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Sleep Efficiency Modulates Associations Between Family Stress and Adolescent Depressive Symptoms and Negative Affect



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A B S T R A C T

Purpose: The goal of this study was to determine whether sleep moderates the associations between family-related stress and depressive symptoms and negative affect outcomes during adolescence. We combined traditional survey measures of stress and depressive symptoms with daily assessments of stress and negative affect to examine whether sleep differentially impacts the link between chronic and acute experiences of stress and affect.

Methods: Participants were 316 adolescents from ethnically diverse backgrounds. Primary caregivers and adolescents reported on stressful family events during the past 12 and 3 months, respectively. Adolescents also reported on their daily experiences of family demands for 15 days and wore actigraph watches for the assessment of sleep during the first eight nights.

Results: Regression analyses revealed that more stressful family events were related to more depressive symptoms. This relation was stronger among adolescents with lower sleep efficiency. The same pattern emerged for the relation between daily family demands and negative affect aggregated across the 15 days. Daily-level analyses indicated that daily negative affect was related to daily family demands when sleep efficiency was higher than usual, but only among European American adolescents.

Conclusions: These findings suggest that chronic experiences of lower sleep efficiency, but not sleep duration, may render adolescents more vulnerable to the negative effects of family stress on emotional adjustment. A more complex picture emerged for the role of prior night's sleep in the day-to-day variation in negative affect reactivity to family stress.

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IMPLICATIONS AND CONTRIBUTION

Difficulty falling and staying asleep may amplify depressive symptoms and negative emotions following family stress during adolescence. Efforts to identify at-risk adolescents and improve emotional adjustment related to family stress should consider the role of sleep.

Conflicts of Interest: The authors have no conflicts of interest to disclose.

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Depression is a common and debilitating mental health disorder that often emerges during adolescence. Up to 11.7% of adolescents meet criteria for clinical depression and nearly a third exhibit subclinical levels of depressive symptomatology [1,2]. Family-related stress is a major risk factor for developing

depression and increases negative affect (NA), a core symptom of depression [3]. However, its effects on depression risk may vary as a function of individual difference factors. Sleep may be one important factor given its reciprocal relations with cognitive and emotional functioning implicated in stress processes and development of depression [4,5]. For instance, poor sleep (e.g., shorter sleep duration and lower sleep quality) disrupts emotion regulation, increasing NA and risk for depression [5,6]. The impact of poor sleep on emotional responses to stress may be especially profound during adolescence given that neural systems underlying cognitive and affective processes and circadian and homeostatic systems underlying sleep processes undergo significant changes during this time [7,8].

Several studies support the moderating role of sleep in the effects of stress. Specifically, perceived discrimination, peer victimization, and interparental conflict have been more strongly related to internalizing symptoms and aggression among adolescents with lower sleep quality and efficiency and shorter sleep duration relative to those with better sleep [9–11]. The present study builds on these studies by combining traditional survey approaches, on which previous studies have relied, with a daily diary approach. Daily measures of experiences minimize retrospection and can elucidate whether previous findings translate to adolescents' everyday experiences in their natural context [12]. In addition, a daily diary approach enables examination of acute and chronic experiences, providing a more nuanced understanding of sleep's modulation of the stress-affect connection. Acute experiences of stress, sleep, and NA are common in everyday life and can have immediate, same-day effects on one another [13,14]. They can also occur repeatedly over time, cumulatively leading to poor outcomes (e.g., [15]). Thus, a daily diary approach can shed light on whether links between family stress, sleep, and affect differ for chronic versus acute experiences in everyday life.

The purpose of the present study was to examine the moderating role of sleep in the link between family-related stress and depressive symptoms and NA among adolescents. With the aim of replicating prior studies, we examined this question using traditional survey measures of depressive symptoms and family-related stressful events, a robust predictor of depression [16]. Extending past studies, we examined the same question using daily assessments of NA and family demands, which increase during adolescence and have been shown to be impactful daily stressors among adolescents [17–19]. We addressed our research question at the individual and daily levels. Individual-level analyses focused on chronic experiences, testing whether the association between family demands and NA aggregated across days varied as a function of sleep averaged across days. Analyses at the daily level focused on acute experiences, testing whether the daily association between family demands and NA depended on prior night's sleep.

We focused on actigraphy estimates of sleep duration and sleep efficiency, common and important sleep parameters used as an index of sleep quantity and quality, respectively [20,21]. Sleep duration reflects the total amount of sleep obtained, whereas sleep efficiency (percentage of sleep during the in-bed period) captures difficulties in falling asleep and maintaining sleep. Both short sleep duration and low sleep efficiency have each been linked to health-related outcomes [22,23]; however, they may also have differential effects [24,25]. Examining both can help identify which aspect of sleep may be a more impactful moderator of stress-related risk.

Methods

Participants

Participants were 316 adolescents (180 females) ages 15–20 years ($\text{Mean}_{\text{age}} = 16.4$ years, standard deviation = .74). Twenty-nine percent of adolescents were of European descent, 42% Latino, 23% Asian, and 6% reported other backgrounds. Parent-reported median household income was \$50,000 (range = \$0–\$825,000). Parents also reported their own and their spouse's highest level of education completed, which was used to calculate mean parental education level across parents. Approximately 14% of participants' parents did not obtain a high school diploma, 15% graduated high school, 42% completed vocational trade school or some college, 17% graduated college, and 11% completed at least some graduate or professional school.

Procedures

Participants were recruited from four Los Angeles high schools. In-class presentations were made and fliers and recruitment forms were distributed at schools and via mail to students' homes. Families expressing interest were contacted, given more details about the study, and scheduled for an in-home visit, during which adolescents and their primary caregivers (usually mothers) completed questionnaires and assessments of biological markers (data not presented here).

Participants then completed a 15-day diary protocol. Each night before going to bed, participants completed a 4-page diary checklist on their social and emotional experiences. Participants indicated when each checklist was completed using security-coded, pre-programmed time stampers and stamping booklets. Approximately 94% of adolescents completed daily checklists for at least 14 days; 4% completed diary checklists for less than 7 days. Of the completed diaries, the vast majority (over 97%) were completed before noon on the following day and therefore judged to be compliant.

Adolescents also wore actigraph watches on their nondominant wrists and completed morning diaries of their previous night's sleep for the first 8 days. They were instructed to push a button on the device to mark when they turned off the lights to sleep, got out of bed during the night, and got out of bed in the morning. The majority of participants (93%) wore the actigraph watches. Of these, 29% wore them for 8 days, 33% for 7 days, 23% for 6 days, 4% for 5 days, and 10% wore them for 4 or fewer days. To help ensure high rates of compliance, adolescents were sent reminder text messages of when to complete the diary checklists and wear their actigraph watches each day.

Adolescents were compensated \$50 and two movie theater passes if their daily checklists were completed correctly and on time. Caregivers consented (with youth assent) to all study procedures, which were approved by the University Institutional Review Board.

Measures

Family-related stressful life events. Parents and adolescents completed event checklists adapted from widely used measures of stressful life events associated with negative outcomes [26,27]. Parents indicated whether they had experienced any of 13 events within the last 12 months (e.g., got laid off, relationship with your spouse changed for the worse, a family member died).

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