

Gender differences in relations between social comparison, social support, and sleep disturbance among midlife and older adults

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ABSTRACT

Objective: To examine associations between sleep disturbance, social support, and social comparison among midlife and older adults, including the moderating role of gender.

Methods: Adults ages ≥ 40 years ($N = 557$, $MAge = 57$, 53% men) completed a cross-sectional survey including validated measures of sleep disturbance, perceptions of social support, and social comparison orientation.

Results: Sleep disturbance was negatively associated with social support ($r_s = -0.42$ to -0.33 , $p_s = 0.001$) and associations were stronger for men than women – particularly perceived support from friends ($\eta^2 = 0.01$). Sleep disturbance was also associated with upward comparison orientation ($r = 0.12$, $p = 0.003$), more strongly for women than men ($\eta^2 = 0.01$).

Discussion: Findings indicate that perceived support from friends (for men) and upward comparison (for women) may have particular influence on sleep among midlife and older adults. Additional work is needed to clarify the nature of these associations and their mechanism(s) of action, to inform potential treatment adaptations for this population.

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Introduction

Subjective sleep disturbance, or the perception of difficulty with falling asleep and staying asleep and/or lack of restorative sleep (Holsboer-Trachsler & Seifritz, 2001), is common among midlife and older adults (ages 40 and older). Estimates show that 43% of midlife and 57% of older adults report at least one chronic sleep problem such as those encompassed in the definition of sleep disturbance (Ancoli-Israel, 2005; McArdle et al., 2022). Causes are multifactorial; for example, high BMI (Koolhaas et al., 2019), stress from caregiving responsibilities (Byun et al., 2016), menopause (Xu & Lang, 2014) and alterations in body temperature and melatonin (Duffy et al., 2015) all affect sleep quality during

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these life stages. Midlife and older adults who report significant sleep disturbance often experience fatigue and associated cognitive functioning and memory issues, which then negatively affect day-to-day activities and abilities (Lallukka et al., 2018). Further, subjective reports of sleep disturbance are strongly predictive of cardiovascular health indicators and all-cause mortality (Buysse, 2014; Gordon et al., 2017). Thus, subjective sleep disturbance is common among midlife to older adults and negatively impacts their functioning and overall well-being.

Additional information is needed about subgroups who experience more (vs. less) severe sleep disturbance (e.g. to guide targeted prevention or intervention efforts), as well as about potential influences on sleep experiences that could serve as effective targets of intervention.

Both theory and existing evidence point to perceptions of the social environment as associated with (and may contribute to) sleep disturbance among midlife and older adults. For example, Social Cognitive Theory (Bandura, 2013) identified direct and indirect influences of these perceptions: social situations can cause or buffer against stress (leading to shifts in biological processes such as increases in cortisol) or create barriers or facilitators to sleep-promoting behavior, respectively. Similarly, Gordon and colleagues (2017) proposed that perceptions of social experiences and environments (e.g. relationship conflict) can affect sleep via disruptions to executive functioning or heightened physiological arousal, and urged researchers to investigate associations between social perceptions and sleep wherever they find opportunities to do so. The present study represents an initial step to address this call using perceptions of two broad domains of social environment: social support and social comparison.

Existing evidence shows that perceived social support (i.e. feeling loved, appreciated, and held in strong regard with and by a network of close others; Cobb, 1976) is negatively associated with subjective sleep disturbance among midlife and older adults (Chung, 2017; Troxel et al., 2010). Perceptions of strong support are also known to mitigate stress and immune function in this population, which can benefit sleep (Cohen & Wills, 1985; Friedman et al., 2005; Walen & Lachman, 2000). Conversely, older adults who perceive weak support report worse sleep disturbance than older adults who perceive strong support (Azizi-Zeinalhajlou et al., 2022). Further, effects of perceived social support may differ based on the source of support (Vila, 2021): strong social support from friends is positively associated with subjective health status, whereas weak social support from family is associated with health problems (Walen & Lachman, 2000). Such findings indicate that midlife and older adults with weak (or lack of) social support may be at unique risk for experiencing sleep disturbance, though the source(s) of support that are most strongly linked to protection against this risk is not yet clear.

There has been less attention to the potential role of social comparison processes (i.e. evaluating oneself relative to others; Festinger, 1954). From the perspective of Social Cognitive Theory (as well as independent social comparison theory), comparisons help to establish perceived norms about an experience or behavior and often motivate efforts to achieve socially accepted standards, as failure to do so triggers negative affective and stress responses (Bandura, 2013; Festinger, 1954; Suls et al., 2002; Tajfel & Turner, 1978). Many aspects of social comparison may be linked to sleep disturbance (Arigo et al., 2014; Arigo & Smyth, 2012; Gerber et al., 2018); *social comparison orientation* represents a useful starting point, as it describes a broad set of individual differences

in self-perceived tendency to make social comparisons (Gibbons & Buunk, 1999). Individuals may differ in global comparison orientation, upward orientation (which describes the more specific tendency to compare with others perceived as better off than the self), and/or downward orientation (the specific tendency to compare with others perceived as worse off than the self; Gibbons & Buunk, 1999; Wood et al., 1985). Previous work suggests that upward comparison orientation is associated with negative affect and feelings of inferiority (Vogel et al., 2014; Collings, 2018), whereas downward comparison orientation is associated with positive affect and can be used to cope with stress (Buunk et al., 1997; Huang, 2016).

Social comparison orientation is known to be weaker among midlife adults compared to both younger and older adults (Buunk et al., 2020). For older adults, downward comparison is associated with better subjective well-being (Stewart et al., 2013) and upward comparison is associated with high anxiety, depression, and neuroticism (Buunk et al., 2006; Kedia et al., 2014; Sheeran et al., 1995). Although both social comparison orientation and sleep disturbance are associated with poor psychological function (Cole & Dendukuri, 2003; Fiske et al., 2008; Lichstein et al., 2006; Perlis et al., 2006), the direct link between these experiences has rarely been examined. One exception documents a positive association between general comparison orientation and sleep problems (Murray-Gibbons & Gibbons, 2023). Establishing whether this association exists among midlife and older adults - and whether upward or downward orientation might be particularly problematic - is an important initial step to establish the scientific justification for additional investigation (e.g. formally testing for mediation, attempts to manipulate or intervene on perceptions; cf. Onken et al., 2014).

Gender as a potential moderator

A characteristic that is common across sleep disturbance, social support, and social comparison is that these experiences present differently among women versus men. For instance, as women approach menopause, symptoms of insomnia are common even in women without a history of sleep problems and can result in an average reduction of 43 minutes of sleep per night over two weeks, relative to women without insomnia (Baker et al., 2015).

Vasomotor symptoms such as hot flashes uniquely disrupt sleep in this age group (Baker et al., 2018). Among both midlife and older women, psychosocial factors such as caregiving responsibilities (which are typically greater than men's; McCurry et al., 2015), as well as changes in health behaviors (Kravitz et al., 2003) and social relationships (Park et al., 2020), may also uniquely affect sleep.

Across the lifespan, men tend to have larger social circles than women (Ajrouch et al., 2005; Fuhrer & Stansfeld, 2002), and although women have more close contacts in their social network and report a wider breadth of support resources than men (Fuhrer & Stansfeld, 2002), they report stronger social isolation and loneliness after retirement (which occurs during midlife or older adulthood; Crowe et al., 2021). As noted, women also report stronger social comparison orientation than men (Buunk et al., 2020). However, men make more comparisons that are motivated by competition and performance optimization (Schneider & Schupp, 2011), whereas women use downward comparison as an emotion- focused coping strategy (Affleck et al., 2000). Such differences

may be reflected in differing associations with sleep. Specifically, the potential impact of friend and family social support or subjective overall appraisal of social support (global), and how social situations are interpreted, may diverge based on gender. Social comparison orientation (including upward and downward) may also function differently for men versus women and thus, affect sleep differently between genders. However, it is not yet clear whether gender differences are present in *associations* between sleep disturbance and (1) perceived social support, or (2) social comparison orientation among midlife and older adults. Understanding how social support and social comparison orientation are *associated* with sleep for men versus women may help to identify particular groups that would benefit from resources to promote healthy sleep, as well as strategies to enhance sleep via improvements in social perceptions (or social functioning) among midlife to older adults.

To achieve these goals, we examined associations between sleep disturbance and perceptions of the social environment (i.e. perceived social support and social comparison orientation) in a sample of midlife and older adults. Our first aim was to test for associations between sleep disturbance and specific aspects of social support (global, friend, family) and social comparison orientation (global, upward, downward). We expected negative associations between social support and sleep disturbance, such that perceptions of stronger (vs. weaker) social support would be associated with less severe sleep problems. We also expected positive associations between global and upward social comparison orientation and sleep disturbance and a negative association between downward social comparison and sleep disturbance, such that stronger (vs. weaker) global and upward orientation would be associated with more severe sleep problems and stronger (vs. weaker) downward orientation would be associated with less severe sleep problems.

Our second and primary aim was to determine whether gender moderated associations between sleep disturbance and (1) social support appraisals (global, friend, family), and (2) social comparison orientation (global, upward, downward). Specifically, we expected that the association between social support (global, family) and sleep disturbance would be stronger for men. However, we also expected that the association between social support (friend) and sleep disturbance would be stronger for women. Additionally, we predicted that the associations between social comparison orientation (global, upward, downward) and sleep disturbance would be stronger for women than men.

Methods

Participants and procedures

Adults ages 40 and older were recruited to complete an anonymous, cross-sectional survey between May and June 2022 in the United States. We set a minimum threshold of $r=0.11$ for detecting small but potentially meaningful associations; an a priori power calculation showed that a sample of 500 would allow for detecting a correlation of $r=0.11$ with 95.0% power. Inclusion criteria were age 40 or older, fluency in English, no history or diagnosis of dementia or other cognitive impairment, and able to engage in activities of daily living without professional assistance (i.e. not requiring nursing or other intensive home care). Adults were recruited through Qualtrics Research Services. A total of 659 participants began the survey; 102 were excluded from the sample

for not finishing the survey battery. This left a final sample of 557 respondents, which exceeded our target sample size of 500.

The average age was 57 ($SD = 13.14$), and 49.0% of participants identified as men. The largest subsets of participants identified as white (73.4%); married (48.1%), had a high school degree or GED (23.8%) and had a household income of \$20,000-\$40,000 (22.0%). Additional demographic information can be found in [Table 1](#). Procedures were approved by the Institutional Review Board at the supporting institution. Participants completed an electronic survey via Qualtrics (Provo, UT, USA), which took approximately 30 minutes. All participants provided electronic documentation of consent and received compensation based on the method of recruitment from the Qualtrics panel (e.g. gift card, SkyMiles). Participants received approximately \$10 through the source in which they joined the study.

Measures

Demographics

Participants reported their age, race, ethnicity, marital status, education level, and income.

PROMIS sleep disturbance short-form

The Patient-Reported Outcomes Information System (PROMIS) is a battery developed with the support of the U.S. National Institutes of Health to provide standardized, norm-referenced assessment in various domains of functioning. Each domain has an associated long-form (8 items) and short-form (4 items) version. The 4-item PROMIS Sleep Disturbance short form (PROMIS-SD) assesses self-reported sleep disturbance over the previous 7 days, encompassing overall sleep quality, satisfaction, restoration and depth of sleep, and issues with falling and staying asleep (Full et al., 2019). For example, ‘In the past 7 days, I had a problem with my sleep ...’ are rated on a 5-point likert scale with the response items of *Not at all* (1), *A little bit* (2), *Somewhat* (3), *Quite a bit* (4), and *Very much* (5).

The raw sum scores from the PROMIS-SD short form are rescaled using the PROMIS score conversion table for the output of a standardized T-score. The T-score with a mean

Table 1. Demographic information for participants (N = 557).

| | <i>M (SD)</i> 57 (13.14) | | <i>n (%)</i> | <i>n (%)</i> | |
|-----------------------|-----------------------------|---------------------------|--------------|-----------------------|------------|
| Age | <i>n (%)</i> | | <i>n (%)</i> | <i>n (%)</i> | |
| Age Phase | | Racial Identification | | Ethnic Identification | |
| Midlife (40-60) | 279 (37.1) | White | 577 (73.4) | Hispanic | 40 (5.1) |
| Older Adult (60-100) | 473 (62.9) | Black or African American | 84 (10.7) | Gender | |
| | | Asian American | 20 (2.5) | Men | 365 (49.0) |
| Education | | Income | | Marital Status | |
| Less than high school | 33 (4.2) | <\$10,000 | 69 (8.8) | Married | 378 (48.1) |
| High School/GED | 187 (23.8) | \$10,001-\$20,000 | 115 (14.6) | Widowed | 72 (9.2) |
| Bachelor's degree | 158 (20.1) | \$20,001-\$40,000 | 173 (22.0) | Divorced | 121 (15.4) |
| Graduate degree | 93 (11.8) | \$40,001-\$60,000 | 109 (13.9) | Single | 153 (5) |
| | | \$60,001-\$80,000 | 77 (9.8) | | |
| | | \$80,001-\$100,000 | 63 (8.0) | | |
| | | >\$100,000 | 93 (11.8) | | |

of 50 is the average population score for sleep disturbance in the U.S. adult population. Each 10-point increment on this scale represents 1 standard deviation from the mean (average population score) (Kim et al., 2022; Liu et al., 2010). Thresholds of 0.5 standard deviation from the population mean (T-score >55; T-score < 45) indicate the existence of sleep disturbance (Cella et al., 2010; Hayes, 2017). Specifically, sleep disturbance scores within normative limits are 38.8 ($SD = 6.0$) to 55.9 ($SD = 3.0$). Scores of 55.9 ($SD = 3.0$) to 60 ($SD = 3.1$) indicate mild sleep problems, scores of 60 ($SD = 3.1$) to 69.3 ($SD = 3.1$) indicate moderate sleep problems, and scores of 69.3 ($SD = 3.1$) to 79.1 ($SD = 2.9$) indicate severe sleep problems.

This measure has strong psychometric properties (e.g. Cronbach's $\alpha = 0.90$; Yu et al., 2012) and has been compared against the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989), a commonly used, much longer measure of sleep disturbance. These measures have convergent validity of $r = 0.83$, and the PROMIS-SD short-form has shown greater measurement precision when compared with the PSQI (Cella et al., 2016). Subjective sleep measures such as the PSQI have been validated as strongly correlated with objective sleep measures (e.g. actigraphy, polysomnogram, electroencephalogram; O'Donnell et al., 2009). Specifically, the PSQI was found to be strongly correlated with objective measures when evaluated in a healthy sample of adults over a period of 30 consecutive days (O'Donnell et al., 2009). Further, the PROMIS-SD has demonstrated strong validity in associations with diseases, mood disorders (e.g. depression), adverse health behaviors (e.g. smoking and use of narcotics; Ananthakrishnan et al., 2013). This measure also has strong validity for distinguishing between individuals with and without the presence of sleep disorders (Buysse et al., 2010). The PROMIS-SD has also predicted disease in a subsample of patients with autoimmune disorders (e.g. Crohn's Disease; $N = 1291$) (Ananthakrishnan et al., 2013). This measure has been used in a large variety of populations including parents of newborns in intensive care units (Busse et al., 2013), populations with neurological conditions (Cook et al., 2012), individuals experiencing pelvic pain (Fenton et al., 2011) and cancer (Stachler et al., 2014).

Social support appraisals scale (SAA)

The 23-item Social Support Appraisals Scale assesses the extent to which an individual identifies as supported by friends and family (Vaux et al., 1986). For example, items such as 'People admire me' are rated on a 4-point scale with the response options of *strongly agree* (1), *agree* (2), *disagree* (3), and *strongly disagree* (4). This measure includes subscales for social support appraisals specific to friends (7 items) and family (8 items; e.g. 'My family cares for me very much'). Numeric values for each relevant item are summed to create global and subscale scores, with higher scores indicating perceptions of *weaker* social support. Consistent with prior work (cf. Arigo & Cavanaugh, 2016), we reverse-scored this measure for ease of interpretation, so that higher scores indicated perceptions of stronger social support than lower scores. Previous validation studies have shown strong psychometric properties for this measure (Vaux et al., 1986). In the present study, Cronbach's alphas were $\alpha = 0.82$ (global), $\alpha = 0.55$ (family support subscale) and $\alpha = 0.71$ (friend support subscale).

Iowa-Netherlands comparison orientation measure (INCOM)

This 23-item measure assesses people's perceptions of their tendency to make social comparisons (Gibbons & Buunk, 1999). Items such as 'I always pay a lot of attention to how I

do things compared with how others do things' are rated on a 5-point scale with the response options *I disagree strongly* (1), *I disagree* (2), *I neither agree nor disagree* (3), *I agree* (4) and *I strongly agree* (5). This measure uses 11 items to capture global comparison orientation and includes subscales for self-reported tendencies to make upward and downward comparisons (e.g. 'When things are going poorly, I think of others who have it better [worse] 'than I do'), with 6 items per subscale.

Numeric values for each relevant item are summed to create global and subscale scores, with higher scores indicating a stronger tendency to compare. Previous validation studies have shown good psychometric properties for this measure (Gibbons & Buunk, 1999). In the present study, Cronbach's alphas were $\alpha = 0.86$ (global), $\alpha = 0.93$ (upward comparison subscale), and $\alpha = 0.93$ (downward comparison subscale).

Statistical analysis

First, descriptive statistics were conducted on variables of interest, and independent samples *t*-tests were used to test for gender differences in these experiences. Next, Pearson's *R* correlations were used to determine the strength and direction of associations between (1) sleep disturbance and social support appraisals (global and subscale scores), and (2) sleep disturbance and social comparison (global and subscale scores). We then used a simple moderation analysis to test for a moderating effect of gender on the associations between sleep disturbance and social support appraisals (global), family support, and friend support. Similarly, we used a simple moderation analysis to test for a moderating effect of gender on the associations between general social comparison orientation (global, upward, downward), all with separate models.

Interaction models included the main effects of each predictor, to identify the unique contribution of the interaction (over and above the individual predictor associations).

Data were analyzed using SPSS Version 29 (IBM Corporation, U.S.A). To streamline this process and limit human error with respect to calculating interaction terms, we used Hayes's (2017) PROCESS macro 4.0. This macro also centers each variable in the moderation model to facilitate accurate interpretation. We used the moderation 1 model with post-hoc probing for each moderation analysis, which also controlled for main effects, and we report effect sizes as η^2 . R (Version 12.0.352, R Core Team, 2022) was used as an additional assessment of normality testing for the dataset along with Flexplot (Version 2022.12.0.353) to generate figures.

Results

Participants showed an average score of 50.66 on the PROMIS sleep disturbance scale ($SD = 11.09$), corresponding to mild sleep problems; this score is within the previously observed range of 32–73 in the population of interest (Yu et al., 2012; Table 2). Additionally, 66.4% of participants reported no sleep disturbance (T-score <55), 12.6% of participants reported mild sleep disturbance (T-score 55–59), 12.20% of participants had moderate sleep disturbance (T-score 60–69) and 5.02% of participants reported severe levels of sleep disturbance (T-score > 70). As expected, all three dimensions of social support were negatively associated with sleep disturbance (global $r = -0.42$, family $r = -0.33$, friends $r = -0.39$, $p = 0.001$; see Table 2); midlife and older adults who perceived

Table 2. Descriptive statistics and correlations for key study variables.

| Measure | <i>N</i> | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------------------------------|----------|----------|-----------|----------|---------|---------|---------|---------|---------|---|
| 1. Sleep Disturbance | 546 | 50.66 | 11.09 | – | | | | | | |
| 2. Social Support (Global) | 546 | 50.49 | 8.91 | –0.420** | – | | | | | |
| 3. Family Social Support | 546 | 17.53 | 3.55 | –0.333** | 0.860** | – | | | | |
| 4. Friend Social Support | 546 | 14.93 | 3.42 | –0.391** | 0.864** | 0.583** | – | | | |
| 5. Social Comparison Orientation | 546 | 36.86 | 8.48 | 0.050 | –0.084* | –0.046 | –0.093* | – | | |
| 6. Downward Social Comparison | 546 | 16.00 | 6.02 | 0.049 | –0.069 | –0.102* | –0.018 | 0.604** | – | |
| 7. Upward Social Comparison | 546 | 16.41 | 6.45 | 0.128** | 0.060 | 0.010 | 0.101* | 0.757** | 0.717** | – |

Note: * $p < 0.05$; ** $p < 0.01$.

weaker (vs. stronger) support from their social networks also reported greater sleep disturbance. In contrast, only upward comparison orientation was significantly associated with sleep disturbance ($r = 0.12$, $p = 0.003$), such that midlife and older adults with a stronger tendency to make upward comparisons reported more severe sleep disturbance than those with a weaker tendency toward these comparisons.

Gender as a moderator: social support and sleep disturbance

T-tests showed no significant differences between men and women with respect to sleep disturbance or social comparison orientation. However, social support (global, friend, family) was higher for women than men ($p = 0.01$; see Table 3). Consistent with hypotheses, the negative association between social support appraisals (global) and sleep

Table 3. Gender differences in key study variables (t-tests).

| | <i>M (SD)</i> | <i>t-value</i> | <i>df</i> |
|---------------------------------|---------------|----------------|-----------|
| Sleep Disturbance | | –4.498 | 544 |
| Women | 52.74 (11.08) | | |
| Men | 48.54 (10.71) | | |
| Social Support (global) | | –0.346** | 522.91 |
| Women | 50.62 (9.85) | | |
| Men | 50.35 (7.86) | | |
| Social Support Family | | –0.034* | 537.56 |
| Women | 17.53 (3.77) | | |
| Men | 17.52 (3.31) | | |
| Social Support Friends | | –0.220** | 522.54 |
| Women | 14.96 (3.79) | | |
| Men | 14.90 (3.01) | | |
| Social Comparison Orientation | | 0.223 | 544 |
| Women | 36.78 (8.53) | | |
| Men | 36.94 (8.45) | | |
| Upward Comparison Orientation | | –0.277 | 544 |
| Women | 16.48 (6.54) | | |
| Men | 16.33 (6.37) | | |
| Downward Comparison Orientation | | –1.314 | 544 |
| Women | 16.33 (6.37) | | |
| Men | 15.66 (5.91) | | |

Note: * $p < 0.05$; ** $p < 0.01$

Table 4. Regression analysis testing moderation by gender.

| | <i>B</i> | <i>SE</i> | <i>t</i> |
|---|----------|-----------|------------|
| Social Support (Global): Model $F(3,546) = 50.98, p = 0.001, R^2 = 0.2201, MSE = 96.4542$ | | | |
| Intercept | 50.6825 | 0.4204 | 120.5711** |
| Social Support (Global) | 0.5476 | 0.0484 | 11.3151** |
| Gender | 4.0514 | 0.8408 | 4.8187** |
| Social Support (Global) x Gender | -0.2537 | 0.0970 | -2.6148* |
| Family Social Support: Model $F(3,546) = 31.4459, p = 0.001, R^2 = 0.1483, MSE = 105.3401$ | | | |
| Intercept | 50.6664 | 0.4392 | 115.3503** |
| Family Social Support | 1.0562 | 0.1249 | 8.4557** |
| Gender | 4.1854 | 0.8785 | 4.7641** |
| Family Social Support x Gender | -0.2415 | 0.2502 | -0.9650 |
| Friend Social Support: Model $F(3,546) = 44.63, p = 0.001, R^2 = 0.1981, MSE = 99.1748$ | | | |
| Intercept | 50.6767 | 0.4262 | 118.9005** |
| Friend Social Support | 1.3370 | 0.1277 | 10.4672** |
| Gender | 4.1099 | 0.8525 | 4.8211** |
| Friend Social Support x Gender | -0.6791 | 0.2561 | -2.6518** |
| Social Comparison Orientation (Global): $F(3,557) = 10.77, p = 0.001, R^2 = 0.0552, MSE = 116.8467$ | | | |
| Intercept | 50.6857 | 0.4581 | 110.6478** |
| Social Comparison Orientation | 0.0669 | 0.0541 | 1.2377 |
| Gender | 4.3127 | 0.9163 | 4.7067** |
| Social Comparison Orientation x Gender | 0.3191 | 0.1082 | 2.9495** |
| Upward Social Comparison Orientation: $F(3,557) = 11.65, p = 0.001, R^2 = 0.0594, MSE = 116.3256$ | | | |
| Intercept | 50.6640 | 0.4570 | 110.8637** |
| Upward Comparison Orientation | 0.2011 | 0.0708 | 2.8417** |
| Gender | 4.2982 | 0.9141 | 4.7021** |
| Upward Comparison Orientation x Gender | 0.2936 | 0.1416 | 2.0726** |
| Downward Social Comparison Orientation: $F(3,557) = 8.87, p = 0.001, R^2 = 0.0460, MSE = 117.9925$ | | | |
| Intercept | 50.6215 | 0.4607 | 109.8802** |
| Downward Comparison Orientation | 0.0555 | 0.0767 | 0.7237 |
| Gender | 4.2685 | 0.9215 | 4.6320** |
| Downward Comparison Orientation x Gender | 0.3144 | 0.1535 | 2.0491** |

Note: * $p < 0.05$; ** $p < 0.01$.

disturbance was moderated by gender ($F = -6.84, p = 0.01, \eta^2 = 0.01$), and the association was stronger for women ($r = -0.50$) than for men ($r = -0.38$). Similarly, the negative association between friend social support and sleep disturbance was moderated by gender ($F = -7.03, p = 0.01, \eta^2 = 0.01$), though this relation was stronger for men than women ($r_s = -0.47, -0.34$), respectively; interaction (see Table 4). Contrary to our expectations, however, the negative association between family social support and sleep disturbance was not moderated by gender ($r = -0.36$ for men and -0.32 for women; interaction $F = -0.93, p = 0.34, \eta^2 = 0.002$; see Table 4).

Gender as a moderator: social comparison orientation and sleep disturbance

As predicted, the positive association between social comparison orientation (global) and sleep disturbance was moderated by gender ($F = 8.70, p = 0.003, \eta^2 = 0.02$). The association was modestly positive for women ($r = 0.17$) and close to zero for men ($r = -0.07$; see Table 4). Similarly, the hypothesis that the positive association between upward comparison orientation and sleep disturbance would be moderated by gender was also supported: again, the association was modestly positive for women and close to zero for men ($r = 0.21, 0.04$, respectively; interaction $F = 4.30, p = 0.04, \eta^2 = 0.01$; see Table 4). Finally, as expected, the association between downward comparison orientation and sleep disturbance was also moderated by gender, and the association was stronger for women than for men ($r_s = 0.22, -0.05$, respectively; interaction $F = 4.20, p = 0.04, \eta^2 = 0.01$; see Table 4).

Discussion

The goals of this study were (1) to examine perceptions of the social environment that may contribute to sleep disturbance in midlife and older adults (i.e. social support appraisal, social comparison orientation), and (2) to determine whether gender moderates these associations. Our results indicate that 30% of midlife and older adults experienced sleep disturbance in the past 7 days and replicate the negative associations between social support and sleep disturbance observed in prior research (Gosling et al., 2014; Kent de Grey et al., 2018; Liu et al., 2016). Our findings also show consistency in these associations across global, family, and friend perceptions. Although gender differences were small, women in this study showed a stronger link between overall perceptions of social support and sleep disturbance than men, though men showed a stronger link between perceptions of *friend* social support and sleep disturbance than women.

Previous work suggests relevant potential mechanisms of action. Perceptions of friendship quality are known to influence sleep across the lifespan (Gordon et al., 2021), and men tend to have fewer resources for emotional support outside of family units than women; this could increase stress (or fail to buffer against it), which could negatively influence sleep (Nordin et al., 2005; Vandekerckhove, 2017). Changes in social networks during midlife and older adulthood that result in fewer close friendships than earlier in adulthood may also have stronger negative effects on men if they do not have other emotional outlets (Fuhrer & Stansfeld, 2002; McKenzie et al., 2018), either via stress processes or increases in behaviors that are detrimental to sleep (e.g. alcohol consumption; Parke et al., 2018). Qualitative studies show that midlife and older men tend to approach sleep more individualistically than women (whereas women look to friends and other social resources for sleep improvement tips; Venn et al., 2013), though respond favorably to health promotion programs that increase social support from friends (as a pathway to improve health; Parthasarathy et al., 2013; Sharp et al., 2018).

Thus, increasing social support from friends among midlife and older men may be an acceptable and effective approach to reducing their sleep disturbance, and steps to identify mediators such as stress and health behaviors will improve the efficacy of intervention efforts.

In contrast, we did not observe differences in associations between perceptions of social support from family members and sleep disturbance. Social support between family members is known to promote meaning and the establishment of role identity in both genders (Toyoshima & Nakahara, 2021); this is particularly salient in midlife to older adulthood, given powerful role changes such as increased caregiving responsibilities (e.g. caring for spouses or parents), and shifts in employment status (e.g. working to retired; Infurna et al., 2020). Additionally, family support is important for the functioning of both genders in midlife to older adulthood as social and cognitive resources begin to decline (Ying et al., 2020). Thus, social support from the family may be important for coping with the stresses of these changes for both genders, with little difference in how perceptions of family support affect sleep (Fuller-Iglesias et al., 2015).

As noted, much less is known about associations between social comparison orientation and sleep disturbance; the general tendency to compare could promote affiliation and a sense of connectedness (which could benefit sleep; Buunk et al., 2012), though the tendency to compare in ways that are self-critical may contribute to sleep disruption (Vincent et al., 2009). Findings from the present study align with this latter pattern

with respect to upward comparison orientation, which was modestly positively associated with sleep disturbance. Upward comparison can be used to highlight the comparer's inferiority and the distance between their current and desired status (Gomez et al., 2022), which may reflect broader characteristics such as neuroticism (which were not assessed in this study). Use of upward comparison in this way is strongly associated with the experience of negative affect (Buunk & Ybema, 2013), which can interfere with sleep, and reductions in the tendency to compare upward are known to mediate the effects of self-regulation interventions on sleep health (Arigo & Smyth, 2012).

In the present study, we also observed gender differences in associations between social comparison orientation (global, upward, and downward) and sleep disturbance, where associations were modest but positive for women and close to zero for men. As noted, women have a stronger overall tendency to make social comparisons than men (Buunk et al., 2020), and that this tendency in women is associated with higher levels of anxiety and neuroticism when compared to men (which were not assessed in this study; Buunk et al., 2006; Kedia et al., 2014; Sheeran et al., 1995). As women also have stronger tendencies toward internalized self-criticism than men (Thompson & Zuroff, 2004), they may be more likely to use opportunities for comparison in ways that induce negative affect or stress - particularly upward comparison. Importantly, however, it is also possible to use upward comparison to identify positive behavioral models and illustrate the likelihood of achieving a better-off status (which can boost self-efficacy; Bandura, 2005; Meier et al., 2020). There is a need for an improved understanding of *how* the tendency to compare might affect sleep, which could inform improvements to intervention efforts. For example, it may be more effective to help midlife and older adults modify the way they interpret comparison information than to attempt changes to the underlying tendency to compare (which is automatic; Gilbert et al., 1995).

Strengths, limitations, and future directions

This study had the advantages of considerable sample size, equal gender distribution, and diversity in socioeconomic status. We also used well-validated measures of sleep disturbance, social support appraisals, social comparison orientation; measures of social perceptions captured multiple aspects of these experiences among midlife and older adults, allowing for insight into distinctions in their associations with sleep problems (Ancoli-Israel, 2009). Noteworthy limitations include a cross-sectional design in a convenience sample, modest internal consistency for the family subscale of the Social Support Appraisals measure, and reliance on retrospective self-reports of sleep problems. Our use of the PROMIS measure of sleep disturbance over the past 7 days was intentional. We conceptualized perceptions of the social environment to influence sleep, rather than sleep influencing social perceptions; consistent with this conceptual model, we assessed global, stable perceptions of the social environment (which should precede the past 7 days) and recent sleep (past 7 days).

However, this measure may not capture long-term chronic sleep issues that are common and disruptive among midlife to older adults (Full et al., 2019). We also used a 4-item version of the PROMIS sleep disturbance scale, which may provide less information than the 8-item version. Although subjective measures of sleep are useful in their own right, it will be important to determine which aspects of sleep may be

influenced by perceptions of the social environment, including parameters that are assessed objectively (e.g. via polysomnography or movement monitors such as accelerometers).

In addition, as an initial step toward understanding associations between social comparison experiences and sleep disturbance, we used a global, retrospective measure of comparison that does not account for important contextual features such as the dimension of comparison or participants' responses to specific comparisons. A critical next step is to account for distinct types of comparisons (including comparisons of sleep, as well as experiences of social support) - ideally, close to when they occur in daily life, using methods such as ecological momentary assessment (EMA; Arigo et al., 2020). This approach would help to identify the types of social comparisons and support experiences that may impact sleep as well as their temporal sequencing. Such information is essential to mapping mechanistic pathways and optimal contexts that can be targeted with interventions to improve sleep among midlife and older adults and the present findings suggest that efforts to do so are warranted.

Replication of the associations observed in this study in larger, more diverse samples will be of benefit in two additional ways. First, it will ensure adequate power to detect a range of effects for interactions (in addition to main effects), which we may have been underpowered to do in the present study. Second, it will increase the generalizability of findings: specifically, as the relation between discrimination and sleep disturbance has been well documented (Slopen et al., 2016; Slopen & Williams, 2014), it will be essential for future work to capture the experiences of midlife and older adults who identify with marginalized racial/ethnic groups.

Future meta-analytic work to pool estimates across samples will also be useful to determine the average size of these associations. Finally, these next steps will be optimally informative if they also assess and control for relevant individual differences (such as neuroticism, coping style, and additional features of the social environment and perceptions) and potential mediators (such as stress and health behaviors). This will help to determine the unique contributions of perceived social support and social comparison orientation and to identify mechanistic pathways that can be activated in health promotion interventions for midlife and older adults.

Conclusions

The present study offers additional insight into potential social contributors to (and buffers against) sleep disturbance among midlife and older adults. In particular, this study is among the first to document a link between social comparison experiences and sleep disturbance in this population, and to demonstrate that this link is particularly negative for women. Additional work is needed to elucidate the nature of these associations in daily life and to clarify the mechanism(s) of action linking perceptions of social support and social comparison to sleep problems.

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Data availability

Data for the current study is available upon request from Jacqueline A. Mogle, Ph.D.: Department of Psychology, Clemson University; jmogle@clemson.edu

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Ethics approval

This study was approved by the Institutional Review Board at Penn State University under protocol number STUDY00020153.

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