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# The Roles of Parental Support and Family Stress in Adolescent Sleep

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The current study examines the association between parental support and adolescent sleep under varying levels of family stress. Participants included 316 adolescents ( $M_{\text{age}} = 16.40$  years, 43% male) and their parents ( $M_{\text{age}} = 45.67$  years, 91% mothers) from diverse ethnic backgrounds. Both adolescents and parents completed questionnaires and adolescents wore wrist actigraphs and completed self-reports on their sleep for 7 consecutive days. Results indicated that under contexts of family stress, more parental support was linked to longer sleep duration, less sleep variability, and less time spent awake during the night. Findings suggest that under contexts of family stress, cohesive family relationships may provide a sense of stability and security that is necessary for healthful sleep.

Relative to the increasing knowledge on the importance of sleep for adolescent functioning, less is understood about contextual factors that contribute to healthful sleep (Dahl & El-Sheikh, 2007). Biobehavioral perspectives on sleep have emphasized the opponent processes of sleep and vigilance, positing that perceived environmental and social threat heightens arousal and awareness, which adversely affects sleep (Dahl, 1996; Dahl & Lewin, 2002). Feelings of both physical and emotional security, therefore, are crucial for sleep. Research has begun to pay particular attention to the role of safety, as conferred by positive feelings of family cohesion and support, for children's sleep (Adam, Snell, & Pendry, 2007; Erath & Tu, 2011; Keller & El-Sheikh, 2011; Maume, 2013). Findings supporting a direct

link between family cohesion and sleep, however, are inconclusive. In the current study with parent-adolescent dyads, we examined the significance of parental support for different dimensions of adolescent sleep (i.e., duration, variability, latency, awakenings) under varying conditions of family stress.

## *Family Context and Sleep*

According to the opponent-process theory on sleep (Dahl, 1996), sleep is a physiological state with a fundamental diminishment of awareness and responsiveness to the external environment. As a result, sleep behavior should be facilitated by perceptions of safety and places where vigilance needs are minimal. Among humans, appraisals of safety are strongly influenced by the social and emotional context, particularly during childhood and adolescence when children seek a sense of security from their caretakers (e.g., Cummings & Davies, 1996). Studies have examined the role of emotional security derived from family relationships in different aspects of children's sleep, such as sleep duration and sleep latency (i.e., the amount of time it takes

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to fall asleep; Davies & Cummings, 1994; El-Sheikh, Buckhalt, Cummings, & Keller, 2007; Vaughn et al., 2011). The majority of studies, however, have focused on insecure and unstable family contexts (e.g., parent-child conflict, marital discord) rather than on how positive relational qualities contribute to adolescent sleep (El-Sheikh, Buckhalt, Mize, & Acebo, 2006; Gregory, Caspi, Moffitt, & Poulton, 2006; Sadeh, Raviv, & Gruber, 2000). Of the limited studies that have examined the role of positive relational qualities on children's sleep, findings have been mixed. Parental warmth and attachment have been linked to longer sleep duration and fewer sleep disruptions among younger children (Adam et al., 2007; Bell & Belsky, 2008; Keller & El-Sheikh, 2011). This association, however, has not always been evident among adolescents. Although a few studies with adolescents have reported that perceived parental support is associated with longer sleep duration, shorter sleep latency (i.e., minutes to fall asleep), fewer sleep disturbances, and better overall quality of sleep (Brand, Hatzinger, Beck, & Holsboer-Trachsler, 2009; Fuligni, Tsai, Krull, & Gonzales, 2015; Palermo & Kiska, 2005), other studies found no association (Adam et al., 2007; Maume, 2013). Thus, there is emerging evidence, albeit scarce, suggesting that cohesive and supportive family relationships are critical for healthful sleep in younger children, but there is mixed evidence among adolescents.

It is possible that findings supporting a direct link between family cohesion and sleep are inconsistent because this association depends on other features of the family environment. According to the emotional security hypothesis, children's fundamental sense of security and stability are threatened under contexts of family stress (e.g., parental separation), and these diminished feelings of safety have significant consequences for children's adjustment (Davies & Cummings, 1994; El-Sheikh et al., 2007). Drawing from the emotional security hypothesis, we examined whether the association between parental support and sleep may differ according to varying levels of family stress. It is possible that parental support is particularly beneficial toward adolescent sleep under conditions of high family stress when feelings of stability are in jeopardy and warm, cohesive family interactions are warranted. In contrast, parental support may play little role in sleep in a family context in which family stress is already low.

Although prior studies have not examined how the association between parental support and adolescent sleep may be moderated by family stress, research has indicated that family stress, in general,

is detrimental for sleep. Studies with young children have shown that greater stressful family life events (e.g., family illness) were related to greater sleep variability, poor sleep quality, and more night awakenings (Bates, Viken, Alexander, Beyers, & Stockton, 2002; Sadeh et al., 2000). In addition to episodic stressful family life events, experiences of chronic stress related to family financial hardships may disrupt sleep because economic challenges can threaten feelings of stability at home. El-Sheikh et al. (2013) found that parents' difficulties to meet financial needs at home were related to greater sleep variability and poorer sleep quality among children. Therefore, our study explored whether parental support may be particularly crucial for sleep under context of both episodic (i.e., family life events) and chronic (i.e., economic strain) family stress.

### *Current Research Study*

In the current study, we explored how parental support is related to adolescent sleep and whether this association may be moderated by the presence of family stress. We hypothesized that among families undergoing family stress (i.e., stressful life events, economic strain), adolescents who perceived high parental support would display better sleep outcomes (e.g., longer duration, less variability, shorter latency, and fewer night awakenings) compared to adolescents in families undergoing less stress but who perceived low parental support.

Multiple methods and reporters were used to address this hypothesis. Adolescent sleep behaviors were assessed subjectively through self-reports and objectively through the use of wrist actigraphy, the latter of which assesses body movements from which sleep estimates that are closely linked to similar estimates from polysomnography can be derived (Sadeh, Sharkey, & Carskadon, 1994). These methods allow for the measurement of multiple sleep parameters, going beyond simply sleep duration—for instance, we examine sleep variability (i.e., the extent to which sleep varies from day to day), efficiency (i.e., proportion of the night spent asleep), latency (i.e., length of time it takes to fall asleep), number of awakenings during the night, and the duration of awakenings. Thus, the inclusion of both subjective and objective measurements of sleep can contribute to a more comprehensive understanding of how family stress may differentially impact various dimensions of sleep. Unlike many previous studies that relied upon single reporters of the family environment (Gregory et al., 2006; Sadeh et al., 2000), adolescents in the current

study reported the level of parental support that they received and parents reported on family stress.

## Method

### *Participants*

Participants were recruited from four high schools in the Los Angeles area during the 2011–2012 academic year. The first high school enrolled students primarily from European American (55%) and Latino (34%) backgrounds, and 22% of the students qualified for free or reduced-price meals (FRPM). The second high school included students primarily from European American (64%) and Latino (22%) backgrounds, and 24% of the students qualified for FRPM. The third school enrolled students primarily of Asian American (43%) and Latino (48%) descent, and 71% of students qualified for FRPM. The fourth school included students primarily of Latino (39%) and Asian American (58%) descent, and 88% of students qualified for FRPM.

The current study included 316 adolescents ( $M_{\text{age}} = 16.40$  years,  $SD = 0.74$ ; 43% male) from the 10th and 11th grades and their primary caregivers ( $M_{\text{age}} = 45.67$ ,  $SD = 6.96$ ; 91% mothers, 7% fathers, 2% grandmother). The primary caregiver self-identified as the adult who spent the most time with the adolescent and knew the most about the adolescent's daily activities. Adolescents came from diverse ethnic backgrounds, including Latino (42%), Asian American (23%), European American (29%), and other (6%) ethnic backgrounds (e.g., African American, Middle Eastern descent). Two-thirds (67%) of the families were two-parent households. The majority of parents (82%) had at least a high school education. There was a wide range in household income ( $M = \$70,317$ , median = \$50,000,  $SD = \$76,666$ , range = \$0–\$825,000).

### *Procedure*

Participants were recruited via in-class presentations and study fliers. Recruitment forms were also mailed to students' homes. On these fliers, we described the criteria for the study, which required that both adolescent and primary caregiver would participate in the study, and the incentive being offered. The fliers also stated that participants would complete a questionnaire and short daily checklists. Additionally, we informed participants that adolescents would be asked to wear a watch that measures their sleep and that both the adolescent and parent would be asked to provide small

samples of saliva, blood, and have their height and weight measured to assess aspects of their health. The biobehavioral measurements were not included in the analyses for the current article. The flyer also informed participants that adolescents would receive \$50 and parents would receive \$80 for completing the study. Families who indicated interest on recruitment forms were contacted and scheduled for the study. Although the majority of families participated in the study during the academic year, 14% ( $N = 45$ ) of families participated during the summer, after the school year had ended.

Research staff visited the participants' homes where adolescents and parents each completed a questionnaire that assessed their family background, family relationships, and well-being. Adolescents were given an actigraph watch (Micro Motionlogger Sleep Watch; Ambulatory, Inc., Ardsley, NY) to wear for the seven consecutive nights, which is a recommended number of days to obtain reliable sleep measurements (Acebo et al., 1999). They were instructed to place the actigraph watch on their nondominant hand before going to bed and to keep it on until the following morning when they woke up. They were asked to push a button on the actigraph watch when they (a) turned off the lights to go to sleep at night, (b) got out of bed in the middle of the night (e.g., to use the bathroom), and (c) got out of bed in the morning. The majority of adolescents wore the watch for at least 6 of the 7 nights ( $M = 5.92$  of 7 nights;  $SD = 1.26$ ). We did not receive reports on adolescents' sleep via actigraphy for 7.6% of the nights due to participants' forgetting to wear the watch or watch malfunction. Two-fifths (40%) of the participants had actigraphy data for all 7 days, 35% for 6 days, 12% for 5 days, 6% for 4 days, 4% for 3 days, 2% for 2 days, and 1% for 1 day. These completion rates are comparable to other studies (Acebo et al., 1999; El-Sheikh et al., 2013). Finally, adolescents were provided with a 7-day supply of diary sleep reports to complete every morning upon waking. To ensure timely completion of the daily sleep reports, participants stamped their reports with a time stamper, which imprinted the current date and time. We obtained high rates of compliance with 98% of the diaries being completed. Adolescents and parents each received \$50 for participating in the study.

### *Measures*

#### *Actigraphic Sleep*

We utilized the software package Action4 (Ambulatory Monitoring) to code and score the

actigraphy data. The in-bed period began at the time of the first event marker indicating when the adolescent turned off the lights to go to sleep and ended at the time of the last event marker indicating when the adolescent got out of bed in the morning. If event markers were not present for a particular night, we utilized adolescents' daily sleep reports to identify their bed and wake time (van Den Berg et al., 2008).

We focused on six sleep parameters: duration, efficiency, variability, latency, number of awakenings, and duration of awakenings. To calculate sleep duration and sleep efficiency (proportion of time spent in bed asleep), we scored 1-min epochs using the Sadeh actigraphy scoring algorithm, which has been validated and used in studies with children and adolescents (El-Sheikh et al., 2006; Sadeh et al., 1994). Sleep onset time was the first of at least 3 consecutive minutes of sleep and sleep offset time was the time of the last 5 or more consecutive minutes of sleep (Acebo et al., 2005). Sleep duration was the total hours scored as sleep during the in-bed period. We averaged adolescents' sleep duration across the seven nights to assess their average nightly sleep duration. To assess sleep variability, we calculated average sleep variability by calculating the mean of the absolute differences between adolescents' mean nightly sleep duration and each individual night's sleep duration (Fuligni & Hardway, 2006). Sleep latency refers to the number of minutes in bed before falling asleep. Actigraph watches also captured the number of times that adolescents woke up during the night and the length of time that they stayed awake during these awakenings. Sleep latency, number of awakenings, and duration of awakenings were averaged across the 7 days.

#### *Self-Report Sleep*

Each morning, adolescents answered the following questions: (a) "What time did you turn off the lights to go to sleep last night?" (b) "How long did it take you to fall asleep after turning the lights off?" (c) "What time did you wake up and no longer sleep this morning?" We focused on three sleep parameters: duration, variability, and latency. Sleep duration was calculated by subtracting the amount of time it took for adolescents to fall asleep from the duration of time between turning the lights off to waking up the following morning. Sleep variability was calculated by taking the mean of the absolute differences between adolescents' mean nightly sleep duration and each individual

night's sleep duration (Fuligni & Hardway, 2006). To assess sleep latency, we averaged adolescents' response to the second question across the 7 days.

#### *Parental Support (Adolescent Report)*

A nine-item scale measured the extent to which adolescents perceived that their parents supported and understood them in the past month (Armsden & Greenberg, 1987). Adolescents responded to items such as "My parents showed that he or she understands me," and "I could count on my parents when I needed to talk" (1 = *almost never*, 5 = *almost always*). This measure has been used in prior studies with individuals from different ethnic backgrounds and has consistently demonstrated high levels of internal reliability and predictive validity, predicting other aspects of family interactions (e.g., parental disclosure) and adolescent well-being (Gonzales, Deardoff, Formoso, Barr, & Barrera, 2006; Tsai, Telzer, Gonzalez, & Fuligni, 2015; Yau, Tasopoulos-Chan, & Smetana, 2009). The measure had high internal reliability across the ethnic groups in our sample ( $\alpha$ s = .94–.96).

#### *Family Life Events (Parental Report)*

Parents reported if any of the following six family life events occurred within the last 12 months (0 = *no*; 1 = *yes*): your relation with your partner changed for the worse; a family member died; you took on financial responsibility for a parent, in-law, or other family member; you moved far away from your family or friends; someone in your family had a serious medical problem or mental illness; you got separated or divorced (Holmes & Rahe, 1967: Life Stress Inventory). We calculated the sum of family life events for each participant. Over half (60%) of parents reported experiencing no family stressors, whereas 24.5% reported one, 11.1% reported two, and 4.4% reported three or more family stressors within the last 12 months. We categorized participants into two groups to represent families (40%) who experienced at least one family life event stressor and families (60%) who did not experience any family life events. This scale has been previously used with families from diverse ethnic backgrounds and has illustrated the impact of stressful family life events on parent-child relationships, such as parental involvement, and adolescent well-being, including depressive and anxiety symptoms (Camacho-Thompson, Gillen-O'Neel, Gonzales, & Fuligni, 2016; Nilzon & Palmerus, 1997).



### Economic Strain (Parental Report)

Parents completed a nine-item scale that assessed the extent to which they had experienced difficulties meeting their economic needs over the last 3 months (Conger et al., 2002). Parents responded to questions such as “How much difficulty did you have paying your bills” (0 = *no difficulty*, 4 = *great deal of difficulty*) and additional items including “You had enough money to afford the kind of food you needed” (0 = *not true at all*, 4 = *very true*). These latter items were reverse scored. Parents experienced a moderate level of economic difficulty ( $M = 2.00$ ,  $SD = 0.75$ ). This measure has been validated in past studies with parents from diverse ethnic backgrounds and has shown that parental economic strain plays an important role in shaping family dynamics (e.g., parental warmth & involvement) and child sociobehavioral development (Benner & Kim, 2010; Camacho-Thompson et al., 2016; Conger et al., 2002; Dennis, Parke, Coltrane, Blacher, & Borthwick-Duffy, 2003). This measure had high internal consistency across the ethnic groups in our sample ( $\alpha s = .90-.95$ ).

### Parental Education

Research has established important differences in sleep as a function of parental education (El-Sheikh et al., 2013; Sadeh et al., 2000), therefore parental education was included as a covariate in our models. Parents reported on their own and their partner’s highest level of educational attainment by

selecting one of the following categories: some elementary school; completed elementary school; some junior-high school; completed junior-high school; some high school; graduated from high school; trade or vocational school; some college; graduated from college; some medical, law, or graduate school; graduated from medical, law, or graduate school. We averaged both parents’ level of education. About one fifth of the parents had less than or completed some high school (18.2%), 17.6% graduated from high school, 23.3% went to trade/vocational school, 20.5% completed some college, 12.8% graduated from college, and 7.7% attended or graduated from medical, law, or graduate school.

## Results

### Bivariate Associations and Group Mean Differences

We examined bivariate associations among the key variables of interest. As shown in Table 1, actigraphic sleep duration was related to greater sleep efficiency, longer duration of awakenings and longer self-report sleep duration. Actigraphic sleep variability was positively linked to self-report sleep variability. Actigraphic sleep efficiency was positively related to actigraphic sleep latency, number of awakenings, and duration of awakenings and self-report sleep duration. Actigraphic number of awakenings was related to duration of awakenings. Additionally, correlation analyses also indicated that economic strain was negatively associated with parental education ( $r = -.31$   $p < .001$ ) and

Table 1  
Descriptives and Bivariate Associations Among Actigraphic and Self-Report Sleep Measures and Family Context Variables

	<i>M (SD)</i>	1	2	3	4	5	6	7	8	9	10	11
1. Duration (A)	7.46 (1.04)	1										
2. Variability (A)	0.94 (0.46)	-.09	1									
3. Efficiency (A)	96.19 (5.27)	.37***	-.03	1								
4. Latency (A)	10.79 (11.98)	-.11	.09	-.28***	1							
5. Awakenings (A)	3.98 (2.86)	.03	-.03	-.59***	.14*	1						
6. Duration of awakenings (A)	4.43 (3.71)	-.17**	.08	-.65***	.25***	.10 <sup>†</sup>	1					
7. Duration (S)	7.95 (1.02)	.61***	-.06	-.13*	.12*	.23***	.19**	1				
8. Variability (S)	1.02 (0.50)	-.01	.55***	.04	.00	-.07	-.06	-.01	1			
9. Parental support	3.65 (0.96)	.03	-.09	-.08	.03	.05	.00	.10	.01	1		
10. Family life events		.09	-.08	.05	-.10	-.03	.07	.04	-.08	.03	1	
11. Economic strain	2.00 (0.75)	.01	-.02	-.06	.07	.03	.03	.07	-.06	-.03	.16***	1
12. Parental education	7.19 (1.81)	.00	-.02	.03	-.08	-.01	-.01	-.06	-.14*	.04	-.03	-.31***

Note. Duration and variability are measured in hours. Latency is measured in minutes. A = actigraphic measure; S = self-report measure.  
<sup>†</sup> $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

household income ( $r = -.31, p < .001$ ), and that household income and parental education were positively associated with one another ( $r = .34, p < .001$ ). Parental support and economic strain were not related to any of the sleep indices.

A series of  $t$  tests were conducted to examine gender differences in key variable of interest. Among the actigraphic measures, girls slept longer, female:  $M = 7.60$  hr,  $SD = 0.94$ ; males:  $M = 7.27$  hr,  $SD = 1.15$ ;  $t(290) = 2.76, p = .006$ , had higher sleep efficiency, female:  $M = 97.37\%$ ,  $SD = 2.05$ ; male:  $M = 94.63\%$ ,  $SD = 7.40$ ;  $t(290) = 4.54, p < .001$ , woke up less often, female:  $M = 3.13$  times,  $SD = 1.85$ ; male:  $M = 5.07$  times,  $SD = 3.54$ ;  $t(293) = 6.04, p < .001$ , and stayed awake during wake-up for a shorter duration, female:  $M = 3.97$  min,  $SD = 2.64$ ; male:  $M = 5.07$  min,  $SD = 4.76$ ;  $t(293) = 2.54, p = .012$ , compared to males. Based on adolescents' self-reports, girls ( $M = 1.06$  hr,  $SD = 0.52$ ) experienced greater sleep variability than boys ( $M = 0.93$  hr;  $SD = 0.53$ ),  $t(306) = 2.27, p = .024$ . There were no gender differences in reports of family life event stress, parental support, or economic strain.

A series of analyses of variance were conducted to examine ethnic differences in key variables. The only ethnic differences in sleep indices were in regard to sleep latency. Adolescents from Latino families ( $M = 12.44$  min,  $SD = 13.05$ ) took longer to fall asleep compared to their European American peers ( $M = 7.86$  min,  $SD = 6.95$ ),  $F(3, 290) = 2.96, p = .033$ . Ethnic differences were also found in adolescents' report of parental support and parents' report of economic strain. Adolescents from Latino ( $M = 3.72$ ,  $SD = 0.97$ ) and European American ( $M = 3.82$ ,  $SD = 0.90$ ) families reported greater parental support compared to their peers from Asian ( $M = 3.29$ ,  $SD = 0.95$ ) backgrounds,  $F(3, 310) = 4.82, p = .003$ . Latino ( $M = 2.11$ ,  $SD = 0.79$ ), and Asian ( $M = 2.15$ ,  $SD = 0.72$ ) parents reported higher economic strain compared to European American ( $M = 1.71$ ,  $SD = 0.63$ ) parents,  $F(3, 309) = 6.93, p < .001$ . On average, European American families included parents who had higher levels of education compared to both Latino and Asian families,  $F(3, 309) = 46.03, p < .001$ . There were no ethnic differences in family life event stress and whether families were single- or dual-parent households.

#### *The Moderating Role of Family Stress in the Link Between Family Cohesion and Sleep*

Although results from our bivariate associations indicated that parental support was not related to

any of the indices of sleep, the main objective of this study was to examine whether the association between parental support and sleep may be modified by family stress. A significant interaction effect can be present even in the absence of significant main effects (Baron & Kenny, 1986). We conducted a series of regression models with parental support, family stress, and the interaction between parental support and each index of family stress, predicting each index of sleep separately. All models controlled for parental education, dual-parent household, adolescent ethnicity, gender, and timing of study participation (i.e., school year or summer months). Parental support, family stress, and parental education were centered at the sample means. Additional analyses were also conducted to exclude participants ( $N = 37$ ) with fewer than five actigraphic nights of sleep measurements; however, these results indicated similar findings compared to our full analytic sample, which our reported findings reflect.

#### *Family Life Events*

As illustrated in Table 2, family life events significantly moderated the association between parental support and actigraphic sleep variability and duration of awakenings. The interaction between family life events and parental support predicting actigraphic sleep duration was marginally significant,  $p = .095$ . In order to interpret the interactions, we examined the significance of the individual slopes for families that experienced zero life events and those that reported at least one life event. Figure 1a shows that among adolescents with parents who reported at least one stressful family life event, greater parental support was marginally related to longer sleep duration.,  $b = 0.16, SE = 0.09, p = .071$ . Figure 1b indicates that among adolescents from families who experienced at least one family life event, greater parental support was associated with less sleep variability,  $b = -0.09, SE = 0.4, p = .046$ . Finally, Figure 1c illustrates that among adolescents with families who experienced at least one family life event, greater parental support was associated with shorter duration of awakenings during the night.  $b = -0.92, SE = 0.40, p = .024$ . Among families in which parents experienced zero family life event stressors, parental support was not associated with sleep duration, variability, or duration of awakenings during the night,  $ps > .05$ .

Table 2 also shows that in our analyses predicting adolescent self-report sleep, family life events moderated the association between parental support and

Table 2  
*The Moderating Role of Family Life Events in the Link Between Parental Support and Sleep*

	Duration		Variability		Efficiency		Latency		Number of awakenings		Duration of awakenings	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Actigraphic sleep measures												
Intercept	7.55	0.16	0.98	0.07	94.32	0.79	11.38	1.82	5.47	0.41	5.35	0.56
Parental education	0.01	0.07	0.00	0.03	0.32	0.33	-0.22	0.76	-0.12	0.17	-0.26	0.23
Dual parent	-0.02	0.07	-0.09	0.03**	0.48	0.33	-1.05	0.76	-0.17	0.17	-0.26	0.23
Asian	-0.35	0.18 <sup>†</sup>	0.09	0.08	0.47	0.89	3.78	2.06 <sup>†</sup>	-0.25	0.47	-1.26	0.63
Latino	-0.12	0.16	-0.02	0.07	-0.76	0.79	4.96	1.82**	0.07	0.41	0.28	0.56
Other	-0.03	0.27	-0.08	0.12	0.44	1.36	1.84	3.23	-0.07	0.72	0.71	0.97
Gender	0.33	0.12**	0.10	0.05 <sup>†</sup>	2.77	0.62***	-2.09	1.43	-1.80	0.32***	-1.17	0.44**
School year	0.30	0.09**	0.07	0.04 <sup>†</sup>	-0.18	0.46	1.56	1.05	0.52	0.24*	0.26	0.32*
Parental support	-0.06	0.08	0.01	0.03	-0.71	0.40 <sup>†</sup>	0.65	0.91	0.08	0.21	0.50	0.28
Family life events	0.23	0.12	-0.08	0.05	0.53	0.62	-2.22	1.44	-0.07	0.33	0.43	0.44
PS × FS	0.21	0.13 <sup>†</sup>	-0.11	0.06*	1.01	0.64	0.66	1.47	0.06	0.33	-1.34	0.45**
<i>R</i> <sup>2</sup> (adj. <i>R</i> <sup>2</sup> )	.10 (.06)		.10 (.07)		.11 (.07)		.06 (.03)		.12 (.09)		.09 (.06)	
Self-report sleep measures												
	Duration		Variability									
	<i>b</i>		<i>b</i>		<i>SE</i>		<i>SE</i>		<i>b</i>		<i>SE</i>	
Intercept	8.34		0.15		0.99		0.7					
Parental education	-0.09		0.06		-0.07		0.03*					
Dual parent	-0.01		0.06		-0.04		0.03					
Asian	-0.44		0.17**		0.01		0.08					
Latino	0.02		0.15		0.01		0.07					
Other	-0.08		0.26		-0.07		0.13					
Gender	-0.16		0.12		0.12		0.06*					
School year	0.33		0.09***		0.02		0.04					
Parental support	0.10		0.07		0.07		0.04 <sup>†</sup>					
Family life events	0.13		0.12		-0.10		0.06					
PS × FS	-0.04		0.12		-0.17		0.06**					
<i>R</i> <sup>2</sup> (adj. <i>R</i> <sup>2</sup> )	.09 (.06)				.08 (.06)							

Note. Dual parent, gender, and school year were effects coded (-1 = single parent, male, school year; 1 = dual parent, female, summer). Ethnicity was dummy coded with European American participants as the reference group. PS = parental support; FS = family life event stressors.

<sup>†</sup>*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

sleep variability. As shown in Figure 2, tests of simple slopes revealed that among adolescents from families who experience at least one life event, greater parental support was associated with less sleep variability,  $b = -0.09$ ,  $SE = 0.05$ ,  $p = .056$ . Among adolescents from families who did not experience any life events, parental support was not associated with sleep variability,  $p > .05$ .

#### Economic Strain

We conducted similar regression models with parental support, economic strain, and the interaction between parental support and economic strain

predicting sleep. Findings indicated that these interaction effects were not significant,  $ps > .05$ .

#### Gender and Ethnic Variation

Finally, we tested whether the associations between parental support, family stress, and adolescent sleep varied according to adolescents' gender and ethnicity. We tested two-way (e.g., Parental Support × Gender, Family Stress × Gender) and three-way (e.g., Parental Support × Family Stress × Gender) interactions including gender and ethnicity. Findings revealed no significant gender or ethnic differences in these associations.



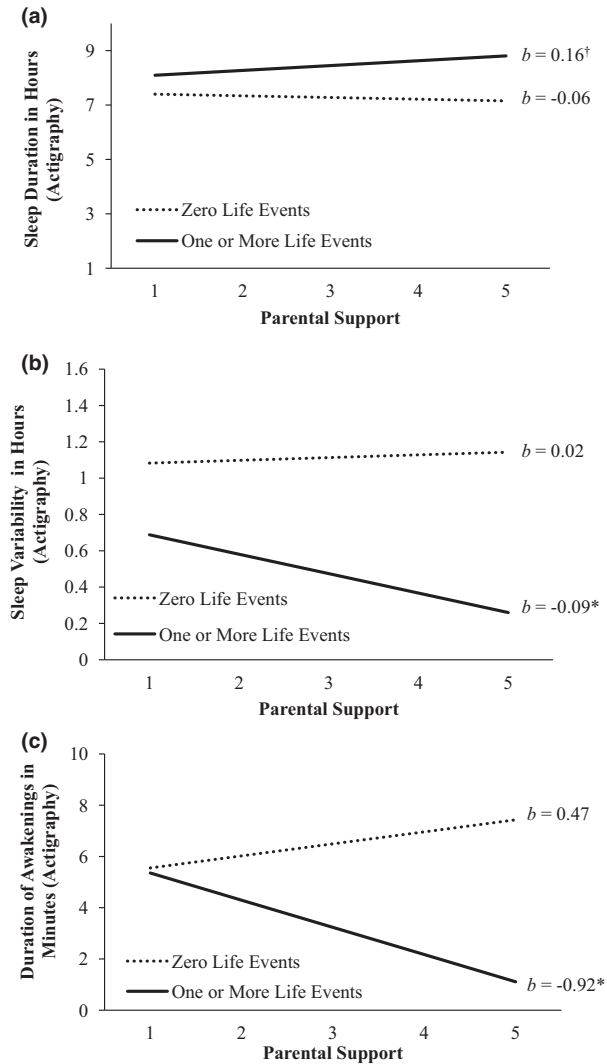


Figure 1. Among families who experienced at least one stressful life event, greater parental support was (a) associated with longer sleep duration (the  $y$ -axis refers to hours of sleep), (b) related to less sleep variability (the  $y$ -axis refers to hours of sleep variability), and (c) associated to shorter nighttime awakenings (the  $y$ -axis refers to minutes of awakening).

$^\dagger p = .071$ .  $^* p < .05$ .

## Discussion

Despite some evidence suggesting that unstable family contexts have adverse effects on sleep, the link between positive relational qualities and sleep among adolescents is less clear. Although we did not find a direct association between parental support and adolescent sleep, findings indicated that under conditions of family stress, parental support was linked to better sleep, including longer duration, shorter awakenings, and less variability across the week. Results provide support for the opponent-processes theory on sleep and emotional

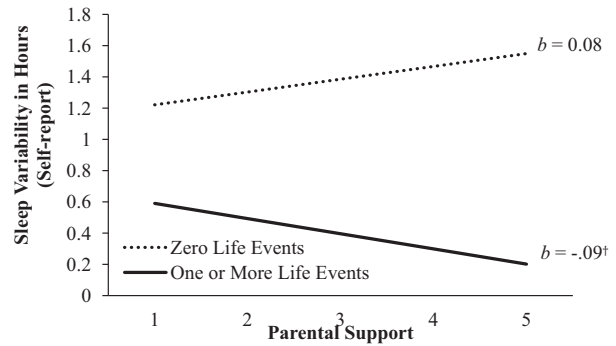


Figure 2. Among families who experienced at least one stressful life event, greater parental support was associated less self-reported sleep variability. The  $y$ -axis refers to hours of sleep variability.

$^\dagger p < .06$ .

security hypothesis as findings suggest that close family bonds are particularly important for adolescent sleep when families are experiencing stressful family events. During adolescence, parental support can serve as a “safety signal” that become particularly important to sleep when family stress can potentially raise adolescents’ vigilance and interfere with their sleep.

It is possible that empirical support highlighting the role of positive family relationships on adolescent sleep is sparse because there may not be a direct link, as is evident in the current article. That is, there was no main effect of parental support on adolescent sleep, which coincides with previous studies (Adam et al., 2007; Maume, 2013). Rather, cohesive parent–child relationships may have an impactful role on adolescent sleep under conditions of family stress. Among families who were facing at least one family life event (e.g., divorce, death of a family member), adolescents who continued to have supportive and warm relationships with their parents appeared to sleep longer, more soundly, and have more consistent sleep patterns across the week compared to their peers who received less support from their parents. More precisely, for every one unit increase in parental support, adolescents who came from families experiencing a stressor slept for about 10 min longer, stayed awake for 1 min less during each of their night awakenings, and had sleep that fluctuated about 6 min more or less each night across the week. The maintenance of a cohesive bond with parents can provide adolescents a sense of security and stability that can otherwise be threatened under stressful family circumstances. For instance, prior studies indicate that children with divorced parents fare better when the parent–child relationship remains intact (Hines,

1997; Sun, 2001). More generally, results parallel research highlighting the significance of social support during times of stress (Licitra-Kleckler & Waas, 1993; Uchino, Cacioppo, & Kiecolt-Glaser, 1996).

It is also interesting that under conditions of no family life event stressors, high levels of perceived parental support were not related to adolescent sleep. Only adolescents who came from families experiencing at least one family life event stressor and also perceived high levels of parental support displayed more optimal sleep patterns (i.e., greater duration, shorter night awakenings, less variability). Given the unique period of adolescence when teenagers are beginning to establish greater autonomy from their family (Steinberg, 1988), parental support may be particularly beneficial toward adolescent sleep under difficult circumstances, such as family stress, that necessitate warm and cohesive family interactions. In family contexts in which stress is already low, parental support may play a more limited role on adolescent sleep. Thus, our findings align with the emotional security hypothesis by highlighting the importance of parental support under contexts of family stress when feelings of safety and stability may be threatened (Davies & Cummings, 1994; El-Sheikh et al., 2007). Furthermore, there may be other factors that account for variability among those low in life events and high in support that merit future research. For example, nonfamilial stressors (e.g., academic demands, peer conflict) that cannot be easily remedied by parental support can also interfere with adolescent sleep.

At a developmental stage that is characterized by various transitions (e.g., puberty, school transitions), stability and security at home remain critical for adolescents' overall well-being and health. Although parental support was not similarly associated with sleep for all adolescents, it is possible that other qualities of the parent-child relationship, including specific types of parenting practices, may have a broader impact on adolescents' sleep. Prior research by Adam et al. (2007) revealed that whereas parental warmth was associated with longer sleep duration among children (ages 5–12 years), stricter parental household rules played a critical role toward earlier bedtimes and longer sleep for adolescents (ages 12–19 years). As adolescents begin to face greater demands (e.g., schoolwork, extracurricular activities), household rules may provide the important structure that is necessary for adolescents to develop and maintain consistent sleep routines. Further research is needed to explore which aspects of family relationships are crucial for sleep across different developmental

periods. Furthermore, research to investigate how features of the family context (e.g., parental support, parental academic expectations) can combat other nonfamilial stressors would also be valuable at a developmental period when adolescents face an increasing number of stressors that make them vulnerable to sleep difficulties. For example, stress related to school achievement and the effort spent completing schoolwork are contributing factors of sleep deprivation among adolescents (Fulgini & Hardway, 2006).

It is important to note that parental support was beneficial toward adolescent sleep among families who were undergoing stressful family life events but not stressors specifically related to economic hardships. Episodic family stressors (e.g., divorce, death in the family) may be more tangible and contribute to marked changes in family life, whereas financial challenges may include more chronic stressors that do not elicit immediate disruptions to family life. Although we did not ask participants to report when the family life events occurred, it is possible that some may have happened recently and, therefore, may have had a more significant impact on their sleep behaviors. As our findings suggest, in the context of an acute, stressful family life event, parental support can reduce feelings of instability that are antithetical to sleep. Additionally, given that economic strain was assessed across the last 3 months, this may not be a sufficient length of time to have an enduring effect on adolescents' sleep. Further research is warranted to understand how the timing and duration of family stressors impact adolescent sleep. It is also possible that family economic strain may not have a noticeable impact on adolescents' sleep because parents may shield their children from financial challenges, thereby lessening the impact of financial strain on adolescent well-being (Lehman & Koerner, 2002). Additionally, future research can also take into consideration how parents, themselves, are affected by the family stressor, potentially compromising their ability to nurture a supportive family context under challenging family circumstances.

The inclusion of both actigraphic and self-reports to measure sleep is a notable strength of our study. Despite the correlations between actigraphic and self-report sleep indices, we did not obtain perfect agreement across both measures in our findings. The significant interactions between parental support and family life event stressors were more consistently evident in predicting actigraphic than self-report sleep patterns. Specifically, we found that under contexts of family stress, high parental

support was related to actigraphic measurements of sleep duration, sleep variability, and duration of nighttime awakenings, whereas similar interactions were found predicting only self-report sleep variability. One explanation for these discrepancies between these two methodologies to assess sleep is that wrist actigraphs provide more objective estimates on sleep compared to self-reports, which are more susceptible to recall bias (Sadeh et al., 1994). Given that wrist actigraphs monitor movement across the night, it can detect more precise sleep patterns, such as sleep latency or duration of nighttime awakenings, that individuals may have difficulty recalling. As wrist actigraphs become more widely used in studies with children and adolescents, it would be helpful for researchers to document how their findings replicate across actigraphic and self-report sleep assessments to better inform our knowledge about how different sleep parameters may be differentially associated with important factors (e.g., family stress, parental support) that play a critical role in sleep and the validity of sleep assessments in diverse settings.

Despite the strengths of our study, including our ethnically diverse sample of parent-adolescent dyads, some limitations should be noted. Although the ethnic composition of our sample closely reflected the geographic area in which the study was conducted, we did not have equal representation of families across all ethnic groups, which may have limited our ability to detect potential ethnic differences in our analyses. For example, our sample included an underrepresentation of students from Asian and other minority (e.g., African American, Middle Eastern) backgrounds. We noted in our results that the inclusion of ethnicity as a covariate did not alter the significant interactions between parental support and family stress predicting sleep outcomes. Another limitation is that we relied only on parental reports of family stressors and did not obtain information on adolescents' perceptions of family stress. Relatedly, it would be valuable for future research to include daily measurements of family support to better understand how daily family dynamics help to buffer the negative effects of daily stress on adolescent sleep and other aspects of their well-being and health. Given the cross-sectional design, we cannot infer how the interaction of parental support and family stress may prospectively contribute to adolescent sleep. Future longitudinal studies can help to examine the role of parental support in promoting and sustaining long-term, healthy sleep routines among adolescents, particularly those living in strained family

environments. Additionally, longitudinal designs can clarify the directionality of effects between parental support, family stress, and sleep, and potential reciprocal relations among these factors. For example, it is plausible that adolescent sleep behaviors can shape parental support over time and that family stress can moderate these effects. Nevertheless, given that family dynamics, including parental support and family stressors, are highly variable and can change over time, our cross-sectional findings are still valuable in capturing how family dynamics at a given time and context can concurrently influence sleep.

In conclusion, findings from our study point to the significance of parental support in contributing to healthful sleep among adolescents who are experiencing stressors in their family life. Maintenance of warm and cohesive parent-child relationships can provide adolescents a sense of safety and security during times of difficulty, which is imperative for good sleep. Future research should continue to explore aspects of family relationships and context that serve as risk and protective factors in contributing to adolescent health during this critical developmental period.

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