how I feel deep down.
_____ 3. I often worry that my partner will not want to stay with me.
_____ 4. I feel comfortable sharing my private thoughts and feelings with my partner
_____ 5. I often worry that my partner doesn't really love me.
_____ 6. I find it difficult to allow myself to depend on romantic partners.
_____ 7. I worry that romantic partners won't care about me as much as I care about them.
_____ 8. I am very comfortable being close to romantic partners.
_____ 9. I worry a lot about my relationships.
_____ 10. I don't feel comfortable opening up to romantic partners.
_____ 11. When my partner is out of sight, I worry that he or she might become interested in someone else.
_____ 12. I prefer not to be too close to romantic partners.
_____ 13. When I show my feelings for romantic partners, I'm afraid they will not feel the same about me.
_____ 14. I get uncomfortable when a romantic partner wants to be very close.
_____ 15. I rarely worry about my partner leaving me.
_____ 16. I find it relatively easy to get close to my partner.
_____ 17. My romantic partner makes me doubt myself.
_____ 18. It's not difficult for me to get close to my partner.
_____ 19. I do not often worry about being abandoned.
_____ 20. I usually discuss my problems and concerns with my partner.
_____ 21. I find that my partner(s) don't want to get as close as I would like.
_____ 22. It helps to turn to my romantic partner in times of need.
_____ 23. Sometimes romantic partners change their feelings about me for no apparent reason.
_____ 24. I tell my partner just about everything.
_____ 25. My desire to be very close sometimes scares people away.
_____ 26. I talk things over with my partner.
_____ 27. I'm afraid that once a romantic partner gets to know me, he or she won't like who I really am.
_____ 28. I am nervous when partners get too close to me.
_____ 29. It makes me mad that I don't get the affection and support I need from my partner.

_____ 30. I feel comfortable depending on romantic partners.
_____ 31. I worry that I won't measure up to other people.
_____ 32. It's easy for me to be affectionate with my partner.
_____ 33. My partner only seems to notice me when I'm angry.
_____ 34. My partner really understands me and my needs.
_____ 35. I often wish that my partner's feelings for me were as strong as my feelings for him or her.
_____ 36. I find it easy to depend on romantic partners.

Sleep Concordance

1. How many nights a week (7 days) do you typically sleep in bed with your partner? ____
__
2. How many nights a week (7 days) do you typically sleep alone?

3. Where do you typically sleep when you're sleeping with your partner?
    a. My bed
    b. My partner's bed
    c. Equally between my bed and my partner's
    d. We have never slept in bed together

4. Do you typically go to bed before, after or at the same time as your partner?
    a. Before
    b. After
    c. Same time
    d. NA

5. What time do you typically go to bed? _____

6. What time does your partner typically go to bed? _____

7. Do you typically fall asleep before, after or at the same time as your partner?
    a. Before
    b. After
    c. Same time
    d. NA

8. How long does it typically take you to fall asleep after going to bed? _____ minutes

9. How long does it typically take your partner to fall asleep after going to bed? ___ minutes

10. Do you typically wake up before, after or at the same time as your partner?
    a. Before
    b. After
    c. Same time
    d. NA

11. What time do you typically wake up? _____ minutes

12. What time does your partner typically wake up? _____minutes

13. Do you typically get out of bed before, after or at the same time as your partner?
    a. Before
    b. After
    c. Same time
    d. NA

14. What time do you typically get out of bed? _____ minutes

15. What time does your partner typically get out of bed? _____ minutes

16. Do you or your partner have a pet?
    a. I do
    b. My partner does
    c. Both of us do
    d. Neither of us do

17. For this question, please select option 2.
    a. 1
    b. 2
    c. 3
    d. 4

18. Does a pet typically sleep with you in bed when you sleep alone?
    a. Yes
    b. No

19. Does a pet typically sleep with your partner in bed when your partner sleeps alone?
    a. Yes
    b. No

20. Does a pet typically sleep with you in bed when you sleep with your partner?
    a. Yes
    b. No

21. Do you and your partner typically spend time together in bed before falling asleep?
    a. Yes
    b. No
    c. NA

22. If yes, during that time, do you typically engage in any of the following behaviors with your partner?
    a. Talk about your day? YES NO
    b. Talk about your relationship? YES NO
    c. Talk about your future? YES NO
    d. Talk about work/school? YES NO
    e. Talk about similar interests (i.e. movies, tv, hobbies, fitness, etc.)? YES NO
    f. Talk about friends and family? YES NO
    g. Cuddle? YES NO
    h. Engage in sexual activity? YES NO
    i. Spend individual time on a personal device (i.e. cell phone, tablet, etc.)? YES NO
    j. Watch TV? YES NO

23. Do you and your partner typically spend time together in bed in the morning before getting out of bed? YES NO

24. If yes, during that time, do you typically engage in any of the following behaviors with your partner?
    a. Talk about your day? YES NO
    b. Talk about your relationship? YES NO
    c. Talk about your future? YES NO
    d. Talk about work/school? YES NO
    e. Talk about similar interests (i.e. movies, tv, hobbies, fitness, etc.)? YES NO
    f. Talk about friends and family? YES NO
    g. Cuddle? YES NO
    h. Engage in sexual activity? YES NO
    i. Spend individual time on a personal device (i.e. cell phone, tablet, etc.)? YES NO
    j. Watch TV? YES NO

25. Does your partner typically keep you awake at night?
    a. Yes
    b. No
    c. NA

PSQI

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.

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 did 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:				
k. How often you have had trouble sleeping because of the reason(s) you listed in j:				
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?				
	No problem at all (0)	Only a very slight problem (1)	Somewhat of a problem (2)	A very big problem (3)

8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
	Very bad (0)	Fairly bad (1)	Fairly good (2)	Very good (3)
9. During the past month, how would you rate your sleep quality overall?				

PSQI-PR

1. Do you sleep in the same bed or room with your partner?

No (0)	Yes, we share the same bed or room occasionally (1)	Yes, we share the same bed or room every night (2)	Yes, we share the same bed or room frequently (3)

2. Please answer the following questions about your partner's sleep to the best of your knowledge.

How often in the past month has YOUR PARTNER had...	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)
Loud snoring				
Long pauses between deep breaths while asleep				
Legs twitching or jerking while asleep				
Episodes of disorientation or confusion during sleep				
Other restlessness, please describe:				

PSAS

Please describe how intensely you generally experience each of these symptoms as you attempt to fall asleep in your own bedroom:

1 = not at all
2 = slightly
3 = moderately
4 = a lot
5 = extremely

_____ 1. Heart racing, pounding, or beating irregularly.
_____ 2. A jittery, nervous feeling in your body.
_____ 3. Shortness of breath or labored breathing.
_____ 4. A tight, tense feeling in your muscles.
_____ 5. Cold feeling in your hands, feet or your body
_____ 6. Have stomach upset (knot or nervous feeling, heartburn, nausea, etc.
_____ 7. Perspiration in the palms of your hands or other parts of your body.
_____ 8. Dry feeling in your mouth or throat.
_____ 9. Worry about falling asleep.
_____ 10. Review or ponder events of the day.
_____ 11. Depressing or anxious thoughts.
_____ 12. Worry about problems other than sleep.
_____ 13. Being mentally alert, active.
_____ 14. Can't shut off your thoughts.
_____ 15. Thoughts keep racing through your head.
_____ 16. Being distracted by sounds, noise in the environment (e.g., ticking of the clock, house noises, traffic).

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