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Anger tendencies and sleep: Poor anger control is associated with objectively measured sleep disruption

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ABSTRACT

This study investigated whether trait anger linked to actual sleep behavior and what anger tendencies play the most important role for particular aspects of sleep. Data from 436 adults in Midlife of the United States Study were used to link anger tendencies to both objectively (actigraphy) and subjectively (daily diary) assessed sleep across a week. Overall, individuals who had poor anger control also had worse objectively and subjectively measured sleep and these relations were robust to effects of gender, age, race, socioeconomic status, and stress. The findings tie actual sleep behavior to individual differences in anger, suggesting poor anger control plays the most important role, and add to the growing evidence that anger and sleep depend on each other.

1. Introduction

Personality differences in anger and hostility have been linked to important behavioral and health consequences such as heightened aggression, worse cardiovascular health, and poor relationships among the anger-prone (Bettencourt, Talley, Benjamin, & Valentine, 2006; Chida & Steptoe, 2009; Kassinove, Roth, Owens, & Fuller, 2002; Suls, 2013). Whereas the aggressive and cardiovascular consequences of trait anger have received ample attention, research has often neglected the role of trait anger in the sleep-wake cycle. This gap is notable because proper sleep plays a critical role in physiological restoration and psychological functioning. To address this gap, the aim of the current study was not only to tie individual differences in anger to actual sleep behavior, but also to identify which anger tendencies are the most important predictors. To meet this goal, we employed data from a large sample of community adults and linked anger tendencies to both subjectively and objectively measured sleep.

1.1. Anger tendencies and sleep

Trait anger is a dispositional tendency to experience feelings of anger and is related to propensities toward hostile thought and aggressive behavior (Martin, Watson, & Wan, 2000). The general propensity to become angry can be further broken into more specific forms of anger experience and what people tend to do with anger once it occurs (Buss & Perry, 1992; Spielberger, 1988). In terms of experiencing anger, people often differ in the frequency in which they experience anger, what provokes anger, and how quickly they become angry. In terms of reacting to feeling angry, people differ in the frequency in which they suppress or hold anger in, express anger outwards towards people or objects, and control or dissipate feelings of anger (Novaco, 2003; Spielberger, 1988).

Why should anger propensities predict sleep? First, individuals who are more likely to feel anger may experience worse sleep because they are more likely to perceive and ruminate on provocation, to respond with anger, and to insufficiently regulate these perceptions and reactions (Wilkowski & Robinson, 2010). These cognitive and affective characteristics may induce physiological and cognitive arousal that opposes the calmness needed to fall and stay asleep (Deffenbacher et al., 1996; Wolk, Gami, Garcia-Touchard, & Somers, 2005). Feelings of anger before sleep increase physiological arousal (i.e. cardiovascular activity) both before and during sleep, while cognitively ruminating on an anger-provoking event can further maintain or increase angry emotions, thoughts, and physiological arousal (Gerin, Davidson, Christenfeld, Goyal, & Schwartz, 2006; Pedersen et al., 2011; Schwartz, Weinberger, & Singer, 1981; Shapiro, Jamner, & Goldstein, 1997). In turn, physiological and cognitive arousal have been associated with delayed sleep onset, poor sleep integrity, and insomnia (Harvey, 2000; Pillai, Steenburg, Ciesla, Roth, & Drake, 2014; Radstaak, Geurts, Beckers, Brosschot, & Kompier, 2014; Thomsen, Mehlsen, Christensen, & Zachariae, 2003). Thus, anger and angry

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dispositions may induce mental restlessness and amplify physiological arousal, undermining initiation and maintenance of sleep.

To date, existing evidence supports a link between greater angry dispositions and worse sleep, implicating anger as a contributing factor to difficulties falling and staying asleep. Children with greater angry temperament and externalization of anger are more likely to have problems falling and staying asleep, sleep problems, and higher daytime sleepiness (Chervin, Dillon, Archbold, & Ruzicka, 2003; Kidwell, Van Dyk, Guenther, & Nelson, 2016; Reid, Hong, & Wade, 2009). Surveyed adults who tend to become angry or to suppress angry feelings also report worse sleep integrity in terms of difficulty falling asleep and unwanted awakenings during the night (Caska et al., 2009; Ottoni, Lorenzi, & Lara, 2011; Shin et al., 2005). Additionally, after an interpersonal conflict, individuals with more hostile views of others report greater difficulties falling asleep and staying asleep (Brissette & Cohen, 2002).

While this evidence clearly implicates anger in sleep, it is worth noting that much of this evidence comes from cross-sectional studies. Although existing evidence suggests that angry feelings can undermine sleep, evidence also suggests that disrupted sleep may increase anger (Kamphuis, Meerlo, Koolhaas, & Lancel, 2012; Krizan & Hisler, 2016). These possibilities suggest that the relation between anger tendencies and sleep is bi-directional. We consider these distinct possibilities in the discussion, with our study focused on anger tendencies as predictors of sleep.

Because past research has considered different aspects of anger mainly in isolation (e.g. overall frequency of anger or reactions to feeling angry; Caska et al., 2009; Shin et al., 2005, respectively), it is critical to simultaneously model the influence of different aspects of anger on sleep to identify which aspects are the most important. We speculated that the tendency to control and dissipate angry feelings is likely to be especially important for sleep as past research simultaneously modeling the influence of anger tendencies on other health outcomes, such as cardiovascular disease and wound healing, has suggested anger-control to be the most important feature of chronic anger (Gouin, Kiecolt-Glaser, Malarkey, & Glaser, 2008; Haukkala, Konttinen, Laatikainen, Kawachi, & Uutela, 2010). Individuals with greater anger-control engage in more active and reappraisal-based coping strategies, and such strategies have been associated with reduced stress reactivity that can damage physical health and impair healthy sleep (Diong et al., 2005; McEwen, 2008; Sladek, Doane, Luecken, & Eisenberg, 2016). Additionally, anger-control may reflect self-control more broadly, which has been linked to better sleep. Individuals with poorer self-control exhibit worse bed-time habits and poor sleep (Kroese, Evers, Adriaanse, & de Ridder, 2016), and individuals with poor or insufficient sleep show difficulties inhibiting cognitive and emotional responses (Killgore, 2010; Krizan & Hisler, 2016).

In addition to past research neglecting to investigate what anger tendencies are the most important for sleep, virtually all prior evidence is based on self-reports of sleep and no study has tied anger tendencies to *actual* (i.e. objectively measured) sleep. Given the important theoretical ties between anger dispositions and sleep, it is imperative to establish if these dispositions predict actual sleep behavior rather than just sleep self-reports.

1.2. Shortcomings of sleep self-reports

The need to establish a link between actual sleep and angry tendencies is crucial because the reliance on self-reports of sleep in past research limits confidence in prior evidence. Specifically, subjective reports of sleep can both inflate and suppress the relation between sleep and anger. In addition, self-reports of sleep are inherently limited in their ability to accurately assess specific sleep characteristics which may be important for a comprehensive understanding of the relation between anger and sleep.

1.2.1. Inflation

Self-reports of sleep can often be influenced by individuals' negative reporting styles. Individuals high in neuroticism (a disposition towards feeling negative affect) are more likely than those low in neuroticism to both report and *over*-report negative symptoms such as sleep loss and distress about sleep (Fernandez-Mendoza et al., 2011; Suls & Howren, 2012; Watson & Pennebaker, 1989). Thus, self-reports can inflate the relation between sleep and anger because individuals with negative dispositions may be more likely to report and over-report disturbed sleep and feelings of anger and frustration. Moreover, other sources of common method variance (e.g., tendencies to agree with any survey questions) shared by self-report measures can further lead to inflation (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

1.2.2. Suppression

While self-reports may inflate the relation between sleep and anger, self-reports of sleep may also suppress this relation due to extraneous influences on perceptions of sleep that reduce reliability. When studied across individuals, self-reported sleep shows limited convergence with objective polysomnographic and actigraphic sleep (Grandner, Kripke, Yoon, & Youngstedt, 2006; Keklund & Akerstedt, 1997). This poor convergent validity likely reflects that self-reports of sleep integrity and amount are often measured with only one or two questions relying on memory of recent sleep or general beliefs. In contrast, actigraphy and polysomnography use moment-to-moment measurements of sleep-wake state over a sample of days to assess sleep integrity and amount, yielding indices of sleep which avoid errors of memory or self-perception, yet also specific to a time-window. Using aggregate self-reports of sleep may thus capture more measurement noise and mask any relation between sleep and anger.

1.2.3. Crudeness

In addition to possibly inflating and suppressing the relation of anger and sleep, self-reports of sleep are often crude in their assessment of finer characteristics of sleep. For instance, a self-report item such as "How many hours of actual sleep do you get at night?" does not take into account how long a person was in bed and trying to fall asleep nor if that individual's sleep was fragmented by periods of wakefulness (i.e., does not capture sleep efficiency, the time sleeping relative to time in bed). Such a question would equate an individual who slept continually for six hours to an individual who slept for six total hours, but was in bed for eight hours and woke up for four thirty-minute periods. The sleep between these two individuals is not equivalent because the former individual had better sleep as sleep integrity mainly reflects sleep continuity and efficiency (Akerstedt, Hume, Minors, & Waterhouse, 1994). Even if self-reports of sleep specifically accounted for fragmentations in sleep amount, it would be questionable to expect a respondent to accurately recall the number and duration of arousals from sleep, which may not involve coming to full consciousness. Objective assessment methods such as actigraphy, however, easily track and measure such nuanced characteristics of sleep and can reveal specific aspects of sleep most important for anger.

1.3. Purpose

In sum, this study sought to address two pressing issues. First, past research tying anger and sleep has exclusively relied on subjective reports of sleep which are prone to reporting biases that could inflate (e.g., over-reporting) or suppress (e.g., lack of insight)