Sleep in the Context of Close Relationships

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In over 50 years of sleep research, scientists have learned that sleep and sleep behaviors are an integral component of health and wellbeing. Yet, most of what we know about sleep is observed at the individual level. In reality, the social environment influences sleep via a cascade of interconnecting processes. At the broadest level are societal constructs such as technology, public policy, globalization, environment, and geography (Grandner, 2017; Tudge, Mokrova, Hatfield, & Karnik, 2009). For example, work schedules, neighborhoods, and policy (broad level constructs) all influence sleep timing, sleep duration (i.e. total time asleep), and sleep behaviors (Fuller-Rowell et al., 2016; Kalil, Dunifon, Crosby, & Su, 2014; Owens, Belon, & Moss, 2010). In this chapter, we argue that *proximal processes*, everyday social interactions within our immediate environment (Bronfenbrenner & Morris, 1998), have a powerful influence on sleep timing, duration, and quality. We conceptualize close relationships, (i.e., spouses, family members, friendships) as proximal processes that influence sleep through interpersonal interactions, shared health beliefs, and/or shared living arrangements.

This chapter provides an overview of the extant literature on family relationships and sleep, potential mechanisms by which family relationships influence sleep, a discussion of gaps in the literature, and, finally, suggestions for future research. To demonstrate how family relationships influence sleep, we will use two types of relationships as exemplars: couples' relationships and parent-youth (school-age and adolescent) relationships. We chose these two types of relationships to demonstrate how different relational processes associate with sleep.

In contrast to infants, toddlers, and preschool-aged children, school-aged youth generally have consolidated nighttime sleep patterns. In addition, school-aged youth and adolescents are also beginning to make, or are already making, autonomous decisions (Steinberg, 2001), which likely includes decisions about sleep timing, and

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daily activities that influence sleep. Parent-youth negotiations about activities and sleep potentially sets the stage for life-long beliefs and decisions about sleep at a time when youth begin to have biologically driven preferences for later bedtimes (Carskadon, Vieira, & Acebo, 1993).

Explicit or implicit negotiations about health behaviors, including sleep, are also inherent in couples' relationships (Homish & Leonard, 2008; Lee et al., 2018). Moreover, about 61% of couples opt to bed share (National Sleep Foundation, 2005), which can influence sleep patterns (Meadows, Arber, Venn, Hislop, & Stanley, 2009) and one's sense of *felt* security, a feeling of safety that is capable of attenuating the stress response (Troxel, Cyranowski, Hall, Frank, & Buysse, 2007). In contrast to parent-youth relationships; however, the dynamics in couples' relationships likely involves more individual autonomy.

Background and Organizing Framework on Close Relationships and Sleep

Although we will focus on cohabitating or dyadic relationships and sleep, the importance of the social environment is apparent even at the individual level. Lonely adults have more wakefulness at night than non-lonely individuals (Cacioppo et al., 2002). On the other hand, higher levels of social support are associated with less wakefulness and shorter sleep latencies than lower levels of support (Troxel, Buysse, Monk, Begley, & Hall, 2010). In 12–15 year old adolescents, social determinants of sleep (e.g., peers, parents) were more predictive of sleep than biological developmental factors (i.e. puberty; Maume, 2013). Among individuals, any interpersonal conflict is associated with greater sleep disturbance the following night (Brissette & Cohen, 2002) and distress due to interpersonal problems is associated with more presleep cognitions (Gunn, Troxel, Hall, & Buysse, 2014). Furthermore, following a paradigm of social rejection, individuals had shorter sleep durations compared to their baselines (Gordon, Del Rosario, Flores, Mendes, & Prather, 2019) Thus, social interactions, even with others outside the home, are linked to sleep and sleep behaviors.

The impact of cohabiting social relationships on sleep is likely amplified due to physical proximity and psychological connectedness. To that end, we describe three potential mechanisms by which proximal processes such as close relationships influence sleep. First, cohabitating individuals are literally positioned to have direct and indirect influence on sleep and daily activities that influence sleep. A couple's shared environment facilitates mutual influences on the timing and duration of social interactions, exercising, and meals (Jarosz, 2017; Murtorinne-Lahtinen, Moilanen, Tammelin, Ronka, & Laakso, 2016; Perales, del Pozo-Cruz, & del Pozo-Cruz, 2015). In married couples, health behaviors are concordant and begin to converge. For example, Homish and Leonard (2008) found that during the first four years of marriage, partners eating habits and exercise habits become more similar.

Convergence on daily social activities, such as eating and exercise, in turn, influence sleep timing (Soehner, Kennedy, & Monk, 2011). Family members also directly influence sleep by engaging in behaviors that interfere with other's sleep (e.g., watching television while a family member is attempting to sleep) and by enforcing social control (e.g., "it's time for bed").

Second, close relationships influence interpersonal security, which can facilitate psychophysiological responses that promote or hinder sleep onset and sleep maintenance. Sleep is a vulnerable process that requires reversible temporary loss of consciousness. To protect against predators, our ancestors cultivated strong interpersonal bonds and social networks that provided safety from predators, especially during sleep (Dahl & Lewin, 2002; Worthman & Melby, 2002). In the absence of interpersonal security, we adapt to danger by having heightened vigilance (or arousal to maintain wakefulness), which is counterproductive for sleep (Dahl & Lewin, 2002). Modern day humans are not as vulnerable to predators, but the modern brain responds to threat and stressors in much of the same way (Bernardy, Friedman, & American Psychological Association; Cannon, 1939). Thus, a lack of interpersonal security, (e.g., interpersonal stress, interpersonal conflict, loneliness, social rejection, etc.) can increase psychophysiological arousal which is counterproductive for sleep (Gordon et al., 2019; Palagini et al., 2018).

Finally, coregulation and synchrony of biological processes, such as sleep, are emerging as one feature of attachment within close relationships. Attachment is defined as an enduring affectionate tie between two individuals. Attachment theory began as a way to describe the type of bonds between infants and young children and their mothers (Ainsworth & Bell, 1970), but one's attachment style is developmentally stable, even into adulthood (Doyle & Cicchetti, 2017). *Coregulation* occurs as a function of attachment to loved ones and is defined as "the reciprocal maintenance of psychophysiological homeostasis within a relationship" (Sbarra & Hazan, 2008, p. 143). For example, psychophysiological processes such as cortisol and blood pressure are coregulated within couples and mother-youth dyads (Papp, Pendry, & Adam, 2009; Saxbe & Repetti, 2010; Wilson et al., 2018). Sleep and sleep behaviors may also be coregulated within couples (Gunn, Buysse, Hasler, Begley, & Troxel, 2015) and parent-child dyads as a function of their attachment (see Williams, this volume).

In the following paragraphs, we review the literature on couples' and parent-child relationships using the aforementioned mechanisms (e.g. shared environment, interpersonal security, sleep coregulation) as a guiding framework for understanding close relationships and sleep.

Couples' Relationships and Sleep

Shared environment and sleep For most adults, sleep is a dyadic behavior. Sixty-one percent of couples sleep with their partner (National Sleep Foundation, 2005) and individuals report better sleep quality when they sleep with their partner

(Pankhurst & Horne, 1994). Despite a preference for bed-sharing, individuals in a couples' relationship had less restorative, stage 3 sleep when they shared a bed compared to when they slept alone (Monroe, 1969). This may be due to bed-partners movements. Although a bed partner's movements may not reach consciousness awareness, one-third of sleep movements are associated with a sleep movement in a partner (Pankhurst & Horne, 1994). Sleep behaviors (e.g. bed timing, wake timing) within couples often parallel one another. Couples tend to go to bed at similar times, have similar sleep onset latencies, a similar number of wakings (Meadows et al., 2009), and when one member of a couple reports better sleep quality, their partner is also more likely to report better quality of sleep (Lee et al., 2018).

The finding that couples have similar sleep behaviors is parallel to the literature on other health behaviors within couples. For example, when couples begin to live with one another their diets converge (Bove, Sobal, & Rauschenbach, 2003). The shared environment gives couples more opportunities to influence each other's behaviors. In addition, couples engage in *social control*, influence on one another's behavior through positive methods such as persuasion, positive reinforcement, and modeling and/or negative methods such as negative emotional expression, pressuring, or restricting (Lewis, Butterfield, Darbes, & Johnston-Brooks, 2004). Eighty percent of married men and 59% of married women cite their spouse as the primary individual that reminds or tells them to engage in health behaviors (Umberson, 1992). Compared to single individuals, married individuals report receiving more pressure and persuasion to engage in healthy behavior, and married men report the greatest levels of pressure and persuasion (August & Sorkin, 2010). This pattern appears to extend to sleep. Lee et al. (2018) found that after controlling for contextual factors and covariation *within* couples, the effects of partner influence on an individual's sleep was more apparent for men. In other words, when women slept longer than usual, their partners tended to sleep longer than usual.

Interpersonal security and sleep In addition to opportunities for social control, sleep within couples is also vulnerable to relationship characteristics. Attachment style in adult couples' relationships is associated with sleep at the individual and dyadic level. Wives with avoidant and anxious attachment styles have worse sleep (Troxel et al., 2007; Troxel & Germain, 2011). Both husbands and wives who are more anxiously attached have less restorative, stage 3 sleep (Troxel et al., 2007; Troxel & Germain, 2011). This finding suggests that sleep may be one proxy for couples' relationship functioning.

To that end, in a study of several hundred couples, individuals who report greater partner responsiveness (e.g. feeling cared for, understood, and validated) report better perceived sleep quality. In addition, greater spouse responsiveness indirectly predicted greater sleep efficiency (i.e. the percentage of time in bed that the participant is actually asleep) through lower levels of anxiety (Selcuk, Stanton, Slatcher, & Ong, 2017). These findings provide support for indirect effects of interpersonal security on sleep. That is, spouse responsiveness (which is one aspect of interpersonal security) is associated with lower arousal, which then facilitates restful sleep.

Tests of lagged associations in couples' day-to-day interactions and sleep provide further support for cross-sectional findings. Women had better sleep efficiency and longer sleep durations on days when they had relatively more self-disclosure to their spouses while men had fewer nighttime wakings on days they disclosed more to their wives (Kane, Slatcher, Reynolds, Repetti, & Robles, 2014). Disclosure implies a sense of trust and security in the relationship and has a positive correlation with marital satisfaction (Hendrick, 1981). Thus, it is possible that among satisfied married couples, more disclosure will increase one's sense of security and influence sleep that same night. Studies on daily interactions have similar findings. Women who reported more positive daily interactions and less negative daily interactions with their partners experienced better sleep quality the following night (Hasler & Troxel, 2010). Women also had poorer sleep efficiency and longer sleep onset latency (i.e., time it takes to fall asleep) on days when they had relatively more negative interactions with their partner. Among men, there were no associations between positive and/or negative daily interactions and sleep (Hasler & Troxel, 2010). In contrast, in a study of military veterans and their partners, positive and negative behaviors during conflict was associated with poor sleep efficiency in both partners (Fillo et al., 2017). However, the authors noted that the study was likely underpowered to detect significant gender interactions. In a larger study (N = 152), patients with osteoarthritis had worse mood and worse sleep when partners responded negatively to their pain complaints (Song, Graham-Engeland, Mogle, & Martire, 2015). Findings remained after controlling for gender, but gender interactions were not reported. Recent findings notwithstanding, it is possible that, compared to men, women's sleep is more closely connected to interpersonal fluctuations. This would be consistent with other health and marriage research that shows women's physiology (e.g. heart rate, blood pressure, cortisol levels) is more sensitive to relationship interactions than men's physiology (Kiecolt-Glaser & Newton, 2001),. However, it will be important to continue to evaluate gender differences in studies of relationship characteristics and sleep in heterosexual couples.

The role of couples' relationship characteristics and sleep is most evident when the relationship itself is a source of stress. High conflict and interpersonal stress contributes to greater arousal (El-Sheikh, Kelly, & Rauer, 2013), which is counterproductive for sleep. Women have shorter sleep durations on average when their husbands report more conflict (El-Sheikh et al., 2013). When women were psychologically aggressive during conflict, both members of the couple had worse sleep efficiency, and over time men showed decreases in sleep efficiency when women were psychologically aggressive (El-Sheikh, Kelly, Koss, & Rauer, 2015). Among couples that reported more psychological aggression, women were more likely to have poor sleep efficiency and shorter sleep durations when they reported more anxious symptoms, and men were more likely to have worse sleep efficiency and shorter sleep duration when they reported more depressive symptoms (El-Sheikh et al., 2015). This suggests that the mechanisms by which high-conflict relationships influence sleep may be different for men and women.

Sleep Coregulation As previously mentioned, coregulation of biological processes is an emerging area of research on close relationships. As a function of attachment to one another, couples appear to have coregulated emotions (Butler & Randall, 2013) and physiology (Sbarra & Hazan, 2008). Although this is an emergent area of research, it appears that couples' sleep may also be coregulated. Pankhurst and Horne (1994) studied bedsharing couples' sleep using actigraphy and found that couples have similar sleep-wake patterns. Gunn and colleagues also demonstrated that couples have more sleep-wake concordance (i.e., they are awake or asleep at the same time) than would be expected due to chance (Gunn et al., 2015). Couples' concordance is also linked to relationship factors. Hasler and Troxel (2010) found that when couples have a concordant sleep onset, women report fewer negative interactions the following day. At the dyadic level, associations among relationship characteristics and sleep appear to be dynamic. When wives reported low marital satisfaction and husbands were more anxiously attached, couples sleep was more concordant throughout the night (Gunn et al., 2015).

Summary of couples' relationships and sleep Couples' relationships are associated with sleep at the individual and dyadic level. Couples influence one another's sleep through direct (social control) and indirect (shared environment, coregulation) means. It is important to note that although much of the literature focuses on how couples' relationship predicts sleep outcomes, bidirectional associations are also evident. For example, Wilson et al. (2017) found that when both spouses have sleep durations shorter than is typical for them, they are more hostile during a laboratory interaction task. In a study of day-to-day interactions and sleep in couples, spouses reported more marital satisfaction following nights with sufficient sleep (Maranges & McNulty, 2017). Moreover, conflict resolution is more likely when both spouses have sufficient sleep (Gordon & Chen, 2014). These findings suggest the importance of examining bidirectional and lagged associations in studies of couples' sleep. Findings also suggest that focusing on sleep in relationships may be one way to improve couples' relationship satisfaction. Troxel and colleagues found that men (not women) were less likely to develop insomnia symptoms after undergoing marital therapy. (Troxel, Braithwaite, Sandberg, & Holt-Lunstad, 2017). However, research on sleep outcomes at the couple level is limited, and to our knowledge, there are no published findings on dyadic approaches to improving sleep within couples.

Parent-Youth Relationships and Sleep

Youth obtain less sleep as they progress through adolescence. On average, 6th graders obtain 8.4 hours per night and 12th graders obtain 6.9 hours per night (National Sleep Foundation, 2006), which is lower than the recommended 8–10 hours for optimal functioning (Hirshkowitz et al., 2015). Much of the literature is focused on factors that increase total sleep duration and facilitate consistent

sleep timing in youth. As such, many studies on parent-youth relationships focus on parent characteristics that enhance or interfere with youth sleep.

Shared environment and sleep As with the couples' relationships and health literature, research on families and health behaviors indicate that family members engage in similar health behaviors. For example, parental inactivity is a strong predictor of child inactivity (Fogelholm, Nuutinen, Pasanen, Myohanen, & Saatela, 1999). There are few studies on shared sleep behaviors in families, but data suggest that despite differences in bed- and wake-timing, parents and youth have concordant sleep behaviors. For example, sleep duration tracks closely between parents and youth. Parents have shorter or longer sleep durations when their adolescents have shorter or longer sleep durations and vice versa (Fuligni, Tsai, Krull, & Gonzales, 2015). Parental influence may be both direct and indirect. Brand and colleagues found that mother's sleep was indirectly related to adolescent poor sleep via inconsistent, restrictive, and harsh parenting (Brand, Gerber, Hatzinger, Beck, & Holsboer-Trachsler, 2009). The association between sleep parent distress and youth sleep may be bidirectional. Chardon and colleagues found that youth sleep problems amplified the positive association between youth internalizing symptoms and parental distress (Chardon et al., 2018). These findings suggest bidirectional interdependence among parent and youth distress and youth sleep.

Interpersonal security and sleep Likewise, parental factors that contribute to adolescent interpersonal security may be reflected in adolescent sleep. In a longitudinal study of several hundred families, greater parental sensitivity to a child's needs and less hostility in third grade predicted fewer sleep problems two years later compared to parents who were less sensitive and more hostile. In addition, more closeness and low conflict predicted a decrease in child's sleep problems two years later (Bell & Belsky, 2008). Similarly, mother-child attachments characterized by greater security in third grade was associated with less sleepiness in 5th grade (Keller & El-Sheikh, 2011). Mother's fatigue, perceived overload, depressive symptoms, and parental distress were associated with greater child sleep disturbance and shorter sleep duration in a study of children ages 3 to 14 years old (Meltzer & Mindell, 2007). One possible mechanism for this association is through the child's parasympathetic system. For children with lower respiratory sinus arrhythmia, a physiological correlate of the parasympathetic system, maternal depression predicted greater movement in the child's sleep (Keller, Kouros, Erath, Dahl, & El-Sheikh, 2014). This suggests that secure attachment in parent-child relationships is a proximal process that helps children down-regulate arousal, and in turn, have more restful sleep.

Parents often play dual roles in their adolescent's sleep behavior, and these roles are similar to the influence couples have on each other's behavior. Parents create an environment that is conducive to sleep (e.g. warm and secure), and they monitor (or control) their adolescent's sleep habits. Monitoring becomes increasingly important during adolescence, as this developmental stage is marked by a biological shift towards later bedtimes and rise times. This phenomenon is partly attributed to hormonal changes occurring during puberty (Carskadon et al., 1993), but it can be

mitigated by parents' behavior. In a cross-sectional study, parental warmth was associated with longer sleep on school nights for the younger participants (mean age = 8.9 years). In contrast, older adolescent's total sleep time (mean age = 15.2) was linked to more parental rules about bedtime, but not parental warmth (Adam, Snell, & Pendry, 2007). These findings suggest that for older children, monitoring remains important. However, parents tend to allow adolescents more autonomy over their bedtimes (Meijer, Reitz, & Dekovic, 2016). Thus, despite having similar nighttime sleep needs (8–9 hours), it is common for adolescents to have insufficient sleep later bedtimes and early school start times.

Despite the need for adequate sleep, parents may be ambivalent about instilling an earlier bedtime—especially when youth do not seem sleepy. Going to bed when not sleepy increases the risk for sleep problems in adults (Morin, Vallieres, Ivers, Bouchard, & Bastien, 2003). However, Short et al. (2011) found no differences in sleep onset latency in children who bedtimes were and were not monitored. In fact, general monitoring was moderately associated with less sleep disruption (Maume, 2013). In a three-wave longitudinal study, general monitoring was associated with better subjective sleep quality as participants aged (Meijer et al., 2016). Monitoring across throughout adolescent develop likely facilitates circadian entrainment, which in turn, facilitates consistent sleep timing and adequate sleep duration. Thus, although adolescents have a preference for later betimes, parents can influence this preference by setting and monitoring bedtimes. When parents monitor, adolescents are more likely to have earlier bedtimes and adequate sleep duration (Randler, Bilger, & Diaz-Morales, 2009).

While parental monitoring appears to benefit an adolescent's sleep schedule (e.g. sleep onset time and sleep duration), an adolescent's subjective sleep quality (i.e., their assessment of their nighttime sleep) appears to be associated with parent-youth relationship quality. In a three-year, prospective study of 13 years-olds, better parent-adolescent relationship quality (i.e. openness in the relationship) was consistently associated with better sleep quality and less daytime sleepiness, especially in later adolescence. Better parent-adolescent relationship quality was also associated with earlier bedtimes and more time in bed, though this effect was not as strong as monitoring (Meijer et al., 2016). Parental monitoring and parent-set bedtimes were associated with longer sleep durations at ages 12 and 15. Findings were similar in a study of several hundred adolescents; those who reported that their parents set their bedtime had on average 19 more minutes of sleep compared to those who did not have a parent set bedtime. Although the difference in total sleep time appears underwhelming, adolescents with parent set bedtimes had less fatigue and experienced less difficulty maintaining wakefulness compared to adolescents without parent-set bedtimes (Short et al., 2011).

On the other hand, parenting styles that are inconsistent, overly harsh, and restrictive predict poor subjective sleep quality and longer sleep onset latencies (Brand, Hatzinger, Beck, & Holsboer-Trachsler, 2009). Negative parenting styles are also associated greater shifts in bed timing from weekday nights to weekend nights (Brand, Hatzinger, et al., 2009). Importantly, these shifts in sleep timing can lead to social jet lag, which is associated with poor health behaviors

(Roenneberg, Allebrandt, Merrow, & Vetter, 2012; Wittmann, Dinich, Merrow, & Roenneberg, 2006). Taken together, parental monitoring appears to facilitate adequate sleep due to earlier bedtimes, whereas positive parenting styles and better parent-adolescent relationship quality may facilitate better subjective sleep quality and shorter sleep onset latencies.

Some studies of parents and youth have gone beyond the parent-child dyad, and focused on interpersonal security among multiple family members. It appears that children's sleep is sensitive to familial conflict. Even in a normative sample, children (8–9 years) who reported more parental marital conflict had worse sleep efficiency and shorter sleep duration (El-Sheikh, Buckhalt, Mize, & Acebo, 2006). In a longitudinal study, greater distress in children about their parent's marital relationship predicted worse sleep problems and more sleepiness in third grade. Furthermore, greater distress about their parent's marital relationship in 3rd grade predicted an increase in sleep problems by 5th grade (Keller & El-Sheikh, 2011). This suggests that marital problems not only influence couple's sleep, but also interfere with the child's perception of felt security, and ultimately interferes with children's sleep.

Sleep coregulation As presented above, parent sleep behaviors may transmit to children, and transmission may depend on parent-youth relationship quality. For example, parents and youth had more concordant sleep durations (e.g. parent slept shorter or longer on days when their adolescent or parent slept shorter or longer) when adolescents reported high levels of support and understanding (Fuligni et al., 2015). There is some evidence that parent-youth dyads have physiological coregulation; mothers and adolescent's cortisol levels are synchronous throughout the day (Papp et al., 2009). However, to our knowledge sleep coregulation in parent-youth dyads has not been investigated beyond mother-infant paradigms.

Summary of parent-youth relationships and sleep The parent-youth relationship and sleep literature supports the notion that interpersonal security is necessary for sleep. As with couples, parent-youth relationships characterized as secure, open, supportive, and understanding are associated with better sleep outcomes for youth (Meijer et al., 2016). On the other hand, lack of interpersonal security appears to interfere with sleep. Inconsistent, restrictive, and harsh parenting and homes with high levels of conflict (either marital conflict or parent-youth conflict) are associated with worse sleep outcomes for youth (Brand, Hatzinger, et al., 2009). Structure and monitoring, which are aspects of social control and attachment are also relevant. Compared to their peers who are monitored less, adolescents that reported greater monitoring reported longer sleep durations (Adam et al., 2007; Meijer et al., 2016). There also appears to be a transmission of sleep behaviors between parents and adolescents. Parent and youth sleep duration is concordant on a daily level (Fuligni et al., 2015) and parental sleep quality is associated with their adolescent's sleep quality (Brand, Gerber, et al., 2009). This could be due to a shared living environment and heritable genetic traits. However, the quality of the sleep transmitted from parent to child and degree of similarity between parent-youth sleep may also be a function of attachment though this remains to be tested.

Gaps in Knowledge and Future Directions

Over the past 10–20 years, scientific findings have demonstrated significant associations between close relationships and sleep. However, there are several gaps in knowledge and attention to these can inform future directions in this field. With the exception of a few studies (e.g. El-Sheikh et al., 2015; Keller & El-Sheikh, 2011; Keller et al., 2014; Meijer et al., 2016) much of what we know about relationships and sleep is observed cross-sectionally. A small literature suggests that there are bi-directional associations between close relationships and sleep (Gordon & Chen, 2014; Hasler & Troxel, 2010; Kane et al., 2014); however, it is important to determine the strength and directionality as this will inform future research on possible interventions. To that end, we do not yet know whether improving proximal family processes improves sleep, or whether improving sleep improves proximal family processes. In the broader field of social relationships and health, there is strong evidence that relationships shape psychobiological processes that influence health (see Pietromonaco & Collins, 2017). However, a focus on sleep presents a unique opportunity for families to enhance interpersonal warmth and collaborative structure to increase overall interpersonal security. Furthermore, family members' may facilitate response to patient treatments. For example, spouses may bolster adherence to insomnia or other sleep-related treatment regimens (Rogojanski, Carney, & Monson, 2013). Observational and experimental studies that test directionality will help provide targets for future interventions.

Other proximal processes Much of this review, and most of the extant literature on relationships and sleep, focused on dyadic processes. To understand associations between family processes and sleep behaviors, it will be important to expand the focus to include other cohabitating relationships. Among the few studies focusing on sleep in multiple family members, the association between interpersonal relationships and sleep differs depending on the relationship and by gender. For example, interpersonal security between mother and child is linked to daytime sleepiness in boys and girls while interpersonal security between father and child is associated with sleep duration in girls only (Keller & El-Sheikh, 2011). Moreover, there are dynamic associations in sleep timing among family members. Youth sleep timing is similar to mothers, and fathers' sleep timing is associated with mothers' sleep timing (Kouros & El-Sheikh, 2017). This suggests that families have complex, interrelated sleep behaviors that are not observable when assessing sleep at the individual level.

It is also important to consider other types of cohabitating relationships (e.g., roommates). This may be particularly relevant for young adults transitioning into independence. For example, about 40% of college students have a roommate (Forquer, Camden, Gabriau, & Johnson, 2008) and about 40% of all adults aged 18–20 live with nonrelatives (Ingels, Glennie, Lauff, & Wirt, 2012). Social influences within the shared environment may contribute to insufficient and disturbed sleep, which are common in this age cohort (Lund, Reider, Whiting, & Prichard, 2010; Sexton-Radek & Hartley, 2013). However, few studies focus on the impact of roommates, or nonrelative cohabitating relationships on individual sleep.

In addition, few studies focus on sleep in the context of proximal processes outside the shared living environment (e.g., work relationships, peer relationships) whose reach likely extends to processes within the home. This could be especially relevant for youth, as peer relationships are proximal processes that influence youth development and sleep (Maume, 2013). Recent advances in technology make it increasingly common for peer relationships to be a virtual aspect of the household through social media and texting and chatting on technological devices (Rideout, 2015). In a study of over 900 teens, (Maume, 2013), demonstrated that positive peer relationships are associated with fewer sleep disruptions. Moreover, increases in positive peer relationships is associated with longer sleep and fewer sleep disruptions three years later (Maume, 2013). For employed family members, it is also likely that work-related interpersonal conflicts influence sleep processes. A daily diary study of over 100 employees demonstrated that conflict had work spillover into one's personal life (Martinez-Corts, Demerouti, Bakker, & Boz, 2015). Personality characteristics such as hostility mitigate the association between interpersonal conflict and sleep (Brissette & Cohen, 2002); however, a focused study on important proximal processes (in and outside the home) will increase our understanding of relationships and sleep processes.

Sleep measurement Sleep in the context of close relationships is most often studied using daily diaries and/or actigraphy to measure sleep behaviors. These are reliable, non-invasive tools that will continue to serve the field. To advance our understanding of proximal processes and sleep, however, it will be important to also include polysomnography (PSG)-assessed sleep processes. Technological advances in PSG now make it possible to observe sleep architecture in the home. This is particularly useful for capturing family-level sleep data. Troxel and colleagues recently found that couples' daily relationship characteristics were associated with a greater percentage of non-REM stage 3 sleep (Troxel, DeSantis, Germain, Buysse, & Matthews, 2017). The association between proximal processes and sleep appears to extend beyond self-reported and behaviorally observed sleep measurements. However, more data are needed to understand whether and how proximal processes influence sleep architecture.

In addition to more studies on sleep architecture, the field would benefit from more studies on circadian rhythms in the context of close relationships. Human life typically revolves around daily social rhythms, which likely keep the circadian system aligned (Monk, Kupfer, Frank, & Ritenour, 1991). Few studies have examined daily social rhythmicity and its interaction with family level processes; however, Monk and colleagues found that more daily social rhythmicity in infancy was associated with less anxiousness 10 years later (Monk et al., 2010). Their findings suggest that structuring children's daily rhythmicity may enhance early parent-child relationships (Monk et al., 2010). It is possible that this persists throughout one's childhood. Future studies would also benefit from measuring whether family members' rhythmicity is overlapping. Indeed, as previously mentioned, coordinated wake times (i.e., important components of daily rhythmicity) occurs within different family members (Kouros & El-Sheikh, 2017) and the

coordination among family shifts during transitions. For example, husbands and wives have similar rhythmicity until childbirth when wives align more with their infant (Leonhard & Randler, 2009). It is likely that proximal processes, especially cohabitating relationships, influence daily rhythmicity, and ultimately circadian rhythms; however, there are very few studies that examine circadian rhythms in the context of close relationships. Given the coordination between circadian rhythms and sleep processes, measuring circadian rhythms (i.e., endogenous, chronotype preference, daily rhythmicity) is a critical next step in studying relationships and sleep.

Interpersonal processes measurement Social control may enhance interpersonal security, which in turn, could influence sleep. For example, men report greater relationship satisfaction when their partners engage in positive social control (de Montigny et al., 2017), and individuals show greater psychological well-being and positive affect when they report that their partners engage in positive health monitoring. On the other hand, individuals report greater negative affect and worse psychological well-being when their partners engage in negative social control (Craddock, vanDellen, Novak, & Ranby, 2015). This suggests that individuals may interpret positive social control as protective. Interpersonally secure family relationships likely involve some combination of warmth, social control, and moderate involvement. Multi-method assessment of interpersonal processes in future studies will help identify targets for intervention. For example, study protocols might include questionnaires, daily assessments of interpersonal processes, or laboratory engagement tasks.

Implications of focus on sleep in the context of close relationships Sleep may be one mechanism by which close relationships are linked to health. Relationships are strongly linked to long-term health and well-being (Kiecolt-Glaser & Newton, 2001; Pietromonaco & Collins, 2017). Sleep is strongly linked to health and well-being (Buysse, 2014; Gallicchio & Kalesan, 2009; McKnight-Eily et al., 2011). The lack of meaningful social relationships is associated with poor sleep quality (Cacioppo et al., 2002) and poor sleep efficiency (Cacioppo & Hawkley, 2003). Recently, Simon and Walker (2018) demonstrated that poor sleep quality leads to social withdrawal and loneliness. Bidirectional associations between sleep and connectedness will be important to explore in studies of couples' sleep and health. When assessing sleep at the dyadic level, Gunn and colleagues found that couples who were more concordant throughout the night also had lower C-reactive protein, which is a putative marker for cardiovascular disease (Gunn et al., 2017). Troxel and colleagues found that marital conflict was associated with nighttime blood pressure, which is also a putative marker of cardiovascular health (Troxel, DeSantis, et al., 2017). Many studies demonstrate associations between relationship characteristics and waking health behaviors and biological processes. Given that sleep is characterized by intimacy and vulnerability, and that it is highly predictive of short- and long-term health outcomes, it is important to consider how relationships influence psychophysiology at night and across the 24-hour day.

Conclusions

In summary, cohabitating close relationships appear to be powerfully linked to sleep parameters such as sleep quality, sleep duration, sleep efficiency, and sleep timing. Anthropological and attachment theories provide a guiding framework for understanding why and how relationships are associated with sleep. The literature provides strong supportive evidence for interpersonal security being necessary for good sleep and evidence for transmission of sleep behaviors within families, perhaps due in part due to the properties of attachment in close relationships. Most studies focus on cross-sectional associations; however, a few studies demonstrate bidirectional associations between relationship characteristics and sleep parameters. The broader field of the social environment and sleep would benefit from advancing research on controlled intervention studies, enhanced methodological considerations (e.g., daily observations, experimental designs) and greater attention to circadian rhythms in the context of families. Finally, it is likely that sleep characteristics are one way that relationships influence health. Studies examining relationship factors, sleep, and health outcomes will help identify targets for improving health by focusing on relationships and sleep.

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