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SOCIAL RELATIONSHIPS AND SLEEP QUALITY

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Abstract

Background—The quality of social relationships and social support appears to be associated with physical health outcomes and sleep quality. Almost all previous research in this area focuses on positive aspects of relationships.

Purpose—The present study thus intended to examine the links between supportive, aversive, ambivalent, and indifferent network ties and sleep quality.

Methods—Relationship data, PSQI-assessed sleep quality, and depression were examined in 175 middle-aged and older adults.

Results—Consistent with hypotheses, supportive ties were positively related to sleep quality, while aversive ties predicted worse sleep quality; associations that were primarily seen for close relationships. Ambivalent and indifferent ties were not significant predictors of sleep quality. Importantly, depression was found to mediate the link between relationship quality and sleep quality.

Conclusions—These data suggest the more specific types of social relationships that may be linked to poor sleep quality, and that depression appears to underlie these associations.

Keywords

Ambivalence; Relationships; Sleep quality; Social support; Depression

Social relationships are reliably related to physical health outcomes (1, 2). In a recent meta-analysis, Holt-Lunstad and colleagues (1) found that social support was related to lower risk for mortality even when considering standard risk factors such as age, obesity, and health status. Moreover, a smaller but growing literature provides evidence that negative social ties are associated with higher mortality rates (3, 4). One mechanism that might be responsible for links between relationships and health is restorative sleep. There is a relatively large literature suggesting that sleep quality, duration, and other factors are related to health outcomes, including mortality rates (5–8). Thus, research examining links between social relationships and facets of sleep may help clarify the mechanisms by which social ties are related to long-term health outcomes.

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Relationships are thought to be linked to sleep quality due to its evolutionarily adaptive function of providing a safe context in which sleeping individuals were protected from predators and enemies by close others (9, 10). There have been a number of studies examining whether social relationships characterized by high levels of support and satisfaction predict better sleep quality (11, 12). Several studies have found that perceived support is linked to better subjective and objective sleep quality (13–15). Similarly, Troxel, Buysse, Monk, Begley and Hall (15) found that greater perceived social support predicted less actigraphy-assessed wakefulness after sleep onset, an important aspect of sleep. Moreover, interpersonal negativity or strain has also been linked to sleep quality. In one such study, Brummett and colleagues (16) found that negative affect associated with caregiving predicted poorer sleep quality (in this case, including sleep latency, duration, sleep disturbances, daytime dysfunction, etc.). Such an association may be due to the ability of interpersonal stressors to exacerbate social-affective processes (17).

One important issue, however, is that very few studies have examined both positive and negative aspects of relationships together. This is significant because positive and negative aspects of relationships are separable dimensions (18–20), and hence may have independent or overlapping influences on outcomes (21, 22). Thus, failure to consider both may obscure reliable associations with health-related outcomes. In one of the only studies examining both relationship dimensions, Ailshire and Burgard (23) found that social support was related to better sleep quality while social strain was linked to increased sleep problems. Moreover, only social strain was a significant predictor of sleep quality when both were considered in the model, which is consistent with work on a negativity bias, which shows that adverse or threatening events more strongly influence physiological and psychosocial outcomes than do positive events (24).

Researchers have proposed more integrative models that highlight the joint contribution of positivity and negativity in relationship to health (22). According to such models, a person falling in the high positivity/low negativity category would be a strong source of social support (e.g., the best friend you can always count on). In contrast, a network member who falls in the category of low positivity/high negativity would represent an aversive network tie (e.g., an unreasonable supervisor). Network members who exhibit low positivity/low negativity are people with whom we come into contact with very low frequency or depth (e.g., the next-door neighbor). Relatively unique relationship ties that are salient due to this conceptual framework fall into the high positivity/high negativity category and are labeled ambivalent ties (e.g., overbearing parent, volatile romance).

Importantly, prior work using these relationship characterizations suggest links between supportive ties and better health (25), as well as ambivalent ties and worse health (26). Thus, the major aim of this study was to examine links between these more comprehensive relationship categories and sleep quality. Consistent with prior work, we predicted that the number of supportive network ties would be linked to better sleep quality (27), whereas the number of aversive ties should be related to poorer sleep quality (23). Finally, based on prior work linking ambivalent ties to worse health outcomes (28, 29), we predicted they would be related to poorer sleep quality. It was also predicted that indifferent ties would not predict sleep quality due to their lower importance.

A second important aim of this study was to test mechanisms responsible for the links between relationships and sleep quality. Of the potential mechanisms, depression is salient, as the quality of one's relationships, especially supportive ties, has been consistently linked to lower levels of depression (30–32). For instance, in one random sample of over 1000 participants, perceived social support was related to lower levels of depression over a seven year period (32). In addition, various facets of sleep and associated negative outcomes have also been strongly linked to depression (33). Research shows links between depression and sleep problems in both cross-sectional (34–36) and longitudinal designs (37, 38). In fact, depression is perhaps the most prevalent of all health conditions associated with disturbances of sleep (39). Thus, prior work suggests that depression might be an important mediator of links between relationships and sleep quality although a direct test of such a possibility has not yet been conducted.

Method

Participants

One hundred seventy-five relatively healthy participants (93 men and 82 women) were included in this study. We recruited a middle-aged to older community, adult sample between 48 and 77 (M_{age}=60.1, SD=6.5). The median education level was college graduation and the median income was $40,000 or more per year. As part of the larger study, we excluded individuals with serious medical problems (e.g., cancer) (40).

Procedure

Eligible participants were scheduled for an appointment. Following informed consent, participants were first rechecked against the exclusion criteria. Each then completed a demographic questionnaire, the Social Relationships Index, the Pittsburgh Sleep Inventory, as well as The Center for Epidemiologic Studies Depression Scale (see below). Participants were debriefed and compensated for their participation.

Measures

Social Relationships Index (SRI)—The SRI instructs participants to list the initials of individuals in the following domains: (a) spouse / significant other, (b) father, (c) mother, (d) other family, (e) friends, (f) co-workers, and (g) social acquaintances. The categories of other family, friends, co-workers, and social acquaintances are limited to 5 people each in order to keep completion of the SRI within a manageable time frame. These network members are then rated in terms of how helpful and upsetting they are (1 = not at all, 6 = extremely) when the participant needs various types of social support (e.g., emotional, tangible, informational; see 41 for psychometric information). Based on prior work (42; see Figure 1), we operationalized different categories of social relationships as the total number of individuals in one's network who were sources of indifference (i.e., "1" on both positivity and negativity), support (i.e., "2" or greater on positivity and only a "1" on negativity), aversion (i.e., only a "1" on positivity and "2" or greater on negativity), or ambivalence (i.e., "2" or greater on both positivity and negativity).

PSQI—The Pittsburgh Sleep Quality Index (PSQI) assesses sleep quality disturbances during the previous month (43). The scale is comprised of 19 items which are used to derive a total of seven component scores: Sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleep medication, and daytime dysfunction. Component scores are summed to produce a global PSQI score with higher scores indicating poorer sleep quality. This instrument has demonstrated good reliability (alpha = 0.83) and validity (44).

CES-D—The Center for Epidemiologic Studies Depression Scale (CES-D) is a 20-item scale that assesses depressive symptoms. The Cronbach's alpha was high in both patient and control samples (.90), with a 4 week test-retest correlation of .67 (45). Importantly, the CES-D also has good sensitivity for detecting depressive symptoms (46). The internal consistency of the CES-D in the current study was similarly high (.91).

Results

Preliminary Analyses and Overview of Statistical Analyses

The mean global PSQI score was 6.15 (SD=3.6, range 0–17), indicating poor sleep quality on average in this sample (47, 48). Individuals also reported an average of 7.11 (SD=4.3, range 0–19) supportive, 7.25 (SD=4.4, range 0–23) ambivalent, 0.85 (SD=1.2, range 0–6) aversive, and 0.49 (SD=1.2, range 0–9) indifferent ties. This is consistent with prior work showing that supportive and ambivalent ties are equally represented in most social networks (41). These network types were also only moderately correlated, as individuals who had more supportive ties evidenced fewer ambivalent (r=−.37, p<.001) and aversive (r=−.19, p<.01) ties. Interestingly, the number of ambivalent ties was unrelated to the number of aversive ties (r=.05, p=.56). No other correlations between network ties approached significance.

Principal analyses utilized simultaneous regression to examine the links between these relationship categories and sleep. Based on prior work, primary and mediation analyses controlled for age, gender, education, and income, which have been linked to sleep patterns (49–51). Analyses initially focused on the individual links between each relationship category and overall sleep quality (global PSQI score). If significant links were found, subsequent simultaneous regression analyses examined which relationship categories were independently associated with sleep quality. This strategy allows examination of zero-order and unique associations. Ancillary analyses explored whether the links between relationships and sleep were more consistent for particular network ties (e.g., spouse, parents). There is consensus that a test of a nonzero a*b path is necessary to determine mediation (52–54). We tested for this indirect effect using bootstrapping with 2000 resamples to create bias-corrected and accelerated confidence limits for mediated effects (53).

Social Relationships and Sleep Quality

Separate analyses focusing on each relationship category showed that the only significant links were between the number of supportive and aversive ties and overall sleep quality. In

these analyses, the number of supportive ties was linked to better sleep quality (*b*= −.18, 95% CI [−.3, −.05], *p*=.007), whereas the number of aversive ties was related to poorer sleep quality (*b*=.57, 95% CI [.13, 1.01], *p*=.01). Inconsistent with one of our predictions, the number of ambivalent ties was unrelated to sleep quality (*b*=.04, 95% CI [−.08, .17], *p*=.47). As hypothesized, indifferent ties were not related to sleep quality (*b*= −.12, 95% CI [−.55, .29], *p*=.55).

We next examined whether the numbers of supportive and aversive ties were redundant or relatively independent predictors of sleep quality. Simultaneous regression analyses (see Table 1) examining both the number of aversive and supportive ties showed that they were indeed independently associated with sleep quality, as the number of aversive ties continued to predict poorer sleep quality (*p*=.03), whereas the number of supportive ties predicted better sleep quality (*p*=.02). Ancillary analyses revealed that these results were not moderated by age or gender, suggesting they were comparable across middle-aged to older adult women and men.

Ancillary analyses of specific relationships suggested that these links were mostly evident for close ties. Better sleep quality was evident when one had supportive parents (*b* = −.78, 95% CI [−1.66, .10], *p* = .08), a supportive significant other (*b* = −1.33, 95% CI [−2.81, .14], *p* = .07), supportive other family member (*b* = −.50, 95% CI [−.88, .11], *p* = .01), or supportive friends (*b* = −.30, 95% CI [−.63, .02], *p* = .06). Supportive co-workers and social acquaintances were not predictive of sleep quality (*p* = .21 & .42 respectively). Poorer sleep quality was also predicted by having aversive parents (*b* = 2.34, 95% CI [.69, 3.99], *p* = .0057) and aversive friends (*b* = 2.10, 95% CI [−.19, 4.40], *p* = .07). Aversive ties with other family (*p* = .39), co-workers (*p* = .99), and social acquaintances (*p* = .79) were not predictive of sleep quality. Consistent with the overall analyses, exploratory analyses did not show a link between ambivalence towards any of the specific relationships and sleep quality (*p*-values > .15).

Depression as a mediator between Social Relationships and Sleep Quality

Bootstrapping models were next tested to examine whether depression mediates the relationship between supportive and aversive ties and sleep quality. Consistent with mediation, the bias corrected bootstrap analysis indicated that the indirect effect of supportive ties on poorer sleep quality via depression was significant (a × b = −.1175, 95% CI [−.1858, −.0672]). We also examined if depression mediated the links between aversive ties and poorer sleep quality. Consistent with analyses for supportive ties, the bias corrected bootstrap analysis indicated that the indirect effect of aversive ties on poorer sleep quality via depression was significant (a × b = .2500, 95% CI [.0057, .6016]).[1]

[1]When the covariates (age, sex, income, & education) were removed, results remained similar for both supportive (a × b = −.1226, 95% CI [−.1932, −.0656]) and aversive (a × b = .2644, 95% CI [.0408, .5969]) ties. When scoring without CES-D item 11 (“My sleep was restless”), the pattern of mediation was similar for both supportive (a × b = −.1015, 95% CI [−.1746, −.0532]) and aversive (a × b = .2212, 95% CI [.0035, .5546]) ties.

Discussion

The main aim of this study was to examine links between relationships and sleep quality utilizing a unique and more comprehensive framework that considers both positivity and negativity in social ties. Consistent with our hypotheses, we found that supportive ties were related to better sleep quality, whereas aversive ties were related to poorer sleep quality. These links were independent, as supportive and aversive ties continued to predict sleep quality when both were considered in the same analyses. Moreover, the associations between supportive and aversive ties with sleep quality were mediated by depression. Inconsistent with our hypotheses, the number of ambivalent network ties was unrelated to sleep quality. Overall, these data suggest that the quality of social ties may be related to health outcomes because they are linked to differences in the restorative process of sleep. This appears to be the first study to examine the association between discrete supportive, aversive, and ambivalent network ties and sleep quality. Thus, the main contribution of this study was showing the specificity of links between relationships differing in their qualities with sleep and its mediation via depression.

We predicted and found that supportive ties were related to better sleep quality. These results replicate prior work and extend it by examining social support from specific network members instead of general perceptions of support (27). We also replicated the finding of Ailshire and Burgard (23) that aversive ties are related to poorer sleep. Our data are less consistent with their finding that only social strain was independently related to sleep. This may be due to differing analyses of social network structure; as the authors note, they did not separate out individual network members who were sources of positivity, negativity, or ambivalence, but rather, examined support and strain across the family as an aggregated unit. It may be that their analysis of support/strain at the family level resulted in inclusion of both supportive and ambivalent individual relationships in their positive support category, which would have weakened any independent link with “supportive ties.” In contrast, the approach of the present study—analysis based on relationships with distinct network members—examines a different level of social interaction and separates supportive, aversive, and ambivalent ties on an individual basis and allows for a cleaner test of specific aspects of relationship quality. The current study also differed from the work of Ailshire and Burgard (23) by including a wider range of important social network members that were related to sleep quality (e.g., spouse, friends). Thus, stronger results for supportive ties in this study might also be due to the inclusion of these other close relationships as Ailshire and Burgard (23) examined non-spousal familial ties. More generally, the analysis of other important relationship types gives the present study a level of detail not found in earlier work, and may explain results departing from previous findings.

Extending prior work, the mediation analyses in the present study showed that the links between supportive and aversive ties with sleep quality were statistically mediated by depression. These data are consistent with existing work linking relationship quality to depression symptoms (55, 56), as well as depression and impaired sleep quality (57–60). However, this is the first study we are aware of that demonstrates that depression directly mediates links between relationship quality and sleep. It is possible, of course, that these associations are recursive as poor sleep quality may also undermine social interactions

although it this was the case it should have also been linked more generally to other social ties (e.g., ambivalent). Future longitudinal research will be needed to test more complex mediational models based on a consideration of positive and negative aspects of relationships.

Inconsistent with our predictions, we did not find a link between ambivalent ties and sleep quality. There are several potential explanations for this. A number of prior studies have found links between relationship processes and facets of sleep to be stronger in clinical populations (e.g., insomnia; 15, 27). Thus, it is possible that ambivalence might have a larger effect size on sleep in clinical populations, although future research would be needed to test such a possibility. In addition, ambivalent ties have not been linked to health behaviors (e.g., exercise, smoking) thought to increase risk for disease (28, 29). Thus, it is possible that sleep, and health behaviors more generally, are not mechanisms linking ambivalent ties to disease outcomes. This is consistent with laboratory studies showing that interactions involving the presence or salience of ambivalent ties have a direct negative influence in health-relevant physiological processes (21, 26).

This point notwithstanding, future research is needed to examine potential links between ambivalent ties and sleep. Ailshire and Burgard (23) did find that general perceptions of strain and support within familial relationships were linked to sleep problems. However, this assessment is not directly comparable to our ambivalence assessment because individuals in that study may have been thinking of different family members who were only sources of positivity or only sources of negativity so it is unclear if their assessment represents ambivalence toward any specific network member.

There are several important limitations that should be noted. First, these data are cross-sectional, so future studies using longitudinal designs will be needed for stronger inferences. Additionally, some research indicates the associations between relationship quality and sleep may be bidirectional; sleep factors may influence relationship quality via varying degrees of restoration, subsequent affective reactivity, and self-regulation (61–63). Future research examining supportive, aversive, and ambivalent ties should consider such bidirectional influences. Further, although subjective sleep quality has been linked to objective sleep indicators, we do not have measures (e.g., actigraphy, polysomnography) that might provide converging evidence for such links. Finally, this is one of the first studies examining more comprehensive links between relationships and sleep so future work modeling such differences and linking them to direct health outcomes (e.g., incidence of cardiovascular disease) will be needed.

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Table 1

Results from simultaneous regression analyses linking social ties to sleep quality.

Predictor	b	p-level	95% CI
Age	−.08	.05	−.16, .−00
Gender	.64	.22	−.39, 1.67
Income	−.09	.49	−.33, .16
Education	−.25	.20	−.63, .14
Aversive Ties	.49	.03	.04, .92
Supportive Ties	−.15	.02	−.28, −.02