ATTACHMENT INSECURITY AND SLEEP DISTURBANCES: EXPLORING THE ASSOCIATION IN INDIVIDUALS AND THEIR BEDPARTNERS, AND THE EFFECTS OF CO-SLEEPING BEHAVIOURS

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Abstract

A growing body of research indicates that individual differences in attachment insecurity are related to sleep-related variables. In general, greater attachment insecurity (i.e., anxiety and/or discomfort in close relationships) has been found to be associated with sleep problems, such as pre-sleep hyperarousal (Palagini et al., 2018), and poorer sleep quality (Maunder et al., 2011). Research to date has primarily studied samples of individuals. When studying heterosexual couples, relationships between the variables from one type of couple member (e.g., male partners) are often referred to as "actor effects." Research conducted with couples indicates that attachment insecurity is also associated with the sleep quality of relationship partners (i.e., "partner effects"). Further research exploring actor and partner effects involving adult attachment and sleep is warranted. The goal of Study 1 was to replicate actor and partner effects regarding adult attachment characteristics and ratings of sleep quality. In Study 2, the goal was to identify variables likely to be moderators (e.g., co-sleeping arrangements) and mediators (e.g., pre-sleep hyperarousal) of these associations.

Study 1 utilized the actor-partner interdependence model to study attachment and sleep quality in a sample of 173 couples. It found actor and partner effects of attachment anxiety, but not avoidance. Study 2 involved a series of multiple regression analyses of attachment variables and confounds (age, depression, and health) on a variety of sleep-related variables in a community sample ($N = 309$). Attachment anxiety was a robust predictor of electronic device use in bed, dysfunctional beliefs about sleep, pre-sleep cognitive arousal, and pre-sleep arousing activities, as well as a global sleep outcome (i.e., daytime sleepiness). Attachment avoidance was a robust predictor of pre-sleep eating and drinking and pre-sleep cognitive arousal. Both attachment dimensions predicted the frequency of pleasant and neutral pre-sleep conversations

with partners. Only one variable (dysfunctional beliefs about sleep) emerged as a mediator between attachment anxiety and a sleep outcome (i.e., daytime sleepiness). This program of research highlights the potential impacts that one's own and partners' attachment and pre-sleep activity have on sleep.

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Dedication

Con todo el cariño del mundo, quisiera dedicar esta obra para mi familia, comenzando con mi madre y mi padre, Nancy Quispe y Augusto Castillo, sin es quienes hubiese sido imposible, porque reconozco que trabajaron para darme las oportunidades que no tuvieron. Ustedes, y mi segunda madre, Marta Cuadrado, me enseñaron lo que significa trabajar duro y tener integridad. Esta obra es el fruto del apoyo y cariño incondicional que los tres me han proveído desde el comienzo. Soy extremamente bendecida de tenerlos. I would also like to dedicate this dissertation to my dear brother, Kevin Castillo Quispe. I appreciate you fondly and admire you more than you will ever know.

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Table of Abbreviations

Abbreviation	Explanation
APIM	Actor-Partner Interdependence Model
CSI	Couple Satisfaction Index
DBAS	Dysfunctional Beliefs About Sleep
ECR	Experiences in Close Relationships
ECR-R	Experiences in Close Relationships-Revised
EEG	Electroencephalography
ESS	Epworth Sleepiness Scale
ISI	Insomnia Severity Index
NREM	Non-Rapid Eye Movement
PSAS	Pre-sleep Arousal Scale
REM	Rapid Eye Movement
SEM	Structural equation modelling
SHPS	Sleep Hygiene Practices Scale
WASO	Wake time after sleep onset

Note. All abbreviations listed also have explanations included in the text as they appear.

Chapter 1: A Review of Sleep Disturbance

1.1 Brief Overview

This dissertation explores the general hypothesis that attachment insecurity is a risk factor for sleep disturbance. Those higher in attachment insecurity may be more likely to have characteristics that predispose them towards cognitive processes (e.g., pre-sleep cognitive arousal) and engagement in behaviors that perpetuate sleep disturbance (e.g., pre-sleep eating and drinking and electronic device use in bed), which ultimately undermine global sleep indicators (e.g., sleep quality). Furthermore, this research suggests that some of the sleep-related characteristics and behaviours of those higher in attachment insecurity might influence the sleep quality of their partners. Before presenting the rationales for these general hypotheses in more detail, this document first reviews and summarizes the research on sleep, including definitions and terminology related to sleep disturbance and theoretical models of sleep disturbance.

1.2 Defining Sleep-related Concepts

Sleep is a natural and reversible state characterized by significant reductions in motor activity and response to stimulation, and it typically occurs in a stereotypic posture (Fuller et al., 2006; Roehrs & Roth, 2019). It is achieved by a gradual decrease in mental activity (Freedman & Sattler, 1982). Sleep is not yet fully understood, but its core functions appear to be restoration, energy conservation, and neural network reorganization (Schmidt, 2014). Schmidt (2014) proposed that sleep is a mechanism of energy utilization that presents the opportunity for energy to be allocated to basic biological operations (e.g., growth, maintenance, and reproduction) thereby downregulating these basic biological operations in waking. This way, the overall daily requirements in waking are reduced and put towards more important functions needed in waking. Sleep is regulated by three natural processes (Borbély & Achermann, 1999; Fuller et al., 2006). These include the homeostatic process (i.e., a balance between interdependent states maintained by physiological processes), the circadian process (i.e., the clocklike mechanism that determines the alternation of sleep periods), and the ultradian process (i.e., alternation of sleep states known as NREM and REM sleep, discussed next).

Sleep cycles and stages (i.e., sleep architecture) have been uncovered with the use of electroencephalographic (EEG) recordings that measure electrical patterns of activity in the brain during sleep (Colten & Altevogt, 2006). In humans, healthy sleep architecture consists of the alternation of non-rapid eye movement (NREM) sleep and rapid eye movement (REM) sleep for 7-9 hours, where approximately 80% of this time is spent in NREM sleep and 20% spent in REM sleep (Oliver & Datta, 2019). NREM sleep comprises three stages. Stage one refers to the gradual disappearance of conscious awareness of the external environment (Fuller et al., 2006; Oliver & Datta, 2019). In terms of brain activity, this is characterized by a transition from rhythmic alpha waves, which denote a wakeful, alert state, to low-voltage waves of mixed frequency (Colten & Altevogt, 2006; Oliver & Datta, 2019). Theta waves, which denote sleep and quiet wakefulness, begin to appear (Oliver & Datta, 2019). Stage two, colloquially referred to as light sleep, is marked by the loss of conscious awareness, (Fuller et al., 2006; Oliver & Datta, 2019). In this stage, brain wave activity slows. Stage three, known as slow-wave sleep or deep sleep, refers to a state of deep relaxation with the lowest brain, muscle, and heart rate activity. Delta brain waves, which represent a deeply relaxed state, are more prominent in this stage. Earlier understandings of sleep architecture included a fourth stage, but this stage was recently subsumed into stage three (Oliver & Datta, 2019). By contrast, REM sleep is characterized by intense brain activity, rapid breathing, and increases in heart rate and blood pressure not unlike those seen during a wakeful state (Oliver & Datta, 2019). Dreaming is more commonly associated with REM sleep (Colten & Altevogt, 2006), but it can occur in NREM sleep as well (Torterolo et al., 2019).

In the scholarly literature, *sleep disturbance* is an ambiguous term used to refer to poor quality of sleep or to several problems that arise at any point in the sleep cycle. In terms of self-report measures, the term has been used to refer to a range of specific and regular disruptions in sleep, such as difficulty falling asleep or initiating sleep (e.g., Adams & McWilliams, 2015), and to specific sleep-related impairment in functioning, such as excessive daytime sleepiness (e.g., Foley et al., 2007). *Sleep disturbance* has also been used to refer to scores on continuous self-report measures of sleep (e.g., the Pittsburgh Sleep Quality Index; Chan et al., 2017; Lu et al., 2015) that exceed a predetermined cut-off. Objective measures, such as actigraphy (i.e., the measurement of motor activity recorded by a wrist-mounted device throughout the day and night) and polysomnographic recordings (i.e., the measurement of physical activity during sleep

using surface electrodes), have also been used to assess sleep quality and disturbances (e.g., Haynes et al., 2012; Sloan et al., 2007).

When individuals have a chronic sleep disturbance and impaired functioning, they can meet diagnostic criteria for insomnia disorder (American Psychiatric Association, 2022). Insomnia disorder is a clinical diagnosis characterized by a predominant dissatisfaction with sleep quantity or quality, including difficulty initiating sleep, difficulty maintaining sleep, and/or early-morning awakenings without the ability to resume sleep. Importantly, this disturbance causes significant distress or impairment in functioning, and it occurs at least three nights per week for, at least, three months, in spite of adequate opportunity for sleep. Further, this disturbance cannot be attributed to substances (e.g., substance misuse) or occur exclusively during the course of another sleep-wake disorder (e.g., narcolepsy). While insomnia disorder can only be diagnosed by a professional, the presence of "insomnia" is often identified in the scholarly literature by scores on self-report measures of sleep, such as the Insomnia Severity Index (e.g., Gellis et al., 2014). In order to synthesize the literature on adult attachment and sleep in a comprehensive manner, research on all of these sleep variables has been considered in this document. The full range of sleep impairment from acute to chronic disturbances will be referred to using the broad term *sleep disturbance* except when discussing the specific theoretical models of insomnia because many have been named as such.

To study sleep disturbances at the individual level, there are several sleep variables that are often measured. A few have been mentioned and defined already (e.g., sleep architecture, REM and NREM sleep). Aside from these, sleep research also tends to measure sleep-wake times, sleep onset latency, and sleep efficiency. Sleep-wake times are times at which individuals usually go to bed and wake up. Sleep onset latency refers to the amount of time it takes for a person to initiate sleep (McNamara et al., 2011). Sleep efficiency refers to the percentage of time spent awake relative to the amount of time spent in bed.

At the partner level, *sleep concordance* has recently garnered attention. Broadly, sleep concordance refers to couples' (i.e., bedpartners) degree of similarity in sleep-wake patterns. However, sleep concordance has been defined and measured differently by researchers. Elsey et al. (2018) defined sleep concordance as the couples' time spent in bed together out of the total time spent in bed by at least one partner. This was converted into a percentage. Chen (2018) explored *couple-level sleep*, defined as couples' sleeping and waking patterns that result from

implicit and explicit negotiation between the couple. To measure this, partners' sleep and wake times were collected to assess differences in bed and wake times. This information was used to create categories of sleep concordance (e.g., same bedtime, one hour difference, more than one hour difference). Lee et al. (2018) explored a similar variable, *sleep covariation*, by collecting retrospective reports of sleep times from couples. Gunn et al. (2015) and Walters et al. (2020) used a different method to assess a variable similar to sleep concordance. Both studies collected sleep data using actigraphy and determined the period of time that at least one member of the couple was intending to sleep. During this period, each 60-second epoch was coded to represent whether the couple's activity was concordant (awake or asleep together), or discordant (one person awake and the other asleep). The number of concordant epochs was divided by the number of total epochs to compute a variable known as *sleep-wake concordance*. Drews et al. (2017) also used actigraphy to explore what they referred to as *co-sleeping synchronicity*. Similarly, Meadows et al. (2009) used actigraphy to explore couples' sleep-wake cycles as they co-slept. They referred to this variable as an interdependence of *couples' rest-wake cycles*.

There is a great deal of inconsistency in the labels used to describe co-sleep variables and in the methods used to measure them. Nonetheless, each of the studies described above explored similar variables (i.e., either the degree of synchrony between bedpartners' sleep-wake times, overlap in partners' sleep throughout the night, or both). This line of research is necessary as co-sleeping can affect health. For example, Chen (2018) found that greater differences in wake-up times (e.g., 1 hour) among older couples were associated with shorter sleep durations, and differences in bedtimes were positively associated with self-reported psychological distress. Elsey et al. (2018) found that sleep concordance was positively related to sleep quality. In a different study, sleep-wake concordance was found to be unrelated to sleep quality, but it was positively related to relationship satisfaction in some individuals (Gunn et al., 2015). Findings on the impact of co-sleeping on sleep disturbances are discussed in further detail in Chapter 4.

1.3 Theoretical Concepts and Models of Insomnia

Clinically relevant and comprehensive models of insomnia have been presented over the past thirty years to better understand the etiology of insomnia and inform treatment. However, there is no universally accepted model of insomnia (Levenson et al., 2015). The current state of the literature on integrated theoretical models of sleep disturbances is reviewed in this section. The purpose of this review is to: (a) highlight the variables and processes that are thought to play

a role in the development of sleep disturbances, and (b) evaluate whether or not variables central to the current investigation, attachment and partner influences, have been incorporated in theoretical models of insomnia. This section starts with a review on pre-sleep hyperarousal as it represents a building block of contemporary understandings of sleep disturbances. This review is followed by a summary of seven theoretical models of sleep disturbance. These models of describe factors causing and maintaining sleep disturbances. Since these models are not the primary focus of the current research, each of them is presented succinctly.

1.3.1 Cognitive Hyperarousal

Initiating sleep is a process characterized by a gradual decrease in control of mental activity (Freedman & Sattler, 1982). Failure to do this results in difficulty falling and staying asleep (e.g., Harvey, 2000; Palagini et al., 2017, 2018; Yang et al., 2010). An enhanced basal level of arousal or an inability to downregulate cognitive arousal is known as *hyperarousal* (Wuyts et al., 2012). According to Wuyts et al. (2012), hyperarousal can be expressed somatically (e.g., increased heart rate), cortically (e.g., high frequency EEG during sleep), or cognitively (e.g., worry). These are described further in the summarizing remarks of this chapter. In the sleep literature, *cognitive hyperarousal* tends to be given more attention in the development and maintenance of sleep disturbances than somatic or cortical hyperarousal. Research using both physiological (e.g., Freedman, 1986) and self-report (Lichstein & Rosenthal, 1980) means of data collection have highlighted increased cognitive activity as a strong correlate of sleep disturbance. Harvey (2000) sought to distinguish the habits of individuals diagnosed with insomnia and those without insomnia. She found that individuals with insomnia had increased and longer pre-sleep cognitive arousal relative to those without sleep disturbance. This cognitive arousal consisted of rumination about worries and problems, how to fix them, and attunement to noises in the environment. *Cognitive hyperarousal* can refer to increased cognitive arousal or trait predisposition (i.e., arousability; e.g., Pavlova et al., 2001). *Cognitive hyperarousal* is devoid of emotional arousal and it arises specifically when trying to initiate an activity such as sleep (e.g., Wuyts et al., 2012). Trait predisposition refers to cognitive hyperarousal that occurs consistently during wakefulness to an extent that cannot be downregulated when necessary. Both pre-sleep cognitive hyperarousal and trait predisposition to cognitive hyperarousal have been implicated in sleep disturbances (Hantsoo et al., 2013). Researchers have also explored whether certain activities lead to pre-sleep cognitive

hyperarousal. Yang et al. (2010) found that sleep-irrelevant activities in bed, such as watching television, having unpleasant conversations prior to sleep, and pondering unresolved matters while lying in bed, were greater among participants with sleep disturbances compared to healthy sleepers.

Ong et al. (2012) suggested a second process of hyperarousal known as metacognitive arousal. In this second level, attention and emotional bias are directed towards the sleep-related thoughts, the degree of attachment to those thoughts, and their meaning. Metacognitive activity about sleep includes beliefs about sleep disturbances as well as the perceived control of intrusive thoughts about sleep (e.g., believing that sleep cannot be initiated if one is thinking in bed; Waine et al., 2009). Metacognitions and thought control strategies, such as aggressive suppression (e.g., "I get angry with myself for having this thought"), have been positively associated with sleep disturbances (Ree et al., 2005; Sella et al., 2019). Pre-sleep cognitive hyperarousal and sleep disturbances are virtually inseparable, as seen in the next section on theoretical models of insomnia.

1.3.2 Stimulus Control Model

The Stimulus Control Model, proposed by Bootzin (1972), is based on principles of classical conditioning. When a stimulus is frequently paired with a response, the stimulus is likely to elicit that response consistently (i.e., stimulus control is observed). Conversely, when a stimulus is consistently paired with a variety of responses, it is unlikely that the stimulus will elicit only one response. In the case of insomnia, sleep fails to come under stimulus control of the bedroom environment (i.e., associations between the bedroom and sleepiness are not made). Stimuli that are incompatible with sleep (e.g., lying awake in bed or watching television in bed) are thought to have been paired with the bedroom environment. According to the model, stimulating or arousing activities in the bedroom environment disrupt the association between sleepiness and the sleep environment, which make it much more challenging to initiate and maintain sleep. To achieve stimulus control, the environment is structured to facilitate the target response of sleep by eliminating competing responses. An example of this might be to re-establish and strengthen the association between the bedroom and sleepiness by eliminating arousing activities.

1.3.3 3P Model of Insomnia

The prominent 3P Model of Insomnia, proposed by Spielman and Glovinsky (1991) focuses on three broad categories of variables that play a role in the development of insomnia. These include predisposing characteristics (e.g., ruminative tendencies, hyperreactivity), precipitating factors (e.g., life stress), and perpetuating factors (e.g., maladaptive coping strategies such as irregular sleep scheduling and excessive time in bed). According to this model, predisposing characteristics interact with precipitating factors to produce an episode of sleeplessness. Perpetuating factors can elongate the experience of sleeplessness, ultimately producing insomnia (Perlis et al., 1997; Spielman & Glovinsky, 1991). Furthermore, increased cognitive activation (i.e., cognitive hyperarousal) can become associated with the bed and the bedroom environment (i.e., conditioned arousal, also known as the stimulus control theory; Bootzin, 1972), which ultimately exacerbates and perpetuates the sleep disturbance. This model was one of the first widely accepted models that proposed how premorbid sleep disturbances evolved into clinical insomnia. The model underscored the role of perpetuating factors, maladaptive sleep practices, as a behavioural intervention target. Contemporary treatments of sleep disturbances continue to use the 3P Model of Insomnia to inform clinical treatment (e.g., Ellis, 2019).

1.3.4 Neurocognitive Model of Insomnia

Perlis et al. (1997) supported the idea that predisposing and perpetuating factors contribute to the development of insomnia. Building on earlier research that found individuals with insomnia tended to have high frequency EEG activity at, or around, sleep initiations, they presented a model that focused on hyperarousal. Instead of focusing on what they termed ‘mental activity’ in sleep disruptions, they focused on increased cortical arousal (i.e., arousal that could be objectively measured using EEG). According to Perlis et al. (1997), high frequency EEG activity allows for enhanced sensory processing, information processing, and the formation of long-term memory, all of which ultimately perpetuate the sleep disturbances when they occur pre-sleep. In their model, a precipitating event leads to the use of maladaptive coping strategies such as those outlined in the 3P Model of Insomnia. In turn, this form of coping leads to three forms of conditioned arousal (viz., somatic, cognitive, and cortical), which promote cognitive alterations (increases in sensory processing, information processing, and long-term memory

formation) that interfere with sleep. This model expanded on arousal as one of the biological predispositions for insomnia.

1.3.5 The Cognitive-Behavioural Model of Insomnia

Morin (1993) presented a model of insomnia that focused on the interactive roles of arousal, cognitions, maladaptive behaviours, and perceived consequences of inadequate sleep in the maintenance and development of insomnia. Arousal was specified as emotional, cognitive, and/or physiologic. Cognitions, or more specifically, dysfunctional cognitions, included catastrophizing, worry about sleep loss, rumination over consequences, and unrealistic expectations. Maladaptive behaviours included spending an excessive amount of time in bed, having an irregular sleep schedule, daytime napping, and sleep-incompatible activities. Perceived consequences of inadequate sleep, such as mood disturbance, fatigue, performance impairments, and social discomfort, were also included in this integrated model. Morin's (1993) consolidation of processes that maintain insomnia was proposed as an interactive and cyclical model of insomnia. Morin (1993) proposed that several different potential pathways in the model could account for insomnia. This cognitive-behavioural model has served as the basis for cognitive-behavioural therapy for insomnia, which has had substantial success in the clinical treatment of sleep disturbances (Davidson et al., 2019).

1.3.6 Psychobiological Model of Insomnia

Espie (2002) presented a psychobiological model of insomnia. Insomnia was presented as being the result of chronic inhibition of at least one of five core processes encompassed in this model. He proposed that sleep was maintained by five interacting subsystems: sleep-stimulus control, sleep-related physiological de-arousal, sleep-related cognitive de-arousal, daytime facilitation of night-time sleep, and automaticity/plasticity. Sleep-related stimulus control (Bootzin, 1972), presented earlier on in this chapter, refers to sleep coming under stimulus control of the bedroom environment (i.e., forming associations between the bedroom and sleepiness) and the absence of stimuli incompatible with sleep. Failure to come under stimulus control eventually creates associations (i.e., conditioning) between the bedroom environment and being unable to sleep, which perpetuates insomnia. Sleep-related physiological and cognitive de-arousal refer to the internal processes of downregulating arousal physiologically and cognitively, both of which are necessary for sleep. Similar to Morin (1993), Espie (2002) considered the importance of emotion regulation in downregulating physiological and cognitive arousal pre-

sleep. Daytime facilitation of night-time sleep refers to the role of daytime attitudes and behaviours that facilitate sleep. A healthy example of this would be to put less pressure on sleep to compensate for excessive daytime work pressure. According to Espie (2002), these four subsystems each interact with a fifth factor labelled automaticity and plasticity. Automaticity refers to the involuntary nature of the sleep schedule, the conditioned associations that are part of coming under stimulus control, and the expectations and assumptions about sleep continuity and sleep quality. Plasticity refers to the sleep-wake system's ability to readjust and recover following variability in waking life. Processes subsumed by this fifth factor include homeostasis, the circadian cycle, and sleep quality.

1.3.7 Pathophysiological Model of Insomnia

Based on several existing models of sleep, Levenson et al. (2015) proposed a model of the pathophysiology of insomnia. This model presented insomnia as developing from a sequence of events that begin with a genetic vulnerability, such as family history of insomnia. A precipitating event or other person-specific factor (e.g., age, medications) moderates the association between this genetic vulnerability and subsequent abnormalities in neurobiological processes (e.g., reduced cortical neurotransmitter GABA). These neurobiological abnormalities interact with both neurophysiologic hyperarousal (e.g., increased cognitive activity) and psychological/behavioural processes (e.g., increased worry, increased attention to sleep-related threat cues). This interactive process, which is central in the model, ultimately leads to the development of insomnia and other adverse health outcomes. Similar to earlier models of insomnia, heightened pre-sleep cognitive processes, such as attention, hyperarousal, and worry, and sleep-related behaviours were presented as important. Unlike these earlier models, they emphasized the importance of genetic vulnerabilities and neurobiological factors in insomnia.

1.3.8 Integrated Theoretical Model of Insomnia

Hughes et al. (2018) put forth one of the most comprehensive theoretical models of insomnia to better understand the etiology of insomnia in military veterans. Most importantly, the model acknowledged the influences of socio-demographic factors (e.g., age), early-life social factors and health status, stressful events, primary (e.g., self-reliance) and secondary (e.g., coping self-efficacy) appraisal mechanisms, social support, coping style, reactive coping efforts, healthcare utilization and accessibility, and behavioural responses (e.g., irregular sleep scheduling, increased alcohol or caffeine intake). This model expanded on existing

understandings of insomnia and presented several different pathways that lead to insomnia. For example, early-life social factors, such as stress reactivity, and the onset of a stressful event, could lead to primary and secondary appraisal mechanisms that do not regulate stress effectively (e.g., denial, social withdrawal). This lack of healthy regulation could lead to behavioural responses that undermine sleep, such as increased alcohol or caffeine intake. Eventually, the development of insomnia ensues. Aside from insomnia, the pathways that lead to insomnia also result in functional impairments and poor health that perpetuate the cycle. Hughes et al.'s (2018) model acknowledged the importance of non-cognitive psychological factors. Several psychological concepts of this model, including early-life social factors, secondary appraisals (e.g., coping self-efficacy; Wright, Firsick, Kacmarski, & Jenkins-Guarnieri, 2017), coping style (e.g., Deniz & Işik, 2010), and stress response (Kidd et al., 2013) have been linked to sleep disturbances in earlier studies. Although the role of bedpartners in sleep disturbances was not discussed explicitly, Hughes et al. (2018) proposed that social support moderates the relationship between secondary appraisal of stressful events and coping efforts, which was depicted as a relevant pathway in the development of insomnia.

1.3.9 Summarizing Remarks

In general, these theoretical models of sleep disturbances agree on the importance of two main factors in the development of insomnia. These are pre-sleep hyperarousal and maladaptive sleep-related behaviours. With reference to sleep disturbance, maladaptive behaviours are behaviours that disrupt the natural progression, maintenance, and quality of sleep at any point in the sleep cycle. Based on the models summarized in this section, examples of maladaptive behaviours include spending excessive time in bed, failure to schedule sleep, and negative beliefs about sleep. All but one model (viz., Espie, 2002) emphasized the role of behavioural maladaptive strategies in maintaining or exacerbating sleep disturbances. Consistent with the emphasis these model place on such behaviors, contemporary treatments for sleep disturbances focus on modifying them (Dautovich et al., 2010; Ellis, 2019; Williams et al., 2013).

Each model also highlighted the role of pre-sleep hyperarousal in the development of insomnia. Hyperarousal has been defined as either an enhanced basal level of arousal or the inability to downregulate an excess of arousal that can manifest cortically, cognitively, and somatically/physiologically (Pigeon & Perlis, 2006). Cortical hyperarousal refers to increased brain activity, but it is different than cognitive arousal (Perlis et al., 1997). It is measured

objectively, typically with EEG (see Fernandez-Mendoza et al. 2016). Cognitive hyperarousal refers to thoughts that interfere with falling asleep, such as worries about sleep and the consequences of poor sleep (Pigeon & Perlis, 2006). Somatic/physiologic hyperarousal refers to somatic and physiologic indicators of increased activity such as elevated heart rate, galvanic skin response, and activation of the hypothalamic pituitary adrenal (HPA) axis (Pigeon & Perlis, 2006). All theoretical models of insomnia depicted the importance of pre-sleep hyperarousal in insomnia, but they varied in terms of their focus. For example, the Pathophysiological Model of Insomnia (Levenson et al., 2015) discussed hyperarousal in terms of cortical arousal and cognitive arousal (pre-sleep worry), whereas the 3P Model of Insomnia focused on cognitive arousal that occurs pre-sleep (Spielman & Glovinsky, 1991). Somatic/physiologic arousal as a disruption to sleep was discussed in only three of the models (see Espie, 2002; Morin, 1993; Perlis et al.,1997). Emotional hyperarousal, which was not considered in early definitions of hyperarousal (Pigeon & Perlis, 2006; Wuyts et al., 2012), was discussed in two models (see Espie, 2002; Morin, 1993).

One of the purposes of this review was to evaluate whether variables central to the proposed study, attachment and partner influences, have been incorporated in theoretical models of insomnia. Although cognitive processes (e.g., rumination) discussed in these theoretical models often overlap with psychological processes (e.g., anxiety, attachment insecurity), every model overlooked the influence of attachment. Barring Hughes et al.'s (2018) model, integrated theoretical models of insomnia have not addressed whether characteristics that predispose individuals towards sleep disturbances are the result of an early life event such as a disruption in the attachment to caregivers (i.e., attachment insecurity). Furthermore, several of these models and research on sleep depict sleep disturbances as an individual phenomenon. A couple of models (Hughes et al., 2018; Perlis et al., 1997) briefly discussed the influence of social factors (e.g., incompatible sleep schedules, social support in help-seeking) on symptoms of insomnia, but romantic partners or co-sleeping influences typically have not been expanded upon or included in theoretical models. Although there has been a shift towards more comprehensive understandings that are inclusive of psychological and interpersonal factors more recently (Hughes et al., 2018), there remains a need to address how early psychological experiences and interpersonal influences fit in the study of sleep disturbances. The next chapters explore how

attachment and bedpartner influences are associated with sleep disturbances and why the present investigation is necessary.

Chapter 2: Sleep Disturbances and Attachment Insecurity

2.1 A Review of Attachment Theory

Attachment theory (Bowlby, 1969, 1973, 1980) posits that infants ensure their survival by forming and maintaining emotional attachments with caregivers, primarily their parents. These attachments become the templates for adult interpersonal relationships (Mikulincer & Shaver, 2007). When caregivers are responsive, nurturing, and comforting in the formative years, it fosters a sense of stability and security that an attachment figure will be available to alleviate future distress. Ultimately, this promotes exploratory behaviour and trust in others (Bowlby, 1969, 1973, 1980). This comfort and sense of security gained from available and accessible caregivers is referred to as *attachment security*. However, if the nature of the care by attachment figures is unresponsive, inconsistent, or neglectful, individuals develop *attachment insecurity.* This involves negative mental representations of self and/or others. Attachment characteristics, such as the level of attachment security and insecurity, are thought to persist into adulthood (Cassidy, 2000; Hazan & Shaver, 1987). There has been support for the stability of attachment. Waters et al. (2000) followed individuals from infancy to late adolescence and found that a majority (i.e., 64%) retained their predominant attachment style. Using retrospective reports of attachment with parents during childhood, Mohd Hasim et al. (2018) found that individuals' childhood insecurity was positively associated with attachment to spouses in adulthood. This pattern of findings is consistent with the idea that early attachment during childhood is at least partially re-enacted in adult romantic relationships. However, other explanations are also possible (e.g., current relationships influencing perceptions of past relationships).

Self-report measures of adult attachment have been in use since the late 1980s. The first of these measures were based on the idea that there were three (e.g., Hazan & Shaver, 1987) or four (e.g. Bartholomew, 1990; Bartholomew & Horowitz, 1991) prototypic adult attachment styles that roughly corresponded to patterns of attachment observed between infants and their caregivers using the Strange Situation task (for more detail, see Ainsworth et al., 1979). Currently, adult attachment is typically conceptualized as involving two dimensions

(Bartholomew & Horowitz, 1991; Brennan et al., 1998). The two dimensions are *attachment anxiety* and *attachment avoidance. Attachment anxiety* refers to the degree of fear of rejection and abandonment. *Attachment avoidance* refers to the degree of discomfort with closeness and dependence on others. Combinations of these two dimensions can map onto the four attachment styles studied in the earlier research on adult attachment. Attachment security is the combination of low attachment anxiety and low attachment avoidance. The three attachment insecure styles are preoccupied (i.e., high anxiety and low avoidance), fearful avoidant (i.e., high anxiety and high avoidance), and dismissing avoidant (i.e., low anxiety and high avoidance).

Mikulincer and Shaver (2007) introduced a model of attachment system functioning and dynamics in adulthood. This model depicts the process of activation of the attachment system in response to a threatening event. It is characterized by three components. The first includes monitoring and appraisal of threatening events. When there is a perceived threat, proximity-seeking to an attachment figure is engaged. The second component includes monitoring and appraising the attachment figure's responsiveness, attentiveness, and availability, which are related to individual attachment differences. If there is perceived security and relief from an attachment figure, then it further reinforces attachment security. Proximity-seeking facilitates coping and the attainment of positive emotion. However, if the attachment figure is unresponsive, inattentive or unavailable during periods of distress, it disrupts coping efforts and increases the frequency and intensity of distress. This is the basis of attachment insecurity. The third component includes monitoring and appraising the feasibility of procuring proximity to manage this attachment insecurity. When there is attachment insecurity, individuals engage in secondary attachment strategies to alleviate distress (Mikulincer & Shaver, 2007).

The two secondary attachment strategies in Mikulincer and Shaver's (2007) model are hyperactivation and deactivation of the attachment system. When there is attachment insecurity and proximity-seeking is a viable option, there is likely to be hyperactivation of the attachment system. Hyperactivation is used when individuals believe that increased efforts at seeking support may be successful. Individuals high in attachment anxiety tend to rely on the use of hyperactivating strategies in romantic relationships (Cassidy & Kobak, 1988; Mikulincer & Shaver, 2007). In adulthood, these are exaggerated or intensified attempts at emotional expression that were reinforced in the formative years (Mikulincer & Shaver, 2007). High attachment anxiety can manifest as hypervigilance regarding the availability of one's romantic

partner, excessive reassurance-seeking, and intensification of negative emotions (Hazan & Shaver, 1987), such as jealousy and anger (Mikulincer & Shaver, 2003). More recently, high attachment anxiety has been found to be positively associated with the use of social media to monitor partners' activities and location (Reed et al., 2015; Reed et al., 2016). When individuals high in attachment anxiety perceive a threat to the relationship and experience hurt, they are more likely to induce guilt in their partners (Overall et al., 2014). Furthermore, these individuals interpret greater induced guilt in their partners as evidence of their partners' commitment to the relationship. These findings document the maladaptive strategies used by individuals with attachment anxiety in order to reduce their intensified fears of abandonment and rejection by romantic partners. These findings also highlight the potential for these strategies to backfire by undermining partners' relationship satisfaction (Overall et al., 2014).

According to Mikulincer and Shaver (2007), when attachment insecurity develops, but proximity-seeking is not a viable option, there is deactivation of the attachment system. Deactivation is used when individuals expect that their efforts to obtain support will not be successful. Individuals high in attachment avoidance tend to employ deactivating strategies (Mikulincer & Shaver, 2007). In theory, individuals disposed towards the use of deactivating strategies have learned to hide or suppress proximity-seeking needs because earlier efforts with primary caregivers were punished or denied. In such cases, individuals learned to expect better outcomes if signs of need and vulnerability were suppressed. Therefore, these individuals learned protective strategies that promote interpersonal distance to ultimately avoid distress caused by attachment figure unavailability. Examples of deactivating strategies include avoidant coping and compulsive self-reliance (Mikulincer & Shaver, 2003; Bowlby, 1969), and low intensities of romantic love and emotional involvement in adulthood (Feeney & Noller, 1990). In keeping with the protective instinct to maintain interpersonal distance, these individuals are less likely to initiate and maintain friendship ties (Gillath et al., 2017). Should attachment avoidant individuals begin romantic relationships, the use of deactivating strategies persists. High attachment avoidance has been associated with the provision of low levels of support to one's spouse (Barry & Lawrence, 2013), less empathic responses to partners' needs (Mikulincer et al., 2001), and lower monitoring of partners' activities (Reed et al., 2015). Furthermore, these individuals are more likely to disengage during emotionally laden interactions with spouses (Barry & Lawrence, 2013).

2.2 Attachment Insecurity and Sleep Disturbances

Several studies have investigated the hypothesis that attachment insecurity is associated with sleep disturbance. The majority of this research used self-report measures that produce continuous scores reflecting level of or sleep quality. To date, 20 studies have explored such associations, 15 of which were based only on self-report (see Table 2.1). In general, these studies have found negative associations between attachment insecurity and sleep-related variables. Studies using self-report measures suggest that attachment anxiety is positively associated with sleep disturbances. Attachment avoidance has also been positively associated with sleep disturbances, but the associations have been weaker and less consistent. For example, Kent de Grey et al. (2019) found no association between attachment avoidance and sleep quality whereas Maunder et al. (2011) found a small, negative association between attachment avoidance and sleep quality. Research using self-reports has also investigated attachment in relation to more specific sleep problems. For example, Adams and McWilliams (2015) found associations between attachment insecurity and four specific sleep disturbances (i.e., difficulty initiating sleep, difficulty staying asleep, early morning awakenings, and daytime sleepiness). Attachment insecurity has also been associated with increased self-reported cognitive arousal before bed (Palagini et al., 2018).

A few studies have examined attachment in relation to objective measures related to sleep. McNamara et al. (2011) used scores on the Attachment Questionnaire (Hazan & Shaver, 1987) and the Relationships Styles Questionnaire (Bartholomew & Horowitz, 1991) to categorize their participants into one of three attachment styles (viz., secure, anxious, and avoidant) and used overnight polysomnography (i.e., measurement of brain and physiologic functions when the individual is asleep) to record EEG activity. They found no significant differences between the three attachment-based groups in terms of total sleep time, sleep onset latency, sleep efficiency, number of nighttime arousals, arousal index, duration of sleep stages 1 through 4, or total NREM or REM sleep. However, they did find that REM sleep latency was significantly reduced in the attachment anxiety group compared to other groups. It should be noted that this study had a small sample (i.e., $n < 30$ per group), so it was underpowered for detecting relationships with small or moderate effect sizes.

Sloan et al. (2007) studied the persistence of alpha activity during sleep (i.e., the α-EEG anomaly or the alpha-delta anomaly). Since alpha brainwaves are supposed to diminish during

sleep, the persistence of alpha waves is considered an indicator of a more vigilant state or lighter sleep (Hauri & Hawkins, 1973; Martinez, Breitenbach, & Lenz, 2010). Sloan et al. (2007) found a positive association between attachment anxiety and the persistence of alpha activity during sleep. Troxel and Germain (2011) found further evidence that those high in attachment anxiety have lighter sleep. They examined the association between attachment style and sleep disturbances in a sample of military veterans with PTSD symptoms. They used EEG data and focused on beta and delta brainwaves. They found that attachment anxiety was positively associated with beta activity (another indicator of hyperarousal) during NREM sleep. Furthermore, attachment anxiety was negatively related to time spent in stages 3 and 4 during sleep. These findings suggest that the hypervigilance typical of attachment anxiety may extend into sleep. Troxel and Germain (2011) found attachment avoidance was positively associated with delta activity during NREM and REM sleep. They did not interpret this finding, but it provides some evidence that attachment avoidance might actually facilitate a deeper state of relaxation during sleep, at least amongst military veterans with PTSD symptoms.

Most of the research on attachment and sleep disturbances has used self-report measures that only assess sleep disturbances and sleep-related variables over the week or, at most, over the past month (see Table 2.1). This research is often used to suggest attachment is related to sleep disturbance. To date, only one study on attachment has explored insomnia disorder as defined by the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5-TR*; American Psychiatric Association., 2022). Palagini et al. (2018) recruited 64 participants who met diagnostic criteria for *insomnia disorder* following psychiatric interviews and compared them to 38 healthy controls. Palagini et al. (2018) used the Attachment Style Questionnaire to assess attachment insecurity. Attachment insecurity subscales included "preoccupied," "fearful," "avoidant," and "dismissing," which were merged into the broader category of attachment insecurity. Palagini et al.'s (2018) findings indicated what studies on acute sleep disturbances suggested, that individuals with attachment insecurity have significantly greater insomnia than healthy controls. As well, among individuals with insomnia disorder, attachment insecurity was positively correlated with pre-sleep cognitive arousal. More research exploring attachment and *insomnia disorder* is warranted to corroborate these findings.

Studies on attachment and sleep raise an important question: Why does the association between attachment insecurity and sleep disturbances emerge? The authors of past studies of

these associations generally suggest some characteristics of those with attachment insecurity make them prone to sleep difficulties. These have included difficulties with emotion regulation (McNamara et al., 2011), general hypervigilance or reactivity stemming from earlier adverse experiences (Diamond et al., 2008; Sloan et al., 2007), cognitive hyperarousal (e.g., worry) related to romantic partners (Carmichael & Reis, 2005; Elsey et al., 2018; Troxel & Germain, 2011), general cognitive hyperarousal (Verdecias et al., 2009), negative emotions and non-specific distress (Belfiore & Pietrowsky, 2017), or a complex interplay between factors such as emotion dysregulation and hyperarousal (Palagini et al., 2018). However, the majority of researchers generally have not investigated these mechanisms directly or provided details about such potential mechanisms.

There are similarities between cognitive hyperarousal and the internal working models of attachment insecurity. Individuals with an anxious attachment are predisposed to emotional dysregulation (Lanciano et al., 2012; Palagini et al., 2018), heightened emotionality (Ognibene & Collins, 1998), and metacognitions, such as positive beliefs about worrying (Myers & Wells, 2015). Explanations about why attachment avoidance might be related to sleep disturbances have been tougher to posit given the inconsistent findings (see Table 2.1). Similar to attachment anxiety, attachment avoidance has been found to correlate positively with dysfunctional rumination (Lanciano et al., 2012), and it is possible that this is occurs to a weaker extent than what is observed with attachment anxiety.

The current program of research is most closely aligned with past research emphasizing emotional regulation difficulties. Attachment theory and related research suggests that healthy development of emotional regulation skills occurs in the context of proximity to and protection from an available attachment figure. A dysregulation of emotion is seen when internal proximity-seeking processes are either intensified to fulfill the need for more attention, protection, and support from attachment figures (i.e., hyperactivation; typically seen in individuals with high attachment anxiety) or downplayed to deny the need for these attachment needs (i.e., deactivation; typically seen in individuals with high attachment avoidance; Mikulincer & Shaver, 2007).

Numerous studies have found attachment anxiety to be positively associated with sleep disturbance. The authors of such studies have often suggested that characteristics resembling the hyperactivation of the attachment system (e.g., pre-sleep cognitive hyperarousal) might be the

mechanism responsible for the association, but they have not proposed a mechanism that includes specific mediators in general. For example, Sloan et al. (2007) found a positive association between attachment insecurity and the percentage of α-EEG during sleep, a biomarker of unusual arousal during sleep. They suggested that the hypervigilance, anxiety, and difficulties with being soothed characteristic of attachment anxiety explained this finding, but these were not formally tested.

Findings indicate that attachment avoidance and sleep may be either weakly related to sleep disturbances (e.g., Maunder et al., 2011) or unrelated to sleep disturbances (e.g., Kent de Grey et al., 2019). In theory, the deactivation characteristic of attachment avoidance could be protective for sleep (Troxel & Germain, 2011). Carmichael and Reis (2005) also noted that an association between attachment avoidance and sleep quality emerged, but it was nullified when confounding variables (attachment anxiety, depression) were entered into their analysis model. It may be that attachment avoidance is weakly related to sleep disturbances, but other stressors predict sleep disturbances more strongly. It might also be the case that attachment avoidance is generally unrelated to sleep disturbances unless a stressor provokes poor emotion regulatory strategies that negatively impact sleep, though this hypothesis has not been explored.

Theoretical models of sleep disturbances suggest that maladaptive cognitions (e.g., rumination) and pre-sleep hyperarousal are particularly disruptive for sleep. These variables can be conceptualized as reflecting sleep-related regulation difficulties that may be related to attachment insecurity. Although researchers have found emotional and cognitive dysregulation to be associated with sleep disturbances, only recently has attachment been included in this line of research (Palagini et al., 2018). Palagini et al. (2018) found that individuals with chronic sleep disturbances tended to have greater attachment insecurity. Furthermore, this attachment insecurity was related to pre-sleep hyperarousal and emotion dysregulation. However, it remains unknown how attachment insecure individuals currently attempt to regulate pre-sleep emotional or cognitive activations. Theoretical models of insomnia posit several sleep-related compensatory behaviours (e.g., staying in bed when unable to sleep, improper sleep scheduling) play a role in the development of insomnia, but variables such as these have not been investigated as potential mediators of the association between attachment and sleep. Furthermore, it is unknown how individuals might affect or be affected by bedpartners in their attempts to regulate this activation. The current investigation will add to the literature by

exploring whether attachment insecurity predisposes individuals towards ineffective, sleep-related regulatory strategies that could explain the association between attachment insecurity and sleep disturbances.

2.3 Covariates for Attachment and Sleep Research

To isolate the unique contribution of attachment insecurity on sleep disturbance, it is important to consider the role of well-established predictors of sleep that may also be related to attachment security (i.e., potential confounds). Research regarding two such variables (i.e., variables with strong relationships with attachment and sleep) is reviewed in this subsection, followed by a review of one demographic variable (viz., age) with a well-established association to sleep.

2.3.1 Health

The activation of the attachment system is meant to be protective, but attachment insecurity predisposes individuals towards maladaptive emotion and distress regulation, as well as distorted perceptions of support from others (Pietromonaco et al., 2015). Attachment insecurity has been found to predict heightened experimentally-induced physiological stress responses (Powers et al., 2006). It has been proposed that when these stress responses are consistent and prolonged, they can undermine health (Pietromonaco et al., 2015). Several studies have explored relationships between individual differences in attachment and health-related variables. Attachment insecurity has been found to be associated with a wide range of health outcomes, including, but not limited to, chronic pain, ulcers, stroke, and high blood pressure (McWilliams & Bailey, 2010). While the majority of the scholarly work has been cross-sectional, a couple of longitudinal studies have found attachment insecurity to predict physical illnesses (e.g., Puig, Engund, Simpson, & Collins, 2013) and compromised immune function (Picardi et al., 2013). As well, individual differences in attachment have been found to be associated with responses to physical symptoms, such as catastrophizing in response to pain (e.g., McWilliams & Holmberg, 2010), and treatment seeking and participation (Adams, Wrath, & Meng, 2018).

Health is also implicated in the study of sleep. Sutton, Moldofsky, and Badley (2001) reported that allergies, circulatory disease, diabetes, digestive disease, migraine, respiratory disease, rheumatic disorders, pain, and dissatisfaction with one's health were each associated with sleep disturbance. When these health-related variables were entered in a multivariate

analysis model including non-health variables (e.g., age, work status, physical activity), all but diabetes retained statistical significant, suggesting that each of these were robust predictors of sleep disturbance. Sivertsen et al. (2014) found support for this association in the opposite direction. They tested whether insomnia disorder (as defined by the *DSM-IV*) predicted the onset of health conditions 11 years later after first collecting baseline data on physical health, mental health, and sociodemographic variables. They found that insomnia was a considerable risk factor for the onset of arthrosis, asthma, fibromyalgia, headache, hypertension, myocardial infarction, osteoporosis, rheumatoid arthritis, and whiplash, even after adjusting for the effects of mental health and sociodemographic variables. Reportedly, the effects were strongest for fibromyalgia, osteoporosis, and rheumatoid arthritis. Therefore, health and sleep are highly connected bidirectionally, and it is fair to assert that either could predict the other depending on the circumstances.

Given that health is implicated in sleep disturbance, the inclusion of health status as a confound is warranted in the study of attachment and sleep. However, this area of research (see Table 2.1) has either neglected pre-existing health conditions as a confounding variable in studies of attachment and sleep or sleep related variables (e.g., Xie et al., 2022; Haydon et al., 2021; Reed & Rufino, 2019; Escolas et al., 2013; Sloan et al., 2009; Carmichael & Reis, 2005; Elsey et al. 2018), used an exclusion criterion for pre-existing health conditions for the recruitment of research participants that was too narrow to account for the wide range of health conditions (e.g., Gunn et al., 2015; Kent de Grey et al., 2019; McNamara et al., 2011; Palagini et al., 2018), or collected and reported health data without using it as a confounding variable (e.g., Verdecias et al., 2009). Therefore, the current investigation tests whether the association between attachment and sleep withstands the inclusion of this powerful confounding variable.

2.3.2 Depression

Sleep disturbances are so closely related to depression that it is a diagnostic criterion for major depressive disorder and persistent depressive disorder according to the *DSM-5-TR* (American Psychiatric Association, 2022). Given that depression and sleep have been researched extensively (e.g., Alvaro, Roberts, & Harris, 2013; Fang, Tu, Sheng, & Shao, 2019), and depression is not a focus of the current investigation, this section will briefly highlight why depression is an important variable to include in analyses of attachment and sleep.

Zheng et al. (2020) conducted a meta-analysis of 64 research articles to determine the strength of correlations between attachment anxiety and avoidance each with depressive symptoms. They reported that attachment anxiety was strongly related to depressive symptoms and attachment avoidance was weakly related to depressive symptoms. Attachment insecurity has also been found to predict depression symptoms at a later point in time, even after controlling for baseline depressive symptoms. Whiffen (2005) explored whether romantic partners' attachment insecurity predicted their own depressive symptoms. She found a significant predictive effect for husbands' baseline attachment insecurity on their own depressive symptoms over time, but this was not replicated among their wives. Indeed, Zheng et al. (2020) found that the correlation between attachment anxiety and depressive symptoms tended to decrease as the number of females among research samples increased. Whiffen (2005) hypothesized that women with attachment insecurity to their husbands tended to meet their attachment needs elsewhere, whereas husbands tended to have relatively limited emotional connections. In a different study of university students' attachment and depressive symptoms, Jinyao et al. (2012) found that attachment insecurity interacted with stressful general, academic, or social hassles to predict depressive symptoms. When participants were high in attachment anxiety and high in their report of hassles, they experienced greater depressive symptoms compared to counterparts with low report of hassles. Zheng et al. (2020) found that age was a moderator for the association between attachment avoidance and depressive symptoms. This indicated that as participants aged, the association between attachment avoidance and depressive symptoms increased. Although the relationship between attachment and depressive symptoms may not be straightforward, it warrants inclusion in studies of attachment and sleep.

Studies on attachment, depression, and sleep in couples will be reviewed here only briefly because they are a focus of Chapter 4. Carmichael and Reis (2005) wrote about the importance of considering depression as a confounding variable in their analysis model of attachment effects on sleep among couples because they opined that the exclusion of depression in prior research was a limitation. In their study, attachment anxiety significantly predicted depression. They found that attachment anxiety, but not avoidance, predicted their own sleep difficulties even after controlling for depression, suggesting that attachment anxiety had a unique impact on sleep quality. Elsey et al. (2019) also controlled for depression in their study of attachment and sleep concordance between couples by including depression and other covariates

in a model predicting sleep quality. They compared models of attachment and sleep concordance with and without a measure of depression. Contrary to what would be expected, they determined that there was no significant association of depression with sleep quality or an impact of depression on the analysis model. Haydon and Moss (2021) utilized the actor-partner interdependence model (APIM; Cook & Kenny, 2005; Kenny et al., 2006; see Chapter 4 for further details) to investigate relationships between attachment and various indicators of sleep in a sample of couples. They controlled for depression as it was significantly correlated with sleep quality. One of their salient findings was that attachment anxiety, but not avoidance, was predictive of poor sleep quality even after controlling for depression. More recently, Xie et al. (2022) and Kent de Grey (2019) used a variable measuring depressive symptoms differently, as a possible mediator of the attachment-sleep association. Both studies found support for depression as a mediator. This brief review indicates that depression is an appropriate potential confound to include in the present investigation, though these two recent studies suggest its role in the association could be appropriate as a mediator. This issue is revisited in Chapter 8.

2.3.3 Age

A meta-analysis on the association between age and sleep found that as adults' age increased, there was a decrease in several different indicators of sleep, including time spent sleeping, sleep efficiency, percentage of slow-wave sleep (i.e., deep sleep), percentage of REM sleep, and latency of REM sleep (Ohayon et al., 2004). Indeed, this association is corroborated by more recent research. Kim et al. (2021) tested the association between sleep and age by dividing a sample of adult participants into six age groups and conducting a one-way analysis of variance to compare scores on a measure of sleep quality. They found that sleep quality tended to decrease as age increased. As individuals age, there are several physiological and psychosocial changes that take place. A review by Mander et al. (2017) outlined some of the physiological changes that might explain the decline in sleep quality observed as age increases. One of them is that the number of galanin-expressing neurons within a preoptic area of the hypothalamus decline as age increases, and this group of cells has been identified as a promoter of sleep initiation and maintenance. This occurrence can explain why sleep fragmentation, which can affect subjective sleep quality, is more likely to occur as individuals age. In light of these findings, research on associations between attachment and sleep variables would be strengthened by accounting the potential influence of age on sleep.

Chapter 3: Maladaptive Sleep-Related Behaviours

As explored in the review of theoretical models of insomnia, sleep disturbances can be caused or maintained by ineffective or maladaptive sleep-related behaviours. Scholarly investigations of sleep quality have demonstrated that certain behavioural pre-sleep practices, such as sleep scheduling, can have a considerably negative effect on sleep quality (e.g., Gellis & Lichstein, 2009; Gellis et al., 2014; Hershner & Chervin, 2014). Yet, Irish, Kline, Gunn, Buysse, and Hall (2015) argue that the role of sleep hygiene in predicting sleep disturbances is inconclusive because the direct effects of specific sleep hygiene recommendations on sleep quality are not typically explored, and the interplay between behavioural and environmental patterns is not typically considered. Furthermore, the relationship between sleep hygiene practices and attachment insecurity has not been explored. Individuals who are attachment insecure may engage in greater frequencies of compensatory coping strategies or practices that could provide temporary relief from specific (e.g., pre-sleep hyperarousal, difficulties falling asleep) or global (e.g., sleep quality, excessive daytime sleepiness) sleep disturbances at first only to ultimately exacerbate or maintain the problem. Given these unknowns about the influence of sleep hygiene on sleep, it is important to investigate what compensatory practices could be influenced by attachment and interfere with sleep. These are discussed in the next sections.

3.1 Electronic Device Use

An example of a practice that is seemingly helpful for unwinding or downregulating for bed or coping with sleeplessness that can exacerbate or maintain heightened cognitive stimulation is the use of electronic devices. The popularity of handheld technological devices and social media has increased dramatically over the past decade such that a renewed exploration into the impact of technology use on sleep quality is worthwhile. As many as 90% of Americans have reported using some form of technological device in the hour before bedtime (Gradisar et al., 2013). For those under 30 years of age, use of technology was even greater (96%). The most common uses of technology were television viewing (60%), followed by cell phone use (39%),

computers/laptops (36%), electronic music devices (29%), video game consoles (8%), and e-book readers (6%).

Gellis and Lichstein (2009) found that watching television did not contribute to sleep disturbance. However, findings are different when considering whether the use of the technological device is passive or interactive, and what aspects of sleep disturbances are being explored. For example, Gradisar and Short (2013) corroborated the finding that watching television did not contribute to sleep disturbance, but this was specific to falling asleep. In general, they found that passive devices (e.g., watching television, listening to mp3 players) did not contribute to difficulties falling asleep, but interactive devices (use of computers/laptops, cell phones, and videogaming) did. Further, technology use appears to affect other facets of sleep. In the hour before bedtime, television viewing, computer use, and browsing social media or other applications on handheld devices, have also been positively associated with delayed bedtimes, delayed sleep-onset, and impaired daytime functioning (e.g., Gradisar et al., 2013; Pieters et al., 2014). Similarly, Harbard et al. (2016) observed that engagement with social media was related to delayed sleep onset. Although it is likely that the use of these devices close to bedtime disrupts sleep and its initiation because they are too cognitively hyperarousing (Gradisar & Short, 2013), some pre-sleep technology use, such as social media use, can also produce sleeplessness because it can affect mood (Hughes & Burke, 2018).

Technology used throughout the day may also interfere with sleep. Exelmans and Van Den Bulck (2017) explored the increasingly common practice of marathon television viewing (i.e., binge watching) in relation to sleep and found that a higher frequency of binge viewing was related to poorer sleep quality, more fatigue, and symptoms of insomnia. The mechanism by which prolonged or pre-sleep electronic device use affects sleep is through increased cognitive pre-sleep arousal that is sustained throughout the day continuously (Exelmans & Van Den Bulck, 2017; Harbard et al., 2016). These devices might also emit light that can disrupt the circadian rhythm (see Hershner & Chervin, 2014 for a review). However, this claim was refuted by Zeitzer (2015) who argued that exposure to daylight desensitizes individuals to the intensity of light emitted from electronic devices in the evening.

Another possible explanation for the effect of technology use on sleep quality is the co-occurrence of problematic behaviours. Not only can behaviours before sleep jeopardize the quality of sleep, but behaviours during sleep may be just as disruptive. Lin (2019) found that

60.6% of all participants indicated leaving their phones turned on during sleep, and 60.3% slept with their phones or placed them on the bedside table. Based on these findings, it was concluded that participants were willing to let their phones interrupt their sleep, but it is unclear what separates those who were willing to interrupt their sleep in this way from those who were not. Furthermore, individuals might delay their bedtimes to accommodate pre-sleep technology use and sleep more on weekends to compensate for this, thereby jeopardizing their sleep schedules (Brunborg et al., 2011).

There could be several reasons why individuals are predisposed to an increased use of technology to an extent that disrupts sleep, but attachment insecurity as an antecedent is a promising explanation. While the majority of the research on attachment theory explores other individuals as the target of the attachment, it is possible to form an attachment towards other species and objects. Attachments to transitional objects, such as stuffed animals, have been previously documented (e.g., Hooley & Wilson-Murphy, 2012; Keefer, Landau, Rothschild, & Sullivan, 2012). The cellular phone is a popular object in the western world to which many individuals form an attachment, with 79% of smartphone owners keeping their phones on their person at all times and considerable mobile users reporting distress upon separation (e.g., leaving their phone at home; Konok, Gigler, Bereczky, & Miklósi, 2016). Vorderer, Krömer, and Schneider's (2016) work described these behaviours as a psychological state of permanent communicative vigilance that occurs particularly through mobile phone usage. Even during social outings with others who are physically present, the majority of individuals are simultaneously accessing information from the internet (i.e., being *permanently online*) and remaining connected to individuals virtually through several forms of online communication (being *permanently connected*; Vorderer, Hefner, Reinecke, & Klimmt, 2018; Vorderer et al., 2016). This permanent vigilance bears a similarity with the hypervigilance thought to characterize attachment anxiety. Furthermore, this behaviour is driven by the desire to remain interpersonally connected, which is fundamentally an attachment-related goal.

Konok, Gigler, Bereczky, and Miklósi (2016) were the firsts to investigate mobile phone usage in connection with individual differences in attachment. This study did not find an association between attachment anxiety and attachment to mobile phones. However, one component of attachment to mobile phones, need for contact, was positively associated with attachment anxiety. Trub and Barbot (2016) obtained similar findings in their study on the

development of a measure exploring attachment to phones. Their investigation revealed a 2-factor structure consisting of *refuge*, the sensation of safety from having one's phone and feeling uncomfortable upon separation from it, and *burden,* the experience of relief upon separation from the phone and the perception that it diminishes enjoyment of the moment. As part of their efforts to evaluate the validity of their measure, Trub and Barbot (2016) correlated the factors with attachment anxiety and avoidance. They found that *refuge* was moderately and positively associated with attachment anxiety. *Burden* was positively associated with attachment avoidance, though this association was rather weak. In a different study, Morey et al. (2013) found that attachment avoidance was negatively correlated with the frequency of communication with their romantic partners via phone. This is consistent with attachment avoidant interpersonal patterns considering that frequent long-distance communication with a loved one promotes interpersonal intimacy.

These findings on technology use provide several relevant findings for the study of attachment and sleep disturbance. First, there are different types of cognitively arousing technology use that can disrupt sleep. This includes consistent technological use throughout the day, interactive devices close to bedtime, and non-interactive (e.g., watching television) devices close to bedtime. Second, individuals may be willing to let their phones interrupt their sleep, and they could be doing so to meet attachment-based needs. Although the use of technology to keep in touch with romantic partners has not been explored from an attachment perspective, it is possible that attachment insecure individuals in romantic partnerships without cohabitation allow their significant others to disrupt their sleep through their use of late-night digital communications. Therefore, electronic device use and its relation to attachment and sleep is important to explore in the present study.

3.2 Misuse of Sleep-Wake Aids and Stimulants

Sleep-wake aids are often used in an effort to regulate the sleep-wake cycle (Chong et al., 2013). However, prescription and over-the-counter medications, and recreational drugs are implicated in sleep disturbances because they can disrupt sleep architecture. Alcohol, for example, can facilitate sleep (Jefferson et al., 2005; Johnson et al., 1998; Lund et al., 2010), but in high doses, it decreases sleep latency, length of sleep, sleep continuity, and REM sleep (Stein & Friedmann, 2005). Daily alcohol use has also been associated with non-restorative sleep but not with difficulty initiating sleep (Ohayon & Bader, 2010). When frequency of use was

collected in one study, an association between alcohol use and sleep emerged (Lund et al., 2010). Alcoholic drinks per day was significantly greater in the sleep-disturbed sample than among controls. Furthermore, the sleep-disturbed group was more likely to use alcohol to induce sleep, and twice as likely to use sleep aids or over-the-counter prescription stimulants for the purposes of regulating their sleep-wake cycles compared to those healthy controls (Lund et al., 2010).

Caffeine is a widely used substance. In a large community sample, Lopez-Garcia et al. (2014) found that most their sample drank at least one cup of coffee a day. Typically, caffeine is used to enhance cognitive function (Franke et al., 2014). Its stimulating effects are often sought as a compensatory practice for poor sleep. Miller et al. (2018) found that 26.4% of adolescent individuals reported using energy drinks when they did not have enough sleep. Given that caffeine can have stimulating effects that may last into the evening, research on the effects of caffeine on sleep has been carried out. Contrary to what might be expected, caffeine consumption did not differentiate between healthy sleepers and individuals with sleep disturbances in two different studies (Jefferson et al., 2005; Lund et al., 2010). This was further corroborated by more recent research by Anderson et al. (2018). They found that individuals who reported having good quality of sleep tended to have greater daily caffeine intake on average compared to individuals who reported poor sleep quality. However, there was no statistically meaningful difference between the two groups in terms of caffeine intake.

Attachment insecurity has been found to predispose individuals towards ineffective, external coping strategies and increased substance use to regulate internal processes (see Maunder & Hunter, 2001). For example, a recent meta-analysis of studies on attachment security and substance use found a small but significant negative association between early attachment security and later problematic substance use (Fairbairn et al., 2018). More directly related to sleep, Verdecias et al. (2009) investigated attachment in relation to the use of sleep-inducing medications. They found that preoccupied attachment (i.e., high anxiety and low avoidance) was associated with the use of sleep-inducing medications. Therefore, it is possible that attachment insecurity could lead to the misuse of external sleep-wake aids. Aside from Verdecias et al. (2009), no other studies have explored the misuse of sleep-wake aids through an attachment framework. Further research is required to verify this possible relationship.

3.3 Napping

Some evidence suggests that napping is helpful for performance and alertness (Milner & Cote, 2009). However, when napping exceeds 30 minutes, it is considered poor sleep hygiene as it does not compensate for inadequate nocturnal sleep and instead exacerbates sleep disturbance. It has been suggested that napping may disrupt homeostasis by decreasing need for sleep at night (Jefferson et al., 2005). On the surface, long or frequent naps may seem like an effective solution to nocturnal sleep disturbances or daytime sleepiness. In reality, individuals who report napping 1.5 to 2 days per week more than counterparts who do not nap tended to have persistent sleep complaints (McCrae et al., 2006). More specifically, individuals who reported napping frequently (4-7 times per week) tended to have fair-to-poor sleep, shortened nighttime sleep (< 6 hours), difficulty falling asleep, difficulty staying asleep, early awakenings, waking unrefreshed, and excessive daytime sleepiness (Foley et al., 2007). The occurrence of increased napping in samples of individuals with sleep disturbances is corroborated by other research (Gellis & Lichstein, 2009; Jefferson et al., 2005; Vela-Bueno et al., 2008).

To the author's knowledge, only Verdecias et al. (2009) have explored attachment and napping in adults. They assessed napping by asking participants one question about whether or not they slept during the day. They examined napping in relation to attachment categories. Using Bartholomew and Horowitz's (1991) 4-group model of attachment styles in adulthood and the associated attachment questions, Verdecias et al. (2009) categorized participants as either secure, preoccupied, dismissing, or fearful based on individuals' highest subscale score. Participants classified as preoccupied (high anxiety and low avoidance) were found to be more likely to report daytime napping, as well as less sleep in general, independent of confounding variables (e.g., depression). The researchers speculated that individuals with a preoccupied attachment might have been napping more because of daytime sleepiness that results from nocturnal sleep disruptions, but they did not offer concrete explanations in the way of directionality. They reported that it was unclear whether this tendency to nap was a result of coping with distress or a residual effect of a greater problem (e.g., long-acting sleep medications). Verdecias et al. (2009) found a non-significant association between attachment avoidance and napping. This is contrary to what one might expect considering that napping could be used as a form of avoidance or escapism. It is important to note that Verdecias et al. (2009) did not collect data on the frequency

and duration of naps. Thus, future research on attachment insecurity and napping could be strengthened by including a more detailed assessment of napping behavior.

3.4 Late-night Eating

Sleep quality can also be affected by eating practices. Kandeger et al. (2018) found a positive association between sleep disturbances and late-night eating. However, there is very little research on late-night eating as an isolated habit, so the occurrence of late-night eating and snacking is difficult to estimate. What is currently known is that additional eating after dinnertime may cause metabolic consequences, such as exaggerated glucose and insulin responses (Knutsson et al., 2002), that ultimately desynchronize the circadian system (Gallant et al., 2014). Among individuals who are affected with compulsive late-night eating (as in night-eating syndrome; Kandeger et al., 2018), it has been reported that their average circadian rhythm is delayed by approximately 1.5 hours, and delayed circadian rhythm has been associated with sleep disturbances (Goel et al., 2009).

To date, there is an absence of scholarly research exploring the relationship between attachment style and late-night eating. Although the reasons for late-night eating can be as uncomplicated as hunger (Kroeger et al., 2019), attachment insecurity may prompt late-night eating. Attachment anxiety, but not attachment avoidance, has been positively associated with unhealthy eating behaviours, such as binge eating, emotional eating, and unhealthy food intake (Faber et al., 2018; Wilkinson et al., 2010). While there are several theories accounting for the association between attachment anxiety and eating (see Wilkinson et al., 2018), the prevailing one has been that eating represents a form of emotion regulation. When emotions are poorly managed, eating becomes a compensatory behaviour. Indeed, eating for emotional reasons has been identified as an external means of regulating affect (Hernandez-Hons & Woolley, 2012). Shakory et al. (2015) provide further support for the idea that emotion regulation difficulties could mediate the relationship between attachment insecurity and binge eating. Among bariatric surgery candidates, significant and separate indirect effects of attachment anxiety and avoidance on binge eating through emotion regulation difficulties were found. In a related study, emotional eating and the misinterpretation of emotions as hunger each mediated a positive association between attachment anxiety and body mass index (Wilkinson et al., 2018). However, it is important to note that potential relationships between individual differences in attachment and late-night eating have not been investigated.

3.5 Sleep Scheduling

The consistent scheduling of sleep and/or wake times over a 24-hour cycle is known as the sleep-wake cycle (Roehrs & Roth, 2019). Improper sleep scheduling has been shown to be a predictor of sleep disturbances (Gellis et al., 2014). As well, Jefferson et al. (2005) found that compensatory sleep practices that alter the sleep-wake cycle (e.g., sleeping in on the weekends) are more common among individuals with sleep disturbances compared to healthy controls. However, Yang et al.'s (2010) findings casted doubt on inconsistent sleep scheduling as a factor in sleep disturbances. They found that inconsistent sleep scheduling did not differ between healthy sleepers and a sleep disturbed sample. As well, another study did not find inconsistent sleep schedule factors (bedtime delay, sleeping in on the weekends) to be predictors of sleep quality (Lund et al. 2010). Therefore, findings regarding the potential impacts of sleep scheduling and compensatory sleep practices on sleep quality are mixed.

Currently, no research has directly examined relationships between attachment insecurity and either delayed bedtimes or irregular sleep-wake times. As discussed earlier, attachment insecurity is likely related to processes (e.g., pre-sleep hyperarousal; Palagini et al., 2018) and behaviours (e.g., electronic device use; late-night eating) that could disrupt the consistency of sleep schedules. Thus, it seems likely that attachment insecurity could be related to inconsistent sleep scheduling.

Chapter 4: The Impact of Co-sleeping on Sleep

To date, the scholarly work on sleep disturbances has largely ignored the potential influence of having a bedpartner. The act of co-sleeping has only recently started to grow as an area of interest. All the research studies on attachment and sleep to date are presented in Table 2.1, where it is shown that only five out of 20 studies collected data on participants' co-sleeping arrangements. Further, five out of seven studies on attachment and sleep that recruited couples collected data on co-sleeping arrangements. It is possible that co-sleeping was inferred as some studies recruited cohabitating couples (e.g., Elsey et al., 2018). However, co-sleeping arrangements are important to verify. The co-sleeping arrangement could have sleep-related benefits, such as reduced arousal (Elsey et al., 2018). Co-sleeping has also been linked to increased sleep quality both at the subjective and objective level (Drews et al., 2017).

Despite the potential for benefits from co-sleeping, research also suggests that comfortable co-sleeping is not easily achieved (Hislop, 2007). One of the earliest related studies on this topic demonstrated that sleep architecture improves when partners sleep alone instead of together (Monroe, 1969). As well, a recent poll revealed that 46% of participants desired a sleep divorce from their bedpartners (i.e., separating for the night), and 19% named their romantic bedpartners as the principal disruption in their own sleep (Schmall, 2018). The five most common complaints about co-sleeping were partners' snoring, incompatible body temperatures, different bedtimes, lack of space to stretch, and partners "hogging" the blankets. Movement among bedpartners has also been observed to cause several awakenings during the night (Meadows et al., 2009), and they appear to be more disruptive for females' sleep (Pankhurst & Horne, 1994). A more recent study found that having a partner with self-reported insomnia was disruptive to one's own sleep (Walters et al., 2020). This suggests that investigating co-sleeping is important for better understanding sleep disturbance, and it raises questions about specific co-sleeping behaviours, as well as the extent of the impact of romantic partners on each other's sleep quality. This section begins by introducing the challenges of co-sleeping since these have been understudied. This is followed by a review of the research on attachment and co-sleeping.

4.1 The Challenges of Co-sleeping with Bedpartners

Having a comfortable sleeping environment is more challenging when there are two individuals to consider. When individuals are asked to identify issues with co-sleeping, environmental factors (e.g., high temperature and lack of space) emerge as primary reasons (Schmall, 2018). Furthermore, Hislop and Arber (2003) uncovered that the bedroom can become a "battleground in which partners engage in a power struggle for sleeping rights" (p.704), such as for lighting. Individuals may differ on whether they want the blinds/shades open for sleep and bedroom scents (National Sleep Foundation, 2013), perhaps to an extent that disrupts sleep.

The Sleep Foundation recognizes the importance of a pleasant environment, such as a cool bedroom (60-67 degrees), dim lighting or darkness to maintain a healthy sleep-wake cycle, and noise reduction (Suni & Rosen, 2024). Sleep disturbances have been associated with uncomfortable sleeping environments (Gellis et al., 2014). More specifically, they have been associated with excessive noise in the bedroom and uncomfortable nighttime temperature (Gellis & Lichstein, 2009). Although achieving optimal sleeping conditions could be uncomplicated when sleeping alone, the majority of committed partners do not sleep alone (National Sleep Foundation, 2013). Thus, it is important to understand how common disagreement about sleep environment conditions between partners arise.

The primary complaint about co-sleeping among couples has been identified as partners' snoring (Schmall, 2018). Snoring is a form of sleep-related breathing disorder that occurs during sleep as a loud, harsh sound (American Academy of Sleep Medicine, 2020). It can be indicative of a more sinister sleep disorder known as obstructive sleep apnea, a sleep-disorder that causes temporary halts in breathing during sleep that can result in choking or gasping, though this is not always the case. In one study, approximately half of bedpartners sampled identified disruptions in their sleep from spouses' snoring (Virkkula et al., 2005). This disruption seems to be particularly burdensome for females (Hislop & Arber, 2003). More specifically, females living with snorers have been found to be more likely to report insomnia, morning headaches and daytime sleepiness than females living with non-snorers (Ulfberg et al., 2000). Although Blumen et al. (2012) found that noisy breathing abnormalities were not implicated in the awakening and arousal of their bedpartners, they noted that snoring could impede partners' attempts to resume sleep. This study was underpowered, and further investigations into the extent of disruption that snoring presents for respective partners remain necessary.

In terms of other bedpartner behaviours, an important partner preference to consider is how sexual activity at certain times of the evening affects sleep quality, and whether partners intentionally interrupt each other's sleep for sexual activity. This has not been investigated in depth. Informal websites recommend initiating sex with the bedpartner to achieve sleep (e.g., Krans, 2019). With regard to scientific studies, Dittami et al. (2007) found that sexual contact disrupted sleep quality in both men and women, but they did not collect data on whether sexual activity occurred immediately preceding sleep or earlier in the day. Among males, there was support for objective (i.e., actigraphy-based) decreased sleep efficiency following sexual activity. However, sexual contact appeared to affect subjective assessments of sleep quality quite favourably. Interestingly, Jankowski, Díaz-Morales, & Randler (2014) found a major evening peak of sexual activity and desire in females whereas males' peak tended to be in the morning or evening, suggesting that this could be disruptive for heterosexual couples. As a result, it is worth investigating whether sexual activity is interfering with sleep.

Lastly, parasomnias have been defined as undesirable physical or behavioural phenomena that occur related to sleep. Examples include night terrors, somnambulism, and bruxism (Wills & Garcia, 2002). These disorders are conditions that cause movement during or prior to sleep, making restful sleep challenging (Pacheco & Rehman, 2023). There is a paucity of research focused on these disruptions. Therefore, it is plausible that these conditions and awakenings could affect the bedpartner as well. A goal of the current study was to collect data on the frequency of all the possible co-sleeping challenges described in this section and, in some cases, investigate their associations with attachment where appropriate.

4.2 Research on Attachment and Sleep in Couples

In general, research on attachment and sleep has not considered the presence of a bedpartner as a factor influencing sleep or as a moderator of attachment-sleep relationships. Only a few studies have explored attachment and sleep quality using data obtained from both adult partners of romantic couples. Carmichael and Reis (2005) were the firsts to study the effects of one's own attachment on sleep for both members of married couples. Using structural equation modeling, they investigated whether attachment insecurity and depressive affect impacted sleep quality. They included depressive affect as a dependent variable to statistically adjust for its potential effect of the association between attachment and sleep quality. They found that wives' and husbands' attachment anxiety was positively predictive of their own diminished sleep

quality. There were no statistically significant associations between attachment avoidance and sleep quality. It should be noted that they did not explore simple partner effects (e.g., the effect of husband attachment on wife sleep and vice versa) as it is done in more recent research, likely because this study preceded current understandings of the interdependence between partners as it pertains to sleep. Instead, Carmichael and Reis (2005) examined interaction effects of attachment dimensions of a member of a couple (e.g., the interaction effect of wives' attachment anxiety and their attachment avoidance) on their partner's sleep, but no significant findings emerged.

Diamond et al. (2008) investigated temporary separations for travel-related reasons and their influence on sleep and stress levels (i.e., cortisol secretion) of romantic couples. Attachment insecurity affected sleep and stress levels when couples separated temporarily for travel-related reasons. Among couples with disruptions in the co-sleeping arrangement because of partners' travel plans, Diamond et al. (2008) found that the homebound partners with high attachment anxiety experienced significant increases in cortisol secretion following the separation. High attachment anxiety among the homebound partners, but not the traveling partners, was associated with greater separation-related sleep disturbances at the departure of their partners. Furthermore, when the homebound partner was high in attachment anxiety, both homebound and traveling partners showed greater day-to-day declines in sleep disturbances post-travel reunion. It is possible that separations are quite cognitively arousing or threatening for individuals with attachment anxiety, to an extent that is disruptive to sleep.

Researchers have begun to investigate sleep-wake times at the partner-level (i.e., among partners who co-sleep). As discussed in Chapter 1, when sleep-wake times are collected from bedpartners, they can be used to assess bedpartners' level of sleep concordance (e.g., Elsey et al., 2018), also termed couple-level sleep (Chen, 2018). Co-sleeping among couples has also been measured using actigraphy (Drews et al., 2017; Gunn et al., 2015; Meadows et al., 2009) and retrospective reports of time spent sleeping recently (Lee et al., 2018). Research on co-sleep variables reflecting sleep concordance is important as the majority of partners do not share the same bedtime or have concordant sleep patterns. Meadows et al. (2009) found that approximately half of the couples in their study differed significantly in their bedtimes. Chen (2018) found more dramatic findings, with only 20% of individuals sharing the same bedtime as their partners and only 11% sharing the same wake time as their partners. Percent sleep-wake

concordance has been found to be quite variable among couples, ranging anywhere from 53-88% (Gunn et al., 2015).

It is very likely that adult attachment characteristics affect sleep-wake times and co-sleeping. Desire for close physical contact in a relationship, such as in co-sleeping, can be predicted by attachment characteristics. In general, couples have been shown to perceive co-sleeping as a symbol of intimacy that promotes togetherness (Hislop, 2007). However, the desire for intimacy through physical closeness depends largely on attachment characteristics. While attachment characteristics may not explain sleep concordance entirely, there is evidence suggesting that attachment may influence sleep concordance. Elsey et al. (2018) explored relationships between individual differences in attachment and sleep quality in a sample of couples. More specifically, they examined whether relationships between sleep concordance and sleep quality were moderated by individual differences in attachment. They used the Spousal Attachment Styles Questionnaire to assess attachment security, anxiety, and avoidance (Becker et al., 1997). The only significant findings were related to the self-reports of the female participants rather than male participants. Females' attachment security was positively associated with their sleep quality. Furthermore, among females with low attachment security, there was a positive association between mean sleep concordance and sleep quality. This association was not found among females with high attachment security. Females' attachment avoidance was negatively associated with their sleep quality. Among females with high attachment avoidance, there was a positive association between mean sleep concordance and sleep quality. This association was not found among females with low attachment avoidance. These findings suggest that sleep concordance may compensate for the disruptive effects of low attachment security or high attachment avoidance on sleep quality. Overall, the findings of Elsey et al. (2019) provide further support for the hypothesis that individual differences in attachment are related to sleep quality. They also suggest these relationships may be moderated by sex.

Gunn et al. (2015) recruited 46 married couples for an investigation of attachment, marital satisfaction, and couples' sleep concordance. They found that couples' sleep-wake concordance was not associated with couples' sleep quality. However, sleep-wake concordance was positively associated with marital satisfaction. No significant findings emerged between sleep-wake concordance and attachment avoidance. Attachment anxiety was also not significantly associated with sleep-wake concordance. However, when examining this

relationship separately by sex, husbands' attachment anxiety was positively associated with sleep-wake concordance. Additionally, individuals' marital satisfaction interacted with attachment style when predicting concordant co-sleeping. When wives had higher marital satisfaction, there was no effect of husbands' attachment anxiety on sleep-wake concordance. Interestingly, when wives had low marital satisfaction, husbands' attachment anxiety was positively associated with sleep-wake concordance. It may be that when wives have lower relationship satisfaction, husbands who are anxious about the relationship might influence bedtime behaviours since attachment is characterized by a greater need for closeness.

As only two studies have explored the relationship between attachment style and sleep concordance (Elsey et al., 2018; Gunn et al., 2015), more research on attachment dimensions and their influence on sleep concordance is necessary. Competing hypotheses for both attachment anxiety and avoidance are possible. In a search for closeness, high attachment anxiety might prompt individuals to accompany their partners to bed, which could be conducive to their sleep. This would be in keeping with Elsey et al.'s (2019) findings. However, it is also possible that individuals with high attachment anxiety accompany their partners in the absence of sleepiness to prioritize their attachment need for closeness, which could be disruptive to their own sleep.

Conversely, attachment avoidance has been associated with fewer positive feelings about touching to communicate affection, such as cuddling, in romantic relationships (Chopik et al., 2014). In search for more space and alone time, attachment avoidance might predispose individuals to have different bedtimes and wake times than partners (i.e., to decrease sleep concordance), potentially and inadvertently disrupting their partners' sleep. Partners who want to minimize intimate sleep behaviours could inadvertently wake their partner up as they enter the shared space later in the night or as they leave the shared space in the morning earlier. By minimizing sleep concordance, partners might interfere with its relaxing effect on pre-sleep arousal and sleep-inducing effects for partners (Elsey et al., 2018). However, Elsey et al.'s (2018) findings did not support this idea. Based on their findings, it is more likely that even individuals with attachment avoidance benefit from co-sleeping because they are not exempt from attachment-based needs despite their motivations for self-reliance.

4.3 The APIM of Attachment on Sleep

The current program of research most closely resembles the studies described in this section. A study by Kent de Grey et al. (2019) was the first and only one of three studies to

examine individual differences in attachment and sleep disturbances within both members of couples using the APIM (Cook & Kenny, 2005; Kenny et al., 2006). This statistical method is used with data from dyads and simultaneously examines actor effects (e.g., the effect of person A's attachment on their own sleep) and partner effects (e.g., the effect of person A's attachment on partner B's sleep). It is possible to examine actor and partner effects for specific types of members of the couples (e.g., person A represents males and person B represents female members of the couples). Conversely, it is possible to examine actor and partner effects within an entire sample without categorizing participants as person A or B based on a distinguishing factor (e.g., males and females of heterosexual couples can be either person A or person B). Kent de Grey et al. (2019) found a negative actor (i.e., individual) effect of attachment anxiety on sleep. This indicated that greater attachment anxiety was associated with lower sleep quality. This is consistent with past research using samples of individuals reporting on their own attachment and sleep. They also found no significant actor effect for attachment avoidance. This is consistent with the mixed findings regarding the association between attachment avoidance and sleep.

Kent de Grey et al.'s (2019) study did not reveal any main effects of partner attachment. Interestingly, two significant actor-by-partner interactions emerged. When both romantic partners were high in attachment anxiety, each partner's attachment anxiety was positively associated with sleep. This indicated that partners tended to have better sleep quality when they were both high in attachment anxiety. Conversely, when both romantic partners were high in attachment avoidance, they both tended to have poorer sleep quality. These interaction effects are counterintuitive. Attachment insecurity is thought to dispose individuals towards characteristics and behaviours that disrupt their own sleep. Therefore, it would have been expected that this disruption extends to their bedpartners. This expectation is countered by Kent de Grey et al.'s (2019) finding that both partners sleep better when they are both high in attachment anxiety. Furthermore, the finding that greater attachment avoidance in both partners predicted poorer sleep for the two suggests that there may be a poorly understood and complex association between attachment avoidance and sleep.

More recently, Haydon and Moss (2020) investigated the link between attachment and sleep among couples. They recruited 208 couples who completed self-report measures of attachment insecurity and sleep quality. Furthermore, participants wore actigraphy monitors for a

two-week period to collect objective data of sleep quality and duration. Consistent with the literature, Haydon and Moss (2021) found that attachment anxiety was positively associated with self-reported sleep disturbance, nighttime awakenings, and nighttime movements. In their study, no significant actor-partner interactions emerged when using self-reported data on sleep quality. However, significant actor-partner interactions emerged when using sleep data collected using the actigraphy. More specifically, when partners low in avoidance had partners with high avoidance, they tended to have greater wake time after sleep onset (WASO), lower sleep efficiency, and they displayed more nighttime movements compared to when their partners were low in avoidance. Partners high in attachment anxiety had greater WASO and more nighttime movements when they had partners high in attachment avoidance compared to the participants high in attachment anxiety with partners low in avoidance. Interestingly, there was also some evidence that partners high in avoidance had fewer nighttime movements when their partners were high in avoidance compared to partners lower in avoidance. Unlike Kent de Grey et al. (2019), Haydon and Moss (2022) found no significant interaction effect between actor-partner attachment avoidance on sleep quality.

Adding to the small body of research on attachment and sleep using a sample of couples, Xie, Chin, and Feeney (2022) conducted two investigations in this area using samples of young adult couples (Study 1) and older adult couples (Study 2). In each study, they conducted an APIM of attachment insecurity on sleep quality. They then explored the mechanism of action between attachment insecurity and sleep quality. In both studies, they investigated the mediating influences of self-reported relationship-specific security and negative affect (i.e., a composite of experiences of anxiety, depressive symptoms, and stress) on attachment insecurity and sleep.

In their first study, they found significant, negative actor effects of attachment anxiety and avoidance on sleep quality. There were no significant effects of either actor attachment anxiety or actor avoidance on partner sleep quality. There was a cross-partner anxiety by avoidance interaction effect on sleep quality. More specifically, they found that individuals had relatively better quality of sleep when their partners were either low in both attachment avoidance and anxiety (i.e., “secure”) or high in both attachment anxiety and attachment avoidance (i.e., “fearful”).

In terms of indirect effects of attachment insecurity on sleep quality in the sample of young adults (Study 1), Xie et al. (2022) found support for indirect effects of attachment anxiety

on sleep quality. Negative affect and relationship-specific security each mediated the actor relationship between attachment anxiety and sleep quality. Individuals high in attachment anxiety tended to have more negative affect, which predicted poorer sleep quality. They also tended to perceive lower relationship-specific security in their relationship, which predicted their own poor sleep quality. Only negative affect mediated the association between attachment avoidance and sleep, suggesting that individuals higher in attachment avoidance tended to perceive more negative affect in general, which predicted poor sleep quality. There were no significant indirect effects of actor attachment on partner sleep mediated by either relationship-specific security or negative affect.

In their second study using older couples, Xie et al. (2022) found that actor attachment anxiety was not predictive of sleep quality, contrary to what would be expected given past research findings. However, actor and partner attachment avoidance predicted sleep quality in negative and positive directions, respectively. Their findings indicated that greater attachment avoidance was harmful to one's own sleep, but perhaps protective to partners' sleep quality. Further, an interaction effect of attachment anxiety and avoidance on sleep quality at the actor-level emerged. Actors high in attachment anxiety and avoidance (i.e., "fearful avoidance") were observed to have relatively poor quality of sleep compared to actors with other combinations of attachment dimensions (e.g., high attachment anxiety and low attachment avoidance). In terms of cross-partner interaction effects, actors high in attachment avoidance had better sleep quality when partners were low in attachment anxiety.

Analysis of indirect effects revealed that negative affect, but not relationship specific security, mediated the negative association between actor attachment anxiety and actor sleep quality. This indicated that people with higher attachment anxiety had greater negative affect, which predicted their poor sleep quality. There were no significant indirect effects of actor attachment on partner sleep mediated by relationship-specific security and negative affect.

4.4 Pre-sleep Conversations with Bedpartners

Preparing for bed with one's partner could provide an opportunity to discuss personal and relationship issues (Hislop, 2007). It is possible that the nature of these discussions could prove too stimulating and trigger sleep disruptions instead. Consistent with this idea, Gellis and Lichstein (2009) found that poor sleepers tended to report having engaged in exciting or emotionally upsetting "activities" near bedtime compared to those without sleep disturbance.

This behaviour could exacerbate, rather than mitigate, individuals' arousal levels and perhaps those of their partners. When individuals cannot sleep, they may also wake their bedpartners up to talk (Hislop & Arber, 2003). While there is evidence suggesting bedtime talk might interfere with sleep, it is also possible that some forms of communication at bedtime may improve sleep. Kane, Slatcher, Reynolds, Repetti, and Robles (2014) studied the roles of average self-disclosure of thoughts and emotions as well as deviation from average self-disclosure on sleep variables. Among wives, deviation from average self-disclosure was associated with improvements in subjective sleep quality, sleep efficiency, sleep duration, sleep onset latency, and waking after sleep onset. Among husbands, one actor effect was found. Average self-disclosure was positively associated with sleep efficiency. The study also found two partner effects. Wives' average self-disclosure was positively associated with husbands' sleep onset latency and negatively with husbands' sleep efficiency. There were no significant partner effects related to husbands' average self-disclosure. In a different study, Selcuk et al. (2017) found that partner responsiveness, the extent to which individuals feel understood and validated by partners, was negatively associated with sleep disturbances. As well, less negative partner interaction during the day has also been found to predict greater sleep efficiency for respective partners (Hasler & Troxel, 2010). Taken together, these findings suggest that the nature and manner of self-disclosure and conflict resolution could be important factors for sleep. More generally, findings suggest that pre-sleep conversation with bedpartners and its effect on sleep is a promising area of research.

Attachment insecurity is thought to undermine effective interpersonal problem-solving (e.g., Arslan et al., 2012). Individuals with attachment insecurity are more likely to use ineffective negotiation tactics, either avoiding it altogether or using dominating tactics (Shi, 2003). For example, attachment avoidance has been found to correlate strongly with a demand/withdraw communication style, a generally ineffective and possibly anxiety-producing style (Ebrahimi & Ali Kimiaei, 2014). If bedpartners engage in interpersonal problem-solving near bedtime in an ineffective way (i.e., causing increased distress and arousal), it may disrupt sleep for both partners. To date, no research has examined the impact of attachment on sleep through pre-sleep interpersonal problem-solving or conflict immediately before sleep. However, the findings of a few studies conducted with couples could be used to make the case that interpersonal difficulties may be mediators of the association between attachment insecurity and

sleep disturbances. One study of partner interactions over seven days found that less negative partner interactions during the day predicted greater sleep efficiency for each partner (Hasler & Troxel, 2010). As well, El-Sheikh et al. (2015) found that self-reports of using negotiation tactics to overcome conflict were positively associated with better sleep quality for both the negotiators and their spouses. In theory, lower levels of conflict and the use of negotiation tactics to resolve conflict would be less likely among individuals with an insecure attachment. Therefore, it is possible that attachment characteristics could disrupt sleep for both bedpartners indirectly through stimulating or stressful bedtime conversations.

4.5 Co-sleeping with Children

Having children is associated with having poorer sleep quality (Hagen et al., 2013). Only a small body of research has investigated whether attachment and/or co-sleeping may play a role in the connection between being a parent and sleep quality. There is no research examining the relationship between individual differences in attachment and being a parent. As well, the research on adult attachment styles and co-sleeping with children is very limited. Bowlby (1973) wrote about reactions of protest and despair among some children who were left at a residential nursery by their parents for various reasons. Importantly, bedtime and the nighttime elicited tearfulness among the children as isolation and darkness are conditions associated with an increased risk of danger (Bowlby, 1973). This makes it more likely that parental attachment styles characterized by proximity-seeking, such as attachment security or attachment anxiety, could predispose parents to soothe their children's nighttime awakenings by co-sleeping. One study found that among 52 mother-infant dyads, mothers of dyads classified as securely attached were more likely to soothe their infants who awakened during the nighttime sensitively and consistently relative to mothers of dyads categorized as insecurely attached (Higley & Dozier, 2009). In this study, around 25% of mothers took their babies into their own beds after a nighttime awakening at least once during the 3-night period that the dyads were studied. Although no differences were found between the attachment insecure and attachment secure dyads regarding co-sleeping with their infants, this subsample was underpowered.

Barry (2019) noted that co-sleeping with children is not fully understood and reviewed several biopsychosocial factors that could make this behaviour more likely. Some examples included cultural expectations (e.g., racially diverse populations are more likely to co-sleep) and education levels (e.g., co-sleeping mothers tend to have either low education or high education),

and, importantly, personal values (e.g., promoting closeness). In a study on co-sleeping with infants, McKenna and Volpe (2009) found that participants endorsed that co-sleeping represented a means to enhance or strengthen the connection with their infants and, in general, parents believed that co-sleeping contributed to happier, healthier emotional development in their children. Importantly, several of the respondents from dual-income families considered co-sleeping as a compensatory strategy for the promotion of attachment and bonding that work-related daytime separation from their infants jeopardized. Attachment insecurity was not a focus of this study, but it is possible that attachment predisposes individuals to compensate for time spent away from their children by co-sleeping, perhaps to the detriment of their own sleep. Regrettably, there is not much research on co-sleeping with children past infancy. Whether the available research could possibly be extrapolated to children remains to be tested.

4.6 Co-sleeping with Non-human Companions

Recently, there has been growing interest in exploring the effects of sleeping with pets in the bedroom on sleep disturbance. It has been suggested that up to 10% of households with animal companions choose to co-sleep with their pets (Smith et al., 2014). Domestic animals, and more specifically, dogs, have sleep cycles different than humans, and they remain responsive to auditory stimuli during sleep (e.g., Adams & Johnson, 1993). Furthermore, they may display behavioural issues (e.g., scratching) throughout the night that could impact pet owners' sleep (Smith et al., 2018). To understand the effects of dogs on their owners' sleep, Smith et al. (2018) recruited five human-dog dyads to gather data from sleep questionnaires, daily sleep diaries, and accelerometers (i.e., wrist watches that record humans and dogs' activity throughout sleep). The study found that dogs' nighttime activity impacted that of their pet owners. Throughout the night, dogs tended to be active for an average of 17.46% of the night, during which humans were 4.3 times more likely to be awake. Three out of five participants reported excessive daytime sleepiness and poor sleep. The results of this study suggest that co-sleeping with canine companions can be disruptive.

Smith et al. (2014) explored whether there were differences in sleep disturbances between participants who co-slept with pets and those who did not. They found that individuals who co-slept with pets had greater sleep onset latency by almost five minutes, but that it was likely not clinically meaningful. These individuals were also more likely to wake up tired and they had a greater chance of being disturbed by the pet's noises. Patel et al. (2017) also

investigated the effect of pets on human sleep, but they focused on pet dogs. They found that human sleep efficiency throughout the night was greater if the dog was in the bedroom, but not on the bed. Similarly, there was significantly less human wakefulness throughout the night when the dog was in the bedroom compared to when the dog was in the bed. To summarize the small body of literature, it appears that sharing a bedroom with a pet is often disruptive to sleep, and that amongst those with pets, it appears to be less disruptive to share the bedroom with a pet than the bed.

Research on attachment and pet ownership is very limited, but the available research suggests that companion animals have elements of attachment figures. Kurdek (2008) recruited young adults with pet dogs to investigate the extent to which dogs represented attachment figures for their owners. He did this by measuring four components: "secure base" (i.e., being able to rely on the attachment figure), "separation distress" (i.e., discomfort from prolonged period of time spent away from the attachment figure), "safe haven" (i.e., consistently obtaining comfort from the attachment figure for comfort), and "proximity maintenance" (i.e., regular contact and proximity with the attachment figure). Between mothers, fathers, sibling, best friends, significant others, and dogs, dogs were ranked lowest in all these components. However, scores for dogs were above the midpoint for each component, indicating considerable attachment. More recently, Meehan et al. (2017) corroborated findings that pets were a source of support for their owners. In their study, pets tended to be ranked low when participants were asked to rank parents, siblings, best friends, romantic partners, and pets on each of the four features of attachment, suggesting that the tendency to use relationships with pets for attachment-based needs were low overall. Pets were ranked the lowest on secure base and safe haven. Interestingly, pets as attachment figures scored higher on proximity seeking than fathers, mothers and siblings, and higher on separation distress than siblings.

Zilcha-Mano, et al. (2011) suggested that attachment insecurity with pets is similar to those seen in relationships between individuals, and they created a pet attachment questionnaire to test this. Pet attachment anxiety encompassed items that enquired about proximity- and attention-seeking with the pet and deriving self-worth from the pet's behaviours. Pet attachment avoidance included items that asked about discomfort with emotional and physical closeness to the pet. Using correlational analyses, they found that attachment anxiety was positively related to pet attachment anxiety and pet attachment avoidance. Attachment avoidance was positively

associated with pet attachment anxiety, but unrelated to pet attachment avoidance. Using a lexical decision task, Zilcha-Mano et al. (2011) also explored whether pet attachment styles were related to the type of implicit working models. They found that pet attachment avoidance was associated with slower response times for positive expectation words in pet-related sentences. Conversely, pet attachment anxiety was associated with faster response times for words about negative expectation about pet behaviour. Taken together, these findings suggest that attachment insecurity is exhibited not only with other humans, but also with pets. Given that attachment insecure behaviours (e.g., excessive proximity-seeking) can be exhibited towards pets, it is possible that attachment insecurity predisposes individuals towards co-sleeping with pets to an extent that disrupts sleep.

Chapter 5: Objectives and Goals

The aim of the current research was to obtain a more comprehensive understanding of sleep disturbances by investigating the influences of attachment insecurity (one's own and that of romantic partners) and co-sleeping on several sleep-related variables, and to identify possible mechanisms linking attachment with sleep outcomes. The overarching hypothesis is that attachment insecurity in adults makes them susceptible to engaging in ineffective sleep-related characteristics and compensatory behaviours that ultimately undermine sleep outcomes (e.g., sleep quality) for themselves and possibly that of their romantic bedpartners. These ideas are explored across two studies, outlined below.

5.1 Purpose of Study 1

The main objective of Study 1 was to explore the association between attachment dimensions and sleep quality in couples using the APIM. Kent de Grey et al. (2019), Haydon and Moss (2021), and Xie et al. (2022) are the only three studies to have considered the role of romantic partners' attachment insecurity on one another's sleep quality using the APIM. Therefore, this area of research is considerably understudied. Further, none of these studies controlled for health. The current study included a measure of actor health to determine whether APIM findings emerged despite this confounding variable. It was hypothesized that greater attachment anxiety would predict poorer sleep quality (i.e., a positive actor effect of attachment anxiety on sleep quality), even after accounting for the influence of a health variable. It was also hypothesized that greater attachment anxiety would predict poorer partner sleep quality (i.e., a positive partner effect of attachment anxiety on sleep disturbance), even after accounting for the influence of actors' health. No hypotheses were made regarding attachment avoidance due to its relatively inconsistent and weaker associations with sleep in prior research.

The second objective of Study 1 was to replicate the APIM while controlling for health status, a confounding variable that has often been ignored, as reviewed in Chapter 2. Of the three APIM studies on attachment and health to date, only Kent de Grey et al. (2019) considered the impact of health, and they addressed this using an exclusionary criterion when recruiting participants. It can be argued that their criterion was too narrow. They excluded participants with

"serious medical problems" (e.g., HIV, cancer), but it is known that medical problems that are not life-threatening also impact the quality of sleep. It can also be posited that poor health should be accounted for in the study of attachment and sleep rather than used as an exclusion criterion as doing so would help clarify the unique contribution of attachment insecurity on sleep. This is especially important since attachment insecurity and health have been linked (see Chapter 2). Additionally, results would be more generalizable to the population since health problems are quite common in North America (Statistics Canada, 2022).

Another objective of Study 1 was to explore interaction effects. Kent de Grey et al. (2019) found counterintuitive interaction effects, and they were at odds with Haydon and Moss' (2021) findings on interaction effects. The current research analyses were used to corroborate the research findings of either team by looking at partner by partner interactions of attachment dimensions (e.g., actor attachment anxiety by partner attachment avoidance) and exploring how these are related to sleep quality.

5.2 Purpose of Study 2

Study 2 had several broad objectives. The first objective was to replicate past research regarding relationships between adult attachment characteristics and sleep quality, only it also expands on previous research by exploring a variety of specific (e.g., pre-sleep hyperarousal, dysfunctional beliefs about sleep, sleep scheduling, electronic device use in bed; and sleep hygiene practices) and global indicators of sleep (e.g., sleep quality, daytime sleepiness). While some of these variables have been studied extensively in relation to attachment, some have only been studied only once or twice (e.g., sleep-wake aids; Verdecias et al. 2009). Specific hypotheses related to this objective are listed in Table 5.1.

The second objective was to determine whether the relationships between attachment and sleep variables remained after statistically accounting for known confounding variables of attachment and sleep: health and depression, discussed in Chapter 2. Of the two confounding variables, health status has been neglected in this area of research. It should be noted that this program of research is based on the premise that attachment characteristics are important influences on sleep, so it is expected that many, if not all, relationships between attachment and sleep variables will remain after statistically accounting for confounding variables. Expected associations are presented in Table 5.2.

The third objective was to identify potential mechanisms that could explain relationships between attachment insecurity and sleep disturbance. To do this, numerous maladaptive sleep-related behaviours were treated as dependent variables in regression analysis. Individual-level maladaptive sleep-related behaviours included pre-sleep cognitive arousal, pre-sleep somatic arousal, electronic device use in bed, dysfunctional beliefs about sleep, use of sleep-wake aids, frequency and duration of napping, and poor sleep hygiene (i.e., sleep environment practices, sleep scheduling, pre-sleep eating and drinking, and arousing activities). Sleep-related outcomes included sleep quality, sleep efficiency, and daytime sleepiness. Table 5.1 summarizes hypotheses that are supported by previous findings regarding these or very similar variables. Numerous variables that have not been included in past research on attachment and sleep were also explored in the current study. In general, it was hypothesized that these variables would be related to attachment insecurity. Hypotheses were also made about associations between attachment and variables that had not been studied previously, such as pre-sleep eating and drinking and electronic device use in bed. These variables are listed in Table 5.2 along with more specific hypotheses regarding their potential relationships to the attachment dimensions. Support for the aforementioned overarching hypothesis and the specific hypotheses in Table 5.2 can be found in Chapters 2 and 3.

The fourth objective was to determine whether the potential associations outlined in Tables 5.1 and 5.2 were moderated by the participants' reports of co-sleeping with a romantic partner. It is possible that the presence of a bedpartner could heighten the positive influence of attachment security on sleep. It is also possible that the presence of bedpartner could exacerbate the negative the influence of attachment insecurity on sleep. Chapter 4 outlines why this issue is important and notes that it has been ignored in past research on attachment and sleep in greater detail. The current study addressed the gap in the research on the impact of co-sleeping on sleep because it has implications for the interpretability of past empirical findings. Since this is an exploratory endeavour, no specific hypotheses are presented for co-sleeping.

The fifth objective was to build a mediational model accounting for the relationships between attachment insecurity, specific indicators of sleep, and global indicators of sleep. For a variable to have been considered a possible mediator, it must: (a) have been associated with the independent variable (i.e., an attachment variable) robustly, (b) have been associated with the dependent variable (i.e., an indicator of sleep), and (c) plausibly explained the relationship

between the independent and dependent variables. Mediators were selected based on correlation and regression findings connected to the third objective. These models were examined using structural equation modelling. The statistical significance of mediators post-hoc power analyses, and indices of model fit were evaluated to determine whether the model could explain the attachment-sleep association despite controlling for covariates in the model.

The final objective of Study 2 was to identify variables that might explain the association between actors' attachment insecurity and partners' sleep quality. Given that data was collected from individuals, rather than couples, it was not possible to conduct mediational analyses related to such relationships. However, three lines of investigation were possible: the relationships between attachment characteristics and self-reports of behaviors that might, in theory, negatively impact partners' sleep due to the shared sleep environment, including sleep scheduling discrepancies with partners and sleep environment agreement; partner behaviours that were occurring pre-sleep, such as types and frequency of pre-sleep conversations with partners (see Table 5.2 for hypotheses); and lastly, co-sleeping behaviours occurring during sleep that were unintentional (e.g., being awoken by partners' snoring, nighttime awakenings, movements during sleep, nightmares, and noises) and intentional (e.g., awakening a partner for sexual activity or to converse). Since partner-related sleep disturbances have not been studied in the context of attachment, no specific hypotheses were posited.

Chapter 6: Study 1

6.1 Study 1 Methods

Study 1 conducted secondary data analyses using data from couples collected in 2016 for a doctoral dissertation supervised by the present study's thesis advisor (Heidt, 2019).

6.1.1 Recruitment and Data Collection

The focus of the study was broadly described as relationships and health on recruitment material. Participants were recruited using flyers and advertisements distributed at a variety of public spaces (e.g., coffee shops, libraries, event boards) and through online websites across Canada (e.g., Kijiji, Craigslist, Reddit, research study websites). Participants were also recruited through Canadian universities (e.g., the University of Saskatchewan) through either a credit-based research participation program or recruitment emails distributed to psychology and psychology-related departments. An online survey tool (i.e., FluidSurveys) was used to collect the data for this study. Partners' data was then paired in the electronic database.

6.1.2 Eligibility for Participation

To be eligible to participate in this study, individuals were required to be aged 18 years or older and involved in a romantic or dating relationship of at least six months. No other exclusion criteria relating to the specifics of the dating or romantic relationship (e.g., exclusivity) were outlined.

6.1.3 Participants

A total of 184 couples completed the survey (i.e., both partners completed the relevant questionnaires), but a final sample of 173 heterosexual couples had useable data.

As previously stated, data from couples was originally collected for an investigation on the relationship between pain-related support and both attachment and pain catastrophizing variables (Heidt, 2019). Therefore, only variables that are relevant to the present study are described here. Participants were asked to provide information on demographic characteristics, sleep quality, and attachment insecurity, as well as information related to their relationship, such as the duration and relationship satisfaction.

6.1.4 Ethics and Compensation

Approval for data collection was provided by the Research Ethics Board at the University of Saskatchewan. Informed consent was obtained from all individual participants included in the study. Participants were compensated for their time with an entry into a prize draw for one of eight $100 VISA gift cards.

6.1.5 Self-report Measures

6.1.5.1 Sociodemographic Information. Participants completed a questionnaire consisting of items asking for basic demographic information. Information collected included age, highest level of education, marital status, length of current relationship, sexual orientation, primary area of employment and occupation, and ethnic background.

6.1.5.2 The Experiences in Close Relationships questionnaire – Revised (ECR-R). The ECR-R includes an 18-item attachment anxiety scale that measures worries or concerns regarding rejection or abandonment by a romantic partner (e.g., "I often worry that my partner doesn't really love me") and an 18-item avoidance scale that measures discomfort with emotional proximity to partners (e.g.,, "I prefer not to be too close to romantic partners"; Fraley et al., 2000). Participants rate each item on a 7-point Likert Scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Total scores are calculated by reverse-scoring where necessary and averaging across all relevant items per scale, where greater total scores indicate higher levels of the construct in question. This revised version of the Experiences in Close Relationships measure (Brennan et al., 1998a) shares many items with the original measure, but has been found to have slightly stronger psychometric properties (Fraley et al., 2000). Both ECR-R attachment scales have Cronbach's alphas and 3-week test-retest reliabilities that exceed .90.

6.1.5.3 Health. The RAND 36-item Short-Form health survey (SF-36; Hays et al., 1993) is a self-report measure assessing quality of life, which focuses on eight areas of health. There has been support for its convergent and discriminant validity (Sibley et al., 2005), as well as its reliability (Jenkinson et al., 1994). Specific areas measured by this survey include: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, general mental health, social functioning, energy/fatigue, and general health perceptions. For the purposes of the present study, only the general health subscale was used as a covariate for the APIM. It consists of five items (e.g., "I seem to get sick

a little easier than most people") and they are rated on a 5-point Likert scale ranging from 1 (*definitely true*) to 5 (*definitely false*), except for one item. It has been found to have appropriate internal consistency (α = .86) in a sick population (Wu et al., 2023). Once items are coded appropriately, greater scores indicate better general health.

6.1.5.4 Insomnia Severity Index (ISI). The ISI consists of seven questions about the presence and severity of particular sleep problems (Bastien et al., 2001; Morin, 1993). The questions assess issues with sleep onset, sleep maintenance, sleep dissatisfaction, early morning awakening, interference with daytime functioning, noticeability of sleep problems by others, and worries caused by sleep difficulties. However, for the purposes of this investigation, the latter two questions were excluded to maintain the measure representative of sleep difficulties only. The question on sleep dissatisfaction was modified to avoid implying the presence of insomnia and instead enquired about dissatisfaction with sleep patterns. Internal consistency was equal to $\alpha = .80$. Each item is rated on a 5-point Likert scale anchored by 0 (*none/not at all*) and 4 (*very/very much*), except for one item. Scores are summed and higher scores indicate greater sleep disturbances.

6.1.6 Statistical Analyses

This study applied the APIM to explore individual differences in attachment on sleep quality within couples. Structural equation modelling (SEM) employing maximum likelihood estimation was used to conduct the APIM. SEM has advantages over other methods of conducting the APIM. SEM is straightforward (i.e., a basic APIM has two equations, one for each of the dependent variables), it allows the estimation and testing of more than one equation simultaneously, and comparisons of the strength of the main effects between actors and partners are possible (Cook & Kenny, 2005). The data were collected and managed using SPSS v.29. SEM was performed using AMOS v.29. Webinars used to conduct the APIM via AMOS can be found here: https://davidakenny.net/webinars/listw.htm#Dyad.

6.1.6.1 Dataset Preparation. To prepare the data, they were restructured into a dyadic format (i.e., data for both partners was in one row) using an online program developed by Ledermann and Kenny (2015; found here: http://davidakenny.net/RDDD.htm). Second, missing data were screened for and imputed using the expectation maximization (EM) procedure that has been shown to have advantages over mean imputation (Ghomrawi et al., 2011). Tests of Normality. Variables were screened individually for violations to the assumption of normality.

To conduct the SEM (i.e., a model using seven predictors), multivariate outliers were identified through the mahalanobis distance using the cut-off critical value of $\chi^2(7, 173) = 24.32$ at $p = .001$. No multivariate outliers were identified.

6.1.6.2 Grand Mean Centering. When SEM is used to compute an APIM, couples are the units of analyses (i.e., the sample size is equal to the total number of couples). Mean centering is used to facilitate interpretation of coefficients. Kenny et al. (2006) advised against group-mean centering (i.e., subtracting the average score of actors from each actor's score) because group-mean centering removes the effects of the distinguishing variable across partners if there is a distinguishing variable (e.g., sex). An alternative method to facilitate the interpretation of results is grand-mean centering (Stas et al., 2018). This is when the combined mean of actors and partners is subtracted from the variable of interest. Kenny et al. (2006) suggested that grand-mean centering is appropriate when zero is not a meaningful value for predictors (e.g., an attachment anxiety score of zero is not possible or interpretable). Therefore, each attachment variable score was grand-mean centered across actors and partners.

6.1.6.3 Test of Non-independence. The APIM is based on the assumption that pairs are non-independent (i.e., each member of a couple influences the other member). Kenny et al. (2006) recommended reporting the degree of non-independence, also known as the correlation coefficient of dyad members' scores. These correlations are as follows: $r = .32$ between female and male attachment anxiety; $r = .20$ between male attachment anxiety and female attachment avoidance; $r = .34$ between female attachment anxiety and male attachment avoidance; and $r = .05$ between female and male attachment avoidance. Kenny et al. (2006) outlined a standard statistical test for determining whether the null hypothesis (i.e., the correlation coefficient equals zero) can be rejected where n accounts for dyads. Using the smallest significant correlation ($r = .20$), a one-sample t-test exceeded the critical value, $t(171) = 2.74$, suggesting that all correlations were statistically different from zero ($p < .01$) except for the correlation between female and male attachment avoidance.

6.1.6.4 Between-Dyads and Mixed Variable Covariates. Kenny et al. (2006) defined a between-dyads variable as one that differs from dyad to dyad, but not within a dyad (i.e., both members have identical scores on the variable). Several between-dyad covariates were considered when creating the APIM. Given that age has a well-established negative association with sleep quality (see Kim et al., 2021), participants' ages were initially to be included in the

model. However, analyses of extreme collinearity indicated that male and female ages were highly correlated (r = .94). In such cases, Kline (2016) suggested averaging the two variables to form a single new variable to enter into the model. This approach was adopted and age was included in the model as a between-dyads covariate. Length of romantic relationship was also considered as a covariate. Gunn et al. (2015) included length of marriage as a covariate in a study on sleep and attachment to account for potential sleep differences as a function of changes in couple-level sleep habits over time. However, length of relationship was not included as a covariate in the current study because it was not correlated with any of the outcome variables.

Mixed variables in dyadic research are those variables for which variation exists both within the dyads and between the dyads (Kenny et al., 2006). An example would be relationship satisfaction. Its inclusion in the APIM was considered because relationship satisfaction has been found to be related to sleep patterns (e.g., Gunn et al., 2015). Similar to Diamond et al.'s (2008) study on attachment in dyads, we had planned to control for relationship satisfaction by excluding participants in relationships characterized by very little satisfaction (as evidenced by a score lower than two on the same relationship satisfaction measure). However, no participants in the current study reported satisfaction levels that low.

Scores on a measure of health would be another example of a mixed variable covariate. Only paths for actor health on sleep were created as opposed to also creating paths for partner health on sleep. To the author's knowledge, no studies have been conducted on partner effects of general health on sleep quality. Therefore, there is no theoretical or empirical support for these paths. Additionally, the focus of the study was not on understanding the effect of general health on partners' sleep, though this is an interesting avenue for future research. Further, the inclusion of more paths decreases statistical power, which was already quite limited given the sample size, especially with the addition of interaction terms between attachment dimensions. The variable for health was grand-mean centered.

6.1.6.5 Distinguishability. SEM allows the predictor variables to be distinguished by a variable of interest. If members of each couple were categorized by a variable of interest as they were in the current study (e.g., heterosexual couples are distinguishable by sex), it is important to test whether this distinguishable variable is important. Kenny et al. (2006) recommended conducting a test to determine whether dyads are distinguishable by a variable of interest by comparing SEM models in which the parameters (e.g., means, correlations, variance) are fixed

across partners to models in which these parameters are freed. If the best fitting model is the one with all parameters held equal for men and women, the dyads are considered completely indistinguishable. Kenny et al. (2006) stated that couples may be indistinguishable in one set of variables but not another. Therefore, a test of distinguishability for sex was run for models of attachment anxiety variables and attachment avoidance variables separately before the final model including both sets was created (Kenny, 2013).

To evaluate the models for distinguishability, a model's fit must lie somewhere on a continuum from the null model (i.e., the worst fitting model where all possible analysis variable covariances are constrained to zero) to the saturated model (i.e., the best fitting model where all possible analysis variable means, variances, and co-variances are freely estimated; Olsen & Kenny, 2006; Peugh et al., 2013). Given that a saturated model by definition uses all available degrees of freedom and results in a chi-square fit statistic of zero, saturated models do not produce model fit statistics. Therefore, the goal is to create a parsimonious model that does not use all of the degrees of freedom (Peugh et al., 2013). Furthermore, simplifying a model by constraining effects could increase power (Kenny, 2013).

In the case of an indistinguishable model, additional steps are taken. The following parameters are fixed in the model: equal actor effects; equal partner effects; equal predictor means; equal predictor variables; equal outcome intercepts; and equal residual variances—this is also known as the interchangeable saturated model (I-SAT; Olsen & Kenny, 2006). The I-SAT model chi square and degrees of freedom are subtracted from the analysis model's (i.e., the model one is testing) chi square and degrees of freedom. This corrects for the arbitrary designation of actor and partner misfit (see Peugh et al., 2013, for more detail).

The parsimonious model for the analysis model of interest (i.e., the APIM) needed to include both attachment dimensions within the same model rather than creating separate models per attachment style. However, Kenny et al. (2006) indicated that sets of variables could differ on whether the best fitting model is indistinguishable or distinguishable. There was no evidence that distinguishability by sex was important for the set of attachment anxiety variables because the model fit was statistically non-significant. The null-hypothesis that all of the constraints fixed to equality were indeed equal was accepted (i.e., the model for attachment anxiety was indistinguishable). However, the indistinguishable model for attachment avoidance was statistically significant, suggesting that distinguishability by sex could be relevant for this model.

The null-hypothesis that all of the constraints fixed to equality were indeed equal was rejected (i.e., the model was distinguishable). As a result, partial distinguishability (i.e., use of model constraints to have equal actor effects and equal partner effects only, as opposed to constraining other parameters, such as means and variances) was recommended for the final analysis model consisting of attachment anxiety and avoidance variables (D. Kenny, personal communication, April 8, 2023). When only actor and partner effects were constrained to equality, each model's fit was appropriate, suggesting that partial distinguishability was appropriate for the final analysis model subsuming both attachment anxiety and avoidance variables. This is because partial distinguishability was appropriate for both models and complete indistinguishability (i.e., use of the six parameter constraints abovementioned) was only appropriate for one of the models.

Since age was averaged between males and females into a single variable to control for multicollinearity, it was a single variable. As a result, it could not be constrained to equality with a corresponding variable as was done for the other variables in the partially distinguishable model. Covariances between average age with each of the attachment variables could have been constrained to equality, as would be done when creating an indistinguishable model (D. Kenny, personal communication, April 5, 2023; Olsen & Kenny, 2006). However, a partially distinguishable model only constrains actor and partner effects. Unlike the age variable, there was a pair of variables for general health. Actor effects of health were constrained to equality. To evaluate the fit of the final model, model fit statistics have to be adjusted, as mentioned earlier. The I-SAT (i.e., model with equal actor effects for both members and equal partner effects for both members of the couple) has to be removed from the final analysis model (i.e., the model where actor and partner effects are equal to each other per attachment dimension). To calculate the adjusted RMSEA and TLI, equations found in Olsen and Kenny's (2006) paper were used. These computations were indeterminable. In such cases, model fit statistics cannot be computed or evaluated, but the model can be tested by determining whether actor and partner effects are different from zero (D. Kenny, personal communication, April 19th, 2023). Setting actor effects and partner effects equal to zero worsened the model (i.e., the chi square value was statistically significant). The fit of the model can be found in Table A.1 in Appendix A, which contains all supplementary tables.

6.1.6.6 Statistical Power (Post-Hoc) for APIM. To conduct a power analysis of the APIM, a calculator designed by Ackerman and Kenny (2016) was used: https://robert-a-ackerman.shinyapps.io/apimpower/. Standardized beta coefficients of the APIM without interactions and including all covariates were used. Power was .90 to detect the actor effect of attachment anxiety and power was .58 to detect the partner effect of attachment anxiety at a statistical significance level of .05 with 173 couples.

6.1.6.7 Interaction Terms. Interaction terms were computed by forming four products: Male attachment avoidance by female attachment avoidance; male attachment anxiety by female attachment anxiety; male attachment avoidance by female attachment anxiety; and male attachment anxiety by female attachment avoidance. Since the model was indistinguishable in terms of sex, these variables could not be entered into the model freely (Garcia et al., 2015). To maintain partial distinguishability in the model after their addition, equality constrains were placed (D. Kenny, personal communication, April 28 2023). Attachment avoidance was treated as the moderating variable, though this was an arbitrary choice (Garcia et al., 2015). With this in mind, the effect of female attachment anxiety by male attachment avoidance (moderator) on female sleep and the effect of male attachment anxiety by female attachment avoidance (moderator) on male sleep were treated as actor effects constrained to equality. The effect of female attachment anxiety by male attachment avoidance (moderator) on male sleep, and the effect of male attachment anxiety and female attachment avoidance (moderator) on female sleep, were treated as partner effects, which were also constrained to equality.

Interaction terms within the same attachment dimension were constrained to equality to determine the effects of the same attachment dimension across partners on sleep regardless of sex. The effects of male avoidance by female avoidance on male sleep and female sleep were constrained to equality. The effects of male attachment anxiety and female attachment anxiety on female and male sleep were constrained to equality.

6.2 Study 1 Results

6.2.1 Sociodemographic Characteristics

The average age of the women was 27.3 years (*SD* = 8.7), ranging from 18 to 63 years. The majority of these women were White (83.2%) and the remaining 16.8% belonged to a racialized group. The average age of the men was 26 years (*SD* = 9.6), ranging from 18 to 68. The majority of these men were White (82.1%) and the remaining 16.9% belonged to a minority

group. The majority of both women (93.1%) and men (88.4%) reported having received some form education past high school. The average length of relationship was 5.24 years and the average length of cohabitation was 1.40 years. Average scores for general health were $M = 66.2$ ($SD = 19.8$) for women and $M = 70.4$ ($SD = 18.3$) for men. These are somewhat aligned with what has been typically seen among Canadian women ($M = 77.9$, $SD = 15.5$) and men ($M = 80.1$, $SD = 16.6$) in the same age range (Hopman et al., 2000). For more details on the current study's sample characteristics, refer to Table 6.1. Correlations between key variables both within each sex (e.g., female age and male age) and across sex (e.g., male age and female sleep quality) are reported in Table A.2.

6.2.2 APIM

Results showing the main effects of attachment orientation on sleep quality are shown in the top portion of Table 6.2. Values of the APIM with actor *and* partner effects per attachment dimension constrained to equality can be found in Table A.3.

Model fit of the APIM (without the health covariate) where actor effects were constrained to equality and partner effects were constrained to equality (i.e., the I-SAT) was not statistically significant, $\chi^2(4, 173) = 3.55$, $p = .47$, indicating no differences based on sex. When partner effects were constrained to zero, the model remained non-statistically significant, $\chi^2(2, 173) = 4.37$, $p = .22$ (see Table A.1). With the addition of the health covariate, the I-SAT was statistically significant, $\chi^2(7, 173) = 15.62$, $p = .03$, suggesting that the constraints applied to health may not have been appropriate. Since the constraints were aligned with the partially distinguishable nature of the model, the model was retained (Figure 6.1). Further, the APIM (including the health covariate) where actor and partner effects were all constrained to equality per attachment dimension was non-statistically significant, $\chi^2(9, 173) = 16.31$, $p = .06$, suggesting that the actor and partners paths had a comparable impact on the outcome variable (i.e., both actor and partner effects emerged; Figure 6.2). Interpretations on model fit indicators (e.g., RMSEA) were omitted since the values were not interpretable when adjusted to correct for the I-SAT.

Since attachment anxiety and avoidance were included as predictors in the same model, main effects presented represent the unique effects of one attachment orientation on sleep quality while controlling for the effect of the other attachment orientation. Consistent with the literature, actor attachment anxiety (i.e., male and female actor effects constrained to equality) was

positively associated with sleep quality (b = .70, p = .01). Partner attachment anxiety (i.e., male and female partner effects constrained to equality) was also positively associated with sleep quality (b = .43, p = .04). Both of these findings supported the hypothesis that attachment anxiety would positively predict poorer sleep quality at the actor and partner level. These findings emerged while controlling for health and average age of couples. Actor health was a significant predictor of sleep quality (b = -.07, p <.01). Older age positively predicted greater sleep disturbances in males (b = .07, p = .04), but not females (b = .00, p = .99). See Figure 6.1 for the I-SAT. When actor *and* partner effects for attachment were constrained to equality (i.e., all four attachment anxiety main effects were constrained to equality), greater attachment anxiety was predictive of greater sleep disturbance (b = .57, p < .01), which supported the notion that actor and partner' anxiety levels were comparable in impact on sleep disturbance. These findings indicated that individuals higher in attachment anxiety tended to have more sleep disturbances. The actor and partner effects for avoidance on the sleep variable were not statistically significant (b = -.10, p = .59). See Figure 6.2 for the APIM.

Four interaction terms were simultaneously added to the model and constrained as indicated earlier. No specific hypotheses were presented for these interaction terms, and none emerged as statistically significant. Details of these null findings are reported in the lower portion of Table 6.2.

6.3 Study 1 Discussion

This investigation was the first APIM study on attachment and sleep to have accounted for health. It found that individuals with greater attachment anxiety had higher levels of sleep disturbance. No statistically significant findings emerged between attachment avoidance and sleep disturbance. This is consistent with previous research that has generally found greater attachment anxiety to be associated with poorer sleep quality (e.g., Xie, Chin, & Feeney, 2022) and attachment avoidance to be either unrelated (e.g., Carmichael & Reis, 2005) or weakly related (e.g., Xie et al., 2022) to sleep quality. This pattern of findings raises the possibility that individuals with high attachment anxiety might be engaging in behaviours (e.g., hyperactivating strategies) disruptive to sleep that are not common among those characterized by high attachment security or high attachment avoidance. Importantly, attachment anxiety was significantly associated with sleep even after controlling for general health, suggesting that it is a robust predictor of sleep disturbance.

When analyses included romantic partners, findings indicative of interdependence concerning sleep quality emerged. The APIM found clear support for both actor and partner effects of attachment anxiety. The difference between the actor and partner effects was not statistically significant, suggesting that actor and partner attachment anxiety have the same level of influence on the sleep quality of the members of the couples. This result highlights the value of dyadic data analysis of attachment anxiety on sleep, and it adds to the small but growing literature on how partners affect each other's sleep quality. The APIM produced null findings regarding attachment avoidance, which was not surprising given the trend, as well as the inclusion of several other variables that have been linked to sleep quality more reliably (e.g., age, attachment anxiety, and health).

Interactions of attachment anxiety and avoidance were also entered into the model. No significant findings emerged. This overall finding runs counter to a recent investigation of the interaction effects of attachment dimensions on sleep quality. Kent de Grey et al. (2019) found that when both partners were high in attachment anxiety, they had greater sleep quality. Conversely, when both partners had high attachment avoidance, their sleep quality was poor. The current investigation supported Haydon and Moss' (2020) null findings on attachment interactions between partners on self-reported sleep quality.

It is important to consider that to determine the effects of interactions between attachment dimensions, additional variables were entered into the model while the sample size, which was relatively small, remained the same. This lowers statistical power, which could have affected the robustness of these findings.

Chapter 7: Study 2

7.1 Study 2 Methods

7.1.1 Recruitment and Data Collection

Participants were primarily recruited from the University of Saskatchewan student portal (i.e., PAWS). Members of the general public of Saskatoon were also invited to participate. They were recruited through the mass emailing of organizations (e.g., non-profits), administrative teams, and head offices of apartment buildings based in Saskatoon, as well as through recruitment posters placed on poster drums, columns, and bulletin boards in the city. Social media outlets (e.g., Twitter, Reddit) were also used to promote the recruitment of individuals. Data from individuals was collected online using SurveyMonkey.

7.1.2 Eligibility for Participation

To be eligible to participate in the second study, no restrictions aside from the minimum age of 18 and access to the internet were required.

7.1.3 Participants

Participants were asked to participate in a study on relationships and health using an online survey. They were asked to provide information on their relationships, general sleep habits (e.g., bedtime), global indicators of sleep (e.g., sleep quality), specific sleep-related variables (e.g., pre-sleep cognitive arousal) and practices that affect sleep (e.g., electronic device use in bed). Confounding variables with the potential to affect quality of sleep (age, depressive symptoms and health information) were also collected.

7.1.4 Ethics and Compensation

Study 2 received ethical approval from the Research Ethics Board at the University of Saskatchewan. Informed consent was obtained from all individual participants included in the study. Participants were compensated for their time with an entry into a prize draw for one of five $100 VISA gift cards as an honorarium for their participation.

7.1.5 Self-Report Measures

7.1.5.1 Demographic Variables. Participants were asked to provide personal information on themselves, including but not limited to age, biological sex, and level of education. See Appendix B for these items.

7.1.5.2 Miscellaneous Sleep-related Variables. Participants were asked about their bedtimes, wake times and napping behaviour. They were also asked about their frequency of engagement in substances that affect the sleep-wake cycle, including but not limited to use of alcohol, use of over-the-counter sleeping pills, and use of sleep-inducing supplements (e.g., melatonin), over a two-week period. See Appendix C for more details on these items.

7.1.5.2 Confounding Variables. Participants were asked about their health status and depressive symptoms. These variables were chosen based on what other researchers in this area have statistically adjusted for or used as exclusion criteria (e.g., Gunn et al., 2015; Kent de Grey et al., 2019), as well as what the literature supports as strong correlates of sleep (see Chapter 2). These measures are included in Appendices D and E, respectively.

7.1.5.2.1 Health Conditions that Interfere with Sleep. Participants were asked to review a list of health conditions and indicate whether they have ever been diagnosed with and continue to have any of the following: respiratory disorders (e.g., sleep apnea), unexplained chronic pain, musculoskeletal disorders (e.g., arthritis), heart conditions, thyroid problems (e.g., hyperthyroidism), renal problems, neurological problems (e.g., headaches, epilepsy), cancer, infectious diseases (e.g., HIV), and psychiatric disorders (e.g., schizophrenia, bipolar disorder). They were provided with the option to specify an otherwise specified health condition. Importantly, they were asked whether they believed that any of these conditions interfered with their sleep. This variable was used to compute a dichotomous variable of health issues that affect sleep, which was used in regression analyses. Participants who denied having any such health conditions that disrupted their sleep did not complete this section.

7.1.5.2.2 Patient Health Questionnaire-2. The Patient Health Questionnaire-2 (PHQ-2; Kroenke, Spitzer, & Williams, 2003) was used to assess the severity of depressive symptoms over the past two weeks. This 2-item measure includes the core symptoms of a major depressive episode as defined by the *DSM-5-TR* (American Psychiatric Association, 2022). Respondents answered whether they have been bothered by problems (e.g., feeling down, depressed, or

hopeless) over the past two weeks items on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). Total scores were computed by summation and higher scores indicated more frequent depressive symptoms.

7.1.5.3 Indicators of Sleep Outcomes. All participants were asked to provide information on the quality of their sleep, activities and cognitions that could interfere with sleep, and sleep hygiene practices.

7.1.5.3.1 Sleep Disturbance. The Insomnia Severity Index (ISI) is a widely used 7-item self-report measure used to assess daytime and nighttime components of insomnia and their severity over the past two weeks (Morin, 1993). The items evaluate issues with sleep onset, sleep maintenance, sleep dissatisfaction, early morning awakening, interference with daytime functioning, noticeability of sleep problems by others, and distress caused by sleep difficulties. It has been found to have appropriate to excellent internal consistency (αs = .74 to .90; Bastien, Vallières, & Morin, 2001; Morin, Belleville, Bélanger, & Ivers, 2011) and reliability (Bastien et al., 2001; Morin et al., 2011). There is support for the measure's concurrent validity (Bastien et al., 2001; Morin et al., 2011). Each item is rated on a 5-point Likert scale anchored by 0 (*none/not at all*) and 4 (*very/very much*) except for one item. Scores on this measure are calculated by summing responses, where total scores range from zero to 28. Scores between eight and 14 represent subthreshold insomnia and scores exceeding 14 represent clinical insomnia.

In order to differentiate insomnia from acute sleep disturbance, participants who endorsed sleep disturbance were asked to provide additional information based on the diagnostic criteria for insomnia disorder according to the *DSM-5-TR* (American Psychiatric Association, 2022). This information included how long they have had a sleep problem, whether the problem was substance-induced, whether they had a health condition that affects sleep, whether they had the opportunity for sleep, and the degree to which areas of function were disturbed due to sleep difficulties. Participants who did not endorse having difficulties with sleep bypassed these additional diagnostic questions. See Appendix F for more information on the ISI and the additional diagnostic questions.

7.1.5.3.2 Daytime Sleepiness. The Epworth Sleepiness Scale (ESS) is an 8-item self-report measure used to identify excessive sleepiness resulting from accumulated sleep debt or sleep disorders (Johns, 1992). This measure assesses the likelihood that respondents would fall

asleep while doing certain activities (e.g., watching television, sitting and talking to someone, stopped at a traffic light). Responses range from 0 (*would never doze*) to 3 (*high chance of dozing*). Scores range from zero to 24, where scores over 10 indicate significant levels of daytime sleepiness. A systematic review of the ESS found a range of internal consistency coefficients (αs = .73-.86) that was considered appropriate (Kendzerska et al., 2014). The ESS has also been found to have moderate reliability properties and construct validity (Hagell, 2007; Kendzerska et al., 2014). See Appendix G for the items.

7.1.5.3.3 Sleep Efficiency. Participants were asked to estimate the average number of hours spent sleeping per night, and times at which they typically go to bed and wake up, over the past month. The difference between bedtimes and wake times was computed to estimate time spent in bed. This data was then used to compute sleep efficiency as follows: Time spent sleeping/time spent in bed x 100%. Greater scores were indicative of a healthier amount of sleep. See Appendix C for details on the items used to create this variable.

7.1.5.4 Electronic Device Use in Bed. A brief measure of electronic device use in bed was not found in the literature. Therefore, an 8-item measure was created. Participants were asked about electronic device use in bed that could impact their sleep, such as texting, making or receiving phone calls, and browsing social media while in bed. The measure used a 6-point Likert scale ranging from 0 (*never*) to 5 (*always*). Internal consistency of this measure was α = .81. It demonstrated convergent validity by correlating positively with the Insomnia Severity Index and the Epworth Daytime Sleepiness scale. See Table A.4 for the relevant correlations. See Appendix H for the items of this measure.

7.1.5.5 Dysfunctional Beliefs and Attitudes about Sleep. The Dysfunctional Beliefs and Attitudes About Sleep scale (DBAS) is a measure of beliefs, attitudes, expectations, appraisals, and attributions that interfere with sleep (Morin, Vallières, & Ivers, 2007). The 16-item version of this measure was used for this investigation (DBAS-16; Morin et al., 2007). Subscales on this measure include consequences (e.g., cannot function without a good night), worry/helplessness (e.g., worried about losing control of sleep), expectations (e.g., need 8 hours of sleep), and medication (e.g., feeling better off taking sleeping pills). This measure uses an 11-point Likert scale ranging from 0 (*strongly disagree)* to 10 (*strongly agree*) typically with a continuous 100mm line in the background. Whether subscale or total scores are preferred, scores on the DBAS-16 are computed by summing the scores of all relevant items and dividing by the

number of relevant items. Higher scores indicated stronger dysfunctional beliefs about sleep. Investigations into the measure's psychometric properties revealed favourable internal consistency coefficient for the overall measure (αs = .77-.83), reliability estimates, and convergent and discriminant validity (Boysan et al., 2010; Morin et al., 2007). See Appendix I for the items.

7.1.5.6 Pre-Sleep Hyperarousal. The Pre-Sleep Arousal Scale (PSAS) is a 16-item measure that assesses pre-sleep cognitive arousal and somatic arousal, separately (Nicassio et al., 1985). Participants are asked to rate to what degree they experience cognitive (e.g., being mentally alert, active) and physical issues (e.g., heart racing, pounding, or beating irregularly) when they attempt to fall asleep. Responses are recorded on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*extremely*). A more recent investigation on the PSAS identified and eliminated problematic items, and recommended a 13-item version of the measure (PSAS-13; Jansson-Fröjmark & Norell-clarke, 2012). The two-factor structure was retained. This modified version was used for this investigation. Scores are calculated for each factor by summing the answers to the corresponding items. Overall total scores range from 13 to 65, with higher scores indicating greater arousal. Scores for somatic arousal range from eight to 40 and scores for cognitive arousal range from five to 25. The PSAS-13 has been found have appropriate internal consistency (αs = .72-.88 between the two factors) and convergent validity (Jansson-Fröjmark & Norell-clarke, 2012). Furthermore, the PSAS-13 as well as its individual factors have been found to discriminate between groups of individuals with sleep disturbances and control subjects (Jansson-Fröjmark & Norell-clarke, 2012). See Appendix J for these items.

7.1.5.7 Sleep Hygiene Practices. The Sleep Hygiene Practices Scale (SHPS) is a 30-item self-report measure designed to assess the effects of day-to-day activities, sleep-related and pre-sleep habits, and sleep environment preferences on sleep (Yang & Ebben, 2008). According to Yang et al. (2010), it was based on previously published measures of sleep hygiene (e.g., Blake & Gomez, 1998; Mastin, Bryson, & Corwyn, 2006) and general sleep guidelines (e.g., National Sleep Foundation). The SHPS collects responses on a 6-point frequency-based Likert scale ranging from 1 (*never)* to 6 (*always).* Greater scores are indicative of more behaviours and conditions that are disruptive to sleep. Yang et al. (2010) conducted a factor analysis that suggested four latent factors: arousing activities (e.g., vigorous exercise during the two hours before sleep), sleep scheduling (e.g., bedtime not consistent daily), pre-sleep eating and drinking

(e.g., eating too much food during the hour before sleep), and sleep environment (e.g., having uncomfortable bedding and/or pillow). The measure was found to have appropriate internal consistency coefficients for each factor among good sleepers (αs = .70-.82; Yang et al. 2010). Yang et al. (2010) also found support for its convergent validity. For the purposes of this investigation, the response option "not applicable" was added to one item about having a bedpartner because sample included some individuals who did not co-sleep with someone. Further, information on sleep disturbances caused by bedpartners was collected in other questionnaires, described later on. See Appendix K for more details on the SHPS items.

7.1.5.8 Relationship Information. Participants were asked to indicate their relationship status. Those who indicated a relationship status of single were asked whether they have had previous romantic relationships. Single individuals bypassed the section on co-sleeping habits. Those who were in a romantic relationship were asked to provide details of their current relationship such as its duration, how serious they perceived their relationship to be, and whether they were cohabitating with their partner or not. Importantly, this section included soliciting information on attachment dimensions and relationship satisfaction. See Appendix L for more details.

7.1.5.8.1 Attachment Dimensions. The Experiences in Close Relationships (ECR) scale was developed by Brennan, Clark, and Shaver (1998) to measure dimensions of attachment. The ECR is a 36-item measure of attachment anxiety (e.g., worrying about being rejected or abandoned) and attachment avoidance (e.g., preferring not to show others how one feels deep down). While a revised version of the ECR has been developed (i.e., ECR-R; Fraley, Waller, & Brennan, 2000), it was not used. The original ECR has subscales that are less correlated with each other than those in the ECR-R (Cameron et al., 2012). Mikulincer and Shaver (2016) prefer the ECR over the ECR-R because of this and because of some concerns regarding the wording of some items in the ECR-R. As well, they noted that the ECR and the ECR-R correlate quite highly. Items on each of these subscales are rated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Each subscale consists of 18 items. Scores are calculated by first reverse coding several items and then averaging across all relevant items such that higher values indicate a higher level of either attachment anxiety or avoidance. Its subscales have been found to have excellent internal consistency coefficients (αs >.90; Fairchild & Finney, 2006; Sibley, Fischer, & Liu, 2005) and there is support for convergent validity of the ECR

(Conradi et al., 2006). This questionnaire was administered to every participant. See Appendix M for more details.

7.1.5.8.2 Couples' Satisfaction. The Couples Satisfaction Index (CSI) is a measure of relationship satisfaction (Funk & Rogge, 2007). It was developed using item response theory from a pool of items that was collected from a variety of measures assessing relationship satisfaction. It has been found to have excellent internal consistency and appropriate convergent validity (Graham et al., 2011). The current study used the 4-item version of the CSI (CSI-4; Funk & Rogge, 2007). Scores are calculated by adding all relevant items such that higher values indicate a higher level of relationship satisfaction. Except for the first item, items are answered on a response scale ranging from 0 (*not at all/not at all true*) to 5 (*completely/completely true*). Greater scores on this measure suggest greater relationship satisfaction. The CSI-4 has been found to have excellent internal consistency (α = .94; Funk & Rogge, 2007), as well as appropriate convergent validity and construct validity (Maroufizadeh et al., 2018). This measure was only administered to individuals in relationships. See Appendix N for more details.

7.1.5.9 Co-sleeping Behaviours. This section was comprised of questions on whether or not participants co-slept with non-romantic companions (pets and children) and romantic partners, and whether they perceived disruption to their sleep from co-sleeping. Details of the questions related to romantic relationships are included below. Given the low frequency of endorsement of the pet and children co-sleeping variables, these variables were not examined further. Details of these items can be found in Appendix O.

Participants who identified having a romantic relationship were asked about the frequency of co-sleeping with their partners over the past two weeks. For the purposes of the regression analyses, frequencies of co-sleeping were categorized and entered into the regressions as dichotomous variables. Participants in relationships were divided as follows: individuals in relationships that co-slept zero to four times per week and individuals who co-slept five to seven times per week. This information was used to create two dummy coded variables, each with two levels (0 = no, 1 = yes): occasional co-sleeping (i.e., zero to four nights per week) and regular co-sleeping (five to seven nights per week). These variables were then entered together in the regression analyses involving the total sample. In these analyses, single individuals were treated as the reference category. The possibility of using both relationship status and co-sleeping status as separate variables was considered, but this was not reasonable due to their high level of

overlap. Most notably, among individuals who co-slept regularly (n = 118), a large proportion (n = 112) were also living in the same household as partners.

Participants were also asked about their perceived level of similarity with their bedpartners on bedtimes and wake times. They were then asked about their degree of agreement on environmental preferences with partners, and whether this interfered with their own sleep. They provided information on motivations for co-sleeping (e.g., convenience, comfort). Participants also provided data on nighttime awakenings due to partner behaviours that were unintentional (e.g., snoring) and intentional (e.g., being woken up to talk), as well as agreement with partners on sleep environment preferences. These co-sleeping variables were collected primarily to provide descriptive information regarding the frequency of partner-related habits and disruptions that affected sleep (viz. being awakened for sex or to talk, snoring, movements in the bed, getting out of bed, nightmare-related behaviors, and other noises, such as teeth grinding). See Appendix O for more details of all items on co-sleeping with partners and related behaviours.

7.1.5.9.1 Bedtime Talk. A brief measure of pre-sleep bedtime talk between partners was not found in the literature. Therefore, a 5-item measure was created. Participants were asked about the frequency with which they discuss pleasant, neutral, and unpleasant topics with their partners. They were also asked to indicate the discussion topics that they tend to have at bedtime. Participants were asked to provide their responses on a 5-point scale ranging from 1 (*never*) to 5 (*always*). See Appendix P for more details.

7.1.5.9.2 The Sleep Hygiene Practices Scale - Bedpartners. In this study, the SHPS was modified to collect data on participants' perceptions of their bedpartners' sleep-related behaviours. This was done to provide item-level descriptive statistics to better understand the frequency at which certain behaviours occurred. SHPS items needed to be observable and specific to the bedpartner to be retained. Modifications included the following. Items that enquired about cognitions (e.g., worrying about not being able to fall asleep) were removed as participants would be unable to answer these accurately about their bedpartners. Items that were too specific to be answerable (e.g., naps more than three days per week) were either removed or modified. Items related to the sleep environment were removed as they were not specific to bedpartner behaviours. Finally, the response option "I don't know" was added to the 7-Likert

scale ranging from 1 (*never)* to 6 (*always),* and it was coded as zero. See Appendix Q for more details on the items.

7.1.6 Statistical Analyses

Statistical analyses were conducted using SPSS v.29 and AMOS v.29. After online data collection was completed, the data were examined and cleaned to ensure that statistical assumptions had not been violated. This included screening for outliers, examining coefficients of skewness/kurtosis of the distribution of participants' responses per variable, as well as inspecting distribution curves for normality, and inspecting patterns of missing data. In some cases, the statistics analysis used was to offset non-normal distributions.

After the dataset was inspected and cleaned, descriptive statistics were computed for each variable of interest. Correlational analyses were used to examine associations between the demographic and health variables, relationship variables (i.e., attachment and relationship satisfaction), co-sleeping variables, and sleep-related variables.

Multiple regression analyses were used to examine whether the associations found in the correlations of key sleep-related variables with attachment dimensions remained after statistically adjusting for age, depression, and the presence of a health condition that impacts sleep (Step 1). Multiple regression analyses were also used to examine whether associations between attachment and sleep-related variables were moderated by the presence/absence of a bedpartner (Step 2). Interaction effects of attachment dimensions and co-sleeping frequency were added into multiple regression analyses (Step 3). Another set of multiple regression analyses was conducted for the subsample of participants who co-slept with partners to determine whether couple satisfaction predicted pre-sleep talk and/or sleep environment agreement (Step 1). Attachment variables were added into the regression analyses to determine whether they could account for the variance in the dependent variables above that of couple satisfaction (Step 2). Interaction effects of attachment dimensions were added as a final step of the models (Step 3).

Lastly, a mediation analysis consisting of variables that emerged as important in the conceptualization of sleep disturbance was conducted. Findings from correlation and regression analyses were used to identify variables to be included in the model. Resources on conducting SEM were used to specify, test, interpret, and report the proposed model (Collier, 2020; Kline, 2016). Bootstrapping, a technique used to simulate random sampling and construct an empirical sampling distribution, was used. This was used to evaluate indirect effects and to generate 95%

confidence intervals. The recommended number of bootstrap samples, 5000, was used. The model included attachment and confounding variables as independent variables (i.e., attachment anxiety, age, depression, having a health condition that affected sleep, and co-sleeping status), possible sleep-related mediators (i.e., dysfunctional beliefs about sleep, pre-sleep cognitive arousal, electronic device use in bed, sleep scheduling, and pre-sleep eating and drinking), and sleep-related outcome variables that were predicted by attachment (i.e., only daytime sleepiness). Although interactions between attachment anxiety with frequent co-sleeping and avoidance with frequent co-sleeping emerged as possible mediators, they were omitted from the model to reduce effects of multicollinearity. The model was created using SPSS AMOS v.29. Post-hoc power analyses were conducted using a statistical analysis app for mediation (Kenny, 2017; found here: https://davidakenny.shinyapps.io/MedPower/).

7.1.6.1 Data Preparation. All analyses were conducted using SPSS v29. Before conducting the primary analyses, variables of interest (relationship satisfaction, attachment anxiety and avoidance, and several sleep-related variables) were examined for missing values, univariate and multivariate outliers, and other relevant statistical assumptions.

A total of 421 participants reached the end of the survey and submitted responses to the online data collection survey. However, they were not all complete submissions. Furthermore, fast survey completion times (e.g., five minutes) suggested that some participants had submitted random responses. To distinguish submissions from ones that were likely inaccurate, the following criteria were created to remove certain cases from analyses for several issues.

Appropriate survey completion time cut-offs were determined using the total number of words in the survey and the average English reading rate plus 3 *SD* (391.6 words per minute) for adults based on a recent meta-analysis (Brysbaert, 2019). To have eligible data, participants who were not in romantic relationships were required to have a survey completion time of at least 8 min and 29 sec as the approximate word count for the survey excluding relationship measures was 3321. Participants in romantic relationships were required to have spent a minimum of 11 min and 8 sec on the survey because they were asked to fill out additional questions about their relationships, such as satisfaction in relationships and co-sleeping practices. The approximate word count for the survey for people in relationships was 4364. The application of the time criterion resulted in the exclusion of 68 participants who had inappropriately low completion

times on the survey. It should be noted that in addition to the fast completion time, these participants had an average of 14 scales/subscales that were missing more than 25% of data.

In the recruitment process, participants had been invited to participate in a study on relationships, attachment, and health outcomes. Therefore, it was imperative that key questionnaires/questions on relationships, attachment, and sleep had at least 75% of data to be considered complete. In addition to excluding participants for low completion times, six participants were excluded from analyses based on missing three or more incomplete key questionnaires. An additional two participants were excluded for missing all data on the PHQ-2 as this was an important covariate in analyses. One participant was excluded for not providing an answer to whether they bedshared with their partner since analyses depended on categorizing participants on co-sleeping practices. Another participant was excluded for providing contradictory responses on key questionnaires. The application of all these criteria resulted in a sample of 309.

After the unusable data was excluded, a missing value analysis was conducted to impute total scores of key variables. There was a small number of individual items that were not summed into a total (e.g., items on pre-sleep substance use, the SHPS items on partner behaviours). In these cases, individual items were imputed. Missing data for total scores of key variables were imputed using the expectation maximization algorithm for cases with less than 25% of data missing (e.g., a maximum of two items missing out of an 8-item questionnaire) on questionnaires. This resulted in the total imputation of <.001% of all data points.

Despite efforts to screen and retain data, stand-alone items that were open-ended (i.e., string variables) tended to have relatively greater missing data or data that was obviously random. To illustrate this point, when asked how many hours were spent napping in a given day on average, responses ranged from zero to 32. Other open-ended questions that tended to elicit incomplete or random responses included bedtime, wake time, and pleasant, unpleasant, and neutral topics discussed at bedtime. It is possible this occurred because the answers to open-ended questions are tough to estimate or recall. In the case of bedtime and wake times, participants were asked to provide an average estimate over the past month, a timeframe that could have been challenging for individuals to consider. As a result, these variables were analyzed on a case-by-case basis. It was determined that napping and sleep efficiency were unusable and they were omitted from correlation and regression analyses.

7.1.6.2 Statistical Power (Post-Hoc) for Regression. To determine whether the sample size acquired for this investigation was appropriate for multiple regression analyses, Green's (1991) equation ($N \geq 50 + 8m$), where m is equal to the number of independent variables, was used. Using this rule of thumb, a sample size of ≥ 146 participants was needed to have adequate statistical power. This sample size requirement was nearly doubled with $N = 309$. Adequate statistical power for interaction effects typically requires a large sample (McClelland & Judd, 1993). The available a priori power analysis methods for interaction effects require information, such as the expected effect size of the moderation effect, which was not available (see Hayes, 2013). Given this situation, power considerations for the interaction effects were not conducted. However, post-hoc analyses were conducted to evaluate the adequacy of the data for detecting main effects at each level of relationship/co-sleeping variable. Adequate statistical power for detecting a moderate association in each of those groups does not ensure adequate statistical power for detecting moderation effects. However, the ability to detect relationships within each subsample is expected to facilitate the detection of interaction effects and the interpretation of such effects. Based on Cohen's (see Cohen, 1992) recommendations for correlation coefficients, this can be achieved with 85 people in each group. Two of the current subsample sizes exceeded this recommendation ($n = 114, 107$), and the other subsample size approached it ($n = 75$).

7.1.6.3 Tests of Normality. Dependent variables were inspected for violations to the assumption of normality of response distribution using histograms, skewness and kurtosis values, and inspecting the plots of the residuals. The dependent variables used in regressions were determined to be normally distributed.

Individual data points were also inspected for univariate outliers. Z-scores were computed for the variables in order to identify univariate outliers. Scores greater than $z = +/-3.29$ (i.e., 3 *SD* from the mean) were flagged. To control for these, the data points were substituted with the value that corresponded with a standardized z-score of 3.0 to bring the score back into the variable's distribution (Tabachnick & Fidell, 2007). A total of 49 data points (<.0006% of data) were flagged and winsorized.

The individual pre-sleep substance use items were extremely skewed and/or kurtotic despite transformations because the majority of participants did not engage in the behaviours captured by these items or they engaged in these behaviours very infrequently. Therefore, non-

parametric correlations (i.e., Spearman Rho) were performed on those items to address the issue of non-normal response distributions.

For the purposes of multiple regression analyses, the data for the entire sample was then inspected for the presence of multivariate outliers by computing mahalanobis distances. This was done to prepare the data for hierarchical regression analyses. Although variables had been inspected and corrected for univariate outliers, variables may display a combination of unusual scores on more than two variables, which can influence statistical analyses (Tabachnick & Fidell, 2013). Multivariate outliers were identified through the mahalanobis distance using the cut-off critical value of $\chi^2(12, 309) = 33.28$ at $p = .001$. This step identified 13 participants that had multivariate outliers in the attachment and sleep outcome multiple regression analyses. They were excluded from analyses.

For the regression analyses using the sample of individuals who co-slept with partners, the same process was repeated. Multivariate outliers were identified through the mahalanobis distance using the cut-off critical value of $\chi^2(4, 158) = 18.47$ at the $p = .001$ level. This step identified three individuals with multivariate outliers in their data, and they were excluded from analyses.

This analysis of multivariate outliers was repeated for the mediation analysis. The cut-off critical value of $\chi^2(10, 309)$ of 29.59 at the $p = .001$ level. One multivariate outlier was identified. Results were conducted with and without this outlier. No changes in results were observed. Therefore, results with the full sample were retained.

7.1.6.4 Multicollinearity. Ensuring the assumption of collinearity was done using two steps (Field, 2009). First, the correlations among the independent variables for each set of multiple regression analyses (i.e., sleep variables regressed on attachment insecurity) were inspected. This procedure revealed that all correlations ranged from very weak ($r_{pb} = .001$, $p = .99$; correlation between having a health condition that affects sleep with age) to moderately strong ($r = .73$, $p < .001$; correlation between the interaction term for attachment avoidance and regular co-sleeping with attachment avoidance). All correlations were below the common threshold of $r = .80$, which indicated that multicollinearity was unlikely to be a problem (Tabachnick & Fidell, 2007). Second, ensuring collinearity involved checking that predictors' corresponding values of tolerance (< .10) and variance inflation factor (< 10) were above

respective cut-offs. Values of predictors did not suggest violations of the collinearity assumption. Therefore, there were no issues with multicollinearity.

7.2 Study 2 Results

7.2.1 Sociodemographic and Health Characteristics

Table 7.1 presents descriptive statistics for the sample of $N = 309$ participants who had complete data. The average age of the sample was 31.18 years ($SD = 10.02$). The majority of the sample (80.7%) consisted of self-identifying females and 19.3% identified as male. The majority of participants (81.6%) had attended and/or completed college/university. Further, the majority of participants (72.3%) identified as White, and other ethnic groups each comprised less than 10% of the total sample. Close to half of the sample (44.4%) identified having at least one health condition that disrupts sleep, where the most common condition endorsed was "psychiatric condition (e.g., schizophrenia, bipolar disorder, anxiety disorder)", followed by "neurological problems (e.g., headaches, epilepsy)."

7.2.2 Relationship Information

Among the sample of participants, 199 participants (64%) reported being in a romantic relationship. The average relationship length in years was 7.26 years ($SD = 6.99$), ranging from one month to 30 years and 11 months. The mean relationship satisfaction score was 15.36 ($SD = 4.87$), where responses ranged from five to 21. Overall, the distribution of scores was indicative of general satisfaction with relationships. The majority of individuals in romantic relationships indicated cohabiting with their partners (74.4%). Detailed information on the type of relationships can be found in Table 7.1.

7.2.3 Attachment and Sleep Characteristics of the Sample

The sample of participants had a mean attachment anxiety of $M = 3.91$ ($SD = 1.09$) and a mean attachment avoidance of $M = 3.47$ ($SD = 1.09$), where scores closer to seven indicated the highest degree of attachment anxiety or avoidance. The correlation between the two attachment dimensions was $r = .19$, $p < .01$. Based on total scores from the ISI, the average of the sample indicated subthreshold insomnia ($M = 8.57$, $SD = 6.34$). Tables 7.2 and 7.3 contain the descriptive statistics of all broad and specific sleep-related dependent variables used in the correlational analyses and regressions.

A goal of the current investigation was to explore insomnia disorder using diagnostic criteria from the *DSM-5-TR* (American Psychiatric Association, 2022). When the cut-off for the

criterion on participants' perceived interference of sleep disturbance on areas of function was the response option "somewhat," which was a relatively liberal choice, and other diagnostic elements were met (e.g., occurrence of sleep disturbance in spite of the opportunity for sleep), only 3% of participants (n = 8) met diagnostic criteria for insomnia disorder. Given this low prevalence of insomnia, it was not investigated further.

7.2.4 Co-sleeping Frequencies

The majority of the sample did not have dogs (62.8%), cats (69.3%), or other pets (7.4%). The frequencies of pet-related sleep disturbances out of the total sample (N = 309) were as follows: 18.6% reported at least mild sleep disturbance related to having a dog; 17.4% reported at least mild sleep disturbance related to having a cat; and 1.9% reported at least mild sleep disturbance from having a different pet (e.g., birds, rodents). A large majority of the sample (81.9%) did not have young children. Among those with children, 13.1% reported at least mild sleep disturbance from having young children. These frequencies suggest the potential for pets and children to disrupt sleep. However, given the relatively small number of participants with pets and/or children and the focus of this research on romantic partners, further analyses using this data were not conducted.

Around half of participants (n = 80; 50.9%) identified co-sleeping with their partners at least once a week, and the majority of bedsharers co-slept every day on average. Half of individuals reported the same bedtime as their partners (51.9%), followed by those with an earlier bedtime (27.2%) and those with a bedtime after their partners (18.4%). Most participants reported waking up before their partners (40.5%), followed by waking up at the same time (24.1%) and after their partners (33.5%). The remaining participants did not provide an answer.

Table 7.4 contains the frequencies of participants' experiences with co-sleeping with romantic partners, including their pre-sleep-related behaviours, perceptions of sleep disturbance caused bedpartners, and motivations for co-sleeping. A considerable proportion of bedsharers (48.7%) indicated having disruption to their sleep by bedpartners ranging from occasionally to always. An additional 32.3% of bedsharers identified rare disruption to their sleep by bedpartners. The most common reason identified for sleep disruption by bedpartners was partners moving during their sleep, followed closely by partners getting up in the middle of the night. However, a number of participants also reported intentional disruption to their sleep by their bedpartners, such as when partners initiated sex or a conversation. Despite these findings on

partner-induced sleep disturbance, the overwhelming majority of participants (91.1%) indicated that they chose to sleep beside their partners to promote intimacy and togetherness. Disagreement between bedpartners in terms of sleep environment did not appear to be a strong contributing factor to sleep disruptions as only a minority (15.1%) reported disagreement. Further, the large majority of participants (70.3%) reported never or rarely having unpleasant bedtime talk with partners.

7.2.5 Univariate Analyses

7.2.5.1 Findings with the Total Sample Based on Correlations. Table 7.2 presents correlations between all of the main sleep-related multi-item study variables (i.e., variables entered into the regression analyses) and attachment. Table A.4 contains correlations between all key variables. Table 7.5 presents correlations between attachment and the single item variables related to pre-sleep substance use. Notable findings are reviewed below.

In general, the trend observed for attachment anxiety was that it correlated with indicators of poor sleep quality and pre-sleep arousal, such as engagement in dysfunctional beliefs about sleep, cognitive and somatic pre-sleep arousal, and unhealthy sleep-related practices, such as increased engagement in arousing activities pre-sleep and poor sleep scheduling. Aside from pre-sleep use of supplements, attachment anxiety was not correlated with any pre-sleep substance use behaviours.

By contrast, attachment avoidance was not correlated with sleep-related variables in general, and there was a pattern of relatively weak though statistically significant correlations with indicators of pre-sleep arousal (i.e., dysfunctional beliefs about sleep and pre-sleep somatic arousal). Relative to attachment anxiety, attachment avoidance was correlated with more maladaptive sleep-related behaviours, such as pre-sleep eating and drinking, poor sleep environment practices, and pre-sleep substance use (e.g., drinking alcohol to fall asleep, smoking cigarettes to fall asleep, taking supplements for sleep).

7.2.5.2 Findings with the Subsample of Individuals who Co-sleep at Least Once Per Week. The following analyses were conducted with the subsample of individuals who co-slept with their romantic partners at least once per week (n = 158). The average couple satisfaction score [M = 15.57 (SD = 4.83)] suggested that this subsample was generally satisfied with their relationships. Couple satisfaction was negatively correlated with attachment anxiety (r = -.21) and attachment avoidance (r = -.40), at the $p < .05$ level. There was limited support for an

association between couple satisfaction and sleep-related variables. Couple satisfaction was negatively associated with daytime sleepiness (r = -.20, p < .05). No significant association was found between couple satisfaction and general sleep quality. Couple satisfaction was associated positively with pleasant pre-sleep talk (r = .43, p <.01) and neutral pre-sleep talk (r = .51, p <.01). Correlations between all variables related to being in a relationship (e.g., couple satisfaction) and the sleep-related variables from this subsample can be found in Table A.5 in Appendix A (supplementary tables).

Participants were asked about how frequently various partner behaviors interfered with their sleep. The means for these variables are reported in Table 7.5, along with their correlations with the attachment dimensions. Attachment anxiety was generally uncorrelated with partner sleep-related behaviours, but it had small positively correlations with partners' snoring and partners making other noises in their sleep. Attachment avoidance had positive associations with several variables. Most notably, it had moderate negative associations with pleasant pre-sleep talk and sleep environment agreement between partners. Avoidance was also positively correlated with being awakened intentionally (i.e., to have sexual activity or a conversation) and unintentionally (i.e., partners getting out of bed in the middle of the night, making noises in their sleep, or having nightmares).

Participants were also asked to report on their partners' behaviours related to sleep hygiene. These questions were about the frequency of partner behaviors and did not inquire about the degree to which the behaviors interfered with participants' sleep. Descriptive statistics for these behaviors are reported in Table 7.6, along with their correlations with the attachment dimensions. Attachment anxiety was positively correlated with perceiving their partners to fall asleep with the television on or when music was playing, having inconsistent bedtimes and wake times, staying in bed in the mornings after awakening, drinking caffeinated drinks pre-sleep, and drinking a lot before sleep. Attachment avoidance was only correlated with bedpartners exercising pre-sleep, drinking caffeinated beverages pre-sleep, and consuming stimulating substances pre-sleep (e.g., smoking cigarettes).

7.2.5.3 Differences in Attachment Based on Bedtimes Relative to Partners. An independent samples *t*-test was conducted to compare attachment anxiety and avoidance scores of a group of individuals who reported a bedtime earlier or later than their bedpartners against those who reported having the same bedtime as their bedpartners. Individuals who reported

having the same bedtime as their partners did not differ significantly in attachment anxiety scores (M = 3.75, SD = 1.19) as those who usually went to bed before or after their partners (M = 3.63, SD = 1.06), $t(152) = -.64$, $p = .52$. Similarly, individuals who reported having the same bedtime as their partners did not differ significantly in terms of attachment avoidance (M = 3.02, SD = 1.12) as those who usually went to bed before or after their partners (M = 3.18, SD = 1.12), $t(152) = .88$, $p = .38$.

7.2.6 Regression Analyses for All Participants

7.2.6.1 Sleep Quality. The final model included only Step 1 and it is presented in Table 7.7. This model was statistically significant, $F(5,290) = 25.82$, $p < .001$, and accounted for 30% of the variance in the dependent variable. Attachment anxiety and avoidance were not significant predictors. However, depression ($\beta = .31$, $p < .001$), as well as having at least one health condition that interferes with sleep ($\beta = .36$, $p < .001$), each positively predicted sleep quality. The addition of Step 2 (co-sleeping variables) and Step 3 (interaction terms) did not significantly improve the overall model [$F_{change}(2,288) = 2.17$, $p = .12$; $F_{change}(5,283) = 1.04$, $p = .40$; respectively].

7.2.6.2 Daytime Sleepiness. The final model included only Step 1 and it is presented in Table 7.7. The model was statistically significant, $F(5,290) = 6.75$, $p < .001$, and accounted for 8.9% of the variance in the dependent variable. Attachment anxiety ($\beta = .13$, $p = .04$), but not attachment avoidance, was predictive of daytime sleepiness. Age also negatively predicted daytime sleepiness ($\beta = -.18$, $p = .002$). The addition of Step 2 (co-sleeping variables) and Step 3 (interaction terms) did not significantly improve the overall model [$F_{change}(2,288) = .57$, $p = .57$; $F_{change}(5,283) = .73$, $p = .60$; respectively].

7.2.6.3 Electronic Device Use in Bed. The model including Step 1 was statistically significant, $F(5,290) = 18.13$, $p < .001$ and accounted for 22.5% of the variance in the dependent variable. The full results for this model are presented in Table 7.8. Age ($\beta = -.33$, $p < .001$), depression ($\beta = .12$, $p = .04$), and having a health condition that interferes with sleep ($\beta = .15$, $p = .01$) were predictive of the dependent variable. Attachment anxiety ($\beta = .15$, $p < .05$), but not avoidance ($\beta = -.02$, $p < .05$), was significantly associated with electronic device use in bed. The addition of Step 2 [co-sleeping variables; $F_{change}(2,288) = 1.03$, $p = .36$] and Step 3 [interaction terms; $F_{change}(5,283) = .48$, $p = .79$] did not improve the overall model.

7.2.6.4 Dysfunctional Beliefs About Sleep. Originally, we aimed to test whether attachment anxiety and avoidance accounted for unique variance in participants' ratings of four distinct dimensions of dysfunctional beliefs about sleep beyond that accounted for by potential confounds (i.e., age, depression, and having a health condition that disrupts sleep). However, reliability analyses revealed that these factors had generally poor internal consistency (i.e., they ranged from .52 to .79). Instead, the entire measure was used as a dependent variable as it had an internal consistency coefficient of $\alpha = .88$.

The final model including Step 1 was statistically significant, $F(5,290) = 9.32$, $p < .001$, and it accounted for 12.4% of the variance in the dependent variable. Depression ($\beta = .14$, $p = .02$) and attachment anxiety ($\beta = .13$, $p = .03$) positively predicted dysfunctional beliefs about sleep. Having a health condition that interfered with sleep ($\beta = 23$, $p < .001$) also predicted dysfunctional beliefs about sleep. The complete results for this model can be found in Table 7.8. The addition of Step 2 (co-sleeping variables) and Step 3 (interaction terms) did not significantly improve the overall model [$F_{change}(2,288) = .81$, $p = .44$; $F_{change}(5,283) = .58$, $p = .72$; respectively].

7.2.6.5 Pre-Sleep Cognitive Arousal. The initial model with Step 1 was statistically significant, $F(5,290) = 24.46$, $p < .001$, and accounted for 28.5% of the variance in the dependent variable. The significant predictors in this model were depression ($\beta = .35$, $p < .01$), having a health condition that affects sleep ($\beta = .17$, $p < .01$), attachment anxiety ($\beta = .22$, $p < .01$), and attachment avoidance ($\beta = -.11$, $p < .01$). The addition of the co-sleeping variables in Step 2 did not significantly improve the model [$F_{change}(2,288) = 2.54$, $p = .08$], but the addition of the interaction terms in Step 3 did [$F_{change}(5,283) = 2.78$, $p = .02$)]. This model was significant, $F(12,283) = 12.21$, $p < .001$, and accounted for 31.3% of the variance in pre-sleep cognitive arousal. It is presented in Table 7.9. Results indicated that depression ($\beta = .37$, $p < .001$) and having a health condition that affects sleep ($\beta = .17$, $p < .001$) had positive main effects as did the two dummy-coded co-sleeping variables, occasional co-sleeping, ($\beta = .14$, $p = .02$), and frequent co-sleeping ($\beta = .13$, $p = .04$). Compared to Step 1, attachment anxiety and avoidance were no longer significant once co-sleeping variables and interactions were added in the final model.

Results revealed two significant interaction terms in Step 3. These were the interactions between attachment anxiety and regular co-sleeping ($\beta = .22$, $p = .02$) and between attachment

avoidance and regular co-sleeping (β = -.23, p = .01). In this analysis, single individuals were treated as the reference category. The first of these interaction effects is illustrated in Figure 7.1. Figures were created by using the regression equation to obtain predicted scores on the dependent variable for various combinations of the independent variables. The relationship between attachment anxiety and pre-sleep arousal was negligible amongst single individuals (i.e., a flat line in Figure 7.1). In contrast, amongst regular co-sleepers, the slope of the line in Figure 7.1 suggests attachment anxiety is positively associated with pre-sleep cognitive arousal. The second interaction effect is illustrated in Figure 7.2. As shown in Figure 7.2, the relationship between avoidance and pre-sleep cognitive arousal varied as a function of the co-sleeping variable. The relationship is positive amongst single individuals and negative amongst regular co-sleepers. It should be cautioned that the possibility of a Type 1 Error increases when probing an interaction is not possible beyond visually examining the slopes as this is arbitrary.

7.2.6.6 Pre-Sleep Somatic Arousal. The initial model with Step 1 was statistically significant, $F(5,290) = 26.27$, $p < .001$, and accounted for 30.0% of the variance in the dependent variable. The significant predictors in this model were age (β = -.16, p = .002), depression (β = .24, $p < .01$), having a health condition that affects sleep (β = .38, $p < .01$), and attachment avoidance (β = .38, $p < .01$). The addition of the co-sleeping variables in Step 2 significantly improved the model [$F_{\text{change}}(2,288) = 3.52$, p = .03]. The final model with Step 2 was statistically significant, $F(5,290) = 26.27$, $p < .001$, and accounted for 31.2% of the variance in the dependent variable. In this model, age (β = -.14, p = .006), depression (β = .23, $p < .001$), having a health condition that interferes with sleep (β = .37, $p < .001$), and regular co-sleeping (β = -.16, p = .01) were predictive of pre-sleep somatic arousal. These findings are presented in Table 7.10. The addition of Step 3 (interaction terms) did not significantly improve the model, $F_{change}(5,283) = .67$, p = .65.

7.2.6.7 Sleep Hygiene Practices. Whether attachment anxiety and avoidance predicted participants' ratings of four distinct categories of sleep hygiene practices above and beyond the covariates (i.e., age, depression, and having a health condition that disrupts sleep) was tested. Table 7.11 reports the significant findings of these models, and they are described below.

7.2.6.7.1 Sleep Scheduling. The model including Step 1 was statistically significant, $F(5,290) = 23.36$, $p < .001$, and it accounted for 28% of the variance in the dependent variable. Age (β = -.26, $p < .001$) negatively predicted engagement in poor sleep scheduling practices, and

depression (β = .31, p < .001), as well as having a health condition that interferes with sleep (β = .12, p = .02), each positively predicted engagement in poor sleep scheduling practices. Attachment anxiety (β = .12, p = .03) positively predicted engagement in poor sleep scheduling practices even after accounting for the influence of age, depression and having a health condition that affects sleep. The addition of Step 2 (co-sleeping variables) and Step 3 (interaction terms) did not significantly improve the overall model [F_{change} (2,288) = 1.38, p = .25; F_{change} (5,283) = .40, p = .85; respectively].

7.2.6.7.2 Pre-sleep Eating and Drinking. The model including Step 1 was statistically significant, F(5,290) = 8.02, p < .001, and it accounted for 11% of the variance in the dependent variable. Age (β = -.12, p = .04) negatively predicted engagement in poor pre-sleep eating and drinking practices, and depression (β = .17, p = .01), as well as having a health condition that interferes with sleep (β = .18, p < .01), each positively predicted engagement in poor pre-sleep eating and drinking practices. Attachment avoidance (β = .12, p = .04), but not anxiety, positively predicted engagement in poor pre-sleep eating and drinking practices. The addition of Step 2 (co-sleeping variables) and Step 3 (the addition of interaction terms) did not significantly improve the overall model [F_{change} (2,288) = 2.13, p = .12; F_{change} (5,283) = .73, p = .60; respectively].

7.2.6.7.3 Sleep Environment Practices. The model including Step 1 was statistically significant, F(5,290) = 10.94, p < .001), and it accounted for 14.4% of the variance in the dependent variable. Age (β = -.12, p = .03) negatively predicted engagement in poor sleep environment practices. Depression (β = .16, p = .01) as well as having at least one health condition that interferes with sleep (β = .28, p < .001) each positively predicted engagement in poor sleep environment practices. Attachment avoidance (β = .11, p = .05) positively predicted engagement in sleep environment practices. The addition of Step 2 (co-sleeping variables) and Step 3 (interaction terms) did not significantly improve the overall model [F_{change} (2,288) = .99, p = .37; F_{change} (5,283) = .20, p = .96, respectively].

7.2.6.7.4 Arousing Activities. The model including Step 1 was statistically significant, F(5,290) = 23.77, p < .001, and it accounted for 27.8% of the variance in the dependent variable. Depression (β = .24, p < .001) and having a health condition that interferes with sleep (β = .27, p < .001) each positively predicted engagement in arousing activities, and age negatively predicted engagement (β = -.15, p = .01). Attachment anxiety (β = .15, p = .01) positively predicted

engagement in pre-sleep arousing activities. The addition of Step 2 (co-sleeping variables) and Step 3 (interaction terms) did not significantly improve the overall model [F_{change} (2,288) = 1.14, p = .32; F_{change} (5,283) = .62, p = .68; respectively].

7.2.7 Regression Analyses for Individuals who Bedshare

The variables explored in these regression analyses were sleep environment agreement with bedpartners, and frequency of neutral and pleasant pre-sleep talk with partners. A subsample of participants was used to conduct the following regression analyses (n = 158).

7.2.7.1 Sleep Environment Agreement with Bedpartners. The initial model with Step 1 was statistically significant, F(1,148) = 13.16, p < .001, and accounted for 7.5% of the variance in the dependent variable. There was a significant positive effect for couple satisfaction (β = .29, p < .01). Attachment anxiety, avoidance and/or their interaction were introduced in the model to explore their incremental predictive power (Steps 2 and 3). Further details of this model are reported in Table A.6. The addition of Step 2 (attachment variables) and Step 3 (interactions) did not significantly improve the model [F_{change} (2,146) = .92, p = .40; F_{change} (1,145) = 1.61, p = .21; respectively].

7.2.7.2 Quality and Frequency of Pre-sleep Talk and Attachment. Participants reported on the frequency of their unpleasant, pleasant, and neutral pre-sleep talk with their partners. Correlation analyses revealed that attachment was not related to unpleasant pre-sleep talk. Therefore, regression analyses were only performed on the two remaining pre-sleep talk variables.

7.2.7.2.1 Pleasant Pre-sleep Talk with Partners. The initial model with Step 1 was statistically significant, F(1,153) = 55.83, p < .001, and accounted for 26.3% of the variance in the dependent variable. There was a significant positive effect for couple satisfaction (β = .52, p < .01). The addition of Step 2 improved the model [F_{change} (2,151) = 4.36, p = .01]. It was statistically significant, F(3,151) = 22.33, p < .001, and it accounted for 29.4% of the variance in the dependent variable. Attachment anxiety (β = .17, p = .02) and avoidance (β = -.18, p = .02) predicted the frequency of pleasant pre-sleep talk with partners after accounting for the influence of couple satisfaction (β = .48, p < .001). The addition of Step 3 (interaction) did not significantly improve the overall model [F_{change} (1,150) = .05, p = .82]. Details of the final model including Step 2 are reported in Table 7.12.

7.2.7.2.2 Neutral Pre-sleep Talk with Partners. The initial model with Step 1 was statistically significant, $F(1,153) = 11.90$, $p < .01$, and accounted for 6.6% of the variance in the dependent variable. There was a significant positive effect for couple satisfaction ($\beta = .27$, $p<.01$). The addition of Step 2 improved the model [$F_{change}(2,151)= 6.19$, $p < .01$)]. It was statistically significant, $F(1,151) = 8.36$, $p<.001$, and it accounted for 12.5% of the variance in the dependent variable. Attachment anxiety ($\beta = .27$, $p < .01$) and avoidance ($\beta = -.17$, $p = .05$) predicted the frequency of neutral pre-sleep talk with partners after accounting for the influence of couple satisfaction ($\beta = .27$, $p < .01$). The addition of Step 3 (interaction) did not significantly improve the overall model [$F_{change}(1,150) = .09$, $p = .76$]. Details of the final model including Step 2 are reported in Table 7.12.

7.2.8 Mediation Analysis with Total Sample

7.2.8.1 Variables of Interest. Based on the findings of regression analyses and correlations between sleep outcomes and attachment variables using the entire sample (see Table A.4), potential variables that could mediate the association between an attachment dimension and sleep were identified. If a sleep-related potential mediator was a) significantly correlated with a sleep outcome (i.e., sleep quality or daytime sleepiness), b) predicted by at least one attachment dimension, and c) the identified attachment variable predicted a sleep outcome correlated with the potential mediator, the variable in question was considered as a mediator (see Table 7.13). Criteria b and c were based on the multiple regression analyses that accounted for potential confounds (age, depression, and health status). Variables that met the criteria to be considered mediators were electronic device use in bed, dysfunctional beliefs about sleep, sleep scheduling, arousing activities. The relationship between attachment anxiety and daytime sleepiness was the only robust association between an attachment variable and a sleep outcome. Though pre-sleep cognitive arousal was not correlated with daytime sleepiness, it was still included in the model as a covariate due to its relation to attachment and other sleep-related variables. Attachment avoidance was not entered into the model because it did not predict daytime sleepiness. Lastly, variables provided by people in relationships only were not entered into the model since sample size for these variables were limited. The potential mediators and the criteria to be considered as a mediator can be found in Table 7.13. Covariates added to the model were age, depression, having a health condition that affects sleep, and frequent co-sleeping (a dichotomous yes/no variable).

7.2.8.2 Model fit. Chi square goodness of fit index was equal to $\chi^2(4, 309) = 2.23$, $p = .69$, indicating appropriate model fit. Model fit indices indicated a good fit of the data to the hypothesized structure. The root mean square error of approximation (RMSEA) was equal to zero, with 90% confidence intervals ranging from zero to .07, all of which were under the recommended cut-off of .1. RMSEA of the null or independence model exceeded .158, a recommended rule of thumb (Kenny, 2020). The comparative fit index (CFI) value was equal to 1.0, which exceeded the recommended cut-off of .9, suggesting that over 90% of covariation in the data can be reproduced by the model. The standardized root mean square residual (SRMS) was equal to .01, which was below the recommended cut-off of .05. It should be noted that as degrees of freedom approach zero (i.e., just-identified), model fit statistics can become inflated and as free parameters added increase, it can decrease the value of χ^2. However, this is particularly a problem when parameters are added without justification and the model is not theory-driven (Kline, 2016). Further, the model's matrix of standardized residuals, which represent the difference between the observed covariance matrix and the estimated covariance matrix for each pair of observed variables, were also examined closely when determining model fit to support the appropriateness of the model. It has been recommended that if a residual value exceeds 2.58 (i.e., two standard deviations away from the mean), it is indicative of model misspecification (Collier, 2020). Only one pair of variables (daytime sleepiness and pre-sleep cognitive arousal) exceeded this value, so the model was respecified with covariation between the two variables, which is a recommended practice (Collier, 2020). Standardized residuals were deemed appropriate. They can be found in Table A.7 in Appendix A.

7.2.8.3 Indirect effects. Given that the primary purpose of this specific analysis was to test the potential for four variables (i.e., dysfunctional beliefs about sleep, electronic device use in bed, sleep scheduling, and arousing activities) to mediate the relationship between attachment anxiety and daytime sleepiness (i.e., the only sleep outcome predicted by attachment), main effects of the covariates (depression, age, having a health condition that affects sleep) were not interpreted. The complete findings for direct effects can be found in Table 7.14. Direct effects of attachment anxiety and potential mediators are illustrated in Figure 7.3.

As shown in Table 7.15, the significant indirect effects of attachment anxiety on sleep quality were examined. The association between attachment anxiety and daytime sleepiness was mediated by dysfunctional beliefs about sleep ($b = .10$, $p = .01$, 95% CI = [.02, .21]), but not

electronic device use in bed, sleep scheduling, or arousing activities. Engagement in arousing activities marginally missed significance as a mediator between attachment anxiety and daytime sleepiness (b = .06, p = .06, 95% CI = [-.002, .16]). When participants were greater in attachment anxiety, they tended to have stronger dysfunctional beliefs about sleep, which in turn, predicted greater daytime sleepiness. There was no direct effect of attachment anxiety on daytime sleepiness, suggesting the occurrence of full mediation by dysfunctional beliefs about sleep. This indicated that individuals with greater attachment anxiety experienced stronger dysfunctional beliefs about sleep, which in turn, predicted greater daytime sleepiness.

7.2.8.4 Statistical Power (Post-Hoc) for Mediation. Power for the indirect effect of attachment anxiety on daytime sleepiness through dysfunctional beliefs about sleep was equal to .69. This is considered low as .8 is the recommended cut-off (Riedl et al., 2014).

7.3 Study 2 Discussion

The findings of Study 1 were indicative of an association between individuals' attachment anxiety and their sleep (i.e., actor effects), as well as the interdependence between romantic couples as it pertained to sleep quality (i.e., partner effects). To build on these findings, as well as those of past research on attachment and sleep, Study 2 explored a wide range of subjective indicators of sleep quality to identify potential mechanisms responsible for actor and partner effects. Since partner effects are still understudied, testing mechanisms to understand partner effects was not a focus of Study 2. Rather, identifying some potential partner-related mediating variables was necessary so that they could be tested in future research. Age and two potential confounding variables (i.e., depression and having a health condition that interferes with sleep) were included in Study 2. Variables of interest included global indicators of sleep, such as sleep quality and daytime sleepiness, as well as sleep-related variables that could be mediators of the attachment-sleep associations, such as dysfunctional beliefs about sleep, electronic device use in bed, pre-sleep cognitive and somatic arousal, and sleep hygiene (i.e., sleep environment, arousing activities, sleep scheduling, and pre-sleep eating and drinking). Furthermore, data was collected on participants' perceptions of their partners' pre-sleep behaviours, co-sleeping behaviours, and sleep behaviours to make hypotheses about why partner effects of attachment variables on sleep exist.

In general, it was predicted that attachment insecure individuals would be more likely to have cognitions and engage in behaviours that interfere with sleep (e.g., pre-sleep cognitive

arousal) and, as a result, they would have impaired global indicators of sleep (e.g., diminished sleep quality). Tables 5.1 and 5.2 contain the hypotheses for associations between attachment insecurity and the sleep-related variables explored in this investigation. Indeed, attachment anxiety was correlated with these variables in the expected direction. It was associated with some unhealthy sleep-related practices, such as electronic device use in bed, pre-sleep eating and drinking, poor sleep scheduling, poor sleep environment habits, arousing activities before bed (e.g., exercise), and some pre-sleep substance use.

After accounting for the effects of the covariates (i.e., age, depressive symptoms, and having a health condition that disrupts sleep) in the multiple regression analyses, attachment anxiety still predicted the following: daytime sleepiness, electronic device use in bed, dysfunctional beliefs about sleep, pre-sleep cognitive arousal, sleep scheduling, and arousing activities. There were fewer significant multiple regression findings relative to the number of significant correlation findings. Attachment anxiety was not predictive of sleep quality, suggesting that this attachment dimension might affect more specific correlates of sleep quality (e.g., pre-sleep cognitive arousal) or possible mediators of sleep quality rather than sleep outcomes. Likely, attachment anxiety was not predictive of sleep quality in contrast to earlier studies because previous studies had not considered important covariates included in the current study. Furthermore, it is possible that attachment anxiety interacts with other factors, such as frequent co-sleeping, to predict sleep-related disturbances (e.g., pre-sleep cognitive arousal), which is supported by the current findings. Attachment anxiety was not correlated with many sleep-related substance use variables. The general prediction that attachment anxiety would be associated with variables that could represent a hyperactivating secondary attachment strategy (i.e., high arousal and activities that might be indicative of hypervigilance) was met overall, though not to the robust extent that was predicted. More specifically, attachment anxiety was associated with pre-sleep cognitive arousal, electronic device use in bed, dysfunctional beliefs about sleep, and pre-sleep arousing activities (e.g., watching television before bed), but it did not have significant associations with pre-sleep eating and drinking, poor sleep environment habits or pre-sleep substance use. Attachment anxiety was also not associated with somatic arousal, suggesting that attachment anxiety predicts cognitive arousal specifically.

Given that past research has found inconsistent findings on the association between attachment avoidance and sleep, we did not have specific hypotheses for attachment avoidance.

Attachment avoidance was correlated with somatic arousal but not cognitive arousal, and correlated with some poor sleep-related practices, such as pre-sleep eating, poor sleep environment habits, arousing activities, and pre-sleep substance use (i.e., alcohol use, cigarette use, stimulants). After accounting for the effects of having a health condition that disrupts sleep, age, depressive symptoms, and attachment anxiety in the multiple regression analyses, attachment avoidance emerged as a predictor of pre-sleep eating and drinking (positive direction) and pre-sleep cognitive arousal (negative direction), but not pre-sleep somatic arousal. The finding between attachment avoidance and pre-sleep cognitive arousal was surprising considering that it was not correlated with pre-sleep cognitive arousal. These findings suggest that attachment avoidance might be better at predicting specific sleep-related behaviours than at predicting compromised sleep. This could explain the inconsistent findings found throughout the research on attachment and sleep.

These results support the notion that attachment avoidant individuals tend to engage in deactivating strategies and use external methods of regulating emotion. For example, attachment avoidance was correlated with many pre-sleep substance use behaviours and predicted pre-sleep eating and drinking in the regression analyses. However, findings were mixed since attachment avoidance did not emerge as a robust predictor of pre-sleep arousing activities (using a different measure than the pre-sleep arousal scale) or electronic device in bed, measures that represent external methods of regulating emotion.

Co-sleeping arrangements were also added to models predicting indicators of sleep quality and pre-sleep behaviours. When these variables were added, all of the significant main effects of attachment anxiety found in Step 1 of the regressions remained in Step 2, but none of the significant main effects of attachment avoidance found in Step 1 of the regressions remained in Step 2. Co-sleeping arrangements were generally unrelated to the sleep variables. The two exceptions were pre-sleep cognitive and somatic arousal. Occasional co-sleeping, but not regular co-sleeping, was associated with increased pre-sleep cognitive arousal. Regular co-sleeping was associated with decreased pre-sleep somatic arousal. These findings indicate that individuals' sleeping arrangements might influence pre-sleep cognitive arousal. However, if individuals are regulars in their co-sleeping arrangement, it may be beneficial for downregulating pre-sleep somatic arousal.

To investigate whether the attachment-sleep association is moderated by the context of sleep arrangements, interactions between attachment dimensions and co-sleeping arrangements were also entered into regression models. However, significant findings only emerged when pre-sleep cognitive arousal was the dependent variable. Interactions of attachment anxiety with regular co-sleeping and attachment avoidance with regular co-sleeping were positively and negatively (respectively) predictive of pre-sleep cognitive arousal. These findings indicated that individuals with higher attachment anxiety who co-slept regularly had greater pre-sleep cognitive arousal compared to their single, high attachment anxiety counterparts (see Figure 7.1). This was unexpected given that co-sleeping with a partner appears to be a soothing activity on the surface. Anxious individuals have a greater need for closeness that may not be adequately met during the day (e.g., reassurance) or during co-sleeping (e.g., physical closeness, reassurance), which could trigger pre-sleep cognitive arousal. Alternatively, attachment anxious individuals might experience increased pre-sleep cognitive arousal with physical proximity since their partners represent a stressor. Further research is warranted to understand this paradoxical finding.

Findings also indicated that individuals with low attachment avoidance had greater pre-sleep cognitive arousal when they bedshared regularly compared to their single, low avoidance counterparts (see Figure 7.2). High attachment avoidance in singles and partnered individuals were comparable in terms of pre-sleep cognitive arousal. Individuals who were low in avoidance and co-slept with partners might experience higher levels of pre-sleep arousal than single individuals with low attachment avoidance because their bedtime interactions with their partners could be stimulating. Indeed, correlation analyses conducted with the sample of co-sleepers indicated that those low in attachment avoidance engaged in more neutral and positive pre-sleep talk than those higher in avoidance. These conversations might have benefits, such as strengthening their relationships, but they might also increase their pre-sleep cognitive arousal levels. Additional research is warranted to obtain a more detailed understanding of bedtime behaviors that could result in increased cognitive arousal.

Lastly, findings on bedsharing and attachment suggested that attachment avoidant individuals experience some interruptions to their sleep by their partners. Greater attachment avoidance was correlated with more occurrences of being awakened to have sex and to talk about something. Despite this finding, their overall quality of sleep did not appear to be disturbed, which is challenging to reconcile. It might be worthwhile to explore whether this is accurate in

subsequent investigations. To this end, it might be beneficial to incorporate both subjective (e.g., self-report) and objective (e.g., actigraphy) methods of data collection to ensure there is no discrepancy between indicators of sleep quality for these individuals.

To the author's knowledge, Study 2 is the first study to include and test a theoretical model of attachment on sleep disturbance, and mechanisms that could explain the relationship. This investigation revealed that stronger dysfunctional beliefs about sleep is a mechanism by which attachment anxiety predicts daytime sleepiness, even after considering the effects of relevant and often ignored covariates (i.e., age, depression, having a health condition that affects sleep, and frequent co-sleeping). The sample size for this analysis was limited and power was equal to .69. which was relatively low. Therefore, it would be wise to replicate this finding and explore other potential mediators in future research using a larger sample that would provide greater statistical power. The indirect effect of attachment anxiety on daytime sleepiness was full (i.e., there was no direct effect), suggesting that it only affects daytime sleepiness through this mediator. Importantly, this finding highlights the importance of studying all aspects of sleep disturbance than relying on sleep quality ratings only.

Co-sleeping behavior in romantic couples is considerably understudied. As a result, an important goal of Study 2 was to learn about the frequency of co-sleeping behaviours in romantic relationships. Most research on attachment and sleep has not collected data on co-sleeping arrangements or related issues (see Table 2.1). While determining whether co-sleeping is helpful to sleep was not a focus of Study 2, it should be noted that individuals who co-slept regularly (i.e., five to seven nights per week; $n = 118$) perceived benefits to co-sleeping, mainly the promotion of intimacy and togetherness. These individuals tended to report agreement with their partners on sleep environment preferences. Most of these participants reported having conversations about pleasant or neutral topics before bed and over half of them endorsed never or rarely having unpleasant or stressful conversations before bed. Further, greater couple satisfaction was correlated with less daytime sleepiness, suggesting some protective impact of relationship satisfaction on sleep. Despite these positive findings, a considerable proportion of individuals with bedpartners endorsed having some degree of sleep disruption attributable to partners. Around half of participants reported that their partners disrupted their sleep at least occasionally. Attachment anxiety had small positive correlations with their reports of partners snoring and partners making other noises in their sleep, suggesting that people higher in anxiety

may be more sensitive to noises during sleep. Attachment anxiety also had small, positive correlations with partners having inconsistent sleep scheduling, pre-sleep drinking behaviours, and partners falling asleep with the television on or music playing. These are behaviours that could affect both partners.

Interestingly, attachment avoidance was associated with reports of partners intentionally disrupting participants' sleep to have sex and to talk, which could possibly indicate that they are not meeting their partners' needs when awake. However, it might also reflect the neediness of their partners. Attachment avoidance was also associated with bedpartners' pre-sleep consumption of stimulating substances (e.g., nicotine, caffeinated drinks), indicating that their partners may be more likely to utilize these coping strategies. Further research is warranted to corroborate these findings and better understand why they exist.

The attachment variables were associated with the frequency of pleasant and neutral bedtime talk and sleep environment agreement with partners (see Table 10). Interestingly, when participants' attachment avoidance was low, their agreement of sleep environment preferences with their partners was greater. This might indicate that individuals who are low in attachment avoidance (i.e., individuals who are more securely attached) are better at managing disagreements and compromising, which could benefit co-sleeping. Indeed, one study found that individuals with attachment security who had been in romantic relationships were more likely to use appropriate conflict resolution strategies (e.g., compromising) than attachment insecure individuals (Pistole, 1989). In the current study, when partners had high attachment avoidance, participants tended to endorse experiencing greater sleep interruptions by their partners to have sex or to talk. The same finding was not found with the partners of attachment anxious individuals. This could indicate that individuals who are attachment avoidant may not be meeting relationships needs of their partners, prompting their partners to interrupt their sleep. Attachment avoidance was found to negatively correlate with couple satisfaction, and a trend of greater relationship satisfaction in attachment secure individuals compared to attachment insecure individuals has been found in other research (Pistole, 1989).

Attachment anxiety positively predicted the frequency of pleasant and neutral conversations with partners before sleep after accounting for the influence of couple satisfaction, whereas attachment avoidance negatively predicted the frequency of pleasant and neutral conversations with partners before sleep after accounting for the influence of couple satisfaction.

This difference is consistent with what is understood about attachment anxiety, characterized by proximity seeking to an attachment figure, usually by exaggerated strategies, and attachment avoidance, characterized by distancing from an attachment figure, usually by maintaining self-reliance and control or denying one's needs. Pleasant and/or neutral conversations could represent strategies aimed at connection, which is an important and often unmet need of those high in attachment anxiety. Frequent activities of this type of process could be responsible for the relatively heightened pre-sleep cognitive arousal of regular co-sleepers high in anxiety (see Figure 7.1). Conversely, a relatively low frequency of such conversations is consistent with the objective of emotional distance, which is characteristic of those high in attachment avoidant. This type of process could be responsible for the relatively low level of pre-sleep cognitive arousal of regular co-sleepers high in avoidance (see Figure 7.2).

Chapter 8: Discussion

Based on the general hypothesis that attachment insecurity is a risk factor for sleep disturbance, the overarching goal of this research was to examine the association between attachment insecurity and sleep. It was proposed that those higher in attachment insecurity were more likely to have characteristics that predisposed them towards engagement in behaviours that perpetuate sleep disturbance. Furthermore, it was proposed that there would be partner effects of attachment on sleep, likely through sleep-related characteristics and behaviours of those higher in attachment insecurity.

This investigation explored the attachment-sleep association using a dyadic analysis with a sample of romantic couples. Consistent with expectations, attachment anxiety predicted sleep problems in Study 1. Study 1 also found support for partner effects of attachment on sleep. In other words, the greater an actor's attachment anxiety, the poorer the sleep quality of the actor and their partner, even after controlling for the effects of the actor's own attachment anxiety. There is a caveat that should be considered: This finding exists without controlling for depression because the data was originally collected for a different investigation. Nevertheless, this is a significant, novel finding because health was accounted for, which has not been done previously in studies of attachment and sleep in couples. Further, the finding on partner effects suggests that partners' behaviours are an important but often missing piece of information in the study of sleep. This invites further research aimed at exploring the mechanisms about why this partner effect might exist. To our knowledge, this type of research has only been conducted twice before by Xie et al. (2022) and Kent de Grey et al. (2019). Study 1 represents the third project to better understand why partner effects of attachment on sleep exist, discussed further later on in this chapter.

Attachment anxiety is characterized by the use of hyperactivating strategies when a threat is perceived, which are exaggerated attempts to get an unreliable or insufficiently responsive attachment figure to meet the individual's need for protection, attention, or support (Mikulincer & Shaver, 2007). In terms of the "fight-or-flight" activation of the body for survival, Mikulincer

and Shaver (2007) view hyperactivating strategies as a "fight" response. This suggests there would be physiological activation of the sympathetic nervous system that is chronic (Curtis & O'Keefe, 2002). In line with this, Study 2 found that individuals who are attachment anxious exhibited difficulties down-regulating before bed, observed as increased pre-sleep cognitive arousal and stronger dysfunctional beliefs about sleep.

This investigation revealed that attachment anxiety and daytime sleepiness was fully mediated by dysfunctional beliefs about sleep, even after controlling for two potential confounding variables (depressive symptoms and having a health condition that disrupts sleep) and age. It appears that attachment anxious individuals are more likely to experience difficulties down-regulating worries about sleep that ultimately impact their sleep. There are a few possibilities to explain this. These cognitive difficulties could introduce anxiety throughout the day that makes it challenging to obtain restful sleep, which leads to daytime sleepiness. It is also possible that individuals are sleepier during the day because they are constantly thinking about sleep. This is supported by earlier research on thought suppression and rebound effects, which indicates that thought suppression of a state may predict and/or prolong the state (Wenzlaff & Wegner, 2000). Alternatively, given the hypervigilance that is seen in attachment anxiety, these individuals may pay more attention to their energy levels or sleepiness and thus provide higher reports of being sleepy during the daytime.

Conversely, the same "fight" pattern that is observed in individuals with attachment anxiety is not observed in individuals with attachment avoidance. Rather, these individuals exhibit more of a "flight" response (Mikulincer & Shaver, 2007), which could be protective for sleep. In support of this, Study 2 revealed mostly null associations between attachment avoidance and sleep-related variables. Nevertheless, individuals with attachment avoidance might still be at risk of interfering with their own sleep through maladaptive coping behaviours, though this might present differently than what is commonly observed with attachment anxious individuals, and the strategies enacted by attachment avoidant individuals may not have major implications on their sleep. More specifically, Study 2 found that attachment avoidance predicted eating and drinking behaviours right before sleep, but there was no support to suggest that pre-sleep eating and drinking could mediate the association between attachment avoidance and sleep because attachment avoidance was not strongly linked to sleep outcomes. This is consistent with previous research on attachment avoidance and sleep. While attachment avoidant individuals

tended to engage in more substance use pre-sleep based on correlational analyses, it is important to replicate these findings using statistical analyses that can provide more detail about the nature of these associations.

Importantly, Study 2 also investigated the role of sleeping arrangements and general co-sleeping occurrences. This was a necessary program of research because empirical studies on sleep have tended to focus on the individual experience. The investigation found that individuals chose to co-slept with partners mostly to promote intimacy and togetherness, yet considerable proportions of individuals identified their bedpartner as a source of intentional and unintentional disturbance to their sleep. This is an interesting paradox when one considers the health benefits that emerge from being in a romantic relationship with intimacy (Stadler et al., 2012), as well as the deleterious effects on health that arise from longstanding poor sleep quality. To ensure that the effects of sleep disturbance by partners on general health is better understood, it would be beneficial for future research to clearly evaluate the sleep enhancing and interfering properties of romantic relationships and co-sleeping. The current findings raise questions about whether the promotion of intimacy is a protective factor for challenges experienced with sleep loss compared to those without an intimate relationship. It would also be worthwhile to explore whether individuals in bedsharing relationships who are experiencing regular partner-related sleep loss have an appraisal of their sleep quality that is aligned with objective measures of their sleep quality.

8.1 Strengths

The aim of both studies was to better understand the association between attachment and sleep, which is an understudied area as only 20 studies have been conducted on the subject (see Table 2.1). The overall strength of this research is that it had several unique methodological features relative to past research in the area. First, a dyadic statistical approach that required data from both members of couples was adopted. To date, only three studies have used a dyadic approach, the APIM, to explore the association between attachment and sleep. The current investigation adds to the growing research supporting partner effects of attachment on sleep, and it found support for the robust effect of attachment anxiety on sleep despite accounting for general health.

Second, Study 2 collected data on co-sleeping. Most studies on attachment and sleep in adults have not collected data on co-sleeping. Table 2.1 demonstrated that only 5 of the 20

known studies collected this data, which is surprising considering that bedpartners could be sources of sleep disturbance. It would be important to replicate current findings on co-sleeping to determine whether it is appropriate in a theoretical model of sleep disturbance. Since there was limited support for co-sleeping as a factor that could lead to sleep disruptions (e.g., if co-sleeping interacts with pre-sleep cognitive arousal, if there are nighttime awakenings occurring between co-sleepers), there remain questions about its role in models of sleep disturbance that can be better addressed by future research. Hughes et al.'s (2018) model of sleep disturbance discussed the role of social support, which is an overlooked factor among earlier models, and it would be enhanced by a clearer idea of how co-sleeping and co-sleeping rituals (e.g., pre-sleep talk with partners) factor into the maintenance of or protection against sleep disturbance.

Third, the findings from the current research highlight the value of considering multiple components of sleep when studying sleep disturbance. Sleep disturbance is a multifaceted experience that transcends quality. It may not suffice to study a broad construct such as sleep quality because it could limit a deeper understanding about sleep disturbance. Investigations of sleep disturbance that are limited to a single self-report measure of sleep quality do not fully capture the real-world experiences. Most of the succeeding studies used a general measure of sleep quality (e.g., the Pittsburgh Sleep Quality Index) whereas the present investigation used a variety of indicators of sleep beyond sleep quality, including but not limited to specific pre-sleep behaviours (e.g., pre-sleep arousal and pre-sleep eating and drinking) and daytime sleep-related behaviours (e.g., daytime sleepiness) to better understand the association between attachment and sleep. Although the original plan to investigate how attachment relates to sleep efficiency and insomnia disorder was forfeited for unforeseen reasons, the investigation still represents one of the few empirical endeavours to understand how attachment affects sleep disturbance in a broad sense. Further to this point, another strength of this investigation is it made important, novel contributions to understandings of attachment specifically on sleep. Mediation analyses revealed that dysfunctional beliefs about sleep is a strong mechanism by which sleep disturbance could develop or be maintained when individuals have attachment anxiety.

Fourth, this research investigated the attachment-sleep association while controlling for the effects of robust predictors of sleep: depression and health. Sleep disturbance is a common symptom of depression, and it is included in diagnostic criteria for major depressive disorder (American Psychiatric Association, 2022). As such, it is reasonable that it has been treated as a

covariate in some studies on attachment and sleep (e.g., Carmichael & Reis, 2005; see Table 2.1). However, health has not been afforded the same degree of importance in this research area. The present study collected information on general health (Study 1) and asked participants whether they had a variety of health conditions that interfered with their sleep (Study 2), each of which was then used as a covariate in their respective studies. This was done to address the limitation of previous research of ignoring health. In previous studies, health status could have acted as a confounding variable because it is a strong correlate of attachment anxiety (McWilliams & Bailey, 2010; Pietromonaco & Beck, 2019) and sleep (e.g., Luyster, Strollo, Zee, & Walsh, 2012), which could have led to inaccurate interpretations. For example, it was possible that health, not attachment anxiety, explained a considerable amount of variance in the experience of sleep disturbance. By addressing this limitation, the current investigation provided strong support for the robustness of attachment anxiety as a predictor of sleep, among individuals and couples. This is a significant finding for clinical treatment of sleep disturbance among people with an incurable health condition present that affects their sleep who could also have treatable factors, such as attachment insecurity.

Study 2 of this research considered a wide range of variables that might be mechanisms linking attachment insecurity and sleep and most of these have not been investigated previously. Regression analyses were used to identify robust predictors of sleep-related outcomes, and these were then used to propose and test a mediational model. SEM was employed to this end, which makes this investigation only the third investigation to propose a model that links attachment insecurity and sleep disturbances via specific mediators (Xie et al., 2022; Kent de Grey et al., 2019). As well, those in relationships were asked about their interactions with partners at bedtime. This was a novel feature within the attachment and sleep research area. Given that the frequency of positive and neutral conversations was predicted by attachment anxiety and avoidance, and greater frequency of these conversations were correlated with poorer sleep quality, it is likely a promising direction for future research. Exploration of this variable considers the day-to-day sleep environment factors that are often not given attention in previous research on sleep. It would be worthwhile to build on findings from this research by exploring whether types of conversations with bedpartners before bed is playing a role in sleep disturbance for both members of the relationship.

This investigation also took a necessary step into understanding possible ways in which individuals influence partners' sleep quality. While most of this data was descriptive and correlational, this is the first step into learning about co-sleeping in general, an understudied area. Among the published studies using dyads, co-sleeping related behaviour, including partner disturbances, pre-sleep conversations, and degree of partner agreement with sleep environments, has either not been collected at all or not done in sufficient detail to understand what co-sleeping typically looks like among romantic couples. This data suggests that co-sleeping factors (e.g., partner-related awakenings and pre-sleep conversations) might be a worthwhile area to continue probing seeing as how a considerable number of adults in relationships co-sleep and likely have expectations to co-sleep in order to promote intimacy in the relationship. The juxtaposition of partner-related sleep disturbance and closeness with one's partner, both of which could arise from co-sleeping, would be an interesting line of research to pursue.

8.2 Limitations

The investigation also had several limitations that make it challenging to generalize findings. In terms of Study 1, model fit statistics could not be computed for the APIM. Another limiting factor was the sample size. Given that it is difficult to recruit couples, Study 1 had a relatively small sample size of couples. Although statistical power was appropriate to conduct the APIM, the sample size limited the interpretability and robustness of interactions between attachment dimensions and partners. Our findings were inconsistent with past investigations of such interactions, and it would be remiss to conclude confidently that there were no interaction effects considering that the addition of more variables with the current sample size limits the strength of findings. A final limitation of Study 1 relating to the sample was that co-sleeping data was not collected. Given that this study makes hypotheses and conclusions about whether partners affect each other's sleep, co-sleeping frequency could have been important data to better understand the contexts in which this association exists. More specifically, it would have been useful to know whether actor attachment affects partner sleep only when they bedshare or cohabit, or whether the effect of actor attachment on sleep remains even when partners live and sleep apart.

There were also limitations to the generalizability of Study 2 in the following ways. The focus of Study 2 was on sleep disturbances that could represent short-term problems. For example, the insomnia severity index and the Epworth sleepiness scale are measures that ask

about present sleep-related symptoms rather than longstanding sleep disturbances. An attempt was made at exploring insomnia disorder, chronic sleep disturbance, as defined by the *DSM-5-TR* (American Psychiatric Association., 2022), but this was not possible due to the low response rate. Therefore, it is possible that the findings of the study are limited to short-term sleep disturbance. Attachment anxiety was weakly correlated with sleep quality, but there was not a main effect of attachment anxiety on sleep quality in the multiple regression in the present study. This ran counter to previous findings on attachment and sleep. It is possible that attachment anxiety might be more strongly related to chronic insomnia than to more short-term sleep disturbance, and this possibility could not be explored in Study 2. It is recommended that future studies address this limitation by replicating the current findings with a sample of individuals with chronic sleep disturbance.

Further to the point on limited generalizability, the subsample of participants in relationships in Study 2 was relatively small. Although we had many participants interested in completing the study who had started the survey, there was a significant drop off, likely due to the length of the online survey. The relationship data collection portion of the survey was placed in the latter half of the survey, which might have limited the amount of data collected from participants in relationships. Further, one subsample (occasional co-sleepers) was relatively small compared to frequent co-sleepers and single individuals. The same argument for a larger sample could be made for Study 2 since SEM was conducted. SEM requires a substantial sample size, especially when it is a complex model. Although the current sample size was considerable, it would be wise to replicate findings with a larger sample because there was insufficient power to be fully confident with the findings on indirect effects. If power is low, then the probability of detecting a true effect is reduced, leading to Type 2 error. For example, in one case, a probable mediator (i.e., arousing activities) marginally missed significance. This is important to consider for researchers seeking to replicate the current investigation.

Given the large number of statistical tests conducted, Type 1 error is a possibility. Thus, the decision to not account for this by adjusting the critical *p*-values used could be considered a limitation. However, it should be noted that the selection of variables for the multiple regression analyses, which are the primary focus on the research, was based on theory and past research. Furthermore, the regression analyses were only conducted when the preliminary correlation analyses indicated an association between an attachment insecurity variable and a sleep variable.

A main function of the regressions was to determine whether attachment variables were significant predictors of sleep variables after controlling for relevant covariates. This approach yields a very stringent test of the association between attachment variables and the sleep-related variables. Thus, correcting for the number analyses was deemed unnecessary.

There were some shortcomings related to the open-ended (i.e., string variables) Study 2 questions related to sleep, such as asking for the average frequency and duration of naps, average bedtime and wake time, and content of pre-sleep conversations. They had relatively large amounts of missing data or data that was obviously random. This limited the number of dependent variables (e.g., sleep efficiency) that this investigation could explore, which ran counter to the overarching goal of studying several different sleep-related dependent variables to better understand sleep difficulties. This issue of missing data may have arisen because it is challenging to recall such details well enough to report on average, or typical, experiences. Research on sleep patterns would likely need daily reports of behaviours, which could be captured with daily sleep logs or use of actigraphy, to eliminate the challenges of retrospective recall and obtain accurate averages of relevant sleep variables. Another limitation of Study 2 questions is the use of several novel self-report items and measures created solely for this research, specifically those assessing electronic device use in bed and pre-sleep bedtime conversations. Given the absence of well-established measures of these constructs, the current approach was reasonable. As well, efforts were made to ensure their validity and reliability (e.g., reliability analyses, convergent correlations). Nonetheless, the methods used were to assess these measures were not ideal. As a next step, hypotheses regarding these constructs should be investigated in future research with these psychometric limitations addressed.

Further, the use of cross-sectional data, especially when utilizing SEM, is a limitation according to some researchers (e.g., Maxwell et al., 2011). While it can be argued that attachment occurs quite early in the formative years of life and as such, it represents a reasonable predictor of potential mediators and sleep variables, it is still difficult to determine the direction of effects for mediators and dependent variables when they are closely related. For example, it is reasonable that poor sleep scheduling predicts daytime sleepiness because individuals are delaying sleep despite having a fixed wake time. However, it is just as possible that daytime sleepiness arises, which then prompts individuals to accommodate their sleepiness by adjusting their sleep schedules. Longitudinal research is warranted to investigate such issues.

Both investigations had a considerable number of individuals with pain conditions. There was an unusually high number of participants who were ill based on data collected using items about health in Study 2 even when the recruitment process was not focused on individuals in pain. It is possible that the recruitment process drew in participants who were ill because the survey was advertised as a study on "Personality, Relationships, and Health." Therefore, it is important to note that sleep patterns of the sample may have been affected by health. While efforts were made to include covariates in the statistical analyses to isolate unique effects of the variables of interest, such as the inclusion of a health variable in the regressions and SEM analysis, the implication of health status on the analyses is worth considering because health leads to the use of medications, fatigue, habits to accommodate the health issue, as well as other factors that may have been unaccounted for in the analyses. Cannabis use may be one such common and accessible pain relief strategy that was not accounted for in the analyses.

Lastly, this investigation made efforts to account for relevant covariates in the analyses. Despite the effort to statistically account for age, it is important to note that there may be effects of age-related changes that the continuous variable for age could not fully capture. For example, Kim et al. (2021) identified major changes in lifestyle, such as creating a family, that can affect sleep. While these changes are associated with aging, there is considerable variability with the age at which they occur, and they do not occur for all individuals. Beyond psychosocial changes, some specific physiological changes that negatively impact also occur with increased age, such as menopause and neurodegenerative disorders. Other potentially valuable methods of accounting for age could include investigating attachment and sleep in samples defined by specific live changes (e.g., new parents) or investigating whether associations between attachment and sleep variables are moderated by age. There is some evidence that such associations may not be present in older samples (see Xie et al., 2022).

8.3 Future Directions

Using data provided by individuals in relationships, there were a few findings from this investigation that suggest directions in which follow-up research should be headed. First, co-sleeping moderated the effect of attachment anxiety and avoidance on pre-sleep cognitive arousal, though further research is necessary to understand why. It is possible that the presence of a bedpartner alone influences arousal. Alternatively, partners might be engaging in behaviours that are arousing for participants. Second, attachment anxiety and avoidance also predicted the

frequency of pleasant and neutral pre-sleep conversations with partners, correlates of sleep quality. This emphasizes the possibility that partners' behaviours affect individuals' arousal levels, and it sheds light on pre-sleep habits that couples might engage in with the aim of winding down for the day. Earlier research has found benefits of partner responsiveness (e.g., validation, understanding) or decreased negative partner interactions on sleep quality (Hasler & Troxel, 2010; Selcuk et al., 2017). These findings suggest that the nature and manner of self-disclosure and conflict resolution are likely important factors for sleep. These factors in conjunction with findings from the current investigation suggest that a promising direction for research is to understand what specific relational characteristics of attachment are helpful for sleep. For example, being understanding and validating of one's partner might be less likely of attachment avoidance but perhaps more likely of attachment anxiety. Therefore, relational variables should be explored as mediators of the attachment-sleep association in couples.

Third, a trend was observed such that when individuals were higher in attachment avoidance, their frequency of being woken up by partners for sex, to talk, or because partners had nightmares was higher. While this is correlational data, it is still possible that attachment predicts whether bedpartners wake their partners to meet relationship needs. Xie et al. (2022) explored security within a relationship and negative affect as mediators of the relationship between actor attachment and partner sleep. They found support for negative affect as a mediator of attachment anxiety and sleep quality and support for relationship-specific security as a mediator of attachment avoidance and sleep quality for actors when they tested these mediators on sleep quality of partners. However, no indirect partner effects emerged. It is possible that relational and emotional factors alone do not affect partners' sleep because these are unknown to partners unless they are voiced or acted upon. Therefore, it is worthwhile to build on the findings of Study 2 in future research by exploring the frequency and type of conversations between partners before bed, co-sleeping arrangements, and the deliberate waking of individuals as possible mechanisms to explain how partners' attachments might indirectly predict actors' sleep.

The use of negative affect (i.e., depressive symptoms) as a mediator of the attachment-sleep association, as done by Xie et al. (2022) and Kent de Grey et al. (2019), raises an important point that was first introduced and reviewed in Chapter 2. The limited research on attachment and sleep appears conflicted about treating depression as a confounding variable or a mediator, and both have been done. Depression was treated as a potential confounding variable in Study 2

to determine the unique variance of sleep disturbance accounted for by attachment insecurity. In theory, it is difficult to treat depression as a mediator given that the cause of depression is elusive and likely unrelated to one single factor. While attachment anxiety has been found to relate to depressive symptoms (e.g., Zheng et al., 2020), extensive research into depression has conceptualized this disorder as originating from a variety of interacting factors (Schotte et al., 2006), including but not limited to genetics, environment and situational stressors, all of which might be unrelated to attachment. It would be wise to clarify the role of depression in attachment and sleep in future studies.

Study 2 also found that attachment anxiety was positively correlated with their reports of partners' maladaptive sleep-related behaviours (e.g., poor sleep scheduling, drinking before bed). These findings could be explained in several ways. Participants' attachment anxiety levels might simply be related to their perceptions of their partners behavior and be unrelated to their partners' actual behavior. Alternatively, it is possible that participants' attachment anxiety levels might play a causal role in their partners' sleep-related practices, such as poor sleep scheduling and pre-sleep drinking behaviors. The findings might also reflect the impact of attachment on partner selection. Holmes and Johnson (2009) conducted a review of studies on attachment characteristics of participants' and either their desired partners or actual partners. They found that partnered individuals tended to prefer complementary attachment styles in their partners (i.e., partners that confirmed their attachment-based expectations). This suggests that individuals who are attachment insecure are likely to be partnered with other individuals who are attachment insecure. Thus, in the current study attachment anxiety might be related to reports of partners' sleep-related behaviours because participants' levels of attachment anxiety are likely to be related to the attachment characteristics of their partner, which in turn influence their partners' pre-sleep behaviours. Individuals high in attachment anxiety tend to partner with individuals higher in attachment avoidance. Individuals high in avoidance tend to engage in more pre-sleep eating and drinking and less pre-sleep pleasant bedtime talk. It is plausible that some of these behaviors would impact the sleep of such individuals' romantic partners. Future research investigating this possibility is warranted. It would require a large sample of couples in order to have adequate statistical power, the application of the APIM, and a focus on the most promising potential mediators in order to reduce the response burden on participants while maximizing statistical power. This type of research is also required to better understand the relationship

between sleep and attachment anxiety, the attachment dimension with the most consistent associations with sleep.

Lastly, attachment anxiety predicted electronic device use in bed. This is a novel finding. While the robustness of this finding is questionable given that a measure with limited psychometric evaluation was created to capture electronic device use in bed, further research into the association could be valuable for studying motives for engaging in pre-sleep electronic device use among attachment anxious individuals. The purpose behind electronic device use in bed was not investigated in this study, but it may have implications for quality of life or well-being. It is possible that attachment anxiety predicted pre-sleep electronic device use because it is used to connect with romantic partners with whom they do not co-sleep, to remain vigilant about romantic partners' social media activity, or to distract themselves (e.g., watching television, listening to a podcast) from relationship-related anxieties pre-sleep. However, this is speculative and warrants investigation.

8.4 Summary and Conclusion

This program of research sought to better understand the association between attachment insecurity and sleep found in previous studies. It addressed this goal by exploring actor and partner effects of attachment insecurity on sleep quality in Study 1. Actors' and partners' sleep quality was poorer when actors' attachment anxiety was high, and this was found even after statistically accounting for the effects of general health, an often ignored but important confounding variable in the study of sleep quality. In Study 2, multiple regression analyses were conducted to determine whether a portion of the variance in sleep-related variables could be explained meaningfully by attachment dimensions. Attachment anxiety predicted daytime sleepiness and it was also a significant predictor of several potential mediators (i.e., poor sleep hygiene practices, pre-sleep arousal, electronic device use in bed, and dysfunctional beliefs about sleep). An analysis of the indirect effects of these variables between attachment and daytime sleepiness, while controlling for covariates and confounding variables, was conducted subsequently. There was support for the negative impact of attachment insecurity on dysfunctional beliefs about sleep, even after controlling for confounds. This, in turn, predicted daytime sleepiness. Study 2 explored the co-sleeping experience of participants, as well as possible variables that might interfere with partners' sleep. Attachment anxiety and avoidance each interacted with frequent co-sleeping with partners to predict pre-sleep cognitive arousal.

Attachment also predicted having pre-sleep conversations with partners, which had not been previously explored in related studies. This may be one possible mechanism that could explain the effects of actor attachment on partner sleep for future studies.

The effect of attachment on sleep has been neglected in theoretical models of sleep disturbance and research investigations, both of which inform clinical treatments. For example, attachment insecurity has not been mentioned specifically in models of sleep disturbance, yet the current investigation suggests that it could lead to activation of the fight-or-flight system and pre-sleep cognitive arousal, cognitive distortions about oneself and one's sleep, or maladaptive coping strategies, all of which are incompatible with the process of down-regulation required to initiate and maintain sleep. The current program of research indicates that attachment theory, maladaptive coping strategies, and relationships (i.e., co-sleeping) or relationship variables (e.g., pre-sleep talk with bedpartners) deserve their place in theoretical understandings, empirical investigations, and treatments of sleep disturbance as predisposing and perpetuating factors.

In conclusion, attachment insecurity and co-sleeping are important but often missing pieces of information in the study of sleep disturbance. However, their roles appear complex and interrelated. The current research yielded support for several new and potentially clinically relevant ideas regarding attachment insecurity and sleep, so additional research in this area is recommended.

References

Ackerman, R. A., & Kenny, D. A. (2016). *APIMPower: An interactive tool for Actor-Partner Interdependence Model power analysis*. https://robert-a-ackerman.shinyapps.io/apimpower/

Adams, G. C., & McWilliams, L. A. (2015). Relationships between adult attachment style ratings and sleep disturbances in a nationally representative sample. *Journal of Psychosomatic Research*, *79*(1), 37–42. https://doi.org/10.1016/j.jpsychores.2014.12.017

Adams, G. C., Wrath, A. J., & Meng, X. (2018). The relationship between adult attachment and mental health care utilization: A systematic review. *Canadian Journal of Psychiatry*, *63*(10), 651–660. https://doi.org/10.1177/0706743718779933

Adams, G. J., & Johnson, K. G. (1993). Sleep-wake cycles and other night-time behaviours of the domestic dog Canis familiaris. *Applied Animal Behaviour Science*, *36*, 233–248.

Ainsworth, M., Blehar, M. C., Waters, E., & Wall, S. (1979). *Patterns of attachment: A psychological study of the strange situationtle*. Erlbaum.

Alvaro, P. K., Roberts, R. M., & Harris, J. K. (2013). A systematic review assessing bidirectionality between sleep disturbances, anxiety, and depression. *Sleep*, *36*(7), 1059–1068. https://doi.org/10.5665/sleep.2810

American Academy of Sleep Medicine. (2020, November). *Sleep Education: Snoring.* https://sleepeducation.org/sleep-disorders/snoring/

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders (5th ed., T)*. https://doi.org/https://doi.org/10.1176/appi.books.9780890425787

Anderson, J. R., Hagerdorn, P. L., Gunstad, J., & Spitznagel, M. B. (2018). Using coffee to compensate for poor sleep: Impact on vigilance and implications for workplace performance. *Applied Ergonomics*, *70*(March), 142–147. https://doi.org/10.1016/j.apergo.2018.02.026

Arber, S., Hislop, J., Bote, M., & Meadows, R. (2007). Gender roles and women's sleep in mid and later life: a quantitative approach. *Sociological Research Online*, *12*(5), 1–18. https://doi.org/10.5153/sro.1609

Arslan, E., Arslan, C., & Ari, R. (2012). An investigation of interpersonal problem solving approaches with respect to attachment styles. *Kuram ve Uygulamada Egitim Bilimleri*, *12*(1), 15–23.

Barry, E. S. (2019). Co-sleeping as a proximal context for infant development: The importance of physical touch. *Infant Behavior and Development*, *57*(September), 101385. https://doi.org/10.1016/j.infbeh.2019.101385

Barry, R. A., & Lawrence, E. (2013). "Don't stand so close to me": An attachment perspective of disengagement and avoidance in marriage. *Journal of Family Psychology*, *27*(3), 484–494. https://doi.org/10.1037/a0032867

Bartholomew, K. (1990). Avoidance of intimacy: An attachment perspective. *Journal of Social and Personal Relationships*, *7*, 147–178.

Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology*, *61*(2), 226–244. https://doi.org/10.4324/9781351153683-17

Bastien, C. H., Vallières, A., & Morin, C. M. (2001). Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Medicine*, *2*(4), 297–307. https://doi.org/10.1016/S1389-9457(00)00065-4

Becker, T. E., Billings, R. S., Eveleth, D. M., & Gilbert, N. W. (1997). Validity of scores on three attachment style scales: Exploratory and confirmatory evidence. *Educational and Psychological Measurement*, *57*, 477–493. https://doi.org/10.1177/0013164497057003009

Belfiore, L. A., & Pietrowsky, R. (2017). Attachment styles and nightmares in adults. *Dreaming*, *27*(1), 59–67. https://doi.org/10.1037/drm0000045

Blake, D. D., & Gomez, M. H. (1998). A scale for assessing sleep hygiene: Preliminary data. *Psychological Reports*, *8*, 1175–1178.

Blumen, M. B., Salva, M. A. Q., Vaugier, I., Leroux, K., D'Ortho, M. P., Barbot, F., Chabolle, F., & Lofaso, F. (2012). Is snoring intensity responsible for the sleep partner's poor quality of sleep? *Sleep and Breathing*, *16*(3), 903–907. https://doi.org/10.1007/s11325-011-0554-5

Bootzin, R. R. (1972). Stimulus control treatment for insomnia. *Proceedings of the American Psychological Association*, *7*, 395–396.

Borbély, A. A., & Achermann, P. (1999). Sleep Homeostasis and Models of Sleep Regulation. *Journal of Biological Rhythms*, *14*, 557–568. https://doi.org/10.1016/B978-1-4160-6645-3.00037-2

Bowlby, J. (1969). Attachment and loss. Vol 1: Attachment. In *Attachment*. Basic Books. https://doi.org/10.1177/000306518403200125

Bowlby, J. (1973). Attachment and loss. Vol. 2: Separation, anxiety and anger. In *Attachment and Loss*. Basic Books. https://doi.org/10.1016/S0006-3495(04)74250-2

Bowlby, J. (1980). Attachment and loss. Vol. 3: Loss, sadness and depression. In *New York: Basic*. Basic Books. https://doi.org/10.4135/9781446250990.n2

Boysan, M., Merey, Z., Kalafat, T., & Kağan, M. (2010). Validation of a brief version of the dysfunctional beliefs and attitudes about sleep scale in Turkish sample. *Procedia - Social and Behavioral Sciences*, *5*(December 2010), 314–317. https://doi.org/10.1016/j.sbspro.2010.07.095

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998a). Self-report measurement of adult attachment: An integrative overview. In J. A. Simpson & W. . Rholes (Eds.), *Attachment Theory and Close Relationships*. Guilford Press. https://doi.org/10.1097/00005768-199606000-00014

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998b). Self-report measurement of adult attachment: An integrative overview. In J. . Simpson & W. . Rholes (Eds.), *Attachment theory and close relationships*.

Brunborg, G. S., Mentzoni, R. A., Molde, H., Myrseth, H., Skouverøe, K. J. M., Bjorvatn, B., & Pallesen, S. (2011). The relationship between media use in the bedroom, sleep habits and symptoms of insomnia. *Journal of Sleep Research*, *20*(4), 569–575. https://doi.org/10.1111/j.1365-2869.2011.00913.x

Brysbaert, M. (2019). How many words do we read per minute? A review and meta-analysis of reading rate. *Journal of Memory and Language*, *109*, Article 104047. https://doi.org/https://doi.org/10.1016/j.jml.2019.104047

Cameron, J. J., Finnegan, H., & Morry, M. M. (2012). Orthogonal dreams in an oblique world: A meta-analysis of the association between attachment anxiety and avoidance. *Journal of Research in Personality*, *46*(5), 472–476. https://doi.org/10.1016/j.jrp.2012.05.001

Carmichael, C. L., & Reis, H. T. (2005). Attachment, sleep quality, and depressed affect. *Health Psychology*, *24*(5), 526–531. https://doi.org/10.1037/0278-6133.24.5.526

Cassidy, J. (2000). Adult romantic attachments: A developmental perspective on individual differences. *Review of General Psychology*, *4*(2), 111–131. https://doi.org/10.1037/1089-2680.4.2.111

Cassidy, J., & Kobak, R. R. (1988). Avoidance and its relation to other defensive processes. In J. Belsky & T. Nezworski (Eds.), *Clinical Implications of Attachment*. Lawrence Erlbaum Associates, Inc.

Chan, J. S. M., Yu, N. X., Chow, A. Y. M., Chan, C. L. W., Chung, K.-F., Ho, R. T. H., Ng, S., Yuen, L. P., & Chan, C. H. Y. (2017). Dyadic associations between psychological distress and sleep disturbance among Chinese patients with cancer and their spouses. *Psycho-Oncology*, *26*(6), 856–861. https://doi.org/10.1002/pon.4240

Chen, J.-H. (2018). Couples' sleep and psychological distress: A dyadic perspective. *Journals of Gerontology: Series B*, *73*(1), 30–39. https://doi.org/10.1093/geronb/gbx001

Chong, Y., Fryer, C. D., & Gu, Q. (2013). Prescription sleep aid use among adults: United States, 2005-2010. *NCHS Data Brief*, *127*, 1–8.

Chopik, W. J., Edelstein, R. S., van Anders, S. M., Wardecker, B. M., Shipman, E. L., & Samples-Steele, C. R. (2014). Too close for comfort? Adult attachment and cuddling in romantic and parent-child relationships. *Personality and Individual Differences*, *69*, 212–216. https://doi.org/10.1016/j.paid.2014.05.035

Cohen, J. (1992). Quantitative Methods in Psychology: A Power Primer. *Psychological Bulletin*, *112*(1), 155–159.

Collier, J. E. (2020). *Applied structural equation modeling using AMOS: Basic to advanced techniques* (1st ed.). Routledge Taylor & Francis Group. https://doi.org/10.4324/9781003018414

Colten, H. R., & Altevogt, B. M. (Eds.). (2006). *Sleep disorders and sleep deprivation: An unmet public health problem*. National Academies Press. https://doi.org/10.17226/11617

Conradi, H. J., Gerlsma, C., Van Duijn, M., & De Jonge, P. (2006). Internal and external validity of the experiences in close relationships questionnaire in an american and two dutch samples. *European Journal of Psychiatry*, *20*(4), 258–269. https://doi.org/10.4321/s0213-61632006000400006

Cook, W. L., & Kenny, D. A. (2005). The actor-partner interdependence model: A model of bidirectional effects in developmental studies. *International Journal of Behavioral Development*, *29*(2), 101–109. https://doi.org/10.1080/01650250444000405

Curtis, B. M., & O'Keefe, J. (2002). Autonomic tone as a cardiovascular risk factor: The dangers of chronic fight or flight. *Mayo Clinic Proceedings*, *77*(1), 45–54. https://doi.org/10.4065/77.1.45

Dautovich, N. D., McNamara, J., Williams, J. M., Cross, N. J., & McCrae, C. S. (2010). Tackling sleeplessness: Psychological treatment options for insomnia in older adults. *Nature and Science of Sleep*, *2*, 47–61.

Davidson, J. R., Dickson, C., & Han, H. (2019). Cognitive behavioural treatment for insomnia in primary care: A systematic review of sleep outcomes. *British Journal of General Practice*, *69*(686), E657–E664. https://doi.org/10.3399/bjgp19X705065

Deniz, M. E., & Işik, E. (2010). Positive and negative affect, life satisfaction, and coping with stress by attachment styles in Turkish students. *Psychological Reports*, *107*(2), 480–490. https://doi.org/10.2466/02.09.10.20.PR0.107.5.480-490

Diamond, L. M., Hicks, A. M., & Otter-Henderson, K. D. (2008). Every time you go away: Changes in affect, behavior, and physiology associated with travel-related separations from romantic partners. *Journal of Personality and Social Psychology*, *95*(2), 385–403. https://doi.org/10.1037/0022-3514.95.2.385

Dittami, J., Keckeis, M., Machatschke, I., Katina, S., Zeitlhofer, J., & Kloesch, G. (2007). Sex differences in the reactions to sleeping in pairs versus sleeping alone in humans. *Sleep and Biological Rhythms*, *5*(4), 271–276. https://doi.org/10.1111/j.1479-8425.2007.00320.x

Drews, H. J., Wallot, S., Weinhold, S. L., Mitkidis, P., Baier, P. C., Roepstorff, A., & Göder, R. (2017). "Are we in sync with each other?" Exploring the effects of cosleeping on heterosexual couples' sleep using simultaneous polysomnography: A pilot study. *Sleep Disorders*, *2017*, 1–5. https://doi.org/10.1155/2017/8140672

Ebrahimi, E., & Ali Kimiaei, S. (2014). The study of the relationship among marital satisfaction, attachment styles, and communication patterns in divorcing couples. *Journal of Divorce and Remarriage*, *55*(6), 451–463. https://doi.org/10.1080/10502556.2014.931759

El-Sheikh, M., Kelly, R. J., Koss, K. J., & Rauer, A. J. (2015). Longitudinal relations between constructive and destructive conflict and couples' sleep. *Journal of Family Psychology*, *29*(3), 349–359. https://doi.org/10.1037/fam0000083

Ellis, J. G. (2019). Cognitive behavioral therapy for insomnia and acute insomnia: Considerations and controversies. *Sleep Medicine Clinics*, *14*(2), 267–274. https://doi.org/10.1016/j.jsmc.2019.01.007

Elsey, T., Keller, P. S., & El-Sheikh, M. (2018). The role of couple sleep concordance in sleep quality: Attachment as a moderator of associations. In *Journal of Sleep Research*. https://doi.org/10.1111/jsr.12825

Escolas, S. M., Hildebrandt, E. J., Maiers, A. J., Baker, M. M. T., & Mason, S. T. (2013). The effect of attachment style on sleep in postdeployed service members. *U.S. Army Medical Department Journal*, 35–45.

Espie, C. A. (2002). Insomnia: Conceptual issues in the development, persistence, and treatment of sleep disorder in adults. *Annual Review of Psychology*, *53*(1), 215–243. https://doi.org/10.1146/annurev.psych.53.100901.135243

Exelmans, L., & Van Den Bulck, J. (2017). Binge viewing, sleep, and the role of pre-sleep arousal. *Journal of Clinical Sleep Medicine*, *13*(8), 1001–1008.

Faber, A., Dubé, L., & Knäuper, B. (2018). Attachment and eating: A meta-analytic review of the relevance of attachment for unhealthy and healthy eating behaviors in the general population. *Appetite*, *123*, 410–438. https://doi.org/10.1016/j.appet.2017.10.043

Fairbairn, C. E., Briley, D. A., Kang, D., Fraley, R. C., Hankin, B. L., & Ariss, T. (2018). Supplemental material for a meta-analysis of longitudinal associations between substance use and Interpersonal attachment security. *Psychological Bulletin*, *144*(5), 532–555. https://doi.org/10.1037/bul0000141.supp

Fairchild, A. J., & Finney, S. J. (2006). Investigating validity evidence for the Experiences in Close Relationships-Revised Questionnaire. *Educational and Psychological Measurement*, *66*(1), 116–135. https://doi.org/10.1177/0013164405278564

Fang, H., Tu, S., Sheng, J., & Shao, A. (2019). Depression in sleep disturbance: A review on a bidirectional relationship, mechanisms and treatment. *Journal of Cellular and Molecular Medicine*, *23*(4), 2324–2332. https://doi.org/10.1111/jcmm.14170

Feeney, J. A., & Noller, P. (1990). Attachment style as a predictor of adult romantic relationships. *Journal of Personality and Social Psychology*, *58*(2), 281–291.

Fernandez-Mendoza, J., Li, Y., Vgontzas, A. N., Fang, J., Gaines, J., Calhoun, S. L., Liao, D., & Bixler, E. O. (2016). Insomnia is associated with cortical hyperarousal as early as adolescence. *Sleep*, *39*(5), 1029–1036. https://doi.org/10.5665/sleep.5746

Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). Sage Publications Ltd.

Foley, D. J., Vitiello, M. V., Bliwise, D. L., Ancoli-Israel, S., Monjan, A. A., & Walsh, J. K. (2007). Frequent napping is associated with excessive daytime sleepiness, depression, pain, and nocturia in older adults: Findings from the national sleep foundation 2003 sleep in america poll. *American Journal of Geriatric Psychiatry*, *15*(4), 344–350. https://doi.org/10.1097/01.JGP.0000249385.50101.67

Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, *78*(2), 350–365. https://doi.org/10.1037/0022-3514.78.2.350

Franke, A. G., Bagusat, C., Rust, S., Engel, A., & Lieb, K. (2014). Substances used and prevalence rates of pharmacological cognitive enhancement among healthy subjects. *European Archives of Psychiatry and Clinical Neuroscience*, *264*(1), 83–90. https://doi.org/10.1007/s00406-014-0537-1

Freedman, R. R. (1986). EEG power spectra in sleep-onset insomnia. *Electroencephalography and Clinical Neurophysiology*. https://doi.org/10.1016/0013-4694(86)90122-7

Freedman, R. R., & Sattler, H. L. (1982). Physiological and psychological factors in sleep-onset insomnia. *Journal of Abnormal Psychology*, *91*(5), 380–389. https://doi.org/10.1037/0021-843X.91.5.380

Fuller, P. M., Gooley, J. J., & Saper, C. B. (2006). Neurobiology of the sleep-wake cycle: Sleep architecture, circadian regulation, and regulatory feedback. *Journal of Biological Rhythms*, *21*(6), 482–493. https://doi.org/10.1177/0748730406294627

Funk, J. L., & Rogge, R. D. (2007). Testing the ruler with Item Response Theory: Increasing precision of measurement for relationship satisfaction with the Couples Satisfaction Index. *Journal of Family Psychology*, *21*(4), 572–583. https://doi.org/10.1037/0893-3200.21.4.572

Gallant, A., Lundgren, J., & Drapeau, V. (2014). Nutritional aspects of late eating and night eating. *Current Obesity Reports*, *3*(1), 101–107. https://doi.org/10.1007/s13679-013-0081-8

Garcia, R. L., Kenny, D. A., & Ledermann, T. (2015). Moderation in the actor-partner interdependence model. *Personal Relationships*, *22*(1), 8–29. https://doi.org/10.1111/pere.12060

Gellis, L. A., & Lichstein, K. L. (2009). Sleep hygiene practices of good and poor sleepers in the United States: An internet-based study. *Behavior Therapy*, *40*(1), 1–9. https://doi.org/10.1016/j.beth.2008.02.001

Gellis, L. A., Park, A., Stotsky, M. T., & Taylor, D. (2014). Associations between sleep hygiene and insomnia severity in college students: Cross-sectional and prospective analyses. *Behavior Therapy*, *45*(6), 806–816. https://doi.org/10.1016/j.beth.2014.05.002

Gillath, O., Karantzas, G. C., & Selcuk, E. (2017). A net of friends: Investigating friendship by integrating attachment theory and social network analysis. *Personality and Social Psychology Bulletin*, *43*(11), 1546–1565. https://doi.org/10.1177/0146167217719731

Goel, N., Stunkard, A. J., Rogers, N. L., Van Dongen, H. P. A., Allison, K. C., O'Reardon, J. P., Ahima, R. S., Cummings, D. E., Heo, M., & Dinges, D. F. (2009). Circdian rhythym profiles in women with night eating syndrome. *Journal of Biological Rhythms*, *24*(1), 85–94. https://doi.org/10.1177/0748730408328914

Gradisar, M., & Short, M. A. (2013). Sleep hygiene and environment: Role of technology. In A. R. Wolfson & H. . Montgomery-Downs (Eds.), *The Oxford Handbook of Infant, Child, and Adolescent Sleep and Behavior* (pp. 113–126). Oxford University Press.

Gradisar, M., Wolfson, A. R., Harvey, A. G., Hale, L., Rosenberg, R., & Czeisler, C. A. (2013). The sleep and technology use of Americans: Findings from the National Sleep Foundation's 2011 sleep in America poll. *Journal of Clinical Sleep Medicine*, *9*(12), 1291–1299. https://doi.org/10.5664/jcsm.3272

Graham, J. M., Diebels, K. J., & Barnow, Z. B. (2011). The reliability of relationship satisfaction: A reliability generalization meta-analysis. *Journal of Family Psychology*, *25*(1), 39–48. https://doi.org/10.1037/a0022441

Gunn, H. E., Buysse, D. J., Hasler, B. P., Begley, A., & Troxel, W. M. (2015). Sleep concordance in couples is associated with relationship characteristics. *Sleep*, *38*(6), 933–939. https://doi.org/10.5665/sleep.4744

Hagell, P. (2007). Measurement properties and hierarchical item structure of the Epworth Sleepiness Scale in Parkinson's disease. *Journal of Sleep Research*, *16*, 102–109.

Hagen, E. W., Mirer, A. G., Palta, M., & Peppard, P. E. (2013). The sleep-time cost of parenting: Sleep duration and sleepiness among employed parents in the Wisconsin Sleep Cohort Study. *American Journal of Epidemiology*, *177*(5), 394–401. https://doi.org/10.1093/aje/kws246

Hantsoo, L., Khou, C. S., White, C. N., & Ong, J. C. (2013). Gender and cognitive-emotional factors as predictors of pre-sleep arousal and trait hyperarousal in insomnia. *Journal of Psychosomatic Research*, *74*(4), 283–289. https://doi.org/10.1016/j.jpsychores.2013.01.014

Harbard, E., Allen, N. B., Trinder, J., & Bei, B. (2016). What's keeping teenagers up? Prebedtime behaviors and actigraphy-assessed sleep over school and vacation. *Journal of Adolescent Health*, *58*(4), 426–432. https://doi.org/10.1016/j.jadohealth.2015.12.011

Harvey, A. G. (2000). Pre-sleep cognitive activity: A comparison of sleep-onset insomniacs and good sleepers. *British Journal of Clinical Psychology*, *39*(3), 275–286. https://doi.org/10.1348/014466500163284

Hasler, B. P., & Troxel, W. M. (2010). Couples' nighttime sleep efficiency and concordance: Evidence for bidirectional associations with daytime relationship functioning. *Psychosomatic Medicine*, *72*(8), 794–801. https://doi.org/10.1097/PSY.0b013e3181ecd08a

Hauri, P., & Hawkins, D. R. (1973). Alpha-delta sleep. *Electroencephalography and Clinical Neurophysiology*, *34*(1973), 233–237.

Haydon, K. C., & Moss, C. (2021). Attachment and sleep: A dyadic intensive longitudinal actigraphy study. *Journal of Social and Personal Relationships*, *38*(1), 148–157. https://doi.org/10.1177/0265407520958476

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). Guilford Publications. https://doi.org/10.5539/ass.v11n9p207

Haynes, P. L., Ancoli-Israel, S., Walter, C. M., & McQuaid, J. R. (2012). Preliminary evidence for a relationship between sleep disturbance and global attributional style in depression. *Cognitive Therapy and Research*, *36*(2), 140–148. https://doi.org/10.1007/s10608-011-9416-5

Hays, R. D., Sherbourne, C. D., & Mazel, R. M. (1993). The Rand 36-item Health Survey 1.0. *Health Economics*, *2*(3), 217–227. https://doi.org/10.1002/hec.4730020305

Hazan, C., & Shaver, P. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology*, *52*(3), 511–524. https://doi.org/10.1037/0022-3514.52.3.511

Heidt, C. T. (2019). *Understanding differences in pain-related support: Comparing attachment theory and the communal coping model of pain catastrophizing* [Doctoral dissertation, University of Saskatchewan]. College of Graduate Studies and Research.

Hernandez-Hons, A., & Woolley, S. R. (2012). Women's experiences with emotional eating and related attachment and sociocultural processes. *Journal of Marital and Family Therapy*, *38*(4), 589–503. https://doi.org/10.1111/j.1752-0606.2011.00239.x

Hershner, S. D., & Chervin, R. D. (2014). Causes and consequences of sleepiness among college students. *Nature and Science of Sleep*, *6*, 73–84. https://doi.org/10.2147/NSS.S62907

Higley, E., & Dozier, M. (2009). Nighttime maternal responsiveness and infant attachment at one year. *Attachment and Human Development*, *11*(4), 347–363. https://doi.org/10.1080/14616730903016979

Hislop, J. (2007). A bed of roses or a bed of thorns? Negotiating the couple relationship through sleep. *Sociological Research Online*, *12*(5), 1–13.

Hislop, J., & Arber, S. (2003). Sleepers wake! The gendered nature of sleep disruption among mid-life women. *Sociology*, *37*(4), 695–711. https://doi.org/10.1177/00380385030374004

Holmes, B. M., & Johnson, K. R. (2009). Adult attachment and romantic partner preference: A review. *Journal of Social and Personal Relationships*, *26*, 833–852. https://doi.org/10.1177/0265407509345653

Hooley, J. M., & Wilson-Murphy, M. (2012). Adult attachment to transitional objects and borderline personality disorder. *Journal of Personality Disorders*, *26*(2), 179–191. https://doi.org/10.1521/pedi.2012.26.2.179

Hopman, W. M., Towheed, T., Anastassiades, T., Tenenhouse, A., Poliquin, S., Berger, C., Joseph, L., Brown, J., Murray, T. M., Adachi, J. D., Hanley, D. A., & Papadimitropoulous, E. (2000). Canadian normative data for the SF-36 health survey. *Canadian Medical Association*, *163*(3), 265–271.

Hughes, J. M., Ulmer, C. S., Gierisch, J. M., Hastings, N. S., & Howard, M. O. (2018). Insomnia in United States military veterans: An integrated theoretical model. *Clinical Psychology Review*, *59*, 118–125. https://doi.org/10.1016/j.cpr.2017.11.005

Hughes, N., & Burke, J. (2018). Sleeping with the frenemy: How restricting 'bedroom use' of smartphones impacts happiness and wellbeing. *Computers in Human Behavior*, *85*, 236–244. https://doi.org/10.1016/j.chb.2018.03.047

Irish, L. A., Kline, C. E., Gunn, H. E., Buysse, D. J., & Hall, M. H. (2015). The role of sleep hygiene in promoting public health: A review of empirical evidence. *Sleep Medicine Reviews*, *22*, 23–36. https://doi.org/10.1016/j.smrv.2014.10.001

Jankowski, K. S., Díaz-Morales, J. F., & Randler, C. (2014). Chronotype, gender, and time for sex. *Chronobiology International*, *31*, 911–916. https://doi.org/10.3109/07420528.2014.925470

Jansson-Fröjmark, M., & Norell-clarke, A. (2012). Psychometric properties of the Pre-Sleep Arousal Scale in a large community sample. *Journal of Psychosomatic Research*, *72*(2), 103–110. https://doi.org/10.1016/j.jpsychores.2011.10.005

Jefferson, C. D., Drake, C. L., Scofield, H. M., Myers, E., McClure, T., Roehrs, T., & Roth, T. (2005). Sleep hygiene practices in a population-based sample of insomniacs. *Sleep*, *28*(5), 611–615. https://doi.org/10.1093/sleep/28.5.611

Jenkinson, C., Wright, L., & Coulter, A. (1994). Criterion validity and reliability of the SF-36 in a population sample. *Quality of Life Research*, *3*(1), 7–12. https://doi.org/10.1007/BF00647843

Jinyao, Y., Xiongzhao, Z., Auerbach, R. P., Gardiner, C. K., Lin, C., Yuping, W., & Shuqiao, Y. (2012). Insecure attachment as a predictor of depressive and anxious symptomology. *Depression and Anxiety*, *29*(9), 789–796. https://doi.org/10.1002/da.21953

Johns, M. W. (1992). Reliability and factor analysis of the Epworth Sleepiness Scale. *Sleep*, *15*, 376–381. https://doi.org/10.1093/sleep/15.4.376

Johnson, E. O., Roehrs, T., Roth, T., & Breslau, N. (1998). Epidemiology of alcohol and medication as aids to sleep in early adulthood. *Sleep*, *21*(2), 178–186. https://doi.org/10.1093/sleep/21.2.178

Kandeger, A., Egilmez, U., Sayin, A. A., & Selvi, Y. (2018). The relationship between night eating symptoms and disordered eating attitudes via insomnia and chronotype differences. *Psychiatry Research*, *268*, 354–357. https://doi.org/10.1016/j.psychres.2018.08.003

Kane, H. S., Slatcher, R. B., Reynolds, B. M., Repetti, R. L., & Robles, T. F. (2014). Daily self-disclosure and sleep in couples. *Health Psychology*, *33*(8), 813–822. https://doi.org/10.1037/hea0000077

Keefer, L. A., Landau, M. J., Rothschild, Z. K., & Sullivan, D. (2012). Attachment to objects as compensation for close others' perceived unreliability. *Journal of Experimental Social Psychology*, *48*(4), 912–917. https://doi.org/10.1016/j.jesp.2012.02.007

Kendzerska, T. B., Smith, P. M., Brignardello-Petersen, R., Leung, R. S., & Tomlinson, G. A. (2014). Evaluation of the measurement properties of the Epworth Sleepiness Scale: A systematic review. *Sleep Medicine Reviews*, *18*(4), 321–331. https://doi.org/10.1016/j.smrv.2013.08.002

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). *Dyadic Data Analysis*. Guilford Press.

Kenny, D. A. (2013). *Test of distinguishability* [Webinar]. https://davidakenny.net/webinars/Dyad/Standard/Test_of_Distinguishability/Test_of_Distinguishability.html

Kenny, D. A. (2017). *MedPower: An interactive tool for the estimation of power in tests of mediation* [Computer software]. https://davidakenny.shinyapps.io/MedPower/

Kenny, D. A. (2020, June 5). *Measuring model fit*. http://www.davidakenny.net/cm/fit.htm#RMSEA

Kent de Grey, R. G., Uchino, B. N., Pietromonaco, P. R., Hogan, J. N., Smith, T. W., Cronan, S., & Trettevik, R. (2019). Strained bedfellows: An actor–partner analysis of spousal attachment insecurity and sleep quality. *Annals of Behavioral Medicine*, *53*(2), 115–125. https://doi.org/10.1093/abm/kay037

Kidd, T., Hamer, M., & Steptoe, A. (2013). Adult attachment style and cortisol responses across the day in older adults. *Psychophysiology*, *50*(9), 841–847. https://doi.org/10.1111/psyp.12075

Kim, M., Um, Y. H., Kim, T. W., Kim, S. M., Seo, H. J., Jeong, J. H., Lee, J., Kim, S., Cho, I. H., Kim, S. Y., & Hong, S. C. (2021). Association Between Age and Sleep Quality: Findings From a Community Health Survey. *Sleep Medicine Research*, *12*(2), 155–160. https://doi.org/10.17241/SMR.2021.01158

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). The Guilford Press.

Knutsson, A., Karlsson, B., Örnkloo, K., Landström, U., Lennernäs, M., & Eriksson, K. (2002). Postprandial responses of glucose, insulin and triglycerides: Influence of the timing of meal intake during night work. *Nutrition and Health*, *16*(2), 133–141. https://doi.org/10.1177/026010600201600207

Konok, V., Gigler, D., Bereczky, B. M., & Miklósi, Á. (2016). Humans' attachment to their mobile phones and its relationship with interpersonal attachment style. *Computers in Human Behavior*, *61*, 537–547. https://doi.org/10.1016/j.chb.2016.03.062

Krans, B. (2019, February 19). *Want to sleep better? Have more sex*. Healthline Media. https://www.healthline.com/health-news/having-sex-more-often-can-help-you-sleep-better

Kroeger, E. N., Carson, T. L., Baskin, M. L., Langaigne, A., Schneider, C. R., Bertrand, B., Herbey, I. I., Harper, L. M., Biggio, J. R., & Chandler-Laney, P. C. (2019). Reasons for late-night eating and willingness to change: A qualitative study in pregnant black women. *Journal of Nutrition Education and Behavior*, *51*(5), 598–607. https://doi.org/10.1016/j.jneb.2018.11.003

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2003). The Patient Health Questionnaire-2: Validity of a Two-Item Depression Screener. *Medical Care*, *41*, 1284–1292. https://doi.org/10.1097/01.MLR.0000027342.91069.F8

Kurdek, L. A. (2008). Pet dogs as attachment figures. *Journal of Social and Personal Relationships*, *25*(2), 247–266. https://doi.org/10.1177/0265407507087958

Lanciano, T., Curci, A., Kafetsios, K., Elia, L., & Zammuner, V. L. (2012). Attachment and dysfunctional rumination: The mediating role of emotional intelligence abilities. *Personality and Individual Differences*, *53*(6), 753–758. https://doi.org/10.1016/j.paid.2012.05.027

Lee, S., Martire, L. M., Damaske, S. A., Mogle, J. A., Zhaoyang, R., Almeida, D. M., & Buxton, O. M. (2018). Covariation in couples' nightly sleep and gender differences. *Sleep Health*, *4*(2), 201–208. https://doi.org/10.1016/j.sleh.2017.10.009

Levenson, J. C., Kay, D. B., & Buysse, D. J. (2015). The pathophysiology of insomnia. *Chest*, *147*(4), 1179–1192. https://doi.org/10.1378/chest.14-1617

Lichstein, K. L., & Rosenthal, T. L. (1980). Insomniacs' perceptions of cognitive versus somatic determinants of sleep disturbance. *Journal of Abnormal Psychology*, *89*(1), 105–107. https://doi.org/10.1037/0021-843X.89.1.105

Lin, J.-H. T. (2019). Permanently online and permanently connected: Taiwanese university students' attachment style, mobile phone usage, and well-being. *Chinese Journal of Communication*, *12*(1), 44–65. https://doi.org/10.1080/17544750.2018.1511606

Lopez-Garcia, E., Guallar-Castillon, P., Leon-Muñoz, L., Graciani, A., & Rodriguez-Artalejo, F. (2014). Coffee consumption and health-related quality of life. *Clinical Nutrition*, *33*(1), 143–149. https://doi.org/10.1016/j.clnu.2013.04.004

Lu, W., Cantor, J. B., Aurora, R. N., Gordon, W. A., Krellman, J. W., Nguyen, M., Ashman, T. A., Spielman, L., & Ambrose, A. F. (2015). The relationship between self-reported sleep disturbance and polysomnography in individuals with traumatic brain injury. *Brain Injury*, *29*(11), 1342–1350. https://doi.org/10.3109/02699052.2015.1043947

Lund, H. G., Reider, B. D., Whiting, A. B., & Prichard, J. R. (2010). Sleep patterns and predictors of disturbed sleep in a large population of college students. *Journal of Adolescent Health*, *46*(2), 124–132. https://doi.org/10.1016/j.jadohealth.2009.06.016

Luyster, F. S., Strollo, P. J., Zee, P. C., & Walsh, J. K. (2012). Sleep: A health imperative. *Sleep*, *35*(6), 727–734. https://doi.org/10.5665/sleep.1846

Mander, B. A., Winer, J. R., & Walker, M. P. (2017). Sleep and Human Aging. *Neuron*, *94*(1), 19–36. https://doi.org/10.1016/j.neuron.2017.02.004

Maroufizadeh, S., Omani-Samani, R., Almasi-Hashiani, A., Navid, B., Sobati, B., & Amini, P. (2018). The Relationship Assessment Scale (RAS) in infertile patients: A reliability and validity study. *Middle East Fertility Society Journal*, *23*(4), 471–475. https://doi.org/10.1016/j.mefs.2018.04.001

Martinez, D., Breitenbach, T. C., & do Carmo Sfreddo Lenz, M. (2010). Light sleep and sleep time misperception - Relationship to alpha-delta sleep. *Clinical Neurophysiology*, *121*(5), 704–711. https://doi.org/10.1016/j.clinph.2010.01.005

Mastin, D. F., Bryson, J., & Corwyn, R. (2006). Assessment of sleep hygiene using the sleep hygiene index. *Journal of Behavioral Medicine*, *29*(3), 223–227. https://doi.org/10.1007/s10865-006-9047-6

Maunder, R. G., & Hunter, J. J. (2001). Attachment and psychosomatic medicine: Developmental contributions to stress and disease. *Psychosomatic Medicine*, *63*(4), 556–567. https://doi.org/10.1097/00006842-200107000-00006

Maunder, R. G., Hunter, J. J., & Lancee, W. J. (2011). The impact of attachment insecurity and sleep disturbance on symptoms and sick days in hospital-based health-care workers. *Journal of Psychosomatic Research*, *70*(1), 11–17. https://doi.org/10.1016/j.jpsychores.2010.09.020

Maxwell, S. E., Cole, D. A., & Mitchell, M. A. (2011). Bias in cross-sectional analyses of longitudinal mediation: Partial and complete mediation under an autoregressive model. *Multivariate Behavioral Research*, *46*(5), 816–841. https://doi.org/10.1080/00273171.2011.606716

McClelland, G. H., & Judd, C. M. (1993). Statistical difficulties of detecting interactions and moderator effects. *Psycholgical Bulletin*, *114*(2), 376–390. https://doi.org/https://doi.org/10.1037/0033-2909.114.2.376

McCrae, C. S., Rowe, M. A., Dautovich, N. D., Lichstein, K. L., Durrence, H. H., Riedel, B. W., Taylor, D. J., & Bush, A. J. (2006). Sleep hygiene practices in two community dwelling samples of older adults. *Sleep*, *29*(12), 1551–1560. https://doi.org/10.1093/sleep/29.12.1551

McKenna, J. J., & Volpe, L. . (2009). Sleeping With Baby: An Internet- Based Sampling of Parental Experiences, Choices, Perceptions, and Interpretations in a Western Industrialized Context. *Infant and Child Development*, *18*(6), 238–254. https://doi.org/10.1002/icd

McNamara, P., Pace-Schott, E. F., Johnson, P., Harris, E., & Auerbach, S. (2011). Sleep architecture and sleep-related mentation in securely and insecurely attached people. *Attachment and Human Development*, *13*(2), 141–154. https://doi.org/10.1080/14616734.2011.553999

McWilliams, L. A., & Bailey, S. J. (2010). Associations between adult attachment ratings and health conditions: Evidence from the national comorbidity survey replication. *Health Psychology*, *29*(4), 446–453. https://doi.org/10.1037/a0020061

McWilliams, L. A., & Holmberg, D. (2010). Adult attachment and pain catastrophizing for self and significant other. *Pain*, *149*(2), 278–283. https://doi.org/10.1016/j.pain.2010.02.019

Meadows, R., Arber, S., Venn, S., Hislop, J., & Stanley, N. (2009). Exploring the interdependence of couples rest wake cycles an actigraphic study. *Chronobiology International*, *26*(1), 80–92. https://doi.org/10.1080/07420520802678452

Meehan, M., Massavelli, B., & Pachana, N. (2017). Using Attachment Theory and Social Support Theory to examine and measure pets as sources of social support and attachment figures. *A Multidisciplinary Journal of the Interactions of People and Animals*, *30*(2), 273-289.

Mikulincer, M., Gillath, O., Halevy, V., Avihou, N., Avidan, S., & Eshkoli, N. (2001). Attachment theory and reactions to others' needs: Evidence that activation of the sense of attachment security promotes empathic responses. *Journal of Personality and Social Psychology*, *81*(6), 1205–1224. https://doi.org/10.1037/0022-3514.81.6.1205

Mikulincer, M., & Shaver, P. R. (2003). The attachment behavioral system in adulthood: Activation, psychodynamics, and interpersonal processes. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 35). Elsevier Academic Press. https://doi.org/10.1016/S0065-2601(03)01002-5

Mikulincer, M., & Shaver, P. R. (2007). *Attachment in adulthood: Structure, dynamics, and change*. Guilford Press.

Mikulincer, M., & Shaver, P. R. (2016). *Attachment in adulthood: Structure, dynamics, and change* (2nd ed.). The Guilford Press. https://doi.org/10.1097/nmd.0b013e318195fe3f

Miller, K. E., Dermen, K. H., & Lucke, J. F. (2018). Caffeinated energy drink use by U.S. adolescents aged 13-17: A national profile. *Psychology of Addictive Behaviors*, *32*(6), 647–659. https://doi.org/10.1037/adb0000389

Milner, C. E., & Cote, K. A. (2009). Benefits of napping in healthy adults: Rmpact of nap length, time of day, age, and experience with napping. *Journal of Sleep Research*, *18*(2), 272–281. https://doi.org/10.1111/j.1365-2869.2008.00718.x

Mohd Hasim, M. J., Mustafa, H., & Hashim, N. H. (2018). From middle childhood to adulthood attachment: Measuring attachment stability in the context of married Individuals in Penang, Malaysia. *Family Journal*, *26*(4), 444–454. https://doi.org/10.1177/1066480718806522

Monroe, L. J. (1969). Transient changes in EEG sleep patterns of married good sleepers: The effects of altering sleeping arrangement. *Psychophysiology*, *6*(3), 330–337. https://doi.org/10.1111/j.1469-8986.1969.tb02910.x

Morey, J. N., Gentzler, A. L., Creasy, B., Oberhauser, A. M., & Westerman, D. (2013). Young adults' use of communication technology within their romantic relationships and associations with attachment style. *Computers in Human Behavior*, *29*(4), 1771–1778. https://doi.org/10.1016/j.chb.2013.02.019

Morin, C. M. (1993). *Insomnia: Psychological assessment and management.* Guilford Press.

Morin, C. M., Belleville, G., Bélanger, L., & Ivers, H. (2011). The Insomnia Severity Index: Psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep*, *34*(5), 601–608. https://doi.org/10.1093/sleep/34.5.601

Morin, C. M., Vallières, A., & Ivers, H. (2007). Dysfunctional beliefs and attitudes about sleep (DBAS): Validation of a brief version (DBAS-16). *Sleep*, *30*(11), 1547–1554. https://doi.org/10.1093/sleep/30.11.1547

Myers, S. G., & Wells, A. (2015). Early trauma, negative affect ,and anxious attachment: the role of metacognition. *Anxiety, Stress, & Coping*, *28*(6), 634–649.

National Sleep Foundation. (2013). *2013 International bedroom poll.* https://www.thensf.org/wp-content/uploads/2021/03/2013-International-Bedroom-Poll.pdf

Nicassio, P. M., Mendlowitz, D. R., Fussell, J. J., & Petras, L. (1985). The phenomenology of the pre-sleep state: The development of the pre-sleep arousal scale. *Behaviour Research and Therapy*, *23*(3), 263–271. https://doi.org/10.1016/0005-7967(85)90004-X

Ognibene, T. C., & Collins, N. L. (1998). Adult attachment styles, perceived social support and coping strategies. *Journal of Social and Personal Relationships*, *15*(323–345). https://doi.org/10.1177/0265407598153002

Ohayon, M. M., & Bader, G. (2010). Prevalence and correlates of insomnia in the Swedish population aged 19-75 years. *Sleep Medicine*, *11*(10), 980–986. https://doi.org/10.1016/j.sleep.2010.07.012

Ohayon, M. M., Carskadon, M. A., Guilleminault, C., & Vitiello, M. V. (2004). Meta-analysis of quantitative sleep parameters from childhood to old age in healthy individuals: Developing normative sleep values across the human lifespan. *Sleep*, *27*(7), 1255–1273. https://doi.org/10.1093/sleep/27.7.1255

Oliver, M. D., & Datta, S. (2019). Electrophysiological correlates of the sleep–wake cycle. In E. Murrillo-Rodriguez (Ed.), *The Behavioral, Molecular, Pharmacological, and Clinical Basis of the Sleep-Wake Cycle* (pp. 17–26). Elsevier Inc. https://doi.org/10.1016/b978-0-12-816430-3.00002-6

Olsen, J. A., & Kenny, D. A. (2006). Structural equation modeling with interchangeable dyads. *Psychological Methods*, *11*(2), 127–141. https://doi.org/10.1037/1082-989X.11.2.127

Ong, J. C., Ulmer, C. S., & Manber, R. (2012). Improving sleep with mindfulness and acceptance: A metacognitive model of insomnia. *Behaviour Research and Therapy*, *50*(11), 651–660. https://doi.org/10.1016/j.brat.2012.08.001

Overall, N. C., Girme, Y. U., Lemay, E. P., & Hammond, M. D. (2014). Attachment anxiety and reactions to relationship threat: The benefits and costs of inducing guilt in romantic partners. *Journal of Personality and Social Psychology*, *106*(2), 235–256. https://doi.org/10.1037/a0034371

Pacheco, D., & Rehman, A. (2023, December). *Parasomnias: What they are, who they affect, their distinct types, and which treatments can help.* Sleep Foundation. https://www.sleepfoundation.org/parasomnias

Palagini, L., Ong, J. C., & Riemann, D. (2017). The mediating role of sleep-related metacognitive processes in trait and pre-sleep state hyperarousal in insomnia disorder. *Journal of Psychosomatic Research*, *99*, 59–65. https://doi.org/10.1016/j.jpsychores.2017.03.001

Palagini, L., Petri, E., Novi, M., Caruso, D., Moretto, U., & Riemann, D. (2018). Adult insecure attachment plays a role in hyperarousal and emotion dysregulation in Insomnia Disorder. *Psychiatry Research*, *262*, 162–167. https://doi.org/10.1016/j.psychres.2018.01.017

Pankhurst, F. P., & Horne, J. A. (1994). The influence of bed partners on movement during sleep. *Sleep*, *17*(4), 308–315. https://doi.org/10.1093/sleep/17.4.308

Patel, S. I., Miller, B. W., Kosiorek, H. E., Parish, J. M., Lyng, P. J., & Krahn, L. E. (2017). The effect of dogs on human sleep in the home sleep environment. *Mayo Clinic Proceedings*, *92*, 1368–1372.

Pavlova, M., Berg, O., Gleason, R., Walker, F., Roberts, S., & Regestein, Q. (2001). Self-reported hyperarousal traits among insomnia patients. *Journal of Psychosomatic Research*, *51*(2), 435–441. https://doi.org/10.1016/S0022-3999(01)00189-1

Perlis, M. L., Giles, D. E., Mendelson, W. B., Bootzin, R. R., & Wyatt, J. K. (1997). Psychophysiological insomnia: The behavioural model and a neurocognitive perspective. *Journal of Sleep Research*, *6*(3), 179–188. https://doi.org/10.1046/j.1365-2869.1997.00045.x

Peugh, J. L., DiLillo, D., & Panuzio, J. (2013). Analyzing mixed-dyadic data using structural equation models. *Structural Equation Modeling*, *20*(2), 314–337. https://doi.org/10.1080/10705511.2013.769395

Picardi, A., Miglio, R., Tarsitani, L., Battisti, F., Baldassari, M., Copertaro, A., Mocchegiani, E., Cascavilla, I., & Biondi, M. (2013). Attachment style and immunity: A 1-year longitudinal study. *Biological Psychology*, *92*(2), 353–358. https://doi.org/10.1016/j.biopsycho.2012.10.001

Pieters, D., De Valck, E., Vandekerckhove, M., Pirrera, S., Wuyts, J., Exadaktylos, V., Haex, B., Michiels, N., Verbraecken, J., & Cluydts, R. (2014). Effects of pre-sleep media use on sleep/wake patterns and daytime functioning among adolescents: The moderating role of parental control. *Behavioral Sleep Medicine*, *12*(6), 427–443. https://doi.org/10.1080/15402002.2012.694381

Pietromonaco, P. R., & Beck, L. A. (2019). Adult attachment and physical health. *Current Opinion in Psychology*, *25*, 115–120. https://doi.org/10.1016/j.copsyc.2018.04.004

Pietromonaco, P. R., Devito, C. C., Ge, F., & Lembke, J. (2015). Health and attachment processes. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and research: New directions and emerging themes* (pp. 287–318). Guilford Publications.

Pigeon, W. R., & Perlis, M. L. (2006). Sleep homeostasis in primary insomnia. *Sleep Medicine Reviews*, *10*(4), 247–254. https://doi.org/10.1016/j.smrv.2005.09.002

Pistole, C. M. (1989). Attachment in adult romantic relationships: Style of conflict resolution and relationship satisfaction. *Journal of Social and Personal Relationships*, *6*, 505–510.

Powers, S. I., Pietromonaco, P. R., Gunlicks, M., & Sayer, A. (2006). Dating couples' attachment styles and patterns of cortisol reactivity and recovery in response to a relationship conflict. *Journal of Personality and Social Psychology*, *90*(4), 613–628. https://doi.org/10.1037/0022-3514.90.4.613

Puig, J., Engund, M. M., Simpson, J. A., & Collins, W. A. (2013). Predicting adult physical illness from infant attachment: A prospective longitudinal study. *Health Psychology*, *32*(4), 409–417. https://doi.org/10.1037/a0028889

Ree, M. J., Harvey, A. G., Blake, R., Tang, N. K. Y., & Shawe-Taylor, M. (2005). Attempts to control unwanted thoughts in the night: Development of the Thought Control Questionnaire-Insomnia Revised (TCQI-R). *Behaviour Research and Therapy*, *43*(8), 985–998. https://doi.org/10.1016/j.brat.2004.07.003

Reed, L. A., Tolman, R. M., & Safyer, P. (2015). Too close for comfort: Attachment insecurity and electronic intrusion in college students' dating relationships. *Computers in Human Behavior*, *50*, 431–438. https://doi.org/10.1016/j.chb.2015.03.050

Reed, L. A., Tolman, R. M., Ward, L. M., & Safyer, P. (2016). Keeping tabs: Attachment anxiety and electronic intrusion in high school dating relationships. *Computers in Human Behavior*, *58*, 259–268. https://doi.org/10.1016/j.chb.2015.12.019

Riedl, D. F., Kaufmann, L., & Gaeckler, J. (2014). Statistical power of structural equation models in SCM research. *Journal of Purchasing and Supply Management*, *20*(3), 208–212. https://doi.org/10.1016/j.pursup.2014.05.004

Roehrs, T., & Roth, T. (2019). The sleep–wake cycle: An overview. In *The behavioral, molecular, pharmacological, and clinical basis of the sleep-wake cycle* (pp. 1–16). https://doi.org/10.1016/b978-0-12-816430-3.00001-4

Schmall, T. (2018, July 3). Shocking number of couples want to kick their other half out of bed. *New York Post*. https://nypost.com/2018/07/03/shocking-number-of-couples-want-to-kick-their-other-half-out-of-bed/

Schmidt, M. H. (2014). The energy allocation function of sleep: A unifying theory of sleep, torpor, and continuous wakefulness. *Neuroscience and Biobehavioral Reviews*, *47*, 122–153. https://doi.org/10.1016/j.neubiorev.2014.08.001

Schotte, C. K. W., Van Den Bossche, B., De Doncker, D., Claes, S., & Cosyns, P. (2006). A biopsychosocial model as a guide for psychoeducation and treatment of depression. *Depression and Anxiety*, *23*, 312–324. https://doi.org/10.1002/da

Selcuk, E., Stanton, S. C. E., Slatcher, R. B., & Ong, A. D. (2017). Perceived partner responsiveness predicts better sleep quality through lower anxiety. *Social Psychological and Personality Science*, *8*(1), 83–92.

Sella, E., Cellini, N., Miola, L., Sarlo, M., & Borella, E. (2019). The influence of metacognitive beliefs on sleeping difficulties in older adults. *Applied Psychology: Health and Well-Being*, *11*(1), 20–41. https://doi.org/10.1111/aphw.12140

Shakory, S., Van Exan, J., Mills, J. S., Sockalingam, S., Keating, L., & Taube-Schiff, M. (2015). Binge eating in bariatric surgery candidates: The role of insecure attachment and emotion regulation. *Appetite*, *91*, 69–75. https://doi.org/10.1016/j.appet.2015.03.026

Shi, L. (2003). The association between adult attachment styles and conflict resolution in romantic relationships. *American Journal of Family Therapy*, *31*(3), 143–157. https://doi.org/10.1080/01926180301120

Sibley, C. G., Fischer, R., & Liu, J. H. (2005). Reliability and validity of the revised Experiences in Close Relationships (ECR-R) self-report measure of adult romantic attachment. *Personality and Social Psychology Bulletin*, *31*(11), 1524–1536. https://doi.org/10.1177/0146167205276865

Sivertsen, B., Lallukka, T., Salo, P., Pallesen, S., Hysing, M., Krokstad, S., & Øverland, S. (2014). Insomnia as a risk factor for ill health: Results from the large population-based prospective HUNT Study in Norway. *Journal of Sleep Research*, *23*(2), 124–132. https://doi.org/10.1111/jsr.12102

Sloan, E. P., Maunder, R. G., Hunter, J. J., & Moldofsky, H. (2007). Insecure attachment is associated with the α-EEG anomaly during sleep. *BioPsychoSocial Medicine*, *1*(20), 1–6. https://doi.org/10.1186/1751-0759-1-20

Smith, B. P., Browne, M., Mack, J., & Kontou, T. G. (2018). An exploratory study of human–dog co-sleeping using actigraphy: Do dogs disrupt their owner's sleep? *Anthrozoos*, *31*(6), 727–740. https://doi.org/10.1080/08927936.2018.1529355

Smith, B., Thompson, K., Clarkson, L., & Dawson, D. (2014). The prevalence and implications of human–animal co-sleeping in an Australian sample. *Anthrozoos*, *27*(4), 543–551. https://doi.org/10.2752/089279314X14072268687880

Spielman, A., & Glovinsky, P. B. (1991). Introduction: The varied nature of insomnia. In P. J. Hauri (Ed.), *Case studies in insomnia* (pp. 1–19). Plenum Press. https://doi.org/10.1007/978-1-4757-9586-8

Stadler, G., Snyder, K. A., Horn, A. B., Shrout, P. E., & Bolger, N. P. (2012). Close relationships and health in daily life. *Psychosomatic Medicine*, *74*, 398–409. https://doi.org/10.1097/psy.0b013e31825473b8

Stas, L., Kenny, D. A., Mayer, A., & Loeys, T. (2018). Giving dyadic data analysis away: A user-friendly app for actor–partner interdependence models. *Personal Relationships*, *25*(1), 103–119. https://doi.org/10.1111/pere.12230

Statistics Canada (2022). Health characteristics, annual estimates. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310009601

Stein, M. D., & Friedmann, P. D. (2005). Disturbed sleep and its relationship to alcohol use. *Substance Abuse*, *26*(1), 1–13. https://doi.org/10.1300/J465v26n01_01

Suni, E., & Rosen, D. (2024, March). *Mastering sleep hygiene: Your path to sleep quality.* Sleep Foundation. https://www.sleepfoundation.org/sleep-hygiene

Sutton, D. A., Moldofsky, H., & Badley, E. M. (2001). Insomnia and health problems in Canadians. *Sleep*, *24*(6), 665–670. https://doi.org/10.1093/sleep/24.6.665

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Allyn & Bacon/Pearson Education.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson Education.

Torterolo, P., Monti, J. M., & Vanini, G. (2019). Neurochemistry and pharmacology of sleep. In E. Murrillo-Rodriguez (Ed.), *The behavioral, molecular, pharmacological, and clinical basis of the sleep-wake cycle* (pp. 45–83). Elsevier Inc. https://doi.org/10.1016/b978-0-12-816430-3.00004-x

Troxel, W. M., & Germain, A. (2011). Insecure attachment is an independent correlate of objective sleep disturbances in military veterans. *Sleep Medicine*, *12*(9), 860–865. https://doi.org/10.1016/j.sleep.2011.07.005

Trub, L., & Barbot, B. (2016). The paradox of phone attachment: Development and validation of the Young Adult Attachment to Phone Scale (YAPS). *Computers in Human Behavior*, *64*, 663–672. https://doi.org/10.1016/j.chb.2016.07.050

Ulfberg, J., Carter, N., Talback, M., & Edling, C. (2000). Adverse health effects among women living with heavy snorers. *Health Care for Women International*, *21*, 81–90.

Vela-Bueno, A., Fernandez-Mendoza, J., Olavarrieta-Bernardino, S., Vgontzas, A. N., Bixler, E. O., De La Cruz-Troca, J. J., Rodriguez-Muñoz, A., & Oliván-Palacios, J. (2008). Sleep and behavioral correlates of napping among young adults: A survey of first-year university students in Madrid, Spain. *Journal of American College Health*, *57*(2), 150–158. https://doi.org/10.3200/JACH.57.2.150-158

Verdecias, R. N., Jean-Louis, G., Zizi, F., Casimir, G. J., & Browne, R. C. (2009). Attachment styles and sleep measures in a community-based sample of older adults. *Sleep Medicine*, *10*(6), 664–667. https://doi.org/10.1016/j.sleep.2008.05.011

Virkkula, P., Bachour, A., Hytönen, M., Malmberg, H., Salmi, T., & Maasilta, P. (2005). Patient- and bed partner-reported symptoms, smoking, and nasal resistance in sleep-disordered breathing. *Chest*, *128*(4), 2176–2182. https://doi.org/10.1378/chest.128.4.2176

Vorderer, P., Hefner, D., Reinecke, L., & Klimmt, C. (2018). Permanently online, permanently connected: A new paradigm in communication research? In P. Vorderer, D. Hefner, L. Reinecke, & C. Klimmt (Eds.), *Permanently online, permanently connected: Living and communicating in a POPC World* (pp. 1–3). Routledge, Taylor & Francis.

Vorderer, P., Krömer, N., & Schneider, F. M. (2016). Permanently online - Permanently connected: Explorations into university students' use of social media and mobile smart devices. *Computers in Human Behavior*, *63*, 694–703. https://doi.org/10.1016/j.chb.2016.05.085

Waine, J., Broomfield, N. M., Banham, S., & Espie, C. A. (2009). Metacognitive beliefs in primary insomnia: Developing and validating the Metacognitions Questionnaire - Insomnia (MCQ-I). *Journal of Behavior Therapy and Experimental Psychiatry*, *40*(1), 15–23. https://doi.org/10.1016/j.jbtep.2008.03.002

Walters, E. M., Phillips, A. J. K., Mellor, A., Hamill, K., Jenkins, M. M., Norton, P. J., Baucom, D. H., & Drummond, S. P. A. (2020). Sleep and wake are shared and transmitted between individuals with insomnia and their bed-sharing partners. *Sleep*, *43*(1), 1–12. https://doi.org/10.1093/sleep/zsz206

Waters, E., Merrick, S., Treboux, D., Crowell, J., & Albersheim, L. (2000). Attachment security in infancy and early adulthood: A twenty-year longitudinal study. *Child Development*, *71*(3), 684–689. https://doi.org/10.1111/1467-8624.00176

Wenzlaff, R. M., & Wegner, D. M. (2000). Thought suppression. *Annual Review of Psychology*, *51*, 59–91.

Whiffen, V. E. (2005). The role of partner characteristics in attachment insecurity and depressive symptoms. *Personal Relationships*, *12*(3), 407–423. https://doi.org/10.1111/j.1475-6811.2005.00123.x

Wilkinson, L. L., Rowe, A. C., Bishop, R. J., & Brunstrom, J. M. (2010). Attachment anxiety, disinhibited eating, and body mass index in adulthood. *International Journal of Obesity*, *34*(9), 1442–1445. https://doi.org/10.1038/ijo.2010.72

Wilkinson, L. L., Rowe, A. C., Robinson, E., & Hardman, C. A. (2018). Explaining the relationship between attachment anxiety, eating behaviour and BMI. *Appetite*, *127*(April), 214–222. https://doi.org/10.1016/j.appet.2018.04.029

Williams, J., Roth, A., Vatthauer, K., & McCrae, C. S. (2013). Cognitive behavioral treatment of Insomnia. *Chest*, *143*(2), 554–565. https://doi.org/10.1378/chest.12-0731

Wills, L., & Garcia, J. (2002). Parasomnias: Epidemiology and management. *CNS Drugs*, *16*(12), 803–810. https://doi.org/10.2165/00023210-200216120-00002

Wright, S. L., Firsick, D. M., Kacmarski, J. A., & Jenkins-Guarnieri, M. A. (2017). Effects of attachment on coping efficacy, career decision self-efficacy, and life satisfaction. *Journal of Counseling and Development*, *95*(4), 445–456. https://doi.org/10.1002/jcad.12159

Wu, Q., Chen, Y., Zhou, Y. T., Zhang, X., Huang, Y., & Liu, R. (2023). Reliability, validity, and sensitivity of Short-Form 36 Health Survey (SF-36) in patients with sick sinus syndrome. *Medicine (Baltimore)*, *102*(24), E33979. https://doi.org/10.1097/MD.0000000000033979

Wuyts, J., De Valck, E., Vandekerckhove, M., Pattyn, N., Bulckaert, A., Berckmans, D., Haex, B., Verbraecken, J., & Cluydts, R. (2012). The influence of pre-sleep cognitive arousal on sleep onset processes. *International Journal of Psychophysiology*, *83*(1), 8–15. https://doi.org/10.1016/j.ijpsycho.2011.09.016

Xie, Y., Chin, B. N., & Feeney, B. C. (2022). Mechanisms linking attachment orientation to sleep quality in married couples. *Personality and Social Psychology Bulletin*, *0*, 1–20. https://doi.org/10.1177/01461672221123859

Yang, C.-M., & Ebben, M. . (2008). Behavioral therapy, sleep hygiene, and psychotherapy. In S. R. Pandi-Perumal, J. C. Verster, J. M. Monti, M. Lader, & S. Z. Langer (Eds.), *Sleep Disorders: Diagnosis and Therapeutics* (pp. 115–123). Informa Healthcare. https://doi.org/10.1001/jama.2010.467

Yang, C.-M., Lin, S.-C., Hsu, S.-C., & Cheng, C.-P. (2010). Maladaptive sleep hygiene practices in good sleepers and patients with Insomnia. *Journal of Health Psychology*, *15*(1), 147–155.

Zeitzer, J. M. (2015). Real life trumps laboratory in matters of public health. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(13), E1513. https://doi.org/10.1073/pnas.1500717112

Zheng, L., Luo, Y., & Chen, X. (2020). Different effects of attachment anxiety and attachment avoidance on depressive symptoms: A meta-analysis. *Journal of Social and Personal Relationships*, *37*(12), 3028–3050. https://doi.org/10.1177/0265407520946482

Zilcha-Mano, S., Mikulincer, M., & Shaver, P. R. (2011). An attachment perspective on human-pet relationships: Conceptualization and assessment of pet attachment orientations. *Journal of Research in Personality*, *45*(4), 345–357. https://doi.org/10.1016/j.jrp.2011.04.001

Table 2.1

Published Peer-Reviewed Articles on Adults' Attachment and Sleep Disturbances Excluding Literature Reviews, Meta Analyses and Dissertations

Study	Title	Sample	% co-sleeping	Type of sleep data	Name of self-report measure?		Sample size	Associated to sleep?[a]		Acute or chronic sleep issues?[b]
					Sleep	Attachment measure		Anxiety	Avoidance	
Carmichael & Reis (2005)	Attachment, sleep quality, and depressed affect	Married couples from the general public	88.5% of couples	Self-report	PSQI	ECR (adapted)	78 couples	Yes	Yes	Acute
Sloan et al. (2007)	Insecure attachment is associated with the α-EEG anomaly during sleep	Patients with sleep disturbance	N/A	PSG	N/A	ECR-R	31	Yes	No	Both
Diamond et al. (2007)	Every time you go away: Changes in affect, behavior, and physiology associated with travel-related separations from romantic partners	Married or cohabitating heterosexual couples	N/A	Self-report	Daily diaries, PSQI (adapted)	ECR	42 couples	No	No	Acute
Verdecias et al. (2009)	Attachment styles and sleep measures in a community-based sample of older adults	General public, 33% of whom were married or living with a partner	N/A	Self-report	PSQI	RSQ	70	Yes	No	Acute
Hicks et al. (2011)	Don't go to bed angry: Attachment, conflict, and affective and physiological reactivity	Members of the general public in cohabitating relationships	N/A	Self-report	PSQI (adapted)	ECR-R	39	N/A	N/A	Acute

Maunder et al. (2011)	The impact of attachment insecurity and sleep disturbance on symptoms and sick days in hospital-based health care workers	Healthy female hospital workers, 82.4% of whom were married or common law	N/A	Self-report	PSQI	ECR-R	131	Yes	Yes	Acute
McNamara et al. (2011)	Sleep architecture and sleep-related mentation in securely and insecurely attached people	General public and local universities	N/A	Self-report; PSG	PSQI, daily diaries of sleep-related variables (e.g., number of nighttime awakenings)	RSQ, AQ	64	Yes	Yes	Acute
Troxel & Germain (2011)	Insecure attachment is an independent correlate of objective sleep disturbances in military veterans	Healthy military veterans, 21 of whom were married	N/A	Self-report	PSQI	ECR-R	49	Yes	Yes	Acute
Picardi et al. (2013)	Attachment style and immunity: A 1-year longitudinal study	Nurses	N/A	PSG; visual sleep stage scoring; quantitative EEG analysis		ECR	61	No	No	Acute
Escolas et al. (2013)	The effect of attachment style on sleep in .58ed service members	Active duty, postdeployment service members, 69% of whom were married or living with a partner	N/A	Self-report	"Activity level-sleep" and "Rhythmicity-sleep" subscales of the DOTS-R	RSQ, ECR-R	561	Yes	Yes	Acute
Gunn et al. (2015)	Sleep concordance in couples is associated with relationship characteristics	Married couples from the general public	100% at least 4 nights a week	Self-report; Actigraphy	Composite Scale of Morningness, PSQI	ECR	48 couples	Yes	No	Acute

Adams & McWilliams (2015)	Relationships between adult attachment style ratings and sleep disturbances in a nationally representative sample	General public, 55.94% of whom were married or cohabitating	N/A	Self-report	Screening yes/no questions and follow-up questions (e.g., "...problems feeling sleepy during the day?"	AAS	5692	Yes	Yes	Acute
Belfiore & Pietrowsky (2017)	Attachment styles and nightmares in adults	Mostly psychology students	N/A	Self-report	NDQ	ECR	954	Yes	Yes	N/A
Palagini et al. (2018)	Adult insecure attachment plays a role in hyperarousal and emotion dysregulation in Insomnia Disorder	Outpatients with Insomnia Disorder and healthy controls	N/A	Self-report	ISI; APS; PSAS	ASQ	102	Yes[c]		Chronic
Elsey et al. (2019)	The role of couple sleep concordance in sleep quality: Attachment as a moderator of associations	Co-habiting, married parents	N/A	Self-report	Daily diaries of sleep-related variables (e.g., sleep quality)	SASQ	179 couples	N/A	N/A	Acute
Kent de Grey et al. (2019)	Strained bedfellows: An actor–partner analysis of spousal attachment insecurity and sleep quality	Married couples	91% of couples	Self-report	PSQI	ECR	92 couples	Yes	No	Acute
Adams et al. (2019)	An exploration of adult attachment insecurity and psychiatric symptoms in individuals with obstructive sleep apnea	Patients diagnosed with obstructive sleep apnea, 86.3% of whom lived with their romantic partner	88.2% of participants	Self-report	ESS; PSQI	ECR	102	Yes	Yes	Acute

Reed & Rufino (2019)	Impact of fearful attachment style on nightmares and disturbed sleep in psychiatric inpatients	Inpatients from a psychiatric hospital	N/A	Self-report	The Sleep-Disturbance Screening (modified)	RSQ	2876	Yes	Yes	Acute
Haydon and Moss (2021)	Attachment and sleep: A dyadic intensive longitudinal actigraphy study	Couples from the general public who had been together for at least one year	100%	Self-report; Interviews; Actigraphy	PSQI	ECR-RSS	208 couples	Yes	Yes	Acute
Xie et al. (2022)	Mechanisms Linking Attachment Orientation to Sleep Quality in Married Couples	Married heterosexual couples who wed over 10 years ago	N/A	Self-report	PSQI	ECR	113 couples	Yes	Yes	Acute
		Married couples with at least one couple member over age 65	N/A	Self-report	PSQI	ECR	266 couples	Yes	Yes	Acute

Note. AAS = Adult Attachment Styles; APS = Arousal Predisposition Scale; AQ = Attachment Questionnaire; ASQ = Attachment Style Questionnaire; DOTS-R = Dimensions of Temperament Survey-Revised; ECR = Experiences in Close Relationships; ECR-R = Experiences in Close Relationships-Revised; ECR-RSS = Experiences in Close Relationships-Relationships Structures Survey; EEG = electroencephalography; ESS = Epworth Sleepiness Scale; ISI = Insomnia Severity index; NDQ = Nightmare Distress Questionnaire; PSAS = Pre-sleep Arousal Scale; PSG = Polysomnography; PSQI = Pittsburgh Sleep Quality Index; RSQ = Relationship Styles Questionnaire; SASQ = Spousal Attachment Styles Questionnaire.

[a]This column denotes at least one direct, significant ($p < .05$) association (e.g., correlation, regression, t-test) found between attachment and any sleep-related variable (e.g., sleep quality, REM sleep) regardless of direction of the association. Conflicting associations between attachment and sleep in a study (e.g., significant correlation but insignificant regression main effect) were counted as a significant association. Significant moderated and mediated effects were excluded. [b]Acute = sleep issues within the past month, chronic = insomnia disorder. [c]This study had a composite score of attachment insecurity dimensions.

Table 5.1

Study 2 Hypotheses Aimed at Replicating Past Research

Attachment variable	Sleep variable	Hypothesized association
Anxiety	Sleep quality	Positive
Avoidance		-
Anxiety	Sleep efficiency	Negative
Avoidance		-
Anxiety	Pre-sleep cognitive arousal	Positive
Avoidance		-
Anxiety	Daytime sleepiness	Positive
Avoidance		-
Anxiety	Substance use/sleep-wake aids	Positive
Avoidance		Positive
Anxiety	Difference between partners' bedtimes	Negative
Avoidance		Positive
Anxiety	Dysfunctional beliefs about sleep	Positive
Avoidance		-

Note. In general, the directions of these associations indicate that greater attachment will be associated with increased sleep-related behaviours that are incompatible with sleep or poor quality.

Table 5.2

Study 2 Attachment and Sleep-Related Variables That Have Not Been Previously Studied

Independent variable	Dependent Variable	Hypothesized Association
Anxiety	Electronic device use in bed	Positive
Avoidance		-
Anxiety	Pre-sleep eating and drinking	Positive
Avoidance		-
Anxiety	Pleasant pre-sleep talk	Negative
Avoidance		-
Anxiety	Neutral pre-sleep talk	Negative
Avoidance		-
Anxiety	Unpleasant pre-sleep talk	Positive
Avoidance		-
Anxiety	Sleep environment agreement	-
Avoidance		-

Note. In general, the directions of these associations indicate that greater attachment will be associated with increased sleep-related behaviours that are incompatible with sleep.

Table 6.1

Study 1 Table of Descriptive Statistics for Total Sample of Participants with Useable Data

	% Women	% Men
Ethnicity		
Caucasian	83.2	82.1
Aboriginal	4.0	0.6
African/African-American	0.6	1.7
Asian/Pacific Islander	4.6	6.4
Latino/a	2.3	2.3
Middle Eastern	0.6	1.2
East Indian	2.3	1.2
Other	1.2	3.5
Would rather not say	0.6	1.2
Education		
High school degree or below	6.9	13.9
Some college/university	33.5	29.5
Trade/technical/vocational training	5.2	12.7
Bachelor's degree	29.5	27.2
Master's or PhD degree	21.4	12.7
Professional degree (e.g., M.D., Psy.D.)	3.5	3.5
Employment		
Student	50.3	30.6
Unemployed	1.2	4.0
Stay at home parent	3.5	0
Employed	43.9	63.0
Retired	1.2	2.3

Note. $N = 346$.

Table 6.2

Study 1 Interchangeable Actor Partner Interdependence Model of Attachment Anxiety and Avoidance on Sleep Quality

	b	SE	β	*p*	95% CI
Step 1: Estimate Model					
Intercepts					
Female sleep quality	11.48	.96	-	<.01	-
Male sleep quality	8.22	.94	-	<.01	-
Age on female sleep	-.002	.03	-.004	.95	-.06, .06
Age on male sleep	.07	.03	.15	.04	-.03, .15
Actor health	-.07	.02	N/A	<.01	-.11, -.04
Actor attachment anxiety	.70	.22	.19	.01	.23, 1.28
Partner attachment anxiety	.43	.22	.12	.04	-.11, .87
Actor attachment avoidance	-.15	.25	-.04	.55	-.71, .42
Partner attachment avoidance	-.05	.25	-.01	.84	-.59, .54
Step 2: Addition of Interaction Effects					
Intercepts					
Female sleep quality	11.30	.95	-	<.01	-
Male sleep quality	7.94	.94	-	<.01	-
Age on female sleep	-.002	.03	-.005	.94	-.06, .06
Age on male sleep	.07	.03	.16	.03	-.02, .15
Actor health	-.07	.02	N/A	<.01	-.11, -.05
Actor attachment anxiety	.55	.23	.15	.02	.01, 1.02
Partner attachment anxiety	.44	.23	.12	.06	-.07, .91
Actor attachment avoidance	-.01	.27	-.003	.97	-.53, .49
Partner attachment avoidance	-.14	.27	-.03	.62	-.72, .44
Actor x partner attachment anxiety	.23	.19	.07	.23	-.25, .64
Actor x partner attachment avoidance	-.07	.27	-.01	.80	-.85, .47

Actor attachment anxiety x partner attachment avoidance	.38	.23	.09	.09	-.08, 1.27
Partner attachment anxiety x actor attachment avoidance	-.02	.23	-.004	.94	-.60, .38

Note. All predictors except for age were grand mean centered. CI = confidence interval.

Table 7.1

Study 2 Table of Sociodemographic Characteristics for Participants with Useable Data

Education level	%
High school degree or less	7.5
Some college/university	25.2
Trade/technical/vocational training	8.7
Bachelor's degree	27.5
Master's degree	17.2
Phd degree	6.5
Professional degree (e.g., m.d., psy.d., j.d)	5.2
Other advanced degree (e.g., professional certificate)	1.3
Geographic location	
Canada	66.7
U.S.	25.6
Other	7.1
Did not disclose	.64
Ethnicity	
White	72.2
Indigenous	3.6
Black	2.6
Asian/pacific islander	9.1
Latinx	4.2
Middle eastern	1.6
East indian	2.9
Other (e.g., mixed race)	4.85
Would rather not say	.6
Employment	
Student (full-time and/or part-time)	53.7
Employed (full-time and/or part-time)	75.0
Retired/medical leave	3.9

Sexual orientation	
Exclusively heterosexual	56.0
Primarily heterosexual	20.1
More heterosexual than homosexual	5.2
Bisexual	11.3
More homosexual than heterosexual	1.6
Primarily homosexual	1.3
Exclusively homosexual	2.6
Health conditions that interfere with sleep	
Respiratory disorder (e.g., asthma, sleep apnea)	8.1
Unexplained chronic pain	12.9
Musculoskeletal chronic pain (e.g., arthritis, carpal tunnel syndrome)	12.3
Heart or cardiovascular condition	4.5
Thyroid problems (e.g., hyperthyroidism)	6.1
Kidney problems	4.5
Neurological problems (e.g., headaches, epilepsy)	14.6
Cancer or serious infectious disease (e.g., hiv)	10.1
Psychiatric disorder (e.g., schizophrenia, bipolar disorder, anxiety disorder)	23.8
Other	23.9
Relationship information	
Single individuals	
Casually dating	35.9
Seriously dating	.7
Thinking about marriage	9.7
Discussing marriage with partner	6.1
Engaged and living separately	1.6
Engaged and living together	2.9
Common-law (i.e., living together for at least 6 months)	7.8
Married and living together	33.1

Note. N = 309. Examples of "other" health conditions provided by participants included but were not limited to acid reflux, menopause, skin issues (e.g., eczema), and autoimmune diseases (e.g., Lupus).

Table 7.2

Study 2 Descriptive Statistics for Sleep-related Measures and Their Correlations with Attachment Dimensions

Measure	*M*	*SD*	Range	Cronbach's α	Correlations	
					Anxiety	Avoidance
Indicators of sleep outcomes						
Sleep quality	8.57	6.34	0-28	.90	.20**	.11
Daytime sleepiness	4.69	3.29	0-15	.81	.23**	.10
Electronic device use in bed	2.12	1.02	0-5	.81	.36**	.05
Dysfunctional beliefs about sleep	18.0	6.97	2.7-36.7	.88	.24**	.03
Pre-sleep hyperarousal						
Cognitive arousal	14.62	5.56	5-25	.93	.36**	.04
Somatic arousal	14.49	5.74	8-33	.86	.23**	.16**
Sleep hygiene practices						
Sleep scheduling	22.18	6.67	7-39	.76	.31**	.04
Pre-sleep eating and drinking	13.55	4.77	6-29	.69	.14*	.16**
Sleep environment practices	18.35	6.99	7-40	.79	.13*	.15**
Arousing activities	25.50	7.28	9-49	.74	.33**	.16**

Note. $N = 309$.

Table 7.3

Study 2 Statistics for Sleep-related Substance Use Items and Their Correlations with Attachment Dimensions

Item	*M*	*SD*	Range	Correlations	
				Anxiety	Avoidance
Pre-sleep substance use items					
How frequently did you take over-the-counter sleeping pills?	.56	1.32	1-5	.09	.12*
How frequently did you take supplements (e.g., melatonin) to fall or stay asleep?	1.03	2.01	0-7	.13*	.13*
How frequently did you drink alcohol to fall asleep?	.51	1.11	0-4	.01	.15**
How frequently did you smoke cigarettes to fall asleep?	.55	1.34	0-5	.04	.18**
How frequently did you drink caffeinated beverages (coffee, energy drinks) to stay awake?	1.56	2.24	0-7	.09	.06
How frequently did you take other stimulants (e.g., Adderall) to stay awake?	.49	1.31	0-5	.02	.15**

Note. $N =$ 307 to 311 as some individuals omitted responses. Spearman rank correlation coefficients are presented for the items as the response distributions were non-normal. The response scale ranged from 0 to 7 indicating the number of nights per week was used.

Table 7.4

Study 2 Sleep-Related Behaviours and Sleep Disturbance of Participants Who Bedshare at Least Once a Week

	%
Individuals who bedshare with partners	
0 nights per week	13.5
1 night per week	2.9
2 nights per week	2.9
3 nights per week	4.5
4 nights per week	2.6
5 nights per week	2.6
6 nights per week	1.3
7 nights per week	34.1
"Generally, my partner and I have the same sleep environment preferences"	
Strongly disagree	3.2
Disagree	15.8
Neither agree nor disagree	14.6
Agree	39.2
Strongly agree	24.1
Motivations for co-sleeping[a]	
Convenience (e.g., There is only one bed etc.)	27.2
Comfort (e.g., warmth)	63.9
Safety (e.g., protection)	40.5
Intimacy and togetherness	91.1
Convention (every couple does this)	29.7
Partners prefer it	17.7
Individuals who have pleasant or enjoyable conversations with partners pre-sleep at least sometimes	78.5
Individuals who have neutral conversations with partners pre-sleep at least sometimes	76.6
Individuals who have unpleasant or stressful conversations with partners pre-sleep at least	29.1

sometimes	
Individuals who report sleep disturbance attributed to bedpartners	
Not applicable	3.2
Never	15.8
Rarely	32.3
Occasionally	24.7
Sometimes	12.0
Frequently	11.4
Always	.6
Individuals who reported being woken up by their bedpartners over the past two weeks because partners[b]…	
Wanted to have sex	22.1
Wanted to talk about something	17.8
Were moving during their sleep	39.9
Got up in the middle of the night (e.g., to urinate, to eat)	39.2
Were having nightmares	13.3
Were snoring	35.4
Made other noises in their sleep (e.g., talked in their sleep, ground their teeth)	22.8

Note. $n = 158$.

[a]Individuals were asked to select any of these responses that applied to them. [b]Frequencies for these items represent the sum of responses ranging from "sometimes" to "always" using the subsample of individuals who bedshare at least once over the past two weeks.

Table 7.5

Study 2 Descriptive Statistics for Sleep-related Measures Administered to Individuals in Relationships who Bedshare at Least Once a Week

Measure	*M*	*SD*	Range	Correlations	
				Anxiety	Avoidance
Pleasant pre-sleep talk	3.29	1.16	1-5	.04	-.34**
Unpleasant pre-sleep talk	2.15	.88	1-5	.10	.001
Neutral pre-sleep talk	2.97	.99	1-5	.16*	-.19*
Sleep environment preferences	3.67	1.11	1-5	-.07	-.22**
Sleep environment disagreement	1.26	1.10	0-6	.17*	-.10
Sleep interruptions by partners because partners…					
Were having nightmares	.43	.74	0-3	.04	.18*
Wanted to have sex	.64	.92	0-4	.01	.21**
Wanted to talk about something	.53	.95	0-4	-.07	.19*
They were moving during their sleep	1.29	1.09	0-4	.09	.11
They got up in the middle of the night (e.g., to urinate, to eat)	1.20	.98	0-4	.12	.21**
They were snoring	1.18	1.24	0-4	.16*	.13
They made other noises in their sleep (e.g., talked in their sleep, ground their teeth)	.72	.98	0-4	.20*	.21**

Note. $N = 158$.

$^{**}p < .01$. $^{*}p < .05$.

Table 7.6

Sleep Hygiene Practices Scale Items about Partners

Items	*M*	*SD*	Range	Correlations	
				Anxiety	Avoidance
My bedpartner has unpleasant conversations with me prior to sleep	2.05	1.04	1-6	.12	.12
My bedpartner falls asleep with TV or music on	2.32	1.67	1-6	.20*	.12
My bedpartner does vigorous exercise during the two hours prior to sleep	1.49	.94	1-6	-.08	.17*
My bedpartner does not have a consistent bedtime daily	2.62	1.46	1-6	.22**	.09
My bedpartner gets out of bed at inconsistent times	2.62	1.41	1-6	.23**	.05
My bedpartner stays in bed after waking up in the morning	3.01	1.50	1-6	.17*	.05
My bedpartner sleeps in on weekends	3.70	1.61	1-6	.02	-.12
My bedpartner naps or rests in bed for over one hour during the day	2.37	1.41	1-6	.08	.13
My bedpartner drinks caffeinated drinks (e.g., coffee, tea, coca-cola) within the four hours prior to bedtime	2.32	1.52	1-6	.22**	.17*
My bedpartner drinks alcohol within the two hours prior to bedtime	2.37	1.32	1-6	.13	-.04
My bedpartner consumes stimulating substances (e.g., nicotine) during the two hours prior to bedtime	1.76	1.41	1-6	.11	.26**
My bedpartner drinks a lot during the hour prior to sleep	2.16	1.27	1-6	.24**	-.04
My bedpartner eats too much food during the hour prior to sleep	2.40	1.19	1-6	.14	.04

Note. $N = 158$. Individuals needed to bedshare with their romantic partners for at least one night per week on average to be eligible to fill out responses to these items.

$^{**}p < .01$. $^{*}p < .05$.

Table 7.7

Study 2 Final Multiple Regression Models Predicting Sleep Outcomes

Step 1 variables	Sleep quality			Daytime sleepiness		
	b	*SE b*	β	*b*	*SE b*	β
Constant	6.41**	.42		4.35**	.25	
Age	-.01	.32	-.002	-.60**	.19	-.18**
Depression	1.96**	.34	.31**	.26	.20	.08
Health condition	4.63**	.66	.36**	.73	.39	.11
Attachment anxiety	.13	.35	.02	.42*	.21	.13*
Attachment avoidance	.39	.66	.36	.07	.19	.02
Adj. R^2			.30**			.09**

Note. N = 309. Predictors were standardized.

*$p < .05$. **$p < .01$.

Table 7.8

Study 2 Multiple Regression Results for the Models Predicting Electronic Device Use and Dysfunctional Beliefs About Sleep

Step 1 variables	Pre-sleep electronic device use				Dysfunctional beliefs about sleep			
	b	*SE b*	β		*b*	*SE b*	β	
Constant	1.95**	.07			16.54**	.52		
Age	-.32**	.05	-.33**		-.32	.40	-.05	
Depression	.11*	.06	.12*		.94*	.41	.14*	
Health condition	.33**	.11	.17**		3.17**	.80	.23**	
Attachment anxiety	.14*	.06	.15*		.91*	.42	.13*	
Attachment avoidance	-.02	.05	-.02		.13	.39	.02	
Adj. R^2				.22**				.12**

Note. N = 309. Predictors were standardized.

*$p < .05$. **$p < .01$.

Table 7.9

Study 2 Final Multiple Regression Model Predicting Pre-sleep Cognitive Arousal

Step 3 variables	*b*	*SE b*	β	
Constant	12.48**	.60		
Age	-.42	.29	-.08	
Depression	2.06**	.30	.37**	
Health Condition	1.93**	.57	.17**	
Attachment Anxiety	.09	.53	.02	
Attachment Avoidance	.73	.61	.13	
Occasional Co-Sleeping (OC)	1.79*	.76	.14*	
Regular Co-Sleeping (RC)	1.46*	.72	.13*	
Anx X Avd	-.09	.32	-.02	
Anx X OC	1.31	.76	.12	
Anx X RC	1.90*	.78	.22*	
Avd X OC	-1.36	.84	-.12	
Avd x RC	-1.86*	.75	-.23*	
Adj. R^2				.31*

Note. Predictors were standardized. The final model included Step 1 and Step 2 (viz., the dummy coded co-sleeping variables).

*p<.05. **p <.01.

Table 7.10

Study 2 Final Regression Model Predicting Pre-sleep Somatic Arousal

Step 2 variables	*b*	*SE b*	β	
Constant	13.46**	.57		
Age	-.83**	.30	-.14**	
Depression	1.30**	.31	.23**	
Health Condition	4.25**	.59	.37**	
Attachment Anxiety	-.09	.32	-.02	
Attachment Avoidance	.27	.30	.05	
Occasional Co-sleeping (OC)	-.61	.74	-.05	
Regular Co-sleeping (RC)	-1.87*	.72	-.16*	
Adj. R^2				31*

Note. Predictors were standardized. The final model included Step 1 and Step 2 (viz., the dummy coded co-sleeping variables).

*$p < .05$. **$p < .01$.

Table 7.11

Study 2 Multiple Regression Results for the Dimensions of the Sleep Hygiene Practices Scale

Step 1 variables	Sleep scheduling			Pre-sleep eating and drinking			Sleep environment			Pre-sleep arousing activities		
	b	*SE b*	β	*b*	*SE b*	β	*B*	*SE b*	β	*b*	*SE b*	β
Constant	21.22**	.45		12.79**	.36		16.62**	.52		23.71**	.49	
Age	- 1.72**	.34	-.26**	-.56*	.28	-.12*	-.85*	.40	-.12*	-1.08**	.38	-.15**
Depression	2.06**	.36	.31**	.81**	.29	.17**	1.09**	.41	.15**	1.78**	.40	.24**
Health Condition	1.64*	.67	.12*	1.73**	.56	.18**	3.96**	.80	.28**	4.02**	.76	.27**
Attachment anxiety	.81*	.37	.12*	-.004	.29	-.001	-.23	.42	-.03	1.11**	.40	.15**
Attachment avoidance	-.27	.69	- .04	.57*	.27	.12*	.78	.39	.11	.33	.37	.05
Adj. R^2	.28**			.11**			.14**			.28**		

Note. Predictors were standardized. All models had the same predictors entered at each step.

*p<.05. **p <.01.

Table 7.12

Study 2 Multiple Regression Models Predicting Frequency of Pre-sleep Talk Variables

Step 2 variables	Pleasant pre-sleep talk			Neutral pre-sleep talk		
	b	*SE b*	β	*b*	*SE b*	β
Constant	3.27**	.08		2.97**	.08	
Couple satisfaction	.56**	.09	.48**	.27**	.08	.27**
Attachment anxiety	.20*	.08	.17*	.27**	.08	.27**
Attachment avoidance	-.21*	.09	-.18*	-.16*	.08	-.17*
Δ Adj. R^2			.04*			.07*

Note. Predictors were standardized. Step 3 included the interaction between attachment anxiety and avoidance and did not significantly improve the model.

*p<.05. **p <.01.

Table 7.13

Possible Mediators of Attachment and Sleep Outcomes

Variable	Predicted by		Correlated with	
	Attachment anxiety (step 1)	Attachment avoidance (step 1)	Sleep quality	Daytime sleepiness
Pre-sleep electronic device use	**Yes**	No	**Yes**	**Yes**
Dysfunctional beliefs about sleep	**Yes**	No	**Yes**	**Yes**
Pre-sleep arousal scale				
Somatic arousal	No	No	Yes	Yes
Cognitive arousal	**Yes**	**Yes**	**Yes**	No
Sleep hygiene practices scale				
Sleep scheduling	**Yes**	No	**Yes**	**Yes**
Sleep environment	No	No	Yes	Yes
Arousing activities	**Yes**	No	**Yes**	**Yes**
Pre-sleep eating and drinking	No	**Yes**	**Yes**	**Yes**

Note. Bolded variables were considered as mediators.

Table 7.14

Estimates of Direct Effects of Attachment, Covariates, and Possible Mediators on Daytime Sleepiness

Dependent variable	Predictor	*b*	*SE*	β	*p*	95% CI
Dysfunctional beliefs about sleep	Age	-.03	.04	-.05	.37	[-.11, .04]
	Depression	.46	.25	.10	.07	[-.06, .94]
	Health	3.26	.78	.23	<.01	[1.71, 4.85]
	Attachment anxiety	.93	.37	.15	.01	[.20, 1.69]
Pre-sleep cognitive arousal	Age	-.04	.03	-.06	.20	[-.09, .02]
	Depression	1.32	.18	.38	<.01	[.98, 1.68]
	Health	1.88	.55	.17	<.01	[.79, 2.96]
	Attachment anxiety	.93	.26	.18	<.01	[.42, 1.45]
Pre-sleep electronic device use	Age	-.03	.02	-.29	.01	[-.04, -.02]
	Depression	.08	.04	.12	.02	[.01, .14]
	Health	.25	.11	.12	.02	[.04, .46]
	Attachment anxiety	.20	.05	.21	<.01	[.10, .30]
Sleep scheduling	Age	-.17	.03	-.26	<.01	[-.23, -.10]
	Depression	1.22	.22	.29	<.01	[.80, 1.66]
	Health	1.92	.68	.14	.01	[.59, 3.28]
	Attachment anxiety	.69	.32	.11	.03	[.06, 1.35]
Pre-sleep arousing activities	Age	-.09	.04	-.13	.01	[-.16, -.02]
	Depression	1.09	.24	.24	<.01	[.64, 1.58]
	Health	3.92	.74	.27	<.01	[2.45, 5.41]
	Attachment anxiety	1.07	.36	.16	.003	[.36, 1.78]
Daytime sleepiness	Age	-.05	.02	-.15	.01	[-.09, -.01]
	Attachment anxiety	.29	.18	.10	.10	[-.06, .64]
	Dysfunctional beliefs about sleep	.10	.03	.19	<.01	[.05, .16]
	Sleep scheduling	-.03	.04	-.05	.45	[-.09, .04]
	Arousing activities	.05	.03	.12	.06	[-.002, .15]
	Electronic device use in bed	.10	.23	.03	.65	[-.34, .56]

Table 7.15

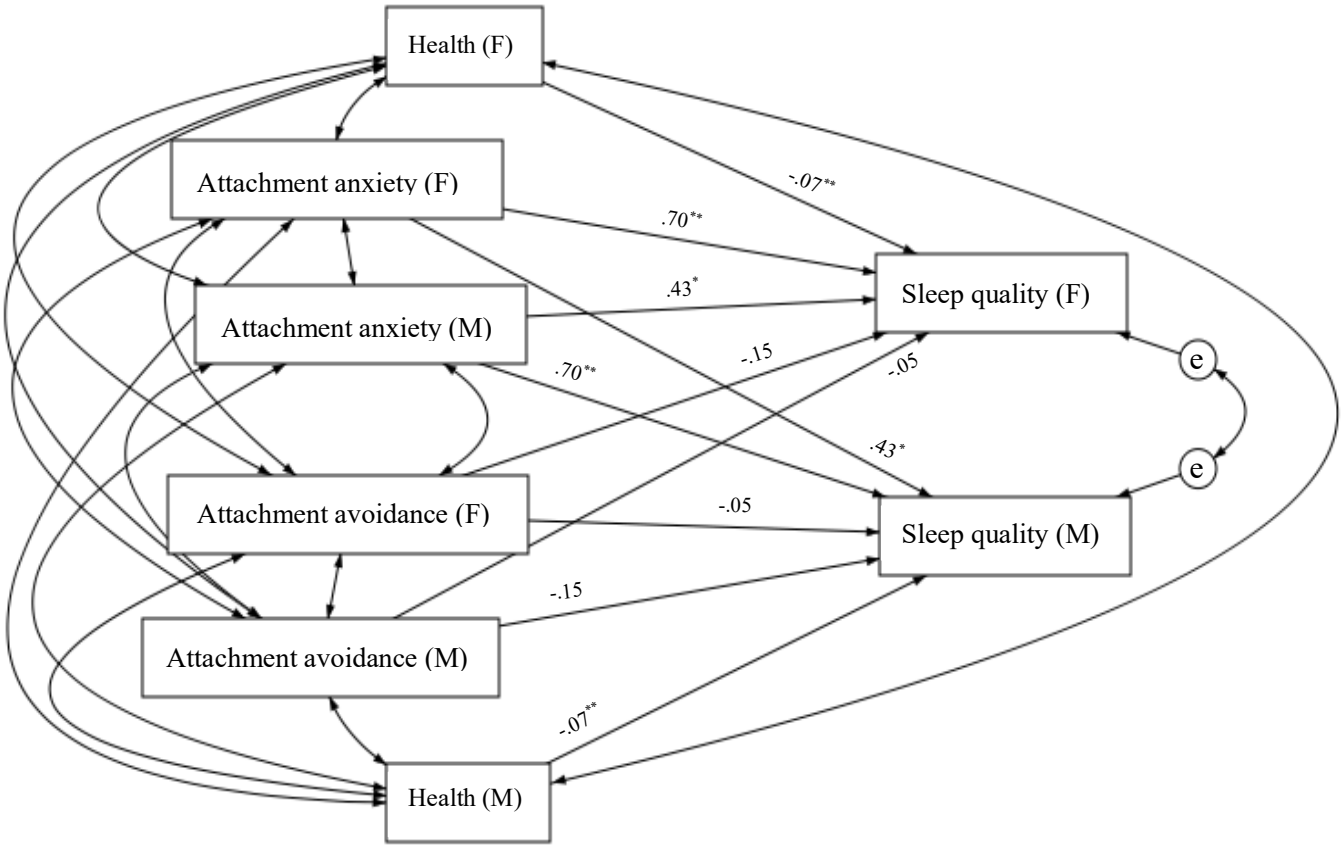
Estimates and Monte Carlo Confidence Intervals of Indirect Effects Between Attachment Anxiety and Daytime Sleepiness

Predictor	Mediator	Estimate	*p*	95% CI
Attachment	Dysfunctional beliefs about sleep	.10	.01	[.02, .21]
Anxiety	Sleep scheduling	-.02	.30	[-.10, .02]
	Electronic device use	.02	.61	[-.07, .12]
	Pre-sleep arousing activities	.06	.06	[-.002, .16]

Note. CI = Confidence interval.

Figure 6.1

Study 1 Interchangeable Saturated Model

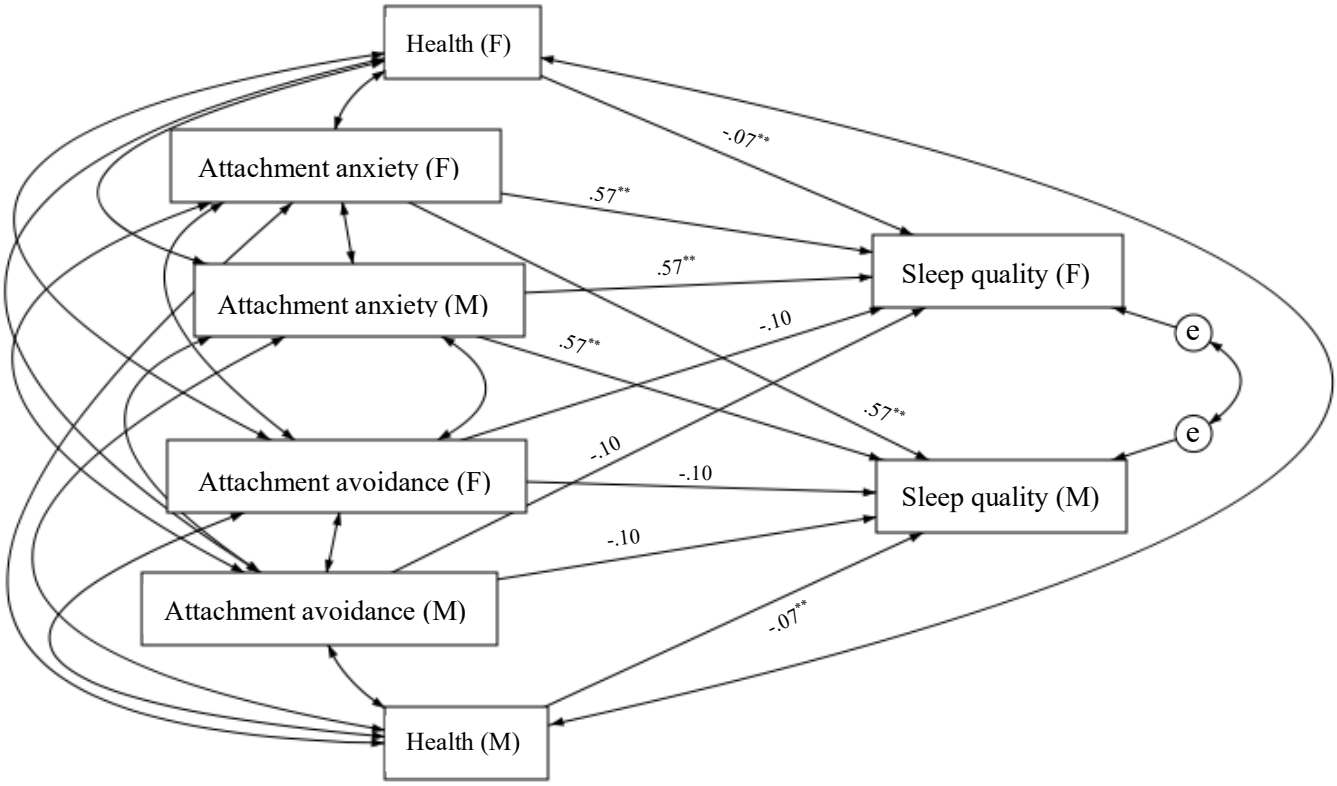


Note. The interchangeable saturated model has equal actor effects and equal partner effects per attachment dimension. This model is partially distinguishable because means and variances were not constrained, only main effects. Age (covariate) and covariance values were omitted to simplify the figure. Unstandardized estimates are presented. F = Female. M = Male. e = residual error.

$^{*}p < .05$. $^{**}p < .01$.

Figure 6.2

Study 1 Actor Partner Interdependence Model of Attachment and Sleep



Note. Actor effects are set equal to partner effects per attachment dimension. This model is partially distinguishable because means and variances were not constrained, only main effects. Age (covariate) and covariance values were omitted to simplify the figure. F = Female. M = Male. Unstandardized estimates are presented. e = residual error.

$^{*}p < .05$. $^{**}p < .01$.

Figure 7.1

Study 2 Interaction Between Attachment Anxiety and Co-sleeping Predicting Pre-Sleep Cognitive

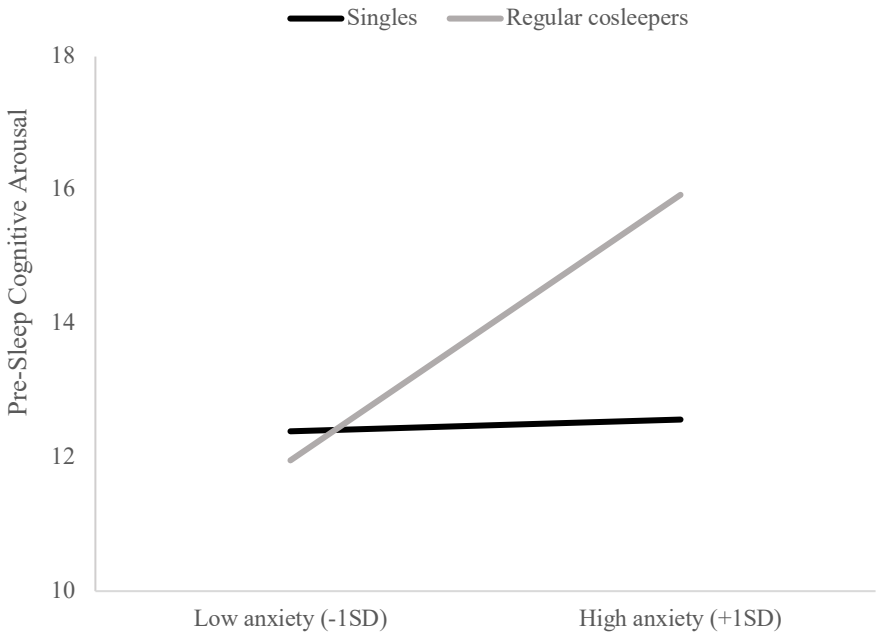


Figure 7.2

Study 2 Interaction Between Attachment Avoidance and Co-sleeping Predicting Pre-sleep Cognitive Arousal

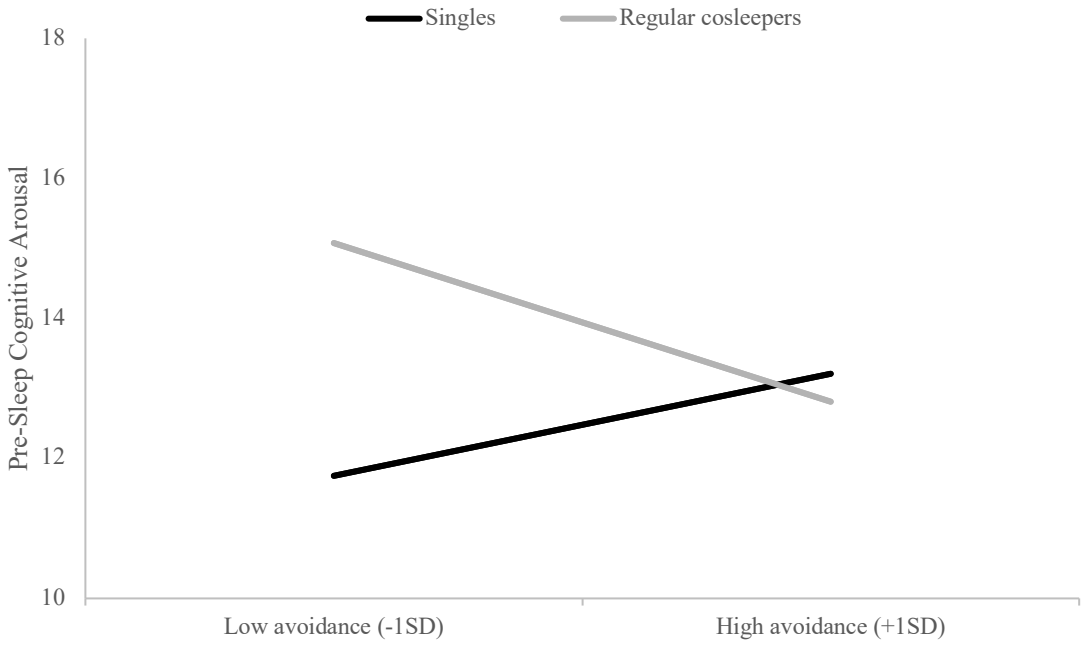
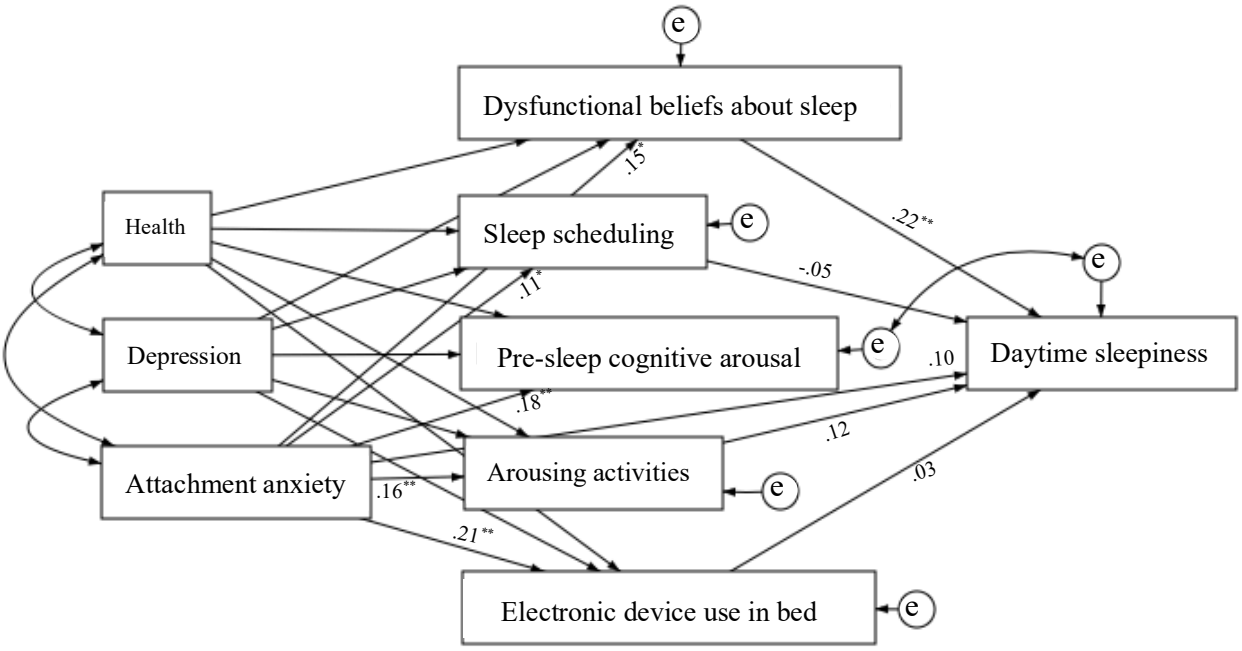


Figure 7.3

Structural Equation Model of Indirect Effects between Attachment and Sleep



Note. Age and frequent co-sleeping were entered as covariates, but these variables and covariance values were omitted from the figure for simplicity. Standardized estimates for attachment anxiety and mediators only are shown.

$^{*}p < .05$. $^{**}p < .01$.

Appendix A: Supplementary Tables

Table A.1

Study 1 Actor Partner Interdependence Model Constraints and Model Fit Statistics for Tests of Distinguishability

	Constraints per model							
	APIM				APIM with interactions			
	Null Model	a = p	p = 0	I-SAT	*Null Model*	a = p	p = 0	I-SAT
χ^2	56.26	16.33	7.92	3.55	43.44	10.23	12.98	8.91
Adj. χ^2	47.61	12.78	4.37	-	34.53	1.32	4.07	-
df	10	10	6	4	14	10	10	8
Adj. *df*	4	6	2	-	6	2	2	-
p	<.001	.22	.22	.47	<.001	.52	.13	.35

Note. APIM = Actor partner interdependence model. a = actor; p = partner; I-SAT = interchangeable saturated model (i.e., equal actor effects and equal partner effects per attachment dimension); The null model is a model where actor and partner effects are constrained to 0; Adjusted model fit indices (RMSEA and TLI) were indeterminate. These models do not include the health covariate.

Table A.2

Study 1 Correlations Between Partners' Key Variables

	1	2	3	4	5	6	7	8	9	10	11
1. Male age	-										
2. Female age	.94**	-									
3. Male attachment anxiety	-.23**	-.22**	-								
4. Female attachment anxiety	-.05	-.06	.32**	-							
5. Male attachment avoidance	-.06	-.04	.47**	.34**	-						
6. Female attachment avoidance	.25**	.24**	.20**	.47**	.05	-					
7. Female relationship satisfaction	-.20**	-.20**	-.26**	-.43**	-.28**	-.43**	-				
8. Male relationship satisfaction	-.003	-.02	-.48**	-.39**	-.59**	-.28**	.53**	-			
9. Female sleep quality	-.06	-.05	.27**	.30**	.21**	.16*	-.30**	-.15*	-		
10. Male sleep quality	.15*	.15	.19*	.10	.09	.07	-.04	-.09	.04	-	
11. Male general health	-.14	-.14	-.24**	-.08	-.22**	-.10	.24**	.20**	-.12	-.35**	-
12. Female general health	.07	.09	-.11	-.23**	-.12	-.08	.23**	.27**	-.35**	-.004	.08

Note. $N = 173$.

*$p<.05$. **$p<.01$.

Table A.3

Study 1 Actor Partner Interdependence Model of Attachment Anxiety and Avoidance on Sleep Quality

	b	*SE*	*p*
Step 1: Estimate Model			
Intercepts			
Female sleep quality	11.45	.94	<.01
Male sleep quality	8.24	.93	<.01
Age on female sleep	-.001	.03	.99
Age on male sleep	.07	.03	.04
Actor health	-.08	.02	<.01
Attachment anxiety	.57	.15	<.01
Attachment avoidance	-.10	.19	.59
Step 2: Addition of Interaction Effects			
Intercepts			
Female sleep quality	11.20	.94	<.01
Male sleep quality	8.03	.93	<.01
Age on female sleep	.001	.03	.98
Age on male sleep	.07	.03	.04
Attachment anxiety	.49	.15	.001
Attachment avoidance	-.07	.19	.70
Actor x partner attachment anxiety	.23	.19	.23
Actor x partner attachment avoidance	-.07	.27	.80
Actor attachment anxiety x partner attachment avoidance	.37	.21	.08
Partner attachment anxiety x actor attachment avoidance	-.004	.21	.99

Note. All predictors except for age were grand mean centered. CI = confidence interval.

Table A.4

Study 2 Correlations Between Variables of Interest for Total Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	-													
2. Health	-.02	-												
3. Depression	-.18**	.25**	-											
4. Attachment anxiety	-.29**	.20**	.33**	-										
5. Attachment avoidance	-.02	.04	.19**	.19**	-									
6. Sleep quality	-.06	.46**	.40**	.20**	.11	-								
7. Daytime sleepiness	-.23**	.15**	.19**	.23**	.10	.13*	-							
8. Pre-sleep cognitive arousal	-.18**	.29**	.49**	.36**	.04	.47**	.09	-						
9. Pre-sleep somatic arousal	-.20**	.45**	.36**	.23**	.16**	.50**	.36**	.47**	-					
10. Dysfunctional beliefs about sleep	-.11*	.28**	.22**	.24**	.03	.47**	.28**	.25**	.34**	-				
11. Sleep scheduling	-.34**	.24**	.41**	.36**	.04	.46**	.19**	.49**	.43**	.36**	-			
12. Eating and drinking	-.14*	.20**	.23**	.22**	.16**	.23**	.38**	.13*	.43**	.22**	.22**	-		
13. Sleep environment	-.12*	.30**	.24**	.28**	.15**	.35**	.33**	.29**	.57**	.28**	.28**	.54**	-	
14. Arousing activities	-.22**	.36**	.38**	.35**	.16	.59**	.25**	.56**	.57**	.35**	.35**	.42**	.51*	-
15. Electronic device use in bed	-.37**	.20**	.28**	.22**	.05	.24**	.21**	.37**	.35**	.22**	.22**	.28**	.33**	.56**

Note. $N = 309$.

Table A.5

Study 2 Table of Correlations Using Variables for Participants who Co-Slept at Least One Night Per Week

	1	2	3	4	5	6	7	8
1. Daytime sleepiness	-							
2. Sleep quality	-.08	-	-					
3. Attachment anxiety	.25**	.23**	-					
4. Attachment avoidance	.14	.07	.24**	-				
5. Couple Satisfaction	-.20**	.01	-.21*	-.40**	-			
6. Positive pre-sleep talk	-.11	.17*	.04	-.34**	.43**	-		
7. Neutral pre-sleep talk	-.11	.25**	.16*	-.19*	.16*	.51**	-	
8. Negative pre-sleep talk	-.03	.23**	.08	-.05	-.06	-.07	.24**	
9. Sleep environment agreement	-.10	.02	-.07	-.22**	.29**	.20*	.13	-.004

Note. $N = 158$.

Table A.6

Study 2 Multiple Regression Models Predicting Sleep Environment Agreement with Partners

	b	*SE b*	β	
Step 2 variables				
Constant	3.68**	.09		
Couple satisfaction	.26**	.10	.24**	
Attachment anxiety	.002	.10	.002	
Attachment avoidance	-.13	.10	-.12	
Δ Adj. R^2				.01

Note. Predictors were standardized. Steps 2 and 3 included the interaction between attachment anxiety and avoidance and did not significantly improve the model.

*p<.05. **p <.01.

Table A.7

Study 2 Standardized Residuals for Structural Equation Model of Attachment, Mediators, and Sleep Outcomes

	1	2	3	4	5	6	7	8	9	10	11
1. Frequent co-sleep	0										
2. Age	0	0									
3. Health	0	0	0								
4. Depression	0	0	0	0							
5. Attachment anxiety	0	0	0	0	0						
6. Electronic device use in bed	-.68	0	0	0	0	0					
7. Sleep scheduling	-.26	0	0	0	0	.03	.02				
8. Pre-sleep cognitive arousal	-.14	0	-.05	0	0	-.04	-.01	-.06			
9. Dysfunctional beliefs about sleep	-.06	0	0	0	0	.05	.02	.01	.01		
10. Excessive daytime sleepiness	.08	0	.47	.47	0	.01	.01	.02	.01	-.01	
11. Arousing activities	-.30	0	0	-.09	0	.03	.02	-.01	.02	.01	.02

Appendix B: Demographic Information

This section consists of questions about your background. Please answer as honestly as possible.

1. Biological sex:
   Female
   Male
   Other
   Prefer not to disclose

2. I identify my gender as:
   Woman
   Man
   Prefer not to disclose
   Other (please specify):

3. What is your age in years?

4. Highest level of education? Please select one of the following:
   Below high school
   Completed high school degree or GED
   Some college/university
   Trade/technical/vocational training
   Bachelor's degree
   Master's degree
   PhD degree
   Professional degree (e.g. M.D., J.D., D.M.D, D.V.M.)
   Other advanced degree: _____

5. Where are you located? Please select one of the following:
   Canada
   U.S.
   Other: _____

6. What is your ethnic background? Please select the closest one:
   White
   Indigenous
   Black or African American
   Asian/Pacific Islander
   Latino/a
   Middle Eastern
   East Indian
   Prefer not to say
   Other: _____

7. Sexual orientation? Select one:
    a) Exclusively heterosexual
    b) Primarily heterosexual
    c) More heterosexual than homosexual
    d) Bisexual
    e) More homosexual than heterosexual
    f) Primarily homosexual
    g) Exclusively homosexual

8. Are you a full-time student?
Yes
No

If no:
9. Are you a part-time student?
Yes
No

10. Are you employed full-time?
Yes
No

If no:
11. Are you employed part-time?
Yes
No

If no:
12. Are you retired OR on medical/disability leave?
Yes
No

If yes to question 9:
13. When do you primarily work?
    a. During the day
    b. Evenings and nights
    c. Both daytime and nights

14. What does your work schedule look like?
    a. I have a regular work schedule (i.e., I work approximately the same time each work day)
    b. Shift work

15. Are you currently pregnant?
    No
    Yes

Appendix C: Miscellaneous Sleep-related Variables

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

1. During the past month, when have you usually gone to bed? Include AM/PM: _____

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night? _____

3. During the past month, when have you usually gotten up in the morning? Include AM/PM: _____

4. During the past month, 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. In a normal week, how many days per week do you have a nap?

0 nights per week	4 nights per week
1 night per week	5 nights per week
2 nights per week	6 nights per week
3 nights per week	7 nights per week

6. On a given day, how long do you nap for typically?

Hours: _____
Minutes: _____

Please indicate how often you engaged in the following behaviours on average over the past two weeks.

Rating scale:

0 nights per week	4 nights per week
1 night per week	5 nights per week
2 nights per week	6 nights per week
3 nights per week	7 nights per week

1. How frequently did you take over-the-counter sleeping pills?

2. How frequently did you take supplements (e.g., melatonin) to fall or stay asleep?

3. How frequently did you drink alcohol?

4. How frequently did you smoke cigarettes?

5. How frequently did you drink caffeinated beverages (coffee, energy drinks) to stay awake?

6. How frequently did you take other stimulants (e.g., Adderall) to stay awake?

Appendix D: Health Status

Below, a number of health conditions are listed. Select all that apply. If none apply, please leave blank.

	This condition or related treatment disturbs my sleep (yes or no)
Respiratory disorder (e.g., asthma, sleep apnea)	
Unexplained chronic pain	
Musculoskeletal disorders (e.g., arthritis, carpal tunnel)	
Heart or cardiovascular condition	
Thyroid problems (e.g., hyperthyroidism)	
Kidney problems	
Neurological problems (e.g., headaches, epilepsy)	
Cancer	
Serious infectious disease (e.g., HIV)	
Psychiatric disorder (e.g., schizophrenia, bipolar disorder, anxiety disorder)	
Other condition:	

If "other" was selected, please specify: _____

On average, over the past two weeks, how frequently do you take prescription medications for a health condition that causes you to feel sleepy as a side-effect?

0 days per week	4 days per week
1 day per week	5 days per week
2 days per week	6 days per week
3 days per week	7 days per week

Appendix E: Patient Health Questionnaire-2

Over the past 2 weeks, how often have you been bothered by any of the following problems?

Rating scale:

Not at All = 1	More than Half the Days = 3
Several Days = 2	Nearly Every Day = 4

1. Little interest or pleasure in doing things?

2. Feeling down, depressed or hopeless?

Appendix F: Sleep Quality and Disturbance

Please rate the CURRENT (i.e, last two weeks) SEVERITY of your:

1. Difficulty falling asleep:

None = 0
Mild = 1
Moderate = 2
Severe = 3
Very severe = 4

2. Difficulty staying asleep:

None = 0
Mild = 1
Moderate = 2
Severe = 3
Very severe = 4

3. Problems waking up too early

None = 0
Mild = 1
Moderate = 2
Severe = 3
Very severe = 4

4. How satisfied/dissatisfied are you with your current sleep pattern?

Very satisfied = 0
Satisfied = 1
Moderately satisfied = 2
Dissatisfied = 3
Very dissatisfied = 4

5. How NOTICEABLE to others do you think your sleep problem is in terms of impairing the quality of your life?

Not at all noticeable = 0
A little = 1
Somewhat = 2
Much = 3
Very Much noticeable = 4

6. How WORRIED/DISTRESSED are you about your current sleep problem?

Not at all worried = 0
A little = 1
Somewhat = 2
Much = 3
Very much worried = 4

7. To what extent do you consider your sleep problem INTERFERE with your daily functioning (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.) CURRENTLY?

Not at all interfering = 0
A little = 1
Somewhat = 2
Much = 3
Very much interfering = 4

8. How long have you had this problem?

a) I don't have a sleep problem
b) Less than one month
c) About a month
d) Between one and three months
e) Three months or longer

If participants selects "I don't have a sleep problem," skip the following questions.

9. Do these issues occur as an effect of a substance?

a) Yes, my sleep issues are the result of taking a non-prescribed substance (e.g., caffeine, alcohol, marijuana, etc.)
b) No, my sleep issues are not the result of a substance

10. Sometimes, sleep difficulties occur because there is no opportunity for sleep (e.g., night shifts, nursing a baby, late night classes etc.) Do your sleep troubles occur even though you have the opportunity for sleep? Note: staying up late to study does not count as not having opportunity for sleep.

a) Yes, I have sleep issues even though I have the opportunity to sleep
b) No, I only have sleep issues when I don't have the opportunity for sleep

11. Do you have any of the following:

a) Narcolepsy (extreme tendency to fall completely asleep whenever in relaxing surroundings).
b) A breathing-related sleep disorder (sleep apnea, snoring).

c) Abnormal movements, behaviours, emotions, perceptions, and dreams that occur while falling asleep, sleeping, or waking up, such as sleepwalking, sleep terrors, sleep eating disorders.

12. Do you have a medical condition that currently interferes with your sleep?

Yes
No

Appendix G: Epworth Sleepiness Scale

How likely are you to doze off or fall asleep in the following situations? You should rate your chances of dozing off, not just feeling tired. Even if you have not done some of these things recently try to determine how they would have affected you. For each situation, decide whether or not you would have.

Rating scale:

No chance of dozing = 0
Slight chance of dozing = 1
Moderate chance of dozing = 2
High chance of dozing = 3

1. Sitting and reading
2. Watching TV
3. Sitting inactive in a public place (e.g., a theater or a meeting)
4. As a passenger in a car for an hour without a break
5. Lying down to rest in the afternoon when circumstances permit
6. Sitting and talking to someone
7. Sitting quietly after a lunch without alcohol
8. In a car, while stopped for a few minutes in traffic

Appendix H: Electronic Device Use in Bed

How often do you engage in the following activities **WHILE IN BED?**

Rating scale:

Never = 0	Sometimes = 3
Rarely = 1	Frequently = 4
Occasionally = 2	Always = 5

1. Make or receive phone calls
2. Send and receive text messages
3. Browse social media
4. Listen to music
5. Watch movies or other videos
6. Look up information
7. Listen to podcasts
8. Play games on a video gaming console or phone

Appendix I: Dysfunctional Beliefs About Sleep

Several statements reflecting people's beliefs and attitudes about sleep are listed below. Please indicate to what extent you personally agree or disagree with each statement. For each statement, circle the number that corresponds to your own personal belief. Please respond to all items even though some may not directly apply to your situation.

Rating scale:
Strongly disagree = 0
Strongly agree = 10
Note: Response options 1-9 were not labeled.

1. I need 8 hours of sleep to feel refreshed and function well during the day.
2. When I don't get the proper amount of sleep on a given night, I need to catch up the next day by napping or the next night by sleeping longer.
3. I am concerned that chronic insomnia may have serious consequences on my physical health.
4. I am worried that I may lose control over my abilities to sleep.
5. After a poor night's sleep, I know it will interfere with my activities the next day.
6. To be alert and function well during the day, I believe I would be better off taking a sleeping pill rather than having a poor night's sleep.
7. When I feel irritable, depressed, or anxious during the day, it is mostly because I did not sleep well the night before.
8. When I sleep poorly one night, I know it will disturb my sleep schedule for the whole week.
9. Without an adequate night's sleep, I can hardly function the next day.
10. I can't ever predict whether I'll have a good or poor night's sleep.
11. I have little ability to manage the negative consequences of disturbed sleep.

12. When I feel tired, have no energy, or just seem not to function well during the day, it is generally because I did not sleep well the night before.
13. I believe insomnia is essentially the result of a chemical imbalance.
14. I feel insomnia is ruining my ability to enjoy life and prevents me from doing what I want.
15. Medication is probably the only solution to sleeplessness.
16. I avoid or cancel obligations (social, family) after a poor night's sleep.

Appendix J: The Pre-Sleep Arousal Scale

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

Rating scale:

Not at all = 1	A lot = 4
Slightly = 2	Extremely = 5
Moderately = 3	

Somatic Arousal

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.

Cognitive Arousal

9. Review or ponder events of the day.
10. Worry about problems other than sleep.
11. Being mentally alert, active.
12. Can't shut off your thoughts.
13. Thoughts keep racing through your head.

Appendix K: The Sleep Hygiene Practices Scale

The following items are descriptions of common sleep habits, daily life activities, and sleep environments. Please select the number to indicate how often the situations fit your personal experiences, with 1 indicating never and 6 indicating always.

Rating scale:

Never = 1	Sometimes = 4
Rarely = 2	Frequently = 5
Occasionally = 3	Always = 6

Arousing activities

1. Doing sleep-irrelevant activities in bed (e.g., watching TV, reading)
2. Worry about not being able to fall asleep in bed
3. Unpleasant conversation prior to sleep
4. Not enough time to relax prior to sleep
5. Falling asleep with TV or music on
6. Pondering about unresolved matters while lying in bed.
7. Check the time in the middle of night.
8. Worry about night-time sleep during the day.
9. Vigorous exercise during the two hours prior to sleep

Sleep Scheduling

10. Bedtime not consistent daily
11. Get out of bed at inconsistent times
12. Stay in bed after waking up in the morning
13. Sleep in on weekends
14. Napping or resting in bed for over one hour during the day
15. Lack of exposure to outdoor light during the day
16. Lack of regular exercise

Eating/Drinking Behaviours

17. Going to bed hungry
18. Drinking caffeinated drinks (e.g., coffee, tea, coca-cola) within the four hours prior to bedtime
19. Drinking alcohol within the two hours prior to bedtime
20. Consuming stimulating substances (e.g., nicotine) during the two hours prior to bedtime
21. Drinking a lot during the hour prior to sleep
22. Eating too much food during the hour prior to sleep

Sleep Environment

23. Sleep environment is either too noisy or too quiet
24. Sleep environment is either too bright or too dark
25. Sleep environment is either too humid or too dry
26. Feeling too hot or too cold during sleep
27. Poor ventilation of bedroom
28. Uncomfortable bedding and/or pillow
29. Too many sleep-unrelated items in bedroom
30. Sleep is interrupted by bed partner

Appendix L: Relationship Information

This section consists of questions about **current** romantic relationships.

1. Are you currently in a relationship (i.e., dating someone, married, living common-law)?
a) Yes
b) No

2. What best describes your relationship status and history:
a) I have never had a romantic/dating relationship.
b) I am not currently in a relationship, but have been in the past.
c) I am currently in a relationship.

3. Have you ever been married or in a common law relationship?
Yes
No

If Yes is selected for first question:

At which one of the following stages would you place your current relationship (please select one only):

a) Casually dating (I date other people).
b) Seriously dating (I do not date other people).
c) I have thought about marriage, but I have not discussed it with my partner.
d) We have discussed marriage, but made no formal plans.
e) Engaged and living separately.
f) Engaged and living together.
g) Common law.
h) Married and living together.
i) Married and living separately.

4. How long have you been in a relationship with your current partner? _____

5. Do you currently live in the same household (e.g., house, apartment, condo, etc.) as your current partner?
a) Yes
b) No

Appendix M: The Experiences in Close Relationships scale

The following statements concern how you generally feel in close relationships (e.g., with romantic partners, close friends, or family members). Respond to each statement by indicating how much you agree or disagree with it. Select the number in the space provided, using the following rating scale:

Rating scale:

Disagree strongly = 1	Agree slightly = 5
Disagree = 2	Agree = 6
Disagree slightly = 3	Agree strongly = 7
Neutral/mixed = 4	

1. I prefer not to show others how I feel deep down.
2. I worry about being rejected or abandoned.
3. I am very comfortable being close to other people.
4. I worry a lot about my relationships.
5. Just when someone starts to get close to me I find myself pulling away.
6. I worry that others won't care about me as much as I care about them.
7. I get uncomfortable when someone wants to be very close to me.
8. I worry a fair amount about losing my close relationship partners.
9. I don't feel comfortable opening up to others.
10. I often wish that close relationship partners' feelings for me were as strong as my feelings for him/her.
11. I want to get close to others, but I keep pulling back.
12. I want to get very close to others, and this sometimes scares them away.
13. I am nervous when partners get too close to me.
14. I worry about being alone.
15. I feel comfortable sharing my private thoughts and feelings with others.
16. My desire to be very close sometimes scares people away.

17. I try to avoid getting too close to others.
18. I need a lot of reassurance that close relationship partners really care about me.
19. I find it relatively easy to get close to others.
20. Sometimes I feel that I force others to show more feeling, more commitment to our relationship than they otherwise would.
21. I find it difficult to allow myself to depend on close relationship partners.
22. I do not often worry about being abandoned.
23. I prefer not to be too close to others.
24. If I can't get a relationship partner to show interest in me, I get upset or angry.
25. I tell my close relationship partners just about everything.
26. I find that my partners don’t want to get as close as I would like.
27. I usually discuss my problems and concerns with close others.
28. When I don't have close others around, I feel somewhat anxious and insecure.
29. I feel comfortable depending on others.
30. I get frustrated when my close relationship partners are not around as much as I would like.
31. I don’t mind asking close others for comfort, advice, or help.
32. I get frustrated if relationship partners are not available when I need them.
33. It helps to turn to close others in times of need.
34. When other people disapprove of me, I feel really bad about myself.
35. I turn to close relationship partners for many things, including comfort and reassurance.
36. I resent it when my relationship partners spend time away from me.

Appendix N: Couple Satisfaction Index

People have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following questionnaire.

1. Please indicate the degree of happiness, all things considered, of your relationship.

Extremely unhappy = 0
Fairly unhappy = 1
A little unhappy = 2
Happy = 3
Very happy = 4
Extremely happy = 5
Perfect = 6

2. People have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following list.

Not at all/Not at all true = 0
A little/A little true = 1
Somewhat/Somewhat true = 2
Mostly/Mostly true = 3
Almost completely/Almost completely true = 4
Completely/Completely true = 5

3. I have a warm and comfortable relationship with my partner.

4. How rewarding is your relationship with your partner?

5. In general, how satisfied are you with your relationship?

Appendix O: Co-sleeping behaviours

1. Do you have a dog?

Yes
No
Prefer not to answer

If no, skip ahead to questions about cats.

2. Does the dog typically sleep in the same bedroom as you?

Yes
No

3. How often does your dog spend some time on your bed while you are sleeping?

0 nights per week
1 night per week
2 nights per week
3 nights per week
4 nights per week
5 nights per week
6 nights per week
7 nights per week

4. How disruptive is your dog to your sleep?

Not at all disruptive
Mildly disruptive
Somewhat disruptive
Very disruptive
Extremely disruptive

5. Do you have a cat?

Yes
No
Prefer not to answer

6. Does the cat typically sleep in the same bedroom as you?

Yes
No

7. How often does your cat spend some time on your bed while you are sleeping?

0 nights per week
1 night per week
2 nights per week
3 nights per week
4 nights per week
5 nights per week
6 nights per week
7 nights per week

8. How disruptive is your cat to your sleep?

Not at all disruptive
Mildly disruptive
Somewhat disruptive
Very disruptive
Extremely disruptive

9. Do you have any other pet (e.g., reptile, rodent, bird)?

Yes
No
Prefer not to answer

10. How disruptive is this pet or pets to your sleep?

Never
Rarely
Sometimes
Frequently
Always

11. Do you have a young child (or children)?

Yes
No
Prefer not to answer

If no, skip to next section.

12. Do they live with you?
Yes
No
Sometimes

13. Does your child sleep with you in the same bed?

Yes
No

14. How often does your child sleep in your bed with you on average?

0 nights per week
1 night per week
2 nights per week
3 nights per week
4 nights per week
5 nights per week
6 nights per week
7 nights per week

15. How disruptive is your child to your sleep?

Not at all disruptive
Mildly disruptive
Somewhat disruptive
Very disruptive
Extremely disruptive

16. In a normal week, how many nights per week do you sleep in the same bed as your partner?

0 nights per week
1 night per week
2 nights per week
3 nights per week
4 nights per week
5 nights per week
6 nights per week
7 nights per week

If 1 nights or more is selected, answer questions below.
If 0 nights is selected, skip to debriefing form.

This section contains questions about your sleep habits. Please answer as honestly as possible.

1. Choose the statement that best applies to you: I choose to sleep beside my partner because of (select all that apply)

a. convenience (e.g., There is only one bed etc.)
b. comfort (e.g., warmth)
c. safety (e.g., protection)
d. intimacy and togetherness
e. convention (everyone does this)
f. they prefer it

2. Over the past two weeks, with your partner in mind, do you usually go to bed

    a. Before your partner
    b. Same time as your partner
    c. After your partner
    d. Don't know

3. If you go to bed at different times, how much of a difference is there typically?

    a. <30 minutes
    b. 30 min-1hr
    c. > 1 hr
    d. Don't know
    e. Not applicable (i.e., we go to bed at the same time)

4. Over the past two weeks, with your partner in mind, do you usually wake up

    a. Before your partner
    b. Same time as your partner
    c. After your partner
    d. Don't know

5. If you wake up at different times, how much of a difference is there typically?

    a. <30 minutes
    b. 30 min-1hr
    c. > 1 hr
    d. Don't know
    e. Not applicable (i.e., we go to bed at the same time)

6. Do you believe you need more sleep than your partner or less sleep than your partner?

    a. Less
    b. About the same amount of sleep
    c. More

7. Check all that apply: Over the past two weeks, right before going to bed with my partner, I generally

a. Give partner a massage
b. Get a massage/back rub from my partner
c. Snuggle with my partner
d. Don't do anything special with them

8. Check all that apply: My partner and I **disagree** on these sleep environment preferences:

    a. Room temperature
    b. Number of pillows
    c. Degree of darkness
    d. Number of blankets on the bed
    e. Space/Size of the bed
    f. Kids/pets in the bed at night

9. Generally, my partner and I have the same sleep environment preferences

    a. Strongly disagree
    b. Disagree
    c. Neither agree nor disagree
    d. Agree
    e. Strongly agree

Over the past two weeks, how often did your partner wake you up because:

Rating scale:

Never	Sometimes
Rarely	Frequently
	Always

1. They wanted to have sex

2. They snore

3. They move at night in their sleep

4. They get up at night (e.g., to urinate)

5. They have nightmares

6. They wanted to talk about something

7. They make other noise (e.g., sleep talk, grind their teeth)

Appendix P: Bedtime Talk

The following questions are about the last conversation or interaction you have with your partner **right before one of you goes to bed**.

1. How frequently do you talk about topics you find pleasant or enjoyable before bed?

Never
Rarely
Sometimes
Frequently
Always

2. Please list the pleasant or enjoyable topics you talk about most often before bed:
   _____

3. How frequently do you talk about topics you find unpleasant or stressful before bed?

Never
Rarely
Sometimes
Frequently
Always

4. Please list the unpleasant or unenjoyable topics you talk about most often before bed:
   _____

5. How frequently do you talk about topics you find neutral (i.e., neither pleasant nor unpleasant) before bed?

Never
Rarely
Sometimes
Frequently
Always

Appendix Q: The Sleep Hygiene Practices Scale - Bedpartners

Below is a list of behaviors that your bedpartner may engage in. To the best of your knowledge, please indicate how often your partner engages in these behaviours.

Rating scale:

I don't know	Occasionally
Never	Sometimes
Rarely	Frequently
	Always

My bedpartner…

1. Has unpleasant conversations with me prior to sleep
2. Falls asleep with TV or music on
3. Does vigorous exercise during the two hours prior to sleep
4. Does not have a consistent bedtime daily
5. Gets out of bed at inconsistent times
6. Stays in bed after waking up in the morning
7. Sleeps in on weekends
8. Naps or rests in bed for over one hour during the day
9. Drinks caffeinated drinks (e.g., coffee, tea, coca-cola) within the four hours prior to bedtime
10. Drinks alcohol within the two hours prior to bedtime
11. Consumes stimulating substances (e.g., nicotine) during the two hours prior to bedtime
12. Drinks a lot during the hour prior to sleep
13. Eats too much food during the hour prior to sleep