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Tired and angry: Sleep, mental health, and workplace relational aggression

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ABSTRACT

Workplace relational aggression incurs substantial costs to organizations in the form of reduced employee effectiveness and can exact a personal toll on the targets of the aggression. The extant literature contains limited studies related to physiological variables in predicting the perpetration of workplace relational aggression. Using survey data from a large US military sample (N = 2290), this research tested a hypothesized indirect effects model of sleep and relational aggression against unit members. Results suggest that subjective sleep duration and discontinuity are associated indirectly with perpetrating relational aggression against unit members through higher levels of poor mental health symptoms. Moreover, this association was more robust at higher versus lower levels of trait anger. This research is among the first to examine sleep disturbance or mental health as potential upstream factors associated with instigating relational aggression in the workplace. This is also among the first scientific studies on perpetrating relational aggression against unit members in the US military.

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What is the public significance of this article?— Poor sleep among soldiers predicts greater use of behaviors intended to undermine the reputation or social standing of fellow unit members when upset. This may be due to diminished mental health associated with poor sleep. This pattern was especially strong for people with personalities prone to anger.

Tired and angry: Sleep, mental health, and workplace relational aggression

Relational aggression describes behaviors intended to harm others through manipulation of their social status, relationships, or self-esteem (Archer & Coyne, 2005). To date, few studies have investigated workplace relational aggression from the point of view of the perpetrator. In particular, the role of physiological antecedents such as sleep in instigating workplace relational aggression are understudied. Indeed, recent reviews have called for more exploration into the role that sleep disturbance might play in perpetrating workplace relational aggression (Schilpzand, De Pater, & Erez, 2016). Thus, more research is needed to test for a relationship and to probe underlying mechanisms. The present research aims to address this gap by using data from a large US Military sample to test the theory that poor sleep is indirectly related to perpetrating workplace relational aggression, mediated by poor mental health symptoms.

Workplace relational aggression

Relational aggression in the workplace and related constructs have been studied under various labels including incivility (Andersson & Pearson, 1999), social undermining (Duffy, Ganster, & Pagon, 2002), abusive supervision (Tepper, 2000), and workplace bullying (Einarsen, 2000). Scientists have also studied behaviors similar to relational aggression under the broad label of "workplace deviance" (see Bennett & Robinson, 2000). Research on workplace relational aggression, generally falls into three categories. The majority of work has focused on the consequences of being targeted with aggression (i.e., experienced aggression), with smaller bodies of work considering the consequences of observing aggression (i.e., witnessed aggression) and identifying factors predicting which employees will be aggressive (i.e., instigated aggression).

Experiencing relational aggression at work can encourage counter-productive attitudes and behaviors among workers. Some attitudinal consequences for victims include reduced organizational commitment (e.g., Lim & Teo, 2009; Mackey, Frieder, Brees, & Martinko, 2017), lower job satisfaction (e.g., Cortina, Magley,

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Williams, & Langhout, 2001; Mackey et al., 2017), and higher turnover intentions (Cortina, Kabat-Farr, Leskinen, Huerta, & Magley, 2013; Lim & Teo, 2009; Nielsen & Einarsen, 2012). Victims also exert less effort at work (Demsky, 2019), perform worse, engage in fewer organizational citizenship behaviors, and engage in more counterproductive workplace behaviors (Mackey et al., 2017). They also miss more days of work (Porath & Pearson, 2012), and work fewer hours (Demsky, 2019). These outcomes aggregate to high financial cost. For instance, according to Pearson (2010), the estimated cost of aggression in the workplace is 14,000 USD per employee annually. Consequences extend outside of work as well. Victims report lower marital satisfaction (Ferguson, 2012), worse physical health (Lim & Teo, 2009; Nielsen & Einarsen, 2012), and lower psychological well-being (Cortina et al., 2001; Lim & Teo, 2009; Mackey et al., 2017; Nielsen & Einarsen, 2012).

Although relational aggression can be occur in any workplace, the military can be a unique setting in which to study anger and aggressive behaviors. Researchers generally conceptualize anger as a set of feelings, cognitions, and physiological responses that are typically accompanied by a desire to do harm to a target (see Fabiansson & Denson, 2016). Research suggests that a subset of soldiers view anger as a useful emotion for solving problems and that this mind-set may be associated with worse mental health symptoms and greater expressions of anger (Adler, Brossart, & Toblin, 2017). Further, many service members experience elevated rates of certain stressors that may contribute to anger and aggression such as combat experiences (see Gallaway, Fink, Millikan, & Bell, 2012), mild traumatic brain injury (Caplan et al., 2015), and elevated rates of certain mental health symptoms, particularly post-deployment (Hoge, Auchterlonie, & Milliken, 2006). Indeed, elevated rates of anger are a documented problem in military samples (e.g., Dyches et al., 2017; Wilk, Quartana, Clarke-Walper, Kok, & Riviere, 2015). Notwithstanding research on anger and *physical* aggression in military populations, workplace *relational* aggression is understudied and deserves greater attention.

The consequences of relational aggression are likely more severe for military populations than for most other workers. Service members often work as teams in high-risk operations where effective teamwork is essential for mission success and safety (Salas, Bowers, & Cannon-Bowers, 1995). Unfortunately, relational aggression can undermine team cohesion and performance by degrading effective communication and knowledge sharing (Sharifirad, 2016). Taken together, understanding factors that contribute to relational aggression in military units could be valuable for improving operational effectiveness and safety. Unfortunately, there is a paucity of research on predictors of who will engage in relational aggression against fellow unit-members in the US military. Studying who is relationally aggressive in the military can reveal underlying mechanisms and guide efforts to prevent it.

Beyond the military, there is a nascent literature exploring factors that predict who will relationally aggress at work (see Hershcovis et al., 2007 meta analysis); however, key gaps remain. The extant literature identifies perceived justice violations (Blau & Anderson, 2005), power (Cortina et al., 2001), experiencing aggression (Scott, Restubog, & Zagenczyk, 2013), revenge motives (Osgood, 2017a), and personality traits (Mackey et al., 2017) as precursors to instigating workplace relational aggression. In particular, high trait anger, which is defined as stable individual differences in the frequency, duration, and intensity of anger (Wilkowski & Robinson, 2008), is strongly associated with perpetrating workplace aggression (Inness, LeBlanc, & Barling, 2008; Meier & Semmer, 2013) and moderates the relationship between perpetrating workplace relational aggression and other predictors (Douglas & Martinko, 2001). Despite this research, physiological antecedents such as sleep are notably underrepresented.

The only investigation to the author's knowledge specifically focused on the role of sleep in perpetrating workplace relational aggression (Barnes, Lucianetti, Bhave, & Christian, 2015) linked poor sleep to abusive supervisory behaviors in civilian workplaces. The authors of that study argued that sleep deprivation affects aggression via an ego-depletion effect. Ego-depletion theory posits that one's ability and/or motivation to use self-control diminishes after a significant exertion of self-control (Muraven & Baumeister, 2000). Although ego-depletion has generally been linked to aggression (e.g., Osgood & Muraven, 2016), the robustness of ego-depletion across some samples has been challenged in recent years (e.g., Osgood, 2017b). Thus, it is important to investigate alternative underlying mechanisms. One such underlying mechanism linking sleep to workplace relational aggression could be poor mental health symptoms.

Sleep, depression, anxiety, and PTSD

Recent research implicates sleep disturbance as a contributor to developing depression, anxiety, and post-traumatic stress (Cox, Tuck, & Olatunji, 2017;

Cox et al., 2016; Freeman et al., 2017). Depression, anxiety, and post-traumatic stress represent the typical suite of stress related mental illnesses (Smoller, 2016). Stress related disorders are prevalent in military settings where healthy sleep is challenging (Osgood, Finan, Hinman, So, & Quartana, 2019; Thomas et al., 2010). The current study hypothesizes an indirect association between sleep duration/discontinuity and relational aggression between military unit-members. Further, we hypothesize that an underlying mechanism of the relationship is symptoms of lowered mental health (see Figure 1).

Although the current research does not directly measure the underlying mechanisms linking sleep to mental health, the current theory is informed by the expansive literature linking the two variables. Researchers have explored numerous putative neurological and hormonal pathways linking sleep to stress related mental disorders (see Cox & Olatunji, 2016). For instance, sleep deprivation is associated with increased amygdala reactivity in response to negative stimuli and with decreased connectivity between the prefrontal cortex and the amygdala (Yoo, Gujar, Hu, Jolesz, & Walker, 2007). These neurological changes could impair emotion regulation and the ability to control upsetting and intrusive thoughts (e.g., anxiety, rumination; Cox & Olatunji, 2016). Correspondingly, sleep disturbance is associated with subsequent poor emotion regulation (Palmer & Alfano, 2017). Poor emotion regulation, as well as maladaptive cognition underpin many stress related mental illnesses (Beck, 1991). Additionally, appropriate top-down control of the amygdala from the medial-prefrontal cortex is important for producing contextually accurate emotional memories and conditioned responses to negative stimuli during stressful experiences (Goldstein & Walker, 2014; Menz et al., 2013; Yoo et al., 2007). Relatedly, sleep loss is associated with deficits in executive functioning (Tucker, Whitney, Belenky, Hinson, & Van Dongen, 2010), inhibition (Drummond, Paulus, & Tapert, 2006), decision making (Killgore, Balkin, & Wesensten, 2006), attention (Drummond, Gillin, & Brown, 2001) and emotional memories (Van Heugten-van Der Kloet, Giesbrecht, & Merckelbach, 2015). With respect to hormonal and endocrine pathways, restricted and disrupted sleep alter the reactivity of the major neuroendocrine stress symptoms to stressors in a manner consistent with what is seen in stress related disorders such as depression (see Meerlo, Sgoifo, & Suchecki, 2008). All of these pathways could increase susceptibility to mental illness (Cox & Olatunji, 2016). In sum, sleep is related to a cascade of neuro-endocrine changes that affect an individual's vulnerability to lowered mental health. What remains under-examined is whether sleep and lowered mental health could predict relational aggression toward coworkers, particularly within a military context.

Mental health and workplace relational aggression

There is robust scientific evidence that stress related lowered mental health is associated with heightened aggression (Fazel et al., 2015). In particular, depression and anxiety are specifically associated with increased relational aggression (e.g., Loudin, Loukas, & Robinson, 2003; Riggs & Kaminski, 2010). Prescient for the current study, depressive and anxiety symptoms are positively associated with abusive supervision at work (Byrne et al., 2014).

Recent theoretical explanations have emphasized emotions and social-cognitive biases, as underlying mechanisms linking lowered mental health to relational aggression. In particular, anger and hostility are elevated in stress-related disorders (Cassiello-Robbins & Barlow, 2016; Elbogen et al., 2014; MacManus et al., 2013). Hostility is typically understood to mean a general dislike and negative evaluation of another (Eckhardt, Norlander, & Deffenbacher, 2004). Further, people

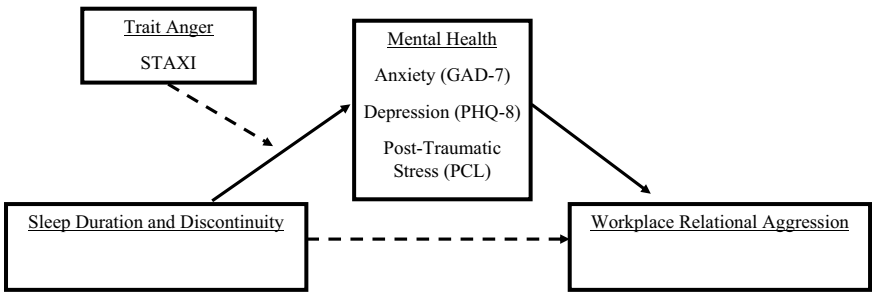

Figure 1. Conceptual model of subjective sleep, mental health and workplace relational aggression. *Notes*. PHQ-8: Patient Health Questionnaire for Depression; GAD-7: Generalized Anxiety Disorder Screener; PCL: Post-Traumatic Stress Disorder Checklist: SRASBM: Self-Report of Aggression and Social Behavior Measure; STAXI: State-Trait Anger Expression Inventory trait anger subscale. Solid lines represent indirect pathway. Dashed lines represent direct pathways and moderators.

with depression and anxiety disorders often display a cognitive bias to perceive the actions of others as being more rejecting, less sympathetic, and more hostile (Pietromonaco, Rook, & Lewis, 1992; Wai & Bond, 2004). Such hostile attribution of intent is a key mechanism underlying relational aggression (Crick, 1995; Godleski & Ostrov, 2010). Moreover, those with high trait anger tend to show more hostile interpretative bias (Wilkowski & Robinson, 2010). Relatedly, these mental illnesses are associated with diminished emotion regulation (e.g., Berking & Wupperman, 2012). This combination of negative emotions, hostile bias, and poor emotion regulation engenders aggressive behavior (Roberton, Daffern, & Bucks, 2012). In support of theories that negative emotions and maladaptive cognitive biases underlie the relationship between certain mental illnesses and aggression, the correlation between stress-related disorder severity and aggression is moderated by trait and state anger (Wilk et al., 2015). Taken together, anger and hostile biases are important mechanisms affecting the link between lowered mental health and aggression. Thus, we predict anger would moderate the pathway from sleep to workplace relational aggression through mental health. Consequently, we hypothesize that the association between sleep-related depression, anxiety, and post-traumatic stress and workplace relational aggression will be more robust for individuals reporting higher (vs. lower) trait anger (see Figure 1).

In sum, we hypothesized that self-reported shorter sleep duration and greater sleep discontinuity would indirectly predict greater workplace relational aggression. Further, we predicted that symptoms of lowered mental health would mediate this relationship. We also predicted that this indirect relationship would be stronger for individuals with higher (vs. lower) trait anger (see Figure 1). We tested this novel model using an extant dataset from a large military sample consisting of US Soldiers in an operational brigade. Depression, anxiety, and post-traumatic stress symptoms represented mental health mediators.

Methods

Sample and dataset

We examined extant survey data collected in 2015 from 2,290 soldiers in a brigade combat team (see Table 1). Soldiers completed paper and pencil surveys as part of a larger study on Soldier health. The purpose of the original study was to assess leadership and behavioral health outcomes in US Soldiers in order to produce reports and recommendations Army leaders. The data used in this research were collected at a garrison setting 18 months after the unit returned from a combat deployment. The majority (86%) of the soldiers who attended the recruitment briefings consented to participate. This study was approved by the organizations Institutional Review Board (IRB).

Measures

Sleep duration

Assessed by asking respondents "On average, how many hours of sleep have you gotten per day during the last week?" (3 or fewer, 4, 5, 6, 7, 8 or more).

Sleep discontinuity

Sleep discontinuity was measured using the sum of two self-report items on a three point Likert-scale (from "Not bothered" to "Bothered a lot"): how often during the past month they had been bothered by "difficulty falling asleep", and "difficulty staying asleep". These are the core sleep continuity items from the Insomnia Severity Index (Morin, Belleville, Belanger, & Ivers, 2011) and the only two items available in the extant data.

Mental health

Depression symptoms were assessed using the Patient Health Questionnaire (PHQ-8; Kroenke et al., 2009). PHQ-8 scores range from 0–24. Generalized anxiety symptoms were assessed using the Generalized Anxiety Disorder Screener (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006). The GAD-7 scale score ranges from 0 to 21. Scores of 10 or higher indicate moderate-impairment and scores of 15 or higher indicate severe-impairment for both the PHQ-8 and GAD-7. Post-traumatic stress symptoms were assessed using the 17-item Post-Traumatic Stress Disorder Checklist (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1993). Severe PTSD was screened at a score of 50 or higher on a scale of 17 to 85 on the PCL (Thomas et al., 2010). Of note, these scales were designed to map onto the previous version of the Diagnostic and Statistical Manual (DSM-IV-TR).

Workplace relational aggression

Relational aggression was measured with an adapted version of the Self-Report of Aggression and Social Behavior Measure (SRASBM), which is a validated measure of relational aggression (see Dahlen, Czar, Prather, & Dyess, 2013; Linder, Crick, & Collins, 2002; Knight, Dahlen, Bullock-Yowell, & Madson, 2018; Morales & Crick, 1998; Ostrov & Houston, 2008). These items asked respondents how often they engaged in certain actions toward other

Table 1. Descriptive data for key study variables.

Variable	α	M (SD)	%	% Meeting screening criteria
Age				
18–24	–	–	*49.4%*	–
25–29	–	–	*27.2%*	–
30–39	–	–	*18.4%*	–
40+	–	–	*5.1%*	–
Sex				
Male	–	–	*92.4%*	–
Female	–	–	*7.6%*	–
Rank				
E4 and below (Junior Enlisted)	–	–	*58.2%*	–
E5-E9 (Noncommissioned Officers)	–	–	*33.1%*	–
Warrant Officers and Commissioned Officers	–	–	*8.7%*	–
Sleep				
Sleep Duration	–	–	–	–
Three or fewer hours	–	–	*4.8%*	–
Four hours	–	–	*15.9%*	–
Five hours	–	–	*29.3%*	–
Six hours	–	–	*29.7%*	–
Seven hours	–	–	*15.7%*	–
Eight or more hours	–	–	*4.5%*	–
Subjective Sleep Discontinuity	–	*4.0 (2.2)*	–	-
Workplace Relational Aggression				
SRASBM	*.82*	*0.7 (1.6)*	–	–
SRASBM-reporting at least one behavior	–	–	*32.8%*	–
Mental Health				
PCL-C	*.96*	*23.9 (11.3)*	–	*4.3%*
GAD-7	*.93*	*2.9 (4.5)*	–	*9.8%*
PHQ-8	*.90*	*3.7 (4.7)*	–	*11.8%*
Trait Anger				
STAXI	*.91*	*15 (5.8)*	–	–

α = reliability (alpha); M = mean; SD = standard deviation; SRASBM: Self-Report of Aggression and Social Behavior Measure; PCL-C: Post-Traumatic Stress Disorder Checklist; GAD-7: Generalized Anxiety Disorder Screener; PHQ-8: patient Health Questionnaire for Depression; STAXI = 10-item trait anger subscale of the State-Trait Anger Expression Inventory. Scores of 15 or higher indicate severe-impairment for both the PHQ-8 and GAD-7. Severe PTSD was screened at a score of 50 or higher on a scale of 17 to 85 on the PCL.

members of their unit over the previous month. Responses were dichotomously recoded (0 = never, 1 = at least once) and summed. The items were:

(1) Members of my unit know that I will think less of them if they do not do what I want them to do.
(2) When I am not invited to do something with members from my unit, I will exclude them from future activities.
(3) When I want something from unit members, I act "cold" or indifferent toward them until I get what I want.
(4) When I have been angry with members of my unit, I have tried to damage their reputation by gossiping about them.
(5) When angry with a unit member, I have flirted with his/her romantic partner.
(6) When someone from my unit does something that makes me angry, I try to embarrass that person.
(7) When I am angry with members of my unit, I try to make sure they are excluded from social activities.
(8) I have threatened to share private information about members of my unit with other members to get them to comply with my wishes.
(9) I have spread rumors about members of my unit just to be mean.
(10) When someone hurts my feelings, I intentionally ignore him/her.
(11) I have intentionally ignored unit members until he/she gave me my way about something.

Trait anger

Trait anger was assessed with the 10-item trait anger subscale of the State-Trait Anger Expression Inventory (STAXI; Spielberger, 1988). Item responses on Likert-scale from 1 = "never" to 4 = "always" were summed for overall score.

Results

Sleep disturbance, mental health, and workplace relational aggression

Descriptive and psychometric data are displayed in Table 1. We conducted our inferential tests using

bootstrapping procedures in PROCESS Version 3 (Hayes, 2018) in SPSS 25, which computes bootstrapped 95% confidence intervals for the effects (k = 5000 resamples). An effect is considered statistically significant at the $p < .05$ level if the 95% confidence interval does not overlap with zero. Bootstrapping procedures use high-speed computing to repeatedly and randomly resample scores (with replacement) from the actual study dataset in order to produce a distribution of null outcomes. Typically, thousands of random resamples are done to create this distribution. The observed statistic is compared to this distribution for null hypothesis significance testing. Bootstrapping is able to estimate sampling distributions of almost any statistic. A key advantage of bootstrapping over traditional parametric approaches is that it does not rely on any underlying assumptions about the distribution of the data (see Efron & Tibshirani, 1994). Thus, it is highly robust against normality assumptions that limit traditional approaches. PROCESS is a powerful software add-on for SPSS that enables bootstrapping of regression models (see Hayes, 2018). Missing data were low (<5%) for our study variables and excluded pairwise as data were missing completely at random and the large sample size of this study buffered against loses of statistical power.

For our first set of analyses, we hypothesized that sleep would predict mental health, which would in turn predict relational aggression (sleep → mental health symptoms → relational aggression). For this test, we used model four in PROCESS. We entered all three mental health symptoms measures (PHQ-8, GAD-7, and PCL-C) into the model simultaneously. PROCESS tested each of these as concurrent (parallel) mediators to estimate an overall indirect effect (see Table 2). Process also estimates simple effects for each mediator individually (see Table 2). To account for potential multicollinearity, PROCESS estimates the unique effects for each parallel mediator when calculating simple effects. In other words, the simple effects presented in Table 2 for our hypothesized models are controlling for the variance accounted for by the other mediated pathways. As shown in Table 2, the indirect effects of sleep duration and sleep discontinuity on relational aggression via mental health were statistically significant for GAD-7 and PCL-C, both individually and when the mediators are included concurrently (Table 2).[1] PHQ-8 was a significant predictor of relational aggression on its own, but not as a mediator.

Given the cross sectional nature of the data, we cannot be certain that the temporal order we theorized (sleep → mental health symptoms → relational aggression) is correct. The most parsimonious model might be found by reversing the temporal order of these variables (mental health symptoms → sleep → relational aggression). To test for this latter possibility, we also ran "alternative" models (see Table 2), where we tested the mediation model with sleep and mental health reversed (mental health symptoms → sleep → relational aggression). For

Table 2. Effects of sleep on workplace relational aggression tested utilizing bootstrapping procedure.

Predictor	Mediator(s)	N	Effect	SE	LL	UL
GAD-7	None	2096	.06	.01	.03	.08
PHQ-8	None	2096	.03	.01	.004	.06
PCL	None	2096	.02	.004	.01	.03
Sleep Duration	None (total effect)	2096	−.11	.03	−.17	−.06
	None (direct effect only)	2096	.06	.03	.00	.12
	GAD-7	2096	−.06	.02	−.10	−.03
	PHQ-8	2096	−.05	.02	−.10	.00
	PCL	2096	−.06	.02	−.11	−.02
	GAD-7, PHQ-8, and PCL	2096	−.17	.02	−.22	−.13
Sleep discontinuity	None (total effect)	2072	.13	.02	.10	.16
	None (direct effect only)	2072	−.03	.02	−.07	.01
	GAD-7	2072	.06	.02	.03	.09
	PHQ-8	2072	.04	.02	.00	.09
	PCL	2072	.06	.02	.02	.10
	GAD-7, PHQ-8, and PCL	2072	.16	.02	.12	.20
Effects for Alternative (Non-hypothesized) Models						
GAD-7	Sleep discontinuity	2147	.002	.006	−.008	.013
PHQ-8	Sleep discontinuity	2147	−.005	.007	−.018	.010
PCL	Sleep discontinuity	2076	.002	.002	−.003	.006
GAD-7	Sleep Duration	2171	−.003	.003	−.008	.002
PHQ-8	Sleep Duration	2171	−.006	.003	−.012	.000
PCL	Sleep Duration	2100	−.001	.001	−.003	.001

Criterion for all analyses above is workplace relational aggression. PHQ-8: Patient Health Questionnaire for Depression; GAD-7: Generalized Anxiety Disorder Screener; PCL: Post-Traumatic Stress Disorder Checklist: SRASBM: Self-Report of Aggression and Social Behavior Measure. Effects are unstandardized beta-weights. Effects are unique effects for specified pathway for predicted models. Models with multiple mediators tests them concurrently (parallel mediation) and represent the cumulative unique effects for each indirect pathway. For alternative models, each model was calculated independently to maximize power. SE is standard error of the effect. LL and UL represent bootstrapped 95% confidence intervals. Missing data were excluded pairwise.

Table 3. Indirect effect of sleep on workplace relational aggression at different levels of trait anger utilizing bootstrapping procedure.

			Effect					
Predictor	Mediator	N	+1 SD STAXI	−1 SD STAXI	IMM	SE	LL	UL
Sleep Duration								
	GAD-7	2170	−.113	−.039	−.006	.002	−.010	−.003
	PHQ-8	2170	−.142	−.074	−.006	.002	−.010	−.003
	PCL	2099	−.137	−.040	−.008	.002	−.012	−.005
Sleep Discontinuity								
	GAD-7	2146	.085	.053	.003	.001	.001	.005
	PHQ-8	2146	.117	.092	.002	.001	.001	.004
	PCL	2075	.097	.053	.004	.001	.002	.006

PHQ-8: Patient Health Questionnaire for Depression; GAD-7: Generalized Anxiety Disorder Screener; PCL: Post-Traumatic Stress Disorder Checklist: SRASBM: Self-Report of Aggression and Social Behavior Measure; STAXI: State-Trait Anger Expression Inventory trait anger subscale; SD: standard deviation; SE: standard error; IMM: index of moderated mediation; LL/UL: bootstrapped 95% confidence interval lower limit/upper limit of IMM. Table displays conditional indirect effect of predictor on relational aggression via mediator at ±1 SD STAXI for context. IMM is the index of moderated mediation, which represents the change in the indirect effect of the sleep variable on workplace relational aggression as a function of the STAXI. A significant IMM suggests that the indirect effect of the sleep variable on workplace relational aggression changes significantly across different levels of STAXI. Effects are the unstandardized conditional indirect effects (beta weights) of the predictor on the criterion. IMM is statistically significant if zero is not in the interval. Missing data were excluded pairwise.

the alternative models (testing the opposite of what we hypothesized), the total effects for each pathway is presented in order to give these alternative explanations the greatest statistical power. None of these alternative models were statistically significant (Table 2).

Trait anger as a moderator of the indirect effect of sleep on workplace relational aggression

To test the moderated mediation, we computed an index of moderated mediation (IMM) using PROCESS (model seven), which represents the change in the strength and/or direction of the indirect effect of our predictors (sleep duration and sleep discontinuity) through our mediators (PCL-C, GAD-7, and PHQ-8) on our criterion (workplace relational aggression) as a function of the moderating variable (STAXI Trait Anger). PROCESS computes a 95% confidence interval for the index of moderation. The IMM is considered significant at the $p < .05$ level if the confidence interval does not overlap with zero. In other words, the moderated mediation tests if the indirect relationship of sleep → mental health symptoms → relational aggression changes significantly as a function of trait anger.

For every model, the indirect effect of sleep (duration and discontinuity) on relational aggression through symptoms of lowered mental health was significant at all levels of trait anger. However, the relationship was significantly stronger at higher levels of trait anger (Table 3).[2] In other words, short sleep duration and/or high sleep discontinuity predicted more workplace relational aggression (via mental health symptoms) for individuals with high vs. low trait anger. We also present the estimated indirect effects at ±1SD from the mean trait anger in our sample for illustrative purposes (Table 3).

Discussion

These data support our theory that subjective sleep duration and discontinuity are associated with more workplace relational aggression within military units indirectly through depression, anxiety, and post-traumatic stress. Alternative models that reversed the order of mental health and sleep were not statistically significant. Although the relationship between sleep disturbance, mental health, and relational aggression was significant across all levels of trait anger, this indirect effect was stronger at higher levels of trait anger. The moderating role of trait anger in our findings is consistent with previous research and illustrates the importance of individual characteristics of the instigator.

This study fills key gaps in the literature. First, this study reports the first descriptive data on perpetrating relational aggression toward fellow unit-members within the US Military. Indeed, this study found that nearly one third of Service Members admitted to using relational aggression against a member of their unit. This is meaningful as it suggests that measures of relational aggression should be included in future large-scale assessments of organizational outcomes in military units. Doing so would allow military leaders to better quantify, address, and track this potential risk. Second, this study implicated subjective sleep in perpetrating relational aggression at work. This is an important theoretical contribution, as the literature to date has rarely considered the possibility of sleep as an upstream predictor of workplace relational aggression. Indeed, a recent review called for research on sleep in predicting workplace relational aggression (Schilpzand et al., 2016). Moreover, third, this research suggests underlying mental health symptoms may be the mechanism of this relationship. The role of perpetrator mental health in

predicting workplace relational aggression had not been previously investigated.

Overall, this research expands our understanding of how mental health and physiology are associated with organizational behavior. Finally, it is important that all of the models tested in this research remained statistically significant in supplementary analyses that removed sleep-related scale items in the mental health measures. This suggests that the examined relationship between sleep, mental, health, trait anger, and workplace relational aggression are not simply artifacts of the measurement items used.

These findings are relevant to military leaders. As discussed earlier, workplace relational aggression is costly to organizations. Although we believe this model of subjective sleep duration, latency, and discontinuity, mental health, and workplace relational aggression would hold across different workplace populations, these findings are especially relevant within high-risk/stress team-based occupations that depend on team functioning. Effective teamwork is paramount in the high risk/stress nature of military combat operations. Unfortunately, operational constraints often prevent healthy sleep in the military (Osgood et al., 2019). Further, stress-related disorders connected to subjective sleep duration, latency, and discontinuity are elevated in these populations (Thomas et al., 2010).

Organizational leaders, both military and civilian, have the means to impact the sleep health of their employees. Providing employees with tools to reduce sleep disturbances (e.g., light blocking masks, sleeping ear plugs) or to improve feedback on sleep habits (e.g., wrist worn devices with biofeedback) may improve sleep quality. Furthermore, organizational leaders could strive to provide employees with more predictable scheduling when feasible and reduce after hours disruptions via work-e-mails, phone calls, etc. (Lanaj, Johnson, & Barnes, 2014). Education and resources to improve sleep hygiene have also demonstrated efficacy (e.g., Steffen et al., 2015).

Although this research contributes important new findings, there are limitations that warrant consideration. The main limitation is the cross-sectional nature of the data. It is possible the temporal order of these variables are actually the reverse of what we predicted (i.e., mental health symptoms may drive sleep problems) or simultaneous (mental health symptoms and sleep problems develop concurrently and/or independently). The pathway presented here is bolstered by the fact that alternative models reversing the order of sleep and mental health were not statistically significant. This supports the order of effects presented here. However, given the cross sectional nature of the data, the temporal order of effects (sleep, mental health symptoms, and relational aggression) cannot be conclusively determined. To do so would require a carefully executed longitudinal study of these variables. Further, these data are correlational, thus there is no causal evidence regarding the impact of sleep on mental health and relational aggression. In sum, although directionality and/or causality cannot be definitively established with our study design, the most parsimonious relationship between sleep, mental health, trait anger, and relational aggression are the models argued in this paper. These data are also self-report. Given the historical stigma surrounding mental illness in the military (see Kim, Thomas, Wilk, Castro, & Hoge, 2010), it is plausible that some of the mental health symptoms were underreported. Finally, a minor limitation may be that this study used a general measure of relational aggression, which does not allow effects to be dissected to lower-level constructs such as incivility and bullying. However, a recent meta-analysis suggests that breaking workplace aggression down to these specific lower-level constructs does not add appreciably to our knowledge of workplace aggression (see Hershcovis, 2011). Nevertheless, future research may consider using more specific measure to dissect the effect of sleep on workplace relational aggression more carefully.

Future investigations could build on the present findings in several valuable ways. First, future research should evaluate the efficacy of interventions to improve sleep and examine the impact on workplace relational aggression. Second, other related antecedents such as physical health, exercise, and diet should be studied. Third, these findings may add context to previous research on workplace aggression. Namely, workplace exhaustion has been longitudinally associated with workplace relational aggression (Blau and Anderson, 2005). Given the documented link between workplace exhaustion and sleep problems (e.g., Winwood, Winefield, Dawson, & Lushington, 2005), it is possible that subjective sleep duration, latency, and discontinuity mediates the relationship between workplace exhaustion and workplace relational aggression. Fourth, future research could also explore if sleep deprivation affects proclivity to engage in more severe forms of relational aggression such as sexual harassment. Fifth, more research is also needed to examine the extent to which individual biases (e.g., racial or gender bias) may interact with sleep deprivation to affect aggressive behavior in military units given the effect of such biases in other populations such as police (see James, 2018). Sixth, some of the underlying mechanisms speculated in this paper should be tested

more directly. For instance, the role of lowered emotion regulation as an underlying mechanism linking sleep related lowered mental health to workplace relational aggression warrants investigation. Give the literature on rumination and aggression (e.g., Pedersen et al., 2011), we would expect diminished emotion regulation to play a key role.

More research is also needed to test the model proposed in this paper in nonmilitary populations. Given the prevalence of sleep and mental health related issues in military populations, we might expect the relationship between sleep and workplace relational aggression to be stronger in military samples than in the general population. On the other hand, the military's culture of discipline and esprit de corps may protect against the effects of sleep problems and workplace relational aggression in ways not found in most civilian workplaces. Ultimately, more research is needed on the relationship between sleep, mental health, and workplace relational aggression in civilian workplaces in order to determine how this model may change across different populations.

Finally, the most intriguing future direction is the potential for a workplace victim-to-workplace-instigator cycle, with subjective sleep duration, latency, discontinuity, and mental health symptoms as intervening mechanisms. Experiencing relational aggression at work predicts both sleep disturbance (Demsky et al., 2019) and instigating workplace relational aggression (Van Jaarsveld, Walker, & Skarlicki, 2010). In combination with our findings, it is possible that experiencing workplace relational aggression may induce subjective sleep duration, latency, and discontinuity, which in turn contributes to poor mental health and transitioning from victim to instigator. If this is the case, it could help explain how patterns of relational aggression could spread throughout organizations thereby creating organizational climate issues.

In sum, the present investigation supports a novel model linking sleep disturbance indirectly to workplace relational aggression. Further, this effect was increasingly robust at higher levels of trait anger. This study represents only the second investigation of sleep as a predictor of instigating workplace relational aggression (the first in a military sample) and broadly contributes to our understanding of how sleep and mental health impact organizational behavior. Fortunately, sleep health is highly mutable and thus an actionable intervention target for individuals and managers. Leaders in organizations could use these findings to justify policy changes that prioritize the sleep health or workers.

Notes

1. We also conducted supplementary analyses after removing sleep-related items from mental health measures to account for potential overlap in our predictor and criterion measures. These supplementary analyses utilized the same bootstrapping procedure and settings as the main analyses. The overall indirect effect of sleep disturbance on relational aggression via mental health symptoms was still significant when all mediators were assessed simultaneously (parallel mediation; unstandardized effect = .15, 95% C.I. [.12, .19]). The simple models for each mediator individually (unique effects) was also still significant (PCL-C: unstandardized effect = .06, 95% C.I. [.03, .10]; PHQ-8: unstandardized effect = .05, 95% C.I. [01, .08]; GAD-7: unstandardized effect = .04, 95% C.I. [.01, .08]).Similarly, the indirect effect of sleep duration on relational aggression via mental health symptoms was still significant when all mediators were assessed simultaneously (parallel mediation; unstandardized effect = −.16, 95% C.I. [−.21, −.13]). The simple models for each mediator individually (unique effects) was also significant (PCL: unstandardized effect = −.06, 95% C.I. [−.10, −.03]; PHQ-8: unstandardized effect = −.05, 95% C.I. [−.09, −.01]; GAD-7: unstandardized effect = −.05, 95% C.I. [−.08, −.01]).
2. We also conducted supplementary moderated-mediation analyses after removing sleep-related items from mental health measures. All models were still statistically significant after removing the sleep items. Trait anger continued to significantly moderate the mediation of sleep duration on relational aggression via PCL-C (IMM = −.008, 95% C.I. [−.01, −.004] and PHQ-8 (IMM = −.006, 95% C.I. [−.01, −.002]. Similarly, trait anger continued to significantly moderate the mediation of sleep disturbance on relational aggression via PCL (IMM = .004, 95% C.I. [.002, .006] and PHQ-8 (IMM = .003, 95% C.I. [.001, .005]. Note, GAD-7 did not include any sleep related items, thus supplementary analyses were not necessary for GAD-7.

Disclosure statement

Material has been reviewed by the Walter Reed Army Institute of Research. There is no objection to its presentation and/or publication. The opinions or assertions contained herein are the private views of the author, and are not to be construed as official, or as reflecting true views of the Department of the Army or the Department of Defense. The investigators have adhered to the policies for protection of human subjects as prescribed in AR 70–25.

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