Journal of Psychiatric Research 96 (2018) 1–8

Contents lists available at ScienceDirect

Journal of Psychiatric Research

journal homepage: www.elsevier.com/locate/psychires

# Associations among adolescent sleep problems, emotion regulation, and affective disorders: Findings from a nationally representative sample

Cara A. Palmer [a, *], Benjamin Oosterhoff [b], Joanne L. Bower [a], Julie B. Kaplow [b], Candice A. Alfano [a]

[a] Department of Psychology, University of Houston, Houston, TX, United States
[b] Department of Psychiatry and Behavioral Sciences, University of Texas, Health Science Center at Houston, Houston, TX, United States

ARTICLE INFO

*Article history:*
Received 10 July 2017
Received in revised form
12 September 2017
Accepted 14 September 2017

*Keywords:*
Adolescent
Insomnia
Mood disorders
Anxiety
Affective symptoms
Emotion regulation

ABSTRACT

Sleep problems in youth reliably forecast the development of anxiety and mood disorders, presumably due to increased emotional difficulties. However, precise emotional mechanisms have yet to be delineated. The current study investigated how sleep problems in adolescence are associated with different emotion regulation strategies, and how sleep and psychiatric risk may be indirectly associated via poor emotion regulation. This study utilized data from the National Comorbidity Survey-Adolescent Supplement, a nationally representative sample from the United States ($N = 10{,}148$; age range 13–18 years). A diagnostic interview determined if adolescents qualified for a mood or anxiety disorder within the past year. Participants provided reports of their sleep, emotion regulation, and current life stress. Adolescents who reported greater sleep problems were more likely to qualify for a mood or anxiety disorder and generally reported poorer emotion regulation strategy use, even when accounting for demographic characteristics and current stress. Specifically, adolescents with greater sleep problems reported less problem solving, and greater avoidance, suppression, rumination, and acceptance. Sleep problems were indirectly associated with anxiety disorders through greater suppression and rumination, and indirectly associated with mood disorders through greater rumination and lower problem solving. Although cross-sectional, this study extends current research by suggesting that certain emotion regulation strategies may be more difficult for youth struggling with sleep problems, and provides initial evidence that poor emotion regulation may be one factor contributing to sleep-based psychiatric risk. These findings can inform more efficacious intervention efforts.



## 1. Associations among adolescent sleep problems, emotion regulation, and affective disorders: findings from a nationally representative sample

Chronic sleep loss is exceedingly pervasive among adolescents and is now considered a public health epidemic (Owens et al., 2014). Among the many harmful effects of problematic sleep patterns is heightened risk for psychiatric disorders, including anxiety and depression (Alvaro et al., 2013; Greene et al., 2015; Gregory et al., 2005; Hatzinger et al., 2014; Ivanenko et al., 2004; Kelly and El-Sheikh, 2014; Ohayon and Roth, 2003; Ong et al., 2006). A mounting body of research proposes that deleterious relations between sleep and psychiatric risk may be rooted in disrupted emotional processes, such as emotion regulation (i.e., the ability to control or modulate one's emotions; Harvey et al., 2011; Palmer and Alfano, 2017). Nonetheless, the precise emotional mechanisms that may be disrupted by poor sleep are largely unknown, particularly during adolescence when sleep and psychiatric problems dramatically increase (Kessler et al., 2001; Owens et al., 2014). The literature on sleep and emotion regulation is currently limited by the use of broad, non-specific indicators of emotional processes and the reliance on healthy adult samples. This study fills a critical gap in the literature by examining how sleep problems are related to distinct emotion regulation strategies in youth with psychiatric

* Corresponding author. Health and Biomedical Sciences Building, #373, University of Houston, Houston, TX 77204, United States.
*E-mail addresses:* cara.palmer@times.uh.edu, capalme3@central.uh.edu (C.A. Palmer).

http://dx.doi.org/10.1016/j.jpsychires.2017.09.015
0022-3956/

disorders, and how sleep problems and psychiatric risk may be indirectly associated via specific emotional processes.

### 1.1. Adolescent sleep and risk for psychopathology

Early sleep problems have been shown to predict the onset of anxiety and depressive disorders even decades later (Greene et al., 2015; Gregory et al., 2005). Although relations between problems sleep and psychiatric disorders are bidirectional (e.g., Johnson et al., 2006), the strongest pathways are routinely shown to extend from early sleep in youth to later affective problems (Alvaro et al., 2013; Gregory and Sadeh, 2016; Kelly and El-Sheikh, 2014; McMakin and Alfano, 2015), highlighting a potential developmental window for intervention. Insomnia-like symptoms in youth in particular are associated with the development of later depression and anxiety (Baglioni et al., 2010; Gregory and O'Connor, 2002; Gregory et al., 2005, 2009; Roberts et al., 2002). For example, bedtime problems (e.g., difficulty initiating sleep) in childhood predict internalizing problems in adolescence (Reynolds and Alfano, 2016), and youth who experience increased sleep onset latency are at increased risk for later depression (Silk et al., 2007) and depression relapse (Emslie et al., 1994). Nonetheless, while the relation between sleep problems and affective symptoms is well-established, more research is needed to investigate the specific processes and mechanisms by which sleep problems may increase psychiatric risk.

Researchers have suggested that disrupted sleep increases vulnerability for anxiety and depression via emotional processes (Harvey et al., 2011; Gregory and Sadeh, 2016). This is supported by research from correlational and experimental studies in healthy adults suggesting that a loss of sleep results in poorer emotional responses, such as heightened reactivity to negative emotional experiences (Kahn et al., 2013; Palmer and Alfano, 2017). Although research in youth samples is more limited, findings are consistent with the adult literature, suggesting that youth experience greater reactivity to negative emotional stimuli and report increased negative mood after their sleep is restricted (McMakin et al., 2016; Motomura et al., 2013; Talbot et al., 2010). Preliminary evidence also suggests that adolescents may be more susceptible to the emotional effects of sleep disruption than adults (McGlinchey et al., 2011; Talbot et al., 2010), highlighting the importance of understanding emotional functioning as a mechanism underpinning relations between sleep and mental health during this key developmental period.

### 1.2. Emotion regulation

Presumably, sleep-based changes in emotional reactivity are rooted in disrupted emotion regulation, which is an intrinsic part of emotional responding and encompasses attempts to influence the nature, magnitude, and duration of emotions (Gross, 1998). There are numerous ways individuals can regulate their emotions, including volitional attempts to manage stressors (i.e., analogous to coping), as well as automatic processes that may alter emotional responses (Compas et al., 2014). Research on emotion regulation suggests that the inability to down-regulate (i.e., reduce) negative emotions is a transdiagnostic feature of many disorders (Gross and Jazaieri, 2014), and several specific emotion regulation strategies have been commonly studied with regard to mood and anxiety symptoms in both adults and adolescents (for meta-analyses, see: Aldao et al., 2010; Schäfer et al., 2017).

Several emotion regulation strategies have been found to successfully reduce negative emotional experiences. *Cognitive reappraisal* (e.g., generating thoughts related to a negative event that are more benign) is effective for reducing negative emotions related to a stressful event (Gross, 1998). Another strategy for managing stressors is *problem solving*, which refers to actions directed at changing a situation that is causing negative emotions (Frye and Goodman, 2000). *Acceptance* refers to the non-judgmental awareness of emotional experience, and can also result in lower levels of distress (Campbell-Sills et al., 2006).

In contrast, other strategies employed in response to stressors are less adaptive and tend to result in increased or prolonged negative emotions. *Suppression* commonly refers to attempts to minimize visible signs of an emotion (e.g., facial expressions); however, suppressing negative emotions often results in increased activation in emotion-generative brain regions (Goldin et al., 2008) and increased physiological responses (Gross, 1998). *Rumination*, or repetitively and passively thinking about negative emotional experiences, results in a fixation on emotions without concurrent action to problem solve, thereby maintaining negative feelings (Nolen-Hoeksema et al., 2014). *Avoidance* includes maladaptive attempts to circumvent or disengage from aversive situations or experiences (Servatius, 2016). A large body of research links habitual use of these particular strategies (i.e., suppression, rumination, and avoidance) with increased rates of depression and anxiety (Aldao et al., 2010; Schäfer et al., 2017) as well as increased risk for suicide (Kaplow et al., 2014).

### 1.3. Sleep and emotion regulation

Shared neurobiological processes that govern both emotion and sleep result in intimate connections between these domains. Accordingly, sleep deprivation results in altered neurological functioning in response to negative stimuli, including decreased connectivity between the medial prefrontal cortex and the ventral anterior cingulate cortex, which can weaken emotional control (Yoo et al., 2007). Studies using samples of children, adolescents, and young adults all suggest that disrupted sleep results in greater dysregulated emotion (Baum et al., 2014; Tavernier and Willoughby, 2015; Vriend et al., 2013), and research on adults with insomnia suggest greater negative mood compared to controls (Buysse et al., 2007; Smith et al., 2015). However, research investigating how sleep may be differentially associated with specific types of emotion regulation strategies is limited. Preliminary research in adults suggests that insomnia patients experience more rumination (Gruber et al., 2008). Poor sleep quality in adults also relates to increased tendencies to engage in rumination (Carney et al., 2006; Thomsen et al., 2003) and reduced ability to use cognitive reappraisal (Mauss et al., 2013). Conversely, one study in adolescents found that the ability to use cognitive reappraisal to down-regulate negative emotion was unaffected by one night of sleep restriction (Reddy et al., 2017). However, Reddy and colleagues provided participants with detailed instructions to cognitively reappraise, which may have attenuated any sleep-based emotional disruptions and may not accurately represent tendencies to regulate in real-world settings. Little is known about how sleep relates to other emotion regulation strategies commonly associated with psychopathology (e.g., suppression, avoidance, problem solving, acceptance).

### 1.4. The current study

In sum, despite robust links between sleep problems in youth and psychiatric risk, a notable lack of research has examined these relations in the context of emotion regulation. Research investigating the specific emotion regulation strategies that might be especially vulnerable to disrupted sleep is lacking. While preliminary evidence suggests sleep-emotion regulation relations exist, identifying the precise emotion regulation strategies that are