



Investigating insomnia as a cross-sectional and longitudinal predictor of loneliness: Findings from six samples

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ARTICLE INFO

Keywords:

Insomnia
Sleep disturbances
Sleep problems
Loneliness
Thwarted belongingness

ABSTRACT

Loneliness has been repeatedly associated with sleep problems; however, there is a dearth of research examining the prospective relationship between insomnia and loneliness, as well as this association controlling for other psychiatric symptoms. This study evaluated the cross-sectional and prospective relationship between insomnia and loneliness using six samples: 666 undergraduates; 2785 Army recruiters; 208 adults with a history of suicidality and/or depression; 343 adult psychiatric outpatients; 326 young adults at elevated suicide risk; and 183 undergraduates. A meta-analysis also was conducted to examine the magnitude of the relationship between insomnia and loneliness across the six studies. More severe insomnia symptoms were significantly associated with greater feelings of loneliness while accounting for some (e.g., anxiety, nightmares) but not all (i.e., depression) psychiatric covariates. Findings underscore the strength of the association between insomnia and loneliness and suggest that depression may account for this relationship. Additional studies are needed to further establish the temporal relationship between these variables, delineate the role of depression in the association between insomnia and loneliness, and test whether insomnia may confer unique risk for subsequent loneliness.

1. Introduction

Insomnia—characterized by the *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* (DSM-5; American Psychiatric Association [APA], 2013) as “dissatisfaction with sleep quantity or quality, with complaints of difficulty initiating or maintaining sleep,” and accompanying clinically significant distress or impairment (p. 363)—is relatively common, with prevalence rates among the general population estimated at 6–15% (Ford and Kamerow, 1989; Morin et al., 2006; Ohayon, 2002). At any given time, approximately one-third of individuals report experiencing at least one insomnia symptom (i.e., difficulty initiating or maintaining sleep, or early morning awakening; Morin et al., 2006).

Not only does insomnia contribute to daytime functional impairment (see Sateia et al. (2000), for review), but it also may be inherently distressing. For instance, the lengthy time spent in bed awake at night

is often a treatment target since it may be particularly aversive and isolating (Edinger and Means, 2005). Indeed, it is plausible that the experience of insomnia itself may elicit feelings of loneliness (i.e., the painful perception and/or experience that one does not belong or is isolated from other individuals; Cacioppo and Patrick, 2008), which may account for findings suggesting that insomnia (see Bernert et al. (2015), and Pigeon et al. (2012), for review) and loneliness (c.f. thwarted belongingness; see Van Orden et al. (2010), for review) are each associated with similar negative psychiatric outcomes. Thus, empirical exploration of the relationship between insomnia and loneliness is indicated.

1.1. The effect of insomnia on loneliness

Few studies have investigated whether insomnia may increase risk for loneliness. In fact, even studies that have aimed to demonstrate a

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prospective relationship between insomnia and loneliness have only tested this relationship through the use of proxy measures. For example, two studies by Roberts and colleagues (2001; 2013) found that insomnia predicted difficulties in interpersonal functioning one year later among adolescents. Although poor interpersonal functioning may ultimately contribute to loneliness, they do not represent the same construct; thus, conclusions regarding whether insomnia influences loneliness remain speculative. To our knowledge, no additional research has examined this prospective relationship.

Despite the dearth of research in this domain, there are theoretical and empirical reasons why this prospective relationship may exist. First, as noted, being awake alone for many hours may be isolating and intrinsically lonely. Second, insomnia has been shown to impair daytime functioning (see Sateia et al. (2000), Shekleton et al. (2010), and Shochat et al. (2014), for review). These impairments may, in turn, impact individuals' motivation and/or ability to engage with others and build meaningful social connections. For example, evidence among adolescents supports that poor sleep is associated with difficulties forming and maintaining interpersonal relationships (Carskadon, 1990; Roberts et al., 2001; Roberts and Duong, 2013). Third, sleep is critical to emotion information processing (see Walker (2009), for review); thus, disturbed sleep may result in emotion regulation difficulties and greater negative affect. As a result, individuals experiencing insomnia may be more prone to maladaptive thoughts, including thoughts that they do not belong in social settings. Relatedly, individuals with insomnia demonstrate increased reactivity to daily stressors (Morin et al., 2003), which conceivably may increase reactivity to interpersonal conflicts or decrease their resources to attend to interpersonal needs. Concurrently, increased reactivity to daily stressors, alongside other insomnia-related consequences, might increase individuals' perceived need for social support.

Theoretical models of suicide and associated research also provide support for the notion that insomnia may lead to feelings of loneliness. The interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010; cf. Joiner et al., 2016) posits that thwarted belongingness (i.e., lack of meaningful social connection) plays a critical role in the emergence of suicidal desire. Additionally, prior research has established a robust longitudinal relationship between insomnia and suicide risk (see Pigeon et al. (2012), for a meta-analytic review). Several cross-sectional studies that have aimed to bridge the gap between this theory and research found that greater perceptions of thwarted belongingness significantly accounted for the relationship between insomnia symptoms and suicidal ideation (Chu et al., 2016, 2017; Hom et al., 2017). These findings suggest that loneliness may be one mechanism by which insomnia confers suicide risk. Consequently, further exploration of the prospective relationship between insomnia and loneliness is indicated, especially given the implications for other mental health domains.

1.2. The effect of loneliness on sleep disturbances

In contrast, a growing body of scientific literature supports the inverse—that loneliness may confer risk for the development of sleep problems. For example, studies have found that loneliness prospectively predicts poorer sleep efficiency (Cacioppo et al., 2002), higher levels of sleep fragmentation (Kurina et al., 2011), and poorer sleep quality (Harris et al., 2013). Notably, one study excluded individuals with mild to severe depression symptoms; suggesting that the relationship between loneliness and sleep problems is not significantly accounted for by depressive symptomatology (Cacioppo et al., 2002). Despite these robust findings, studies typically have not controlled for associated psychiatric symptoms (e.g., Cacioppo et al., 2002; Roberts et al., 2008), including depression and anxiety, which may explain these associations.

Several theories have been posited to explain how loneliness might contribute to sleep problems. It has been hypothesized that loneliness and a lack of a secure social environment lead to greater hypervigilance

for social threats (Cacioppo and Cacioppo, 2014; Cacioppo and Hawkley, 2009). Consequently, the brain remains alert and prepared to detect and fight threats, even when an individual is trying to fall asleep or has just fallen asleep. Consistent with this hypothesis, animal models have indicated that social isolation may indeed disrupt neural mechanisms underlying sleep (see Cacioppo et al. (2014), for review). An alternate explanation posits that individuals who have more positive relationships or interactions with others are more likely to select healthy behaviors (Cohen and Wills, 1985). Because good sleep practices belong to the broader suite of healthy behaviors, individuals with greater social connection may be more likely to experience high-quality sleep (Cacioppo et al., 2002).

1.3. The present investigation

Taken together, evidence suggests that loneliness is associated with and predicts subsequent sleep problems; however, to enhance our knowledge of the relationship between insomnia and loneliness, additional research is needed to test: (1) whether the association between insomnia and loneliness exists independent of other psychiatric symptoms (e.g., nightmares, anxiety, perceived burdensomeness), and (2) whether insomnia also predicts loneliness, controlling for other psychiatric symptoms. In this paper, we present findings from six studies that investigated the relationship between insomnia and loneliness both cross-sectionally (Studies 1–4) and prospectively (Studies 5 and 6). Additionally, we conducted a meta-analysis to examine the strength of the association between insomnia and loneliness across these six studies. Based on our findings, we employed a series of exploratory analyses for our prospective studies to further delineate the temporal relationships between insomnia, loneliness, and depression symptoms, as well as to better understand the directionality of effects.

Consistent with prior research and theory, we hypothesized that insomnia would be: (1) significantly associated with loneliness in cross-sectional investigations, even after controlling for other psychiatric symptoms, and (2) a significant predictor of loneliness over time, controlling for other psychiatric symptoms. Similar to prior studies examining the relationship between loneliness and subsequent insomnia (e.g., Hawkley et al., 2010; Kurina et al., 2011), we elected to control for anxiety and/or depression symptoms where possible since they are likely to be associated with feelings of loneliness and also may confer risk for sleep disturbances.

Participants included undergraduates, military personnel, adults with a history of suicidality and/or depression, adult psychiatric outpatients, and young adults at elevated suicide risk. Each sample represents a group at elevated risk both for sleep disturbances (Bernert and Nadorff, 2015; Buysse et al., 2008; Owens et al., 2014; Seelig et al., 2010; Staner, 2010) and related psychiatric problems (Hoge et al., 2006; Kessler et al., 2014, 2005a; Ketchen Lipson et al., 2015; Mortier et al., 2017). Therefore, inclusion of each sample facilitated the examination of variables of interest in populations for whom research and clinical implications may be particularly salient. Multiple samples were also included in this investigation to enhance generalizability of findings and allow for meta-analytic evaluation. Of note, each study represents secondary analyses of data collected for other investigations. Thus, differences in measures of insomnia and loneliness, as well as available covariates, exist across studies. These differences allowed each study to either complement or build upon findings from other studies. The use of various self-report measures of insomnia and loneliness also bolstered our ability to identify whether these constructs have a conceptually meaningful relationship (i.e., as opposed to only finding a significant relationship between two specific measures). Institutional Review Board approval was obtained for each investigation, and all participants provided informed consent prior to participation. For ease of reference, demographic characteristics for each study and descriptive statistics for self-report measures are presented in Tables 1 and 2, respectively.

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