



Published in final edited form as:

J Youth Adolesc. 2011 June ; 40(6): 666–679. doi:10.1007/s10964-010-9574-x.

Sleep in Mexican American Adolescents: Social Ecological and Well-Being Correlates

Susan M. McHale¹, Ji Yeon Kim², Marni Kan³, and Kimberly A. Updegraff⁴

²University of Hawai'i at Mānoa

³RTI International

⁴Arizona State University

Abstract

A burgeoning body of research documents links between sleep and adjustment in adolescence, but little is known about the role of the social ecology in promoting healthful sleeping habits. This study was aimed at identifying the socio-cultural correlates of adolescents' sleep, including average nighttime sleep duration, average daytime napping, and night-to-night variability in sleep duration and assessing the links between these dimensions of sleep and adjustment in Mexican American youth. Participants were 469 Mexican American adolescents (50.5% female) and their mothers and fathers. Data on family socio-cultural characteristics and youth adjustment were collected in home interviews with youth, mothers, and fathers, and, during 7 evening telephone interviews, adolescents reported on nighttime sleep and daytime napping for the prior 24-hour period. Night-to-night variability and napping were more strongly linked to youth depressive symptoms and risky behavior than was average nighttime sleep, whereas nighttime sleep predicted lower body mass index. Lower parental acculturation and fathers' familism values predicted more healthful sleep, and higher levels of family income, parental education and neighborhood crime predicted less healthful sleep. In addition to illuminating the significance of socio-cultural influences on youths' sleep, this study contributes to the literature by documenting the multidimensionality of sleep patterns and their links with adjustment in an understudied population.

Sleep is a central activity of daily life, and a growing body of research documents its significance for physical and psychological health and development across the lifespan (Colten & Altevogt, 2006). Research on adolescents shows that, although sleep patterns change across the transition to puberty, the need for sleep does not decline (Carskadon, 2002), and sleep patterns have been linked to a range of physical, behavioral, and psychological outcomes during the second decade of life. In the face of its significance for youth well-being, however, we know little about the social ecological conditions that support healthful sleep in adolescence (Adam, Snell, & Pendry, 2007).

In this article we examine the role of socio-cultural factors in youths' sleep patterns, and the links between multiple dimensions of sleep and Mexican American adolescents' well-being. Examining sleep patterns in Mexican American youth, a large and rapidly growing socio-cultural population in the US (US Census Bureau, 2008), can advance understanding of the social ecology of sleep, an area of study that has been neglected in sleep research (Adam et al., 2007). As we elaborate below, although extant studies have examined ethnic/racial differences in youths' sleep, we know almost nothing about *socio-cultural processes* that

¹Corresponding author: College of Health and Human Development & Social Science Research Institute, The Pennsylvania State University, 605 Oswald, University Park, PA 16801, USA mchale@psu.edu.

may help to explain youths' sleeping habits. In focusing on Mexican American adolescents, our study also addresses the well-being concerns of a significant segment of the US population. Research documents that first generation Mexican American youth often exhibit better health and adjustment than those from second and third generation families, suggesting that new patterns of activity that emerge in the acculturation process may have negative well-being implications (e.g., Crosnoe & Lopez-Gonzalez, 2005). For example, in the acculturation process, increasing autonomy and involvement in the world beyond the home, coupled with the individual achievement pressures that characterize Anglo culture, may negatively affect youths' daily routines and their ability to get a good night's sleep. The present study was designed to replicate and extend prior research by assessing the links between sleep and well-being in Mexican American youth and identifying the socio-cultural processes that support or undermine healthful sleep patterns.

Sleep in Adolescence

Early research on sleep in adolescents focused on clinical populations and used experimental laboratory studies, but more recent research has been directed at identifying normative patterns in the development of sleep and their correlates (e.g., Adam et al., 2007; Carskadon, 2002; Fuligni & Hardway, 2006). This work documents that adolescence is a time of change in sleep patterns: "Intrinsic" changes in circadian rhythms as well as in homeostatic sleep-wake processes, both of which emerge at puberty and change across adolescence, underlie developmental changes in the timing of sleep, specifically later morning waking times and correspondingly later times of falling asleep at night (Carskadon, Acebo, & Jenni, 2004). Changes in the social ecology, including earlier school starting times, the demands of school and paid work, and increasing autonomy and time away from home also have implications for developmental and individual differences in adolescents' nighttime sleep. Taken together, this work suggests that adolescence is an important developmental period for research on sleep.

Daily diary methods are particularly effective for collecting information on youths' sleep (Adam et al., 2007). Studying a national sample of youth aged 3 to 17, Adam et al. analyzed daily diary data collected on one weekend and one weekday and reported that bedtime was about 2 hours later at age 17 as compared to age 11. Wake up times differed much less across adolescence, with the result that older adolescents experienced shorter nighttime sleep duration than younger adolescents. Importantly, differences in bed and wake up times on weeknights versus weekend nights reflect *within-individual differences* in nighttime sleep duration. Fuligni and Hardway (2006) collected 14 days of diary data from a multiethnic sample of adolescents and found that variation in sleep duration averaged about one hour over this two week period. Such a pattern may be problematic given the importance of regularity and routine for youth well-being (Harris, King, & Gordon-Larsen, 2005): Irregular sleep patterns can make it harder for youth to fall asleep and stay asleep at night or to wake up in the morning, and they also may contribute to sleepiness and napping during the day. Importantly, researchers have highlighted the significance of sleep deprivation in daytime sleepiness and napping, but diary studies have not yet provided data on napping and its correlates in adolescence. Taken together, existing research suggests that a multidimensional assessment is needed to best capture adolescents' sleep habits.

The Role of Sleep in Adolescent Well-Being

As research on the development of sleep illustrates, sleep patterns are at the interface of physiological and social environmental processes (Carskadon, 2002; Dahl & Lewin, 2002), and mounting evidence documents links between sleep patterns and adolescents' well-being. Existing research examines both physical and psychological health correlates of sleep,

highlighting the role of sleep in areas such as youths' cognitive performance and school achievement, internalizing symptoms and behavior problems, and obesity risk. Below we briefly describe key findings as well as the putative mechanisms underlying associations between sleep and these domains of youth well-being.

Beginning with the cognitive domain, a body of work suggests that sleep promotes cognitive functioning, including learning and memory consolidation (Maguet, 2001). In contrast, sleep deficits and daytime sleepiness in adolescence have been linked to lower levels of attention, performance on cognitive tasks, and overall school achievement (Fredriksen, Rhodes, Reddy, & Way, 2004; Wolfson & Carskadon, 1998). Findings that first generation Mexican American youth exhibit better academic performance than later generation youth direct attention to the contextual conditions that may underlie such patterns (Crosnoe & Lopez-Gonzales, 2005). To the extent that acculturation is marked by increasing involvement in the world beyond the home and a corresponding weakening of family ties, sleep habits may be affected, with implications for poor school performance in more acculturated Mexican American youth.

Sleep patterns also have been linked to psychological and behavioral adjustment problems during adolescence. One set of studies focuses on the links between sleep and internalizing problems, including depressive symptoms and negative mood (Fredriksen et al., 2004; Fuligni & Hardway, 2006; Wolfson & Carskadon, 1998). Analyses of daily diary data, for example, revealed associations between nighttime sleep duration and adolescents' daily mood (Fuligni & Hardway, 2006): less sleep time predicted stronger feelings of anxiety, fatigue and depressive the next day, even with prior day's mood controlled. In contrast, mood during the day did not predict time spent sleeping that night, suggesting that the direction of effects is from sleep to well-being. Analyses of night-to-night variations in sleep duration also revealed that within-individual variability remained a significant correlate of daily mood even when average sleep duration was taken into account. Although less well studied in adolescence, sleep also has been linked to externalizing problems (Dahl & Harvey, 2007). Irritability, impulsivity and compromised decision-making may result from sleep deficits, which have been linked to anger and hostility, aggression, substance use, and even driving accidents (Dahl, 2008; Haynes, Bootzin, Smith, Cousins, Cameron, & Stevens, 2006). Research on Mexican American adolescents reveals higher rates of risky behavior among more acculturated youth (e.g., Vega & Sribney, 2003), and higher rates of depressive symptoms in Mexican American relative to majority culture youth (e.g., Gonzales, Knight, Morgan-Lopez, Saenz, & Sirolli, et al., 2002). Although some large scale studies have included Hispanic youth, research to date has not tested whether sleep habits are linked to such adjustment problems in Mexican American samples.

Another set of studies links sleep habits to overweight and obesity in childhood and adolescence (Chen, Beydoun, & Wang, 2008; Snell, Adam & Duncan, 2007). Sleep deprivation may have implications for lower levels of activity and exercise during the day, and also is linked to changes in hormone levels, including growth hormone, cortisol, and insulin, which in turn, have implications for energy balance and ultimately, weight gain. A recent longitudinal study showed that, controlling for time 1 body mass index (BMI), night time sleep hours predicted increases in BMI over a 5 year period in children and adolescents (Snell, et al., 2007). A number of studies have documented that rates of overweight and obesity increase across generation status among immigrant youth, and Mexican American youth in particular (Crosnoe & Lopez-Gonzales, 2005; Van Hook & Balistreri, 2007), but, to date, researchers have not examined the role of sleep patterns in this phenomenon.

The Social Ecology of Sleep

Research on the implications of sleep for adolescent well-being reveals substantial individual differences in sleep habits, including total amount of sleep, quality of sleep and night-to-night variation in sleep duration. We know relatively little, however, about the social environmental factors that may account for youths' sleep (Adam, et al., 2007). From an ecological perspective, like other daily activities, sleeping is grounded in social-ecological circumstances that afford or constrain opportunities for particular kinds of daily routines (Bronfenbrenner, 1979).

Some research suggests that race/ethnicity is linked to sleep in adolescence. In particular, African American youth have been shown to sleep fewer hours and exhibit more night-to-night variability in sleep duration than White youth (e.g., Adam et al., 2007; Spilsbury, Storfer-Isser, Drotar, Rosen, Kirchner, Benham, & Redline, 2004). Although Hispanic ethnicity was not linked to sleep measures in a nationally representative sample of youth (Adam et al., 2007), Fuligni and Hardway (2006) found that Mexican American youth *from predominantly immigrant families* reported spending more time sleeping at night—on school nights, in particular—than did White or Asian youth. These findings suggest that cultural processes may play a role in youths' sleep patterns, with youth from less acculturated (first generation families) exhibiting more healthful sleep habits. To date, however, investigators who have studied sleep have treated race/ethnicity as a status or social address variable (Bronfenbrenner, 1979), and we know nothing about the role of socio-cultural processes that may explain why some youth sleep more than others.

Traditional Mexican cultural orientations emphasize family connectedness and have been contrasted with the focus on autonomy and individual achievement within Anglo culture (Cuellar, Arnold & Maldonado, 1995). Consistent with the idea that acculturation into Anglo culture may be linked to poor sleep habits are findings that adolescents' time spent with friends and in school work—activities that may reflect autonomy and achievement orientations-- were linked to shorter night sleep duration (Adam et al., 2007; Fuligni & Hardway, 2006). To the extent that sleep deprivation is linked to well-being problems, such a pattern would be consistent with findings that more acculturated, second and third generation Mexican American youth display more well-being problems, including internalizing and externalizing problems, school failure, and obesity, than first generation Mexican American youth.

In the US, immigration status is linked to socioeconomic status (SES) in ways that also may have implications for youths' sleep. Specifically, immigrant families are poorer and live in lower quality housing and neighborhoods than do more acculturated families (Crosnoe & Lopez-Gonzalez, 2005). In turn, economic hardship and neighborhoods that are rundown and unsafe may serve as stressors that disrupt healthful sleep patterns. On the other hand, to the extent that an individual achievement ethic promotes "hurried childhoods" in middle and upper middle class families (e.g., Elkind, 1966; Laureau, 2003), some components of SES, such as parental education and income, also may promote poorer sleep patterns in youth. Indeed in one of the few sleep studies that examined SES markers, higher family income was linked to shorter weekday sleep duration (Adam, et al., 2007).

Finally, social-ecological factors are manifested in family dynamics, particularly family emotional climate. In one nationally representative study, primary caregiver warmth was modestly linked to nighttime sleep duration (Adam, et al., 2007), and marital conflict has been linked to sleep problems in school age children (El Sheikh, Buckhalt, Mize, & Acebo, 2006). Research on family relationship dynamics, however, has tended to focus on a single family relationship and fails to distinguish between the relationship experiences of mothers

and fathers in their roles as parents or marital partners. Because Mexican American families have more traditional gender role orientations, they may provide a unique opportunity to learn about the potentially distinct roles of mothers and fathers in their children's sleeping habits. For example, we might expect that mother-child relationships would have stronger implications for youths' sleep given mothers' greater centrality in adolescents' daily lives. More generally a more nuanced picture of the role of family relationships is an important direction for future research on the social ecology of adolescents' sleep.

The Present Study

Building on prior work, our first goal was to provide descriptive data on Mexican American adolescents' sleep, treating sleep as a multi-dimensional construct. Specifically, using seven days of daily diary data, we examined three indices of sleep: average duration of nighttime sleep, within-individual variability in duration of school night sleep, and time spent napping during the day. We assessed the correlations between these indices predicting that, consistent with prior research, average night sleep duration and nighttime sleep variability would be positively correlated (Fuligni & Hardway, 2006). Given that prior survey research has shown that less nighttime sleep is linked to sleepiness and napping during the day, we also predicted a negative association between the durations of nighttime sleep and napping (Carskadon et al., 2004). We also tested for age differences in youths' sleeping habits. Existing research led us to predict that older adolescents would exhibit less healthful sleep habits (Adam et al., 2007). Although we included gender in our analyses, prior research did not suggest clear hypotheses about gender differences.

The second goal of our study was to replicate and expand on prior work by measuring the links between multiple dimensions of sleep and Mexican American adolescents' well-being. Here, we focused on indices of three dimensions of youth outcomes that have been examined in prior sleep research. To assess cognitive function, we measured school grades; we assessed adjustment problems in terms of both internalizing and externalizing dimensions, as measured by depression symptoms and risky behavior, respectively; and we measured overweight via youth BMI. We tested the predictions that shorter nighttime sleep duration, greater variability in nighttime sleep, and more time napping during the day would be linked to less positive functioning in each of these domains. Further, consistent with Fuligni and Hardway (2006), we expected that variability in nighttime sleep would be a stronger correlate of adjustment problems than average night sleep, at least in the domain of internalizing symptoms. Given that prior research has not examined daytime napping duration, we advanced no hypothesis about the relative strength of napping as a correlate of youth well-being.

Our third goal was to identify social-ecological correlates of sleep patterns. Moving beyond ethnicity as a status variable, we examined the links between youths' sleep and mothers' and fathers' cultural values and practices, markers of family socio-economic functioning, and family relationship dynamics as three dimensions of the socio-cultural contexts of Mexican American youth. We focused on parents' reports of family contextual factors because we were interested in the potentially different roles of mothers' and fathers' socio-cultural characteristics in youths' sleep. Using parent reports also minimizes mono-reporter bias that would result from examining correlations between youths' self reports. Given that acculturation into Anglo culture marks a focus on individual achievement and the world beyond the family, we predicted that youth whose parents were more acculturated into mainstream US culture would experience more problematic sleep patterns; in contrast, we predicted that stronger familism values would be linked to more healthful sleep habits in Mexican American youth. With respect to socio-economic status (SES) as a component of family socio-cultural context, we tested the prediction that SES-related stressors, namely

parents' perceived economic hardship and neighborhood quality, would be related to less healthful sleep patterns, and that SES-related achievement pressures, reflected in higher levels of parental education and family income, would also be related to less healthful habits. Turning to family dynamics, based on prior research (e.g., Adam et al., 2007; El Sheikh et al., 2006), we hypothesized that more positive parent-child relationships and marital quality would be linked to more healthful sleep habits, expanding on prior research to explore these associations separately for mothers and fathers.

Methods

Participants

The data came from a study of family socialization and adolescent development in Mexican American families (McHale, Updegraff, Shanahan & Killoren, 2005). Families were recruited through schools in and around a southwestern metropolitan area. Given the focus of the larger study on normative family, cultural, and gender role processes in Mexican American families with adolescents, criteria for participation were: (1) mothers were of Mexican origin; (2) families included a 7th grader and at least one older adolescent-age sibling living in the home; (3) biological mothers and biological or long-term adoptive fathers lived at home (all non-biological fathers had been in the home for a minimum of 10 years); and (4) fathers worked at least 20 hours per week. Most fathers (93%) also were of Mexican origin. Importantly, our sampling criteria and our focus on a local population mean that our sample was not designed to be representative of Mexican American families in general. Instead, our larger study goals directed attention to two-parent families with employed fathers and at least two adolescent-age siblings. By using a multi-level modeling (MLM) analytic strategy that took into account the clustered nature of our data (i.e., siblings within families), we were able to capitalize on the fact that we had data from two siblings in each family to study the processes of interest in $N = 469$ youth from 237 families.

To recruit families, letters and brochures describing the study were sent to families, and follow-up telephone calls were made by bilingual staff to determine eligibility and interest in participation. Letters were sent to 1,851 families with a Latino 7th grader. For 438 families (24%), contact information was incorrect and repeated attempts to find updated information were unsuccessful. An additional 42 (2.4%) families moved between screening and recruitment, 148 (8%) refused to be screened, and 202 (11%) did not meet study criteria. Eligible families included 421 families (23% of the initial rosters and 32% of those screened for eligibility). Of those eligible ($n = 421$), 284 families (67%) agreed to participate, 95 (23%) refused, and we were unable to re-contact the remaining 42 families (10%) who were eligible to determine if they would participate. Enrollment of families ended when we completed home interviews with 246 families because we had surpassed our target sample size of 240 families (which was based on budget constraints). As noted, the present analyses were based on data from 469 youth from 237 families; 23 youth from the sample were excluded from our analyses due to missing telephone interview data or parents' refusal to provide family income data (a control variable).

Families represented a range of education and income levels, from poverty to upper class. Consistent with the rate in the county from which the sample was drawn (18.6%; US Census Bureau, 2000), 18.3% of families met federal poverty guidelines. Most parents had been born outside the US (71% of mothers and 69% of fathers); this subset of parents had lived in the US an average of 12.4 ($SD = 8.9$) and 15.2 ($SD = 8.9$) years, for mothers and fathers, respectively. About 70% of the parent interviews were conducted in Spanish and the rest were conducted in English. Fifty percent of older siblings were female and 15.70 ($SD = 1.6$) years old on average. Forty-seven percent had been born outside the U.S. and 18% were interviewed in Spanish. Of the younger siblings, 51% were female and they averaged 12.8

($SD = .58$) years of age, 38% had been born outside the US, and 17% were interviewed in Spanish.

Procedures

Data were collected using two procedures. During home interviews lasting an average of 3 hours for parents and 2 for adolescents, family members reported on their family relationships, cultural values and practices, and psychosocial adjustment. After obtaining informed consent/assent, interviews were conducted individually using laptop computers by bilingual interviewers in separate locations in the home. Most questions were read aloud (due to variability in reading levels) and interviewers entered family members' answers into the computer. For sensitive questions (e.g., risky behaviors), adolescents entered their answers directly into the laptop computers. To collect data on youths' sleep patterns we used a modified daily diary procedure originally developed by Huston (Huston & Robbins, 1982). During the three to four weeks following the home visit, adolescents were telephoned on seven evenings (five school nights excluding Fridays and two weekend evenings), and asked about the activities they had engaged in (including nighttime sleep and napping) during the 24 hour period that ended at 5pm on the day of the call. Families without phones were given cell phones. Families were paid \$100 for home interview and \$100 for phone interview participation.

Measures

All measures were forward and back translated into Spanish (for Mexican dialect in the local area) by two independent translators following the procedures outlined by Foster and Martinez (1995). All final translations were reviewed and discrepancies were resolved. Preliminary analyses revealed that some scales were not normally distributed. In each case, we used the most conservative transformation possible to approximate a normal distribution of scores.

Sleep—We assessed sleep as a multi-dimensional construct, using measures derived from the nightly telephone interviews. To index *nighttime sleep duration*, adolescents were asked on each call, what time they went to bed/sleep the previous night and what time they woke up that morning. We calculated total duration of sleep from these reports, and in the analyses used the mean duration across the seven calls. To assess intra-individual *variability in sleep duration*, we used the sum of the difference scores of sleep duration across the five school night calls. We focused on school nights (Monday- Thursday) given our interest in the significance of regular daily routines. Prior work shows that differences in sleep between weeknights and weekend nights are normative, and suggests these differences are not as closely linked to youth well-being as overall night-to-night variability (Fulgini & Hardway, 2006). During the phone calls, youth also used a list of 86 activities provided during the home interview to report on the durations of and their companions in their activities during the day of each call. Napping was one of these activities, and we calculated the average duration of napping across all seven calls. In the cases of sleep variation and nap, square root transformations were applied to correct for positive skewness and high kurtosis.

Grade Point Average (GPA)—As a measure of youth cognitive performance we calculated the average of adolescents' reports of their grades in four subjects (Math, Science, Social Studies/History, and English/Language Arts) on a 4-point scale, with higher scores indicating higher GPAs. Cronbach alphas were .83 and .85 for older and younger siblings. When parents had report cards available, we also collected information on grades directly from report cards, and the correlation between report card grades and self-reported grades ($n = 222$) was $r = .89$, $p < .01$ for younger siblings and ($n = 185$) $r = .85$ for older siblings,

suggesting that youth self reports were reliable. To avoid missing data, we used youth reports of their grades in the analyses.

Depressive Symptoms—To index youths' internalizing symptoms we used the 20-item Center for Epidemiological Studies Depression Scale, a scale with well-established validity and reliability (CES-D; Radloff, 1977). Adolescents rated experiences such as, "I had crying spells," on a 4-point scale (1 = *rarely or none of the time*, 4 = *all of the time*), and ratings were averaged such that higher scores reflect more depressive symptoms. Cronbach alphas were .86 for older and .85 for younger siblings.

Risky Behavior—Externalizing symptoms were measured using an index of risky behavior adapted from Eccles and Barber (1990) for ethnically diverse youth. On this measure, adolescents rated the frequency with which they engaged in each of 24 problem behaviors during the past year (e.g., skip a day of school, got drunk or high) on a 4-point scale (1 = *never*, 4 = *more than 10 times*). Scores were averaged such that higher scores signify more risky behavior. Alphas were .90 for older and .91 for younger siblings. Due to positive skewness and high kurtosis, we used square root transformations in the analyses.

Body Mass Index (BMI)—To assess youth overweight we used BMI percentile scores, which were calculated from adolescents' self reports of their height and weight. Height and weight were converted to age and sex specific BMI percentiles according to the most recent Centers for Disease Control (CDC) growth charts (Kuczmarski, Ogden, Grummer-Strawn, Flegal, Guo, Wei, et al., 2000) using the anthropometry component in Epi Info 2000 software.

Parents' Acculturation/Enculturation—Mothers' and fathers' Anglo and Mexican cultural practices were measured using the Acculturation Rating Scale for Mexican Americans II (ARSMA II; Cuellar, Arnold & Maldonado, 1995). On this 30-item measure mothers and fathers used a 5-point rating scale to show how often (1 = *not at all*, 5 = *extremely often or always*) each statement applied to their behavior during the past year (e.g., acculturation subscale: "I speak English; enculturation subscale: I enjoy Spanish language television"). Cronbach alphas were .87 or higher for acculturation and enculturation reported by mothers and fathers. Given high correlations between the enculturation and acculturation subscales for mothers, $r = -.50$ and for fathers, $r = -.56$, we calculated difference scores, such that high scores reflect more Anglo-oriented practices (i.e., higher levels of acculturation to Anglo than enculturation in Mexican culture).

Parents' Familism Values—As an index of parents' cultural values, we measured the traditional Mexican value of familism in mothers and fathers, indexed via a 16-item subscale of the Mexican American Cultural Values Scale (Knight, Gonzales, Saenz, German, Deardorff, Roosa, & Updegraff, in press). Parents used a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*) to rate their agreement on items such as, "It is always important to be united as a family." Cronbach alphas were .80 for mothers' and .85 for fathers' values. Due to negative skewness and high kurtosis for fathers' reports, and to make mothers' and fathers' reports comparable, we use squared transformations for the familism scale in the analyses. Analyses revealed that the familism values and acculturation/enculturation indices were not highly correlated, $r = -.24$ for mothers, $r = .31$ for fathers, suggesting that these are distinct constructs.

Family Economic Hardship—As an index of socioeconomic stress, mothers and fathers used a 17-item measure of economic hardship that was developed and validated for Mexican American families (Barrera, Caples, & Tein, 2001). This measure includes four correlated

subscales that are combined to create a single index. (1) Inability to make ends meet (two items, e.g., “During the past three months, how much difficulty did you have with paying your bills?”) was rated on a 5-point scale (1 = *no difficulty*, 5 = *a great deal of difficulty*). Alphas were .78 for mothers and .65 for fathers. (2) Not having enough money for necessities (four items, e.g., “During the past three months, my family had enough money to afford the kind of home we should have,”) was rated on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). Alphas were .91 for mothers and .88 for fathers. (3) Economic adjustments or cutbacks (nine items, e.g., “During the past three months, did you change food shopping or eating habits a lot to save money?”) were rated on a 2-point scale (*yes / no*) and scored as the number of endorsed items. (4) Financial strain (two items, e.g., “During the next three months, how often do you think that you and your family will experience bad times such as poor housing or not having enough food?”) was rated on a 5-point scale (1 = *almost never*, 5 = *almost always*). Alphas were .85 for mothers and .81 for fathers. As detailed by Barerra et al. (2001), the composite score is calculated by standardizing the scores from each subscale, weighting the standardized scores using gamma loadings, and summing the weighted scores. Given our focus here on a family-level characteristic and because of the high correlation between parents’ reports, $r = .61$, we used the mean of parents’ composite scores in the analyses.

Neighborhood Crime—Neighborhood quality as another index of SES was indexed using the 12-item Neighborhood Criminal Events Scale (Anashensel & Sucoff, 1996). Mothers and fathers independently rated the frequency during the past year, on a 6-point scale (1 = *never*, 6 = *almost daily*), of events in their neighborhood such as “drive by shootings,” and “people breaking into homes and cars to take things.” Cronbach alphas were .79 and .88 for mothers and fathers. Given our focus here on a family-level characteristic and because parents’ reports were correlated, $r = .42$, we used the parent average as the index of neighborhood crime.

Parental Education—As an additional index of family SES we focused on mothers’ and fathers’ education attainment. Because mothers’ and fathers’ education levels were highly correlated, $r = .64$, we used the mean of the two parents’ education levels in the analyses. Analyses revealed that the measures of economic hardship, frequency of neighborhood crime, and parental education were not highly correlated, and so could be treated as separate constructs, $r = -.17$ for the correlation between neighborhood crime and parental education, $r = .21$ for the correlation between neighborhood crime and economic hardship, and $r = -.42$ for the correlation between parental education and economic hardship.

Marital Conflict—As an index of family relationship quality, mothers and fathers completed the 5-item conflict subscale of the Relationship Questionnaire (Braiker & Kelly, 1979). Parents rated items such as “How often do you feel angry or resentful toward your husband/wife,” using a 9-point rating scale (1 = *not at all*, 9 = *very much*). Cronbach alphas were .67 for both mothers’ and fathers’ reports.

Parent-Adolescent Conflict—As another index of family relationship quality we assessed mother-adolescent and father-adolescent conflict using an index adapted from Smetana (1988). Adolescents rated how often they had disagreements or problems with their mothers and with their fathers in each of 12 domains (chores, appearance, homework/schoolwork, bedtime/curfew, money, religion, behavior and rules, friends, romantic relationships and dating, respect for parents, sibling relationships, and family involvement) using a 6-point scale (1 = *not at all*, 2 = *a couple of times in the past year*, 3 = *a few times each month*, 4 = *several times a week*, 5 = *about once a day*, 6 = *several times a day*).

Cronbach alphas ranged from .80 (younger siblings' ratings of conflict with mothers) to .86 (younger siblings' conflict with fathers).

Parent-Adolescent Temporal Involvement—We used fathers' and mothers' time spent in activities with adolescents as a third index of family relationships. Time with mother and time with father were calculated as the total numbers of minutes youth spent in activities with each parent across the seven telephone interviews. Evidence of the reliability of these reports was the high correlations between parents' and adolescents' reports of their shared activities during the nightly phone calls, $r = .80, p < .01$, and $r = .81, p < .01$, for the correlations between adolescents' and mothers' and fathers' reports of parent-adolescent activities, respectively.

Results

The results are organized around our three study goals. We first report descriptive data on three dimensions of Mexican American adolescents' sleep. Next, to replicate and extend earlier research, we examined the associations between the sleep indices and measures of well-being in this sample of youth. Finally, we assessed the associations between dimensions of the social ecology and adolescents' average nighttime sleep, night-to-night variability in sleep, and time spent napping.

Sleep Patterns of Mexican American Youth

Table 1 shows descriptive data for the three indices of adolescents' sleep: nighttime sleep duration, variation in minutes of sleep across 5 school nights, and average time spent napping. The three measures of sleep were correlated, albeit modestly: duration of nighttime sleep was negatively related to variability in sleep and to napping, $r = -.13$ and $r = -.28$, respectively, and variability and napping were positively correlated, $r = .22$. Consistent with prior research, a series of 2 (gender) X 2 (sibling: older versus younger) mixed model ANOVAs, with sibling as a within-groups factor, revealed marked age differences in adolescents' sleep. Beginning with average hours of sleep, results revealed a significant effect for sibling, $F(1, 466) = 198.37, p < .01$ such that older adolescents slept for fewer hours, on average (about a half hour per night), than younger adolescents. A similar pattern emerged for sleep variability, with older adolescents exhibiting more night-to-night variation in sleep duration across the five school days, $F(1, 466) = 30.11, p < .01$. Correspondingly, the results of analyses of napping revealed that older adolescents spent significantly *more* time napping than did younger adolescents $F(1, 466) = 49.30, p < .01$. In these analyses, the only effect involving gender was one trend level finding, that girls tended to nap more than boys, $F(1, 466) = 3.38, p < .10$.

Links between Sleep and Adolescent Well-Being

Given our nested design (siblings within families) we used a multi-level modeling (MLM) approach to measure the links between the three measures of sleep and the indices of youth wellbeing (GPA, depressive symptoms, risky behavior, and BMI). The MLM models were similar to ordinary least square regression, but essentially corrected for the non-independence of observations of two siblings from each family. At level 1, the sibling term (1 = older; -1 = younger) accounted for the non-independence of siblings within families, and sibling-specific predictors were also included here (gender, sleep indices). (The correlation between sibling birth order and age was $r = .78$, and thus age was not included as a separate factor in the models.) At level 2, we included the family-wide control variable, family income. In these analyses, all three sleep measures were entered into the same model, and family income and youth gender (0=girls, 1=boys) were included as control variables given their links with youth well-being in prior research (interactions between both gender

and sibling birth order and the sleep variables were few and inconsistent so are not reported).

The results are shown in Table 2. Beginning with *GPA*, the findings revealed significant positive effects for family income and gender such that girls and youth from higher SES families received higher school grades. There were, however, no effects of the sleep measures on *GPA*. Turning to adjustment problems, the findings for *depressive symptoms* likewise revealed significant effects for family income and gender indicating that girls and youth from lower SES families reported more symptoms. Beyond these factors, within-individual variation in school night sleep was positively linked to depressive symptoms. In the case of *risky behavior*, boys reported greater involvement, and there was a trend for older adolescents to engage in more risky behavior. Beyond these effects, within-person variation in sleep time and time spent napping were both positively related to risky behavior, and a trend level effect suggested that youth who averaged less nighttime sleep also engaged in more risky behavior. Finally, for *BMI*, there was a significant effect for sibling indicating that younger siblings scored lower in BMI than older siblings. Beyond these control variables, consistent with prior research, adolescents who spent less time sleeping at night had higher BMIs.

The Social Ecology of Sleep

Our final goal was to illuminate the potential role of ecological factors in adolescents' sleep patterns. Again, due to our nested design, we used an MLM approach so that we could include older and younger siblings in the same analyses. Specifically, we conducted a series of three analyses to test whether (a) mothers' and fathers' cultural orientations, (b) family socio-economic circumstances, and (c) mothers' and fathers' family relationship characteristics were linked to adolescents' sleep. In these analyses, siblings' individual characteristics, including birth order, gender, and parent-child relationship reports were entered at level 1. At level 2, we entered the family measures that were relevant to both siblings, including the measures of parents' cultural orientations, family SES, and marital relationships. Separate analyses were conducted to examine the effects of these socio-cultural factors on each of the three measures of sleep.

Beginning with *parents' cultural orientations* (Table 3), we found that parents', especially mothers', cultural *practices* were linked to adolescents' sleep. Higher levels of acculturation into Anglo culture in mothers were linked to less time sleeping at night, more time napping during the day, and a tendency toward more night-to-night variation in adolescents' sleep, and fathers' acculturation was linked to more variation in adolescents' sleep and a tendency to spend more time napping. Fathers' stronger familism *values*, in contrast, predicted *more* nighttime sleep by their adolescent offspring, and was linked at trend level to less time napping. In these analyses, the control variable, family income, was negatively related to nighttime sleep, but also negatively related to variability in sleep. That is, youth from higher income families slept less on average but were less variable in their night-to-night routines.

Turning to family *socio-economic circumstances* (Table 4), we found that, beyond the negative effects of family income, youth with more educated parents slept less, on average, at night. In addition, there was a trend for the neighborhood crime measure, such that youth whose parents reported more neighborhood crime tended to sleep less. Family economic hardship was the only unique predictor of sleep variation with other SES factors in the model, such that hardship was linked to more variable nighttime routines, and neighborhood crime was the only unique predictor of napping, such that youth in higher crime neighborhoods napped more. Together these results suggest that there are risks for poor sleep at both ends of the SES continuum.

Finally, with respect to marriage and parent-child relationships (Table 5), the results supported findings from prior research, but extended those to show effects for both mothers' and fathers' relationships with offspring. With respect to marriage dynamics, mothers' but not fathers' reports of marital conflict were linked to less nighttime sleep. In contrast, adolescents' conflicts with both mothers and fathers were linked to more variability in youths' sleep. Turning to time with parents, adolescents who napped more spent less time with mothers and tended to spend less time with fathers, but more daily time with father was linked to longer nighttime sleep duration.

Discussion

A body of research has documented the significance of sleep in adolescents' psychological and physical health. This study builds on this work to provide descriptive data on three dimensions of Mexican American adolescents' sleep, to replicate prior research on the well-being correlates of sleep in this understudied cultural group, and to examine the social-ecological correlates of adolescents' sleep within a relatively homogeneous cultural context. Our descriptive findings revealed correlations between the three dimensions of sleep, such that youth who slept longer at night, on average, exhibited less variability in sleep duration across school nights, and napped less during the day. Consistent with prior research, older adolescents exhibited shorter average nighttime sleep than younger adolescents; they also were more variable in their night time sleep duration and napped more during the day. Our findings on the links between Mexican American youths' sleep and well-being also were generally consistent with existing research: except in the case of GPA, links between sleep and youth functioning (depressive symptoms, risky behavior, BMI) were evident. Our findings extended this research by documenting that sleep variability and napping were more consistent predictors of adjustment problems (depressive symptoms, risky behavior) than average night sleep. Finally, we found links between indices of socio-cultural factors and youths' sleep. We replicated findings that positive family dynamics were linked to better sleep patterns in adolescents. We also found that, in addition to higher income, parents' Anglo practices and values, higher levels of parental education and family income, and parents' reports of financial hardship and neighborhood crime were generally linked to poorer sleep patterns. Below we discuss these findings in light of prior research and consider their implications for future investigations of adolescents' sleep.

A Daily Diary Approach for Studying Three Dimensions of Adolescents' Sleep

In addressing our first descriptive goal, an important strength of our study was our use of a daily diary approach to collecting data on adolescents' sleep. This diary method involved collecting data on seven days, a strategy that allowed us to measure daytime napping and to calculate the extent of variability in youths' sleep duration across school nights in addition to calculating a nightly average. Prior research established that differences in sleep time from weekday to weekend are normative and not strongly linked to well-being. Our findings suggest that future research should focus on school day routines (Adam et al., 2007; Fuligni & Hardway, 2006).

Taken together the results underscore the utility of collecting diary data across multiple days in efforts to characterize meaningful variations in youths' daily routines. As others have argued, consistency in everyday routines supports positive development (Harris et al., 2005). Regularity in daily activities may reflect a more organized and child-centered home life, and regularity in sleep may make it easier for youth to fall asleep at night and wake up the next morning. More generally, most prior research on youths' daily activities has focused on the time youth spend in particular kinds of activities and has documented that youths' involvement in organized activities is linked to positive development (Feldman & Matjasko, 2005). Our findings and those of others on the significance of *within-individual variability*

in sleep suggest that a fruitful line of research will be to examine regularity in other kinds of daily activities. One reason why organized activities are linked to positive adjustment may be because they promote consistency in youths' daily routines, including in their sleep.

Another contribution of this study is that we expanded on prior work to examine youths' time spent napping. In prior research, sleepiness during the day and napping have been assessed using questionnaire methods with the idea that youth who get too little sleep at night may nap more during the day. The modest correlations that we detected between nighttime sleep and napping suggest, however, that napping may reflect factors operating in adolescents' lives beyond nighttime sleep. Indeed, our descriptive findings generally suggested that the three dimensions of sleep that we studied are distinct. A direction for future research will be to determine whether there are distinct patterns or profiles of sleep activities that are differentially linked to youth adjustment.

Sleep and Youth Well-Being

The analyses of the well-being correlates of sleep replicated and extended existing research on the role of sleep in youth physical and psychological well-being (e.g., Dahl & Harvey, 2007; Fredriksen et al., 2004; Snell, et al., 2007). Results revealed that sleep was linked to depressive symptoms, risky behavior, and overweight, but not to GPA in this sample of Mexican American adolescents. Our results replicated those of Fuligni and Hardway (2006) in showing that, when the three dimensions of sleep were included in the same analysis, night-to-night variation in sleep trumped average duration of sleep in explaining individual differences in depressive symptoms, and we expanded upon this earlier study to show, first, that the same pattern held for risky behavior, and second, that time spent napping was more strongly linked to risky behavior than was duration of nighttime sleep. Only in the case of BMI did nighttime sleep explain a significant amount of unique variance, and, indeed, nighttime duration was the only significant correlate of BMI. Taken together, our findings highlight the importance of obtaining a multi-dimensional picture of adolescents' sleep.

Our failure to find links between GPA and the sleep measures was inconsistent with some earlier findings. GPA may be too global and distal a measure of the kinds of learning and memory processes that have been tied to sleep in most prior research. As we elaborate below, however, results of our analyses of the social-ecological correlates of sleep suggest that the links between sleep and academic achievement may be more complex than we were able to capture in our analyses.

Socio-Cultural Correlates of Adolescents' Sleep

The major contribution of our study is its illumination of the social ecology of adolescents' sleep. Although some prior research has established ethnic/racial group differences in youths' sleep, such ethnic comparative designs do not yield insights into the socio-cultural *processes through which* ethnicity or culture may have an impact on youth (McLoyd, 1998). In this study, we used an ethnic homogeneous design to move beyond the study of ethnicity as a status or social address variable (Bronfenbrenner, 1979) and examine parents' cultural orientations, family socioeconomic circumstances, and family dynamics as potential correlates of adolescents' sleep. Our findings suggested that Mexican cultural orientations serve as protective factors in youths' sleep. Stronger familism values in fathers and higher levels of enculturation in Mexican culture in mothers and fathers were linked to more healthful sleep, but youth whose parents were more acculturated into Anglo society displayed less healthful sleep patterns.

In the US, ethnic minority status is confounded with SES, and thus we also examined indices of family socioeconomic circumstances and their connections with youths' sleep.

Our findings revealed that, beyond family income, which was linked to less nighttime sleep, higher levels of parental education were also associated with less nighttime sleep, but at the other end of the SES continuum, family economic hardship and neighborhood crime were linked to sleep problems. In other words, there appear to be risk and protective factors for healthful sleep at both ends of the SES continuum. On the one hand, our findings are consistent with the idea that forces in mainstream US society that are connected to upward social mobility, such as parental education, family income, and Anglo cultural practices, can have negative implications for adolescents' sleep. Pressures for individual achievement and orientations toward adolescent autonomy and involvement in the world beyond the home may mean that youths' daily routines provide less opportunity for sleep. On the other hand, stressors that characterize a lower SES, such as family economic hardship and neighborhood crime, also may interfere with healthful sleep. These countervailing forces remind us of the tradeoffs immigrant families make in the process of cultural assimilation: social mobility comes at a price, but the stressors of low SES status take their own toll.

The findings on links between family relationship processes and youths' sleep were congruent with prior research on the significance of the family's emotional climate in adolescents' sleep (e.g., Adam et al., 2007; El Sheick, et al., 2006) in documenting links between problematic sleep and both marital and parent-child conflict. Importantly, evidence of positive associations between time spent with fathers and longer nighttime sleep duration suggest that adolescents' time use is not zero sum, but rather that family involvement, as reflected in father-adolescent shared time, has implications for healthful sleep patterns. More generally, the significance of fathers' familism values in addition to fathers' temporal involvement with youth underscores the role of fathers in the health and well-being of Mexican American youth and suggests that future studies of the family contexts of sleep attend explicitly to fathers' important role.

Conclusions

Our findings should be understood in light of the limitations of this study. Our intensive, within-family data collection and interest in fathers directed our attention to a local sample of Mexican American youth from two-parent families, and the results therefore cannot be generalized to the larger population of Mexican American adolescents. Furthermore, the cross-sectional design did not allow for analysis of direction of effects. Although we interpreted the findings as indicating that poor sleep habits have implications for youths' well-being, adjustment problems may exacerbate sleep difficulties (Dahl & Harvey, 2007). And, the sleep problems of adolescents also may have negative implications for family relationship dynamics.

This study makes several important contributions to an understanding of sleep and sleep problems in adolescence. The ethnic homogeneous design allowed us to document how Mexican American youths' involvement in this central activity of daily life may be influenced by the social ecology and have implications for youth well-being. Further, the findings direct attention to social-ecological factors that may be important for other socio-cultural groups and suggest directions for future study. They also shed some light on a question raised in prior research on Mexican American youth, that is, why first generation youth exhibit better health and well-being than those whose families have been in the US for longer periods of time (e.g., Crosnoe & Loez- Gonzales, 2005). In this research, Mexican cultural values and practices proved to be protective for healthful sleep patterns, whereas families' greater affluence and Anglo orientations seemed to come at the price of poorer sleep. At the same time, some socio-economic stressors of new immigrant status, namely neighborhood disadvantage as marked by crime and economic hardship, appeared to have their own costs. Taken together, these findings remind us of the complex, multilayered

nature of the social ecology and the importance of moving beyond social address variables to directly examine the *ecological processes* marked by race, ethnicity, and social class. The social ecology is not monolithic, and its various components can operate in different and sometimes competing ways to influence youths' daily activities and ultimately, their well-being and development. Future research on sleep in adolescence will profit from treating adolescents' sleep and its social ecology as multi-dimensional constructs.

Acknowledgments

We thank the participating families as well as the following schools and school districts: Osborn, Mesa, and Gilbert school districts, Willis Junior High School, Supai and Ingleside Middle Schools, and St. Catherine of Sienna, St. Gregory, St. Francis Xavier, St. Mary-Basha, and St. John Bosco Schools. We also thank Ann Crouter, Nancy Gonzales, Roger Millsap, Mark Roosa, Melissa Delgado, Jennifer Kennedy, Devon Hageman, Sarah Killoren, Shawna Thayer, and Lorey Wheeler for their help in conducting this study. This research was funded by NICHHD (R01-HD39666), Kimberly Updegraff, Principal Investigator and the Cowden Fund to the School of Social and Family Dynamics at ASU.

References

- Adam EK, Snell EK, Pendry P. Sleep timing and quantity in ecological and family context: A nationally representative time-diary study. *Journal of Family Psychology*. 2007; 21:4–19. [PubMed: 17371105]
- Agras WS, Hammer LD, McNicholas F, Kraemer HC. Risk factors for childhood overweight: A prospective study from birth to 9.5 years. *Journal of Pediatrics*. 2004; 145:20–25. [PubMed: 15238901]
- Anashensel CS, Sucoff CA. The neighborhood context of adolescent mental health. *Journal of Health and Social Behavior*. 1996; 37:293–310. [PubMed: 8997886]
- Barrera M, Caples H, Tein JY. The psychological sense of economic hardship: Measurement models, validity, and cross-ethnic equivalence for urban families. *American Journal of Community Psychology*. 2001; 29:493–517. [PubMed: 11469118]
- Braiker, HB.; Kelley, HH. Conflict in the development of close relationships. In: Burgess, RL.; Huston, TL., editors. *Social exchange in developing relationships*. New York: Academic Press; 1979. p. 135-168.
- Bronfenbrenner, U. *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press; 1979.
- Carskadon, MA. Adolescent sleep patterns: Biological, social and psychological influences. New York: Cambridge University Press; 2002. p. 4-26.
- Carskadon, MA.; Acebo, C.; Jenni, OG. Regulation of adolescent sleep: Implications for behavior. In: Dahl, RE.; Spear, LP., editors. *Adolescent brain development: Vulnerabilities and opportunities*. Vol. Vol. 1021. New York: New York Academy of Sciences; 2004. p. 276-291.
- Chen X, Beydoun MA, Wang Y. Is sleep duration associated with childhood obesity? A systematic review and meta-analysis. *Obesity Journal*. 2008; 16:265–274.
- Colten, HR.; Altevogt, BM. *Sleep disorders and sleep deprivation: An unmet public health problem*. Washington, DC: National Academies Press; 2006.
- Crosnoe R, Lopez-Gonzalez L. Immigration from Mexico, school composition, and adolescent functioning. *Sociological Perspectives*. 2005; 48:1–24.
- Cuéllar I, Arnold B, Maldonado R. Acculturation rating scale for Mexican Americans-II: A revision of the original ARSMA scale. *Hispanic Journal of Behavioral Sciences*. 1995; 17:275–304.
- Dahl RE, Harvey AG. Sleep in children and adolescents with behavioral and emotional disorders. *Sleep Medicine Clinics*. 2007; 2:501–511.
- Dahl RE, Lewin DS. Pathways to adolescent health: Sleep regulation and behavior. *Journal of Adolescent Health*. 2002; 31:175–184. [PubMed: 12470913]
- Eccles JS, Barber B. Risky behavior measure. 1990 Unpublished scale, U of MI.
- El-Sheikh M, Buckhalt JA, Mize J, Acebo C. Marital conflict and disruption of children's sleep. *Child Development*. 2006; 77:31–43. [PubMed: 16460523]

- Elkind, D. *The hurried child*. Reading, MA: Addison-Wesley; 1981.
- Feldman AF, Matjasko JL. The role of school-based extracurricular activities in adolescent development: A comprehensive review and future directions. *Review of Educational Research*. 2005; 75:159–210.
- Foster SL, Martinez CR. Ethnicity: Conceptual and methodological issues in child clinical research. *Journal of Clinical Child Psychology*. 1995; 24:214–226.
- Fredriksen K, Rhodes J, Reddy R, Way N. Sleepless in Chicago: Tracking the effects of adolescent sleep loss during the middle school years. *Child Development*. 2004; 75:84–95. [PubMed: 15015676]
- Fulgini AJ, Hardway C. Daily variations in adolescents' sleep, activities, and psychological well-being. *Journal of Research on Adolescence*. 2006; 16:353–378.
- Gonzales, NA.; Knight, GP.; Morgan-Lopez, AA.; Saenz, D.; Sirolli, A. Acculturation and the mental health of Latino youths: An integration and critique of the literature Latino children in the United States. In: Contreras, JM.; Kerns, KA.; Neal-Barnett, AM., editors. Westport, CT: Greenwood; 2002. p. 45-74.
- Harris, KM.; King, RB.; Gordon-Larsen, P. Healthy habits among adolescents: Sleep, exercise, diet, and body image. In: Moore, KA.; Lippman, LH., editors. *What do children need to flourish: Conceptualizing and measuring indicators of positive development*. New York: Springer; 2005. p. 111-132.
- Haynes PL, Bootzin RR, Smith L, Cousins J, Cameron M, Stevens S. Sleep and aggression in substance-abusing adolescents: Results from an integrative behavioral sleep-treatment pilot program. *Sleep*. 2006; 29:512–520. [PubMed: 16676785]
- Hernandez D. Demographic change and the life circumstances of immigrant families. *Future of Children*. 2004; 14:17–47.
- Huston TL, Robins E. Conceptual and methodological issues in studying close relationships. *Journal of Marriage and the Family*. 1982; 44:901–925.
- Knight GP, Gonzales NA, Saenz DS, German M, Bonds DD, Deardorff J, Roosa MW, Updegraff KA. The Mexican American cultural values scale for adolescents and adults. *Journal of Early Adolescence*. (in press).
- Kuczumski RJ, Ogden CL, Grummer-Strawn LM, Flegal KM, Guo SS, Wei R, et al. CDC growth charts: United States. *Advance Data from Vital Health Statistics*. 2000:1–27.
- Lareau, A. *Unequal childhoods: Class, race, and family life*. Berkeley: U of California; 2003.
- Maccoby, EE. *The two sexes: Growing apart and coming together*. Cambridge, MA: Harvard University Press; 1998.
- Maquet P. The role of sleep in learning and memory. *Science*. 2001; 294:1048–1052. [PubMed: 11691982]
- McHale SM, Updegraff KA, Shanahan L, Killoren SA. Siblings' differential treatment in Mexican American families. *Journal of Marriage and Family*. 2005; 67:1259–1274. [PubMed: 18414595]
- McLoyd, VC. Changing demographics in the American population: Implications for research on minority children and adolescents. In: McLoyd, VC.; Steinberg, L., editors. *Studying minority adolescents: Conceptual, methodological, and theoretical issues*. Mahwah, NJ: Lawrence Erlbaum; 1998. p. 3-28.
- Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*. 1977; 1:385–401.
- Smetana, JG. Concepts of self and social convention: Adolescents' and parents' reasoning about hypothetical and actual family conflicts. In: Gunnar, MR.; Collins, WA., editors. *Minnesota Symposia on Child Psychology*, vol. 21. Development during the transition to adolescence. Hillsdale, NJ: Erlbaum; 1988. p. 79-122.
- Snell EK, Adam EK, Duncan G. Sleep and the body mass index and overweight status of children and adolescents. *Child Development*. 2007; 78:309–323. [PubMed: 17328707]
- Spilsbury JC, Storfer-Isser A, Drotar D, Rosen CL, Kirchner LH, Benham H, Redline S. Sleep behavior in an urban US sample of school-aged children. *Archives of Pediatrics & Adolescent Medicine*. 2004; 158:988–994. [PubMed: 15466688]

- US Census Bureau. America's Families and Living Arrangements: 2008. 2008. Retrieved May 8, 2009, from <http://www.census.gov/population/www/socdemo/hh-fam/cps2008.html>
- Van Hook J, Balistreri K. Immigrant generation, socioeconomic status, and economic development of countries of origin: A longitudinal study of body mass index among children. *Social Science & Medicine*. 2007; 65:976–989. [PubMed: 17570571]
- Vega WA, Sribney W. Parental risk factors and social assimilation in alcohol dependence of Mexican Americans. *Journal of Studies on Alcohol*. 2003; 64:167–175. [PubMed: 12713189]
- Wolfson AR, Carskadon MA. Sleep schedules and daytime functioning in adolescents. *Child Development*. 1998; 69:875–887. [PubMed: 9768476]

Table 1

Means (and Standard Deviations) for Sleep Measures (in Hours/7Days) for Older and Younger Girls and Boys

	Older		Younger	
	Girls	Boys	Girls	Boys
Night Sleep (Average Duration)	8.52 (.87)	8.58 (1.02)	9.14 (.70)	9.22 (.71)
Night-to-Night Variation	1.02 (.80)	.97 (.75)	.76 (.78)	.59 (.57)
Naptime (Average Duration)	.24 (.34)	.19 (.28)	.13 (.23)	.10 (.20)

Table 2

Coefficients (and Standard Errors) for Links Between Sleep Measures (Average Night Duration, Night-to-Night Variation, and Nap Duration) and Adolescent Well-Being

Effect	GPA		Depressive Symptoms		Risky Behavior		BMI	
	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Intercept	2.78	(.07)**	1.91	(.03)**	1.15	(.01)**	65.45	(1.97)**
Income	.34	(.07)**	-.11	(.35)**	-.01	(.01)	-.96	(2.10)
Gender (girl = 0)	-.36	(.09)**	-.12	(.04)**	.06	(.01)**	2.32	(2.79)
Sibling (older = 0)	-.06	(.04)	-.00	(.02)	.01	(.01)†	-3.86	(1.46)**
Night sleep	-.04	(.06)	-.04	(.09)	-.02	(.01)†	-3.53	(1.74)*
Variation	-.07	(.04)	.06	(.02)**	.03	(.01)**	.77	(1.41)
Nap	-.01	(.02)	.01	(.01)	.01	(.00)**	.44	(.62)

† p < .10.

* p < .05.

** p < .01.

Table 3
Coefficients (and Standard Errors) for Links Between Mothers' and Fathers' Cultural Orientations and Adolescents' Sleep

Effect	Mothers' Orientations						Fathers' Orientations					
	Night Sleep		Sleep Variation		Naptime		Night Sleep		Sleep Variation		Naptime	
	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Intercept	8.84	(.06)*	2.80	(.07)**	2.40	(.16)**	8.84	(.06)**	2.80	(.07)**	2.39	(.16)**
Income	-.17	(.07)*	-.30	(.08)**	-.21	(.20)	-0.17	(.07)*	-0.32	(.09)**	-.27	-.20
Gender (girl = 0)	-.05	(.07)	-.05	(.10)	-0.66	(.21)*	-.04	(.07)	-.05	(.10)	-.65	(.21)*
Sibling (older = 0)	-.31	(.03)**	.17	(.04)**	.47	(.09)**	-.31	(.03)**	.17	(.04)**	.47	(.09)**
Familism values	.12	(.11)	-.18	(.13)	.16	(.31)	.23	(.10)*	.01	(.12)	-.48	(.28)†
Cultural practices	-.08	(.03)**	.07	(.04)†	.20	(.10)*	-.05	(.03)	.09	(.04)*	.16	(.09)†

† p < .10.
* p < .05.
** p < .01.

Table 4
Coefficients (and Standard Errors) for Links Between Family Socio-Economic Circumstances and Adolescents' Sleep

Effect	Night Sleep		Sleep Variation		Naptime	
	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)
Intercept	8.84	(.06) ^{***}	2.79	(.07) ^{***}	2.39	(.16) ^{***}
Income	-.19	(.08) [*]	-.10	(.10)	.01	(.23)
Gender (0 = girl)	-.06	(.07)	-.05	(.09)	-.66	(.21) [*]
Sibling (0 = older)	-.31	(.03) ^{***}	.17	(.04) ^{***}	.47	(.10) ^{***}
Parental education	-.04	(.01) ^{***}	.01	(.02)	.04	(.04)
Neighborhood crime	-.24	(.13) ⁺	-.15	(.15)	.75	(.37) [*]
Economic hardship	-.01	(.02)	.09	(.03) ^{***}	.03	(.07)

[†] p < .10.

^{*} p < .05.

^{***} p < .01

Table 5

Coefficients (and Standard Errors) for Links Between Mothers' and Fathers' Marriage and Parent-Child Relationships and Adolescents' Sleep

Effect	Mothers' Relationships				Fathers' Relationships							
	Night Sleep		Sleep Variation		Night Sleep		Sleep Variation					
	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)	Coeff	(SE)				
Intercept	8.83	(.06)**	2.82	(.07)**	2.47	(.16)	8.84	(.06)**	2.81	(.07)**	2.40	(.16)**
Income	-.27	(.06)**	-.22	(.07)**	-.02	(.17)	-.27	(.06)**	-.20	(.07)**	-.01	(.17)
Gender (0 = girl)	-.07	(.08)	-.09	(.10)	-.78	(.22)**	-.04	(.07)	-.06	(.09)	-.64	(.21)*
Sibling (0 = older)	-.31	(.03)**	.17	(.05)**	.45	(.09)**	-.30	(.03)**	.17	(.04)**	.46	(.09)**
Marital conflict	-.06	(.03)**	.05	(.03)	.07	(.07)	-.02	(.03)	.01	(.03)	-.06	(.07)
Parent-child conflict	-.02	(.04)	.18	(.05)**	.04	(.12)	-.01	(.04)	.15	(.05)**	.11	(.11)
Parent-child time	.00	(.00)	-.01	(.01)	-.03	(.01)*	.01	(.01)*	-.00	(.01)	-.02	(.01)†

† p < .10.

* p < .05.

** p < .01