



HHS Public Access

Author manuscript

J Adolesc. Author manuscript; available in PMC 2019 October 01.

Published in final edited form as:

J Adolesc. 2018 October ; 68: 165–170. doi:10.1016/j.adolescence.2018.07.016.

Adolescent Sleep Insufficiency One Year After High School

Jessamyn G. Perlus, MS^a, Fearghal O'Brien, PhD^b, Denise Haynie, PhD, MPH^c, and Bruce Simons-Morton, EdD, MPH^c

^aCorresponding author: University of Illinois at Urbana-Champaign, Department of Educational Psychology, 1310 S. Sixth Street, Champaign, IL 61820 USA, Telephone: (217) 333-2245, Fax: (217) 244-7620, perlus2@illinois.edu

^bNational College of Ireland, Mayor Street, Dublin 1 fearghal.obrien@ncirl.ie

^cEunice Kennedy Shriver National Institute of Child Health and Human Development 6710B Rockledge Drive, Bethesda, MD 20817 USA Denise_Haynie@nih.gov, mortonb@exchange.nih.gov

Abstract

Introduction: Sleep difficulties affect approximately 45% of adolescents and are associated with health consequences such as depression and obesity. Sleep duration immediately following high school is not well understood, especially for those not pursuing post-secondary education. We examined adolescent sleep insufficiency and its association with school and work status.

Methods: Data were collected in 2012 and 2013 as part of the NEXT Generation Health Study (NEXT), a nationally representative, longitudinal study of U.S. adolescents. Self-reported sleep was compared with guidelines for healthy sleep.

Results: On weekdays, 31% reported less than 7 hours of sleep; which reduced to 6% on weekends. Average weekday sleep was 7.4 hours and weekend sleep was 9.2 hours. Few results emerged from interaction analyses comparing different work and school statuses.

Conclusions: This study captures sleep habits of adolescents one year after high school regardless of school and/or working status. Implications and future directions are discussed.

Keywords

United States; Sleep; Health Behavior; Adolescents; Emerging Adults

Adolescent Sleep Insufficiency One Year after High School

Sleep difficulties, such as insufficient sleep, affect approximately 45% of adolescents in 6th to 12th grade (Gradisar, Gardner, & Dohnt, 2011). These difficulties are associated with a

Correspondence to: Jessamyn G. Perlus.

Declaration of interest: none

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

host of mental and physical consequences, including increased risk of obesity, drowsy driving, depressed mood, and even suicide attempts (Owens et al., 2014). Poor sleep is also linked to lowered academic performance and behavioral problems such as school absenteeism and substance use (Roberts, Roberts, & Duong, 2009; Shochat, Cohen-Zion, & Tzischinsky, 2014). Physiological and psychosocial changes characteristic of adolescence coincide with sleep habits such as delayed sleep onset and a shift in circadian rhythms (Carskadon, 2011). Behaviors acquired in adolescence tend to persist into adulthood (Lau, Quadrel, & Hartman, 1990); therefore, this is a critical time to examine sleep habits. Persistent sleep deficiency can compromise humans' mental aptitude and physical vitality, and lead to overall poorer health (Walker, 2017). Sleep is a vital health behavior that has widespread impact on functioning, particularly in school and social environments. This impact may be seen in life opportunities and decisions such as employment and school status. These numerous health and academic consequences make sleep, particularly during emerging adulthood, a public health concern.

The recommended sleep duration for adolescents and adults is typically a minimum of seven hours per night (CDC, 2017; Hirshkowitz et al., 2015; NHLBI, 2017). Others have noted that these recommendations may even underestimate the amount of sleep needed (Short, Weber, Reynolds, Coussens, & Carskadon, 2018). Sleep duration has been examined separately for high school (Keyes, Maslow, Hamilton, & Schulenberg, 2015) and college students (Lund, Reider, Whiting, & Prichard, 2010), but changes during this transition are not well understood, and adolescents not attending college are largely unstudied. Many researchers have noted the constricted availability of sleep hours among adolescents due to extracurricular demands (Bartel, Gradisar, & Williamson, 2015) and the particular burden faced by those both enrolled in college and working (Teixeira et al., 2012). No study has examined whether sleep duration differs based on distinctive pathways of work, post-secondary education, or both after high school.

This study investigated the prevalence of sleep insufficiency in the first year after high school and its associations with school enrollment and work status. Using a nationally representative population, we addressed two main research questions: (a) what is the proportion of adolescents obtaining insufficient sleep one year after high school? (b) How does this differ when adolescents are enrolled in post-secondary schooling and/or working? Based on previous estimates we expected more than half the sample to report insufficient weekday sleep (Lund et al., 2010). In contrast, we expected most of the sample to report sufficient weekend sleep. We expected students, particularly those enrolled at universities, to get insufficient weekday sleep and we also expected full-time workers to report similar insufficient sleep patterns.

Demographic factors have been shown to be associated with sleep in this population, so we included gender, race/ethnicity, and parental education as covariates. Although some differences have been found in other sleep quality studies (Vallido, Jackson, & O'Brien, 2009), we did not expect gender differences to be related to insufficient sleep. Race/ethnicity and socioeconomic status have been associated with adolescent health, particularly sleep (Kingsbury, Buxton, & Emmons, 2013) and stress (Goodman, McEwen, Dolan, Schafer-Kalkhoff, & Adler, 2005). We predicted that members of ethnic/racial minority groups

would report shorter sleep duration. Previous studies have also found socioeconomic status and maternal education linked to sleep efficiency in children (El-Sheikh et al., 2013); we expected lower parental education could also be linked to shorter sleep duration.

Methods

Participants

This study used data from the NEXT Generation Health Study (NEXT), a nationally representative cohort of adolescents initially recruited in 2009 during their 10th grade year and were followed for seven years (Li, Iannotti, Haynie, Perlus, & Simons-Morton, 2014). Students were sampled using a clustered sample strategy, stratified across nine U.S. Census divisions with school districts as the primary sampling unit. This examination utilized the third and fourth waves (i.e., 2012 and 2013) and to avoid confusion these are referred to as “Time 1” (i.e., final year of high school), and “Time 2” (i.e., first year after high school). Data collection extended from January to July for both surveys and the majority of responses were provided February to May each year. Most participants completed the survey online; those without Internet access completed a paper version. Participants received monetary incentives at each wave.

At Time 1, 2297 students were in NEXT. Of these, 225 dropped out, 67 were still in high school, and 390 had missing data for the variables in the current study at Time 2. The final analysis sample ($N = 1615$) was 60% female, 66% Caucasian, 12% African American, 17% Hispanic/Latino, 5% other (weighted frequencies, see Table 2). At Time 2 the mean age was 19.1 years ($xSD = 0.03$).

Measures

Sleep duration was total hours of sleep on scheduled-days (typically weekdays) with the phrasing “On days that you go to school, work, or similar activities.” Sleep was measured separately for free-days (typically weekends) with the phrasing “On days that you don’t have to get up at a certain time.” At Time 1, participants reported sleep and wake times (e.g., 11:00pm, 7:00am) for “most weekdays” and “most free-days” but at Time 2 participants reported sleep duration (e.g., “8 hours 10 minutes”). Accordingly, Time 1 reports were converted to duration to allow for comparisons. The estimates reflect weekday (scheduled-day) and weekend (free-day) and averages. Participants who reported less than 7 hours of sleep were classified as having *insufficient sleep*. This dichotomy reflects the way public health recommendations often appear, typically a minimum of 7 hours for adults 18 to 60 according to the Centers for Disease Control (CDC, 2017), the National Heart, Lung, and Blood Institute (NHLBI, 2017), and the National Sleep Foundation (Hirshkowitz et al., 2015).

School and work were independently classified. Post-secondary *school status* was classified as enrolled in a (a) 4-year college or university; (b) community college or vocational/tech school; or (c) not enrolled in any school. *Work status* was classified as working (a) 20 hours; (b) > 21 hours; or (c) not working. Table 1 presents a frequency cross-tabulation of work and school status. Although the Bureau of Labor Statistics defines part time as less

than 35 hours per week, we found the 20-hour cut point a useful categorization for the young adult population; particularly the typical hourly jobs available to college students. Our classification captures part time compared to longer work and still allowed for interpretable interaction analyses.

Control variables were included in all analyses, specifically *gender* (male, female), *race/ethnicity* (Caucasian, Black/African American, Hispanic/Latino, Other), *family affluence* which is indicated by questions about owning computers, vehicles, and taking vacations (low, moderate, high; Currie et al., 2008), and *parents' highest level of education* (high school or less, some college, bachelor degree or greater). Table 2 details the frequencies associated with these variables in the current sample. Additionally, we controlled for *insufficient sleep the previous year* (at Time 1) to examine variables associated with a change (or not) in sleep.

Analysis

Separate logistic regressions were constructed for weekday and weekend sleep duration with sleep sufficiency regressed on the two main predictors (school status and work status), the interaction between these, and the control variables (sleep the previous year collected at Time 1, gender, race/ethnicity, family affluence, and parental education). Control variables were added simultaneously with the predictors. Features of the complex survey design (i.e., stratification, clustering and sampling weights) were included and all analyses were carried out in SAS 9.4. The analytic approach follows directly from previous published NEXT research (e.g., Simons-Morton et al., 2017).

Results

Overall, the average weeknight sleep was 7.39 hours ($SD = 2.28$) and weekend night sleep was 9.18 hours ($SD = 3.03$). Thirty one percent of participants reported less than 7 hours of weeknight sleep; six percent reported insufficient weekend sleep. Incidence of adolescents moving from the sufficient to insufficient categories from Time 1 to Time 2 was 20.6% on weekdays and 5% on weekends. Insufficient weekday sleep at Time 1 increased the odds of getting insufficient weekday sleep the following year (OR = 1.72; 95% CI: 1.22, 2.44). Lastly, individuals moving from the insufficient to sufficient categories represented 16% of the total sample on weekdays and 5% on weekends indicating that some teens increased their weekday sleep post-high school.

As can be seen in Table 3, of the demographic variables included in the final model, ethnicity and parent education were significant predictors. Specifically, compared to white students, Hispanic students were more likely to report insufficient weekday sleep. Also, students whose parents had completed some college education compared to those with high school or less reported greater weekday sleep insufficiency. However, the lower bound of these confidence intervals barely surpassed 1.00.

School and Work Status

After controlling for the demographic covariates and accounting for the previous year's sleep, post-secondary school status was not associated with weekday sleep. On weekends,

those who were not attending post-secondary school were more likely to report insufficient sleep compared to university students (OR = 3.56; 95% CI: 1.10, 11.54). Work status also did not display significant associations with weekday or weekend sleep insufficiency. Additionally, there were no significant interactions between school and work status for weekday or weekend sleep.

We reran the logistic regressions with this 8-hour cutoff and there were very few changes, none of which substantially changed the results. Additionally, we ran the analyses including an interaction between previous year sleep insufficiency status and school, and between previous year sleep insufficiency status and work. No significant interactions occurred for either variable for weekday or weekend sleep.

Discussion

Our first research question addressed the proportion of adolescents obtaining sufficient sleep one year after high school. Current recommendations indicate 7-9 hours per night are appropriate for adults 18 and older (CDC, 2017; NHLBI, 2017). In our nationally representative sample, teens reported an average of about seven and a half hours on weeknights and just over nine hours on weekend nights, a pattern consistent with findings from other studies on adolescents (Galambos, Dalton, & Maggs, 2009). Of the adolescents sampled, 69% reported a minimum of seven hours on weekdays and 94% on weekends. Our study showed students with insufficient weekday sleep their final year in high school had *increased* odds of getting insufficient weekday sleep the following year. Other studies have used an 8-hour cutoff to indicate sleep sufficiency which still falls within the 7-9 hour guideline and is appropriate for older adolescents who need longer sleep (Short et al., 2018). Although this cutoff resulted in most of our participants being classified as getting insufficient weekday sleep (63%), we did not find substantial differences in results when reanalyzing with this cutoff.

The second research question explored how sleep sufficiency differs when adolescents are enrolled in post-secondary schooling and/or working. Our sample had 46% enrolled in college or university after high school, higher than the national estimates of 37% (Bureau of Labor Statistics, 2013). It is possible our rates are higher due to bias in which individuals were more likely to respond to the Time 2 survey. We found type of post-secondary education was associated with sleep insufficiency, but only on weekends. Compared to university students, participants who were not in school were more likely to experience insufficient sleep. Since sleep insufficiency status at Time 1 was controlled for, we have adjusted for whatever influence previous sleep insufficiency may have on likelihood of college attendance possibly through indirect mechanisms, such as academic performance.

Our expectation based on previous estimates was that university students in particular would report decreased weekday sleep, yet this finding did not emerge (Lund et al., 2010). However, Lund's research focused on university students only, whereas our research included similarly aged participants attending 2-year post-secondary education or not in school. Our findings indicate that university students are not unique in the likelihood of experiencing sleep insufficiency; others of similar age with different school statuses are

similarly likely to experience insufficient sleep. Thus, sleep insufficiency is likely widespread among emerging adults, similar to findings among younger adolescents (Owens et al., 2014; Wolfson, 2010). Future research could explore differences in weekend sleep based on working and/or attending school in addition to other time commitments including leisure activities. Another potential avenue for research is to examine residence type (e.g., dorm, with parents) to explore social and environmental contributors to sleep sufficiency.

Work status alone did not display a pattern of sleep insufficiency, indicating that workers did not get substantially more or less sleep than non-workers. The distribution of work hours in our sample did not allow for meaningful comparisons of those working long hours with those working fewer hours or not at all. Other researchers have noted that industry in which you are employed makes an important difference for short sleep duration (Luckhaupt, Tak, & Calvert, 2010), and industry was not captured in this analysis therefore it is one potential direction to explore.

Recognizing that many individuals are engaged in some combination of both work and school, we examined an interaction between school status and work status. The labor force participation rate of college students in four-year settings was 38%, (the same as the national rate of 38%); for students in 2-year programs was 46% (compared to 48% nationally); and for non-students 61% (compared to 69%; Bureau of Labor Statistics, 2013). The non-significant interactions are of particular interest given that previous authors have noted the double burden of working and attending school (e.g., Teixeira et al., 2012). Work and school activities create time demands that truncate available sleep hours. Walker says “No one wants to give up time with their family or entertainment, so they give up sleep instead” (Walker, cited in Cooke, 2017). It could be that students who are at universities and do not participate in the work force (the referent for the interaction analysis) engage in other activities, for example unpaid occupations (e.g., internships, collegiate athletics) that similarly limit time available for sleep. College may provide some structure or impose responsibilities that would discourage staying up late, while not attending college might encourage unconventional sleep patterns. However, sleep insufficiency was not greater among those not attending college and working and/or not working. It is unknown what those not attending college were doing with their time or how their lifestyle may have been different from those attending college. More research is needed on this interesting population.

Other authors have identified perceived stress (Lund et al., 2010), electronic devices, school start times, and caffeine (Owens et al., 2014) as contributors to short sleep duration. Future studies could investigate the differential impact of these factors based on school and work status.

One limitation of this study was the reliance on self-report measures. In a systematic review, Nascimento-Ferreira and colleagues' (2016) meta-analysis found children and adolescents' self-reported levels of sleep (through sleep diaries and estimates of sleep and wake time) and accelerometers to be correlated ($r = 0.64$ for scheduled-day nights and $r = 0.49$ free-day nights). However, one study of middle aged adults showed that participants tended to overestimate their average sleep (Lauderdale, Knutson, Yan, Liu, & Rathouz, 2008).

Collectively, this indicates studies incorporating more measures of sleep, such as sleep diaries and actigraphy data are needed, however, it should be acknowledged that these are difficult and expensive to implement which are not feasible for population-based studies such as ours. More studies are needed to understand the association between survey measures and objective measures in this age group so we can better estimate the expected direction and magnitude of misreporting (Gradisar et al., 2011). Additionally, we did not explore sleep quality such as sleep stage cycle, restlessness, or number of awakenings per night. Similarly, respondents reported typical sleep and wake times, which does not describe variability in sleep or encompass sleep that occurs at other times. Lastly, we did not know the respondents' occupations, work schedules, and whether or not they were working during shifts that coincide with typical sleep hours (e.g., night shifts).

Sufficient sleep is necessary for healthy functioning, particularly in emerging adulthood. Previous research has reported sleep insufficiency in high school (Roberts et al., 2009) and college (Lund et al., 2010; Teixeira et al., 2012), but the current study is the first to examine sleep during the initial year after high school using a nationally representative sample and including (a) multiple types of schooling, (b) multiple categories of work hours, (c) individuals who do not attend post-secondary education, and (d) individuals who do not work or attend school. This study uniquely captures both the *younger* working adults and the individuals who do not pursue post-secondary education which are typically not studied in populations of workers and university students. Post-secondary schools and work environments create new social opportunities and changes in time usage, which may impact sleep.

Acknowledgements

This project (contract number HHSN2752012000011) was supported in part by the intramural research program of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD), the National Heart, Lung and Blood Institute (NHLBI), the National Institute on Alcohol Abuse and Alcoholism (NIAAA), and Maternal and Child Health Bureau (MCHB) of the Health Resources and Services Administration (HRSA), with supplemental support from the National Institute on Drug Abuse (NIDA).

References

- Bartel KA., Gradisar M., & Williamson P. (2015). Protective and risk factors for adolescent sleep: A meta-analytic review. *Sleep Medicine Reviews*, 21, 72–85. doi:10.1016/j.smrv.2014.08.002 [PubMed: 25444442]
- Bureau of Labor Statistics. (2013). College Enrollment and Work Activity of 2012 High School Graduates [Press release]. Retrieved from https://www.bls.gov/news.release/archives/hsgec_04172013.pdf
- Carskadon MA (2011). Sleep in adolescents: the perfect storm. *Pediatric Clinics of North America*, 58(3), 637–647. doi: 10.1016/j.pcl.2011.03.003 [PubMed: 21600346]
- Centers for Disease Control. (2017, March 2). How much sleep do I need? Retrieved from https://www.cdc.gov/sleep/about_sleep/how_much_sleep.html
- Cooke R (2017, 9 24). 'Sleep should be prescribed': what those late nights out could be costing you. *The Guardian*.
- Currie C, Molcho M, Boyce W, Holstein B, Torsheim T, & Richter M (2008). Researching health inequalities in adolescents: The development of the Health Behaviour in School-Aged Children (HBSC) Family Affluence Scale. *Social Science and Medicine*, 66(6), 1429–1436. doi:10.1016/j.socscimed.2007.11.024 [PubMed: 18179852]

- El-Sheikh M, Bagley EJ, Keiley M, Elmore-Staton L, Chen E, & Buckhalt JA (2013). Economic adversity and children's sleep problems: Multiple indicators and moderation of effects. *Health Psychology, 32*(8), 849–859. doi:10.1037/a0030413 [PubMed: 23148451]
- Galambos NL, Dalton AL, & Maggs JL (2009). Losing sleep over it: Daily variation in sleep quantity and quality in Canadian students' first semester of university. *Journal of Research on Adolescence, 19*(4), 741–761. doi:10.1111/j.1532-7795.2009.00618.x
- Goodman E., McEwen BS., Dolan LM., Schafer-Kalkhoff T., & Adler NE. (2005). Social disadvantage and adolescent stress. *Journal of Adolescent Health, 37*(6), 484–492. doi: 10.1016/j.jadohealth.2004.11.126 [PubMed: 16310126]
- Gradisar M, Gardner G, & Dohnt H (2011). Recent worldwide sleep patterns and problems during adolescence: a review and meta-analysis of age, region, and sleep. *Sleep medicine, 12*(2), 110–118. doi: 10.1016/j.sleep.2010.11.008 [PubMed: 21257344]
- Hirshkowitz M, Whiton K, Albert SM, Alessi C, Bruni O, DonCarlos L, ... Ware JC. (2015). National Sleep Foundation's updated sleep duration recommendations: final report. *Sleep Health, 1*(4), 233–243. doi:10.1016/j.sleh.2015.10.004 [PubMed: 29073398]
- Keyes KM, Maslowsky J, Hamilton A, & Schulenberg J (2015). The great sleep recession: Changes in sleep duration among U.S. adolescents, 1991–2012. *Pediatrics*. doi: 10.1542/peds.2014-2707
- Kingsbury JH, Buxton OM, & Emmons KM (2013). Sleep and its relationship to racial and ethnic disparities in cardiovascular disease. *Current cardiovascular risk reports, 7*(5), 10.1007/s12170-12013-10330-12170. doi:10.1007/s12170-013-0330-0
- Lau RR, Quadrel MJ, & Hartman KA (1990). Development and change of young adults' preventive health beliefs and behavior: Influence from parents and peers. *Journal of Health and Social Behavior, 240–259*. [PubMed: 2133479]
- Lauderdale DS, Knutson KL, Yan LL, Liu K, & Rathouz PJ (2008). Self-reported and measured sleep duration: How similar are they? *Epidemiology, 19*(6), 838–845. Retrieved from <http://www.jstor.org.proxy2.library.illinois.edu/stable/25662646> [PubMed: 18854708]
- Luckhaupt SE, Tak S, & Calvert GM (2010). The prevalence of short sleep duration by industry and occupation in the National Health Interview Survey. *Sleep, 33*(2), 149–159. doi:10.1093/sleep/33.2.149 [PubMed: 20175398]
- Lund HG, Reider BD, Whiting AB, & Prichard JR (2010). Sleep patterns and predictors of disturbed sleep in a large population of college students. *Journal of Adolescent Health, 46*(2), 124–132. doi: 10.1016/j.jadohealth.2009.06.016 [PubMed: 20113918]
- Nascimento-Ferreira MV, Collese TS, de Moraes ACF, Rendo-Urteaga T, Moreno LA, & Carvalho HB (2016). Validity and reliability of sleep time questionnaires in children and adolescents: A systematic review and meta-analysis. *Sleep Medicine Reviews, 30*, 85–96. doi:10.1016/j.smrv.2015.11.006 [PubMed: 26921735]
- National Health Lung and Blood Institute. (2017, 6 7). How much sleep is enough? Retrieved from <https://www.nhlbi.nih.gov/health/health-topics/topics/sdd/howmuch>
- Owens J, Au R, Carskadon M, Millman R, Wolfson A, Braverman PK, ... O'Brien, R. F. (2014). Insufficient sleep in adolescents and young adults: An update on causes and consequences. *Pediatrics, 134*(3), e921–e932. doi: 10.1542/peds.2014-1696 [PubMed: 25157012]
- Roberts RE, Roberts CR, & Duong HT (2009). Sleepless in adolescence: Prospective data on sleep deprivation, health and functioning. *Journal of Adolescence, 32*(5), 1045–1057. doi:10.1016/j.adolescence.2009.03.007 [PubMed: 19361854]
- Shochat T, Cohen-Zion M, & Tzischinsky O (2014). Functional consequences of inadequate sleep in adolescents: A systematic review. *Sleep Medicine Reviews, 18*(1), 75–87. doi:10.1016/j.smrv.2013.03.005 [PubMed: 23806891]
- Short MA, Weber N, Reynolds C, Coussens S, & Carskadon MA (2018). Estimating adolescent sleep need using dose-response modeling. *Sleep, 41*(4), zsy011–zsy011. doi:10.1093/sleep/zsy011
- Simons-Morton B, Haynie D, O'Brien F, Lipsky L, Bible J, & Liu D (2017). Variability in measures of health and health behavior among emerging adults 1 year after high school according to college status. *Journal of American College Health, 65*(1), 58–66. doi: 10.1080/07448481.2016.1238384 [PubMed: 27661849]

- Teixeira L, Lowden A, Da Luz AA, Turte SL, Valente D, Matsumura RJ, ... Fischer FM. (2012). Sleep patterns and sleepiness of working college students. *Work*, 41(SUPPL.1), 5550–5552. doi: 10.3233/WOR-2012-0879-5550 [PubMed: 22317611]
- Vallido T, Jackson D, & O'Brien L (2009). Mad, sad and hormonal: the gendered nature of adolescent sleep disturbance. *Journal of Child Health Care*, 13(1), 7–18. doi: [10.1177/1367493508098377](https://doi.org/10.1177/1367493508098377) [PubMed: 19240187]
- Walker M (2017). *Why we sleep: Unlocking the power of sleep and dreams*. New York: Scribner.
- Wolfson AR (2010). Adolescents and emerging adults' sleep patterns: New developments. *Journal of Adolescent Health*, 46(2), 97–99. doi:10.1016/j.jadohealth.2009.11.210 [PubMed: 20113914]

Table 1

Distribution of participants by post-secondary school and work status

		Post-Secondary School Status		
		No School	Community/ Tech School	University
Work Status	No work	151	261	467
	20 hours/week	35	86	186
	>21 hours/week	194	139	96

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2

Sample characteristics of the NEXT Generation Health Study

	<i>N</i>	%
Total Sample	1615	<i>a</i>
Gender		
Male	670	40%
Female	945	60%
Ethnicity		
Caucasian	719	66%
Black/African American	360	12%
Hispanic/Latino	452	17%
Other	84	5%
Family Affluence ^{<i>b</i>}		
Low	465	19%
Moderate	770	50%
High	380	31%
Parents' highest level of education		
High School or Less	578	31%
Some College	595	38%
Bachelor Degree or Greater	442	31%
School		
University	749	46%
Community/Tech School	486	27%
Not in school	380	27%
Work		
Not working	879	47%
Working (≤ 20 hours/week)	307	22%
Working (>21 hours/week)	429	30%
Weekday Insufficient Sleep (<7 hours) ^{<i>c</i>}		
T1 (last year of high school)	433	24%
T2 (first year after high school)	510	31%
Weekend Insufficient Sleep (<7 hours) ^{<i>c</i>}		
T1 (last year of high school)	101	7%
T2 (first year after high school)	97	6%

Note.^{*a*}Percentages are weight-adjusted.^{*b*}Family affluence is indicated by questions about owning computers and vehicles, having your own bedroom, and taking family vacations.^{*c*}Frequencies and percentages refer to participants with insufficient sleep.

Table 3

Odds ratio estimates for Time 2 sleep insufficiency on Weekdays and Weekends.

	Weekday			Weekend		
	OR	95% CI		OR	95% CI	
Gender (ref = male)	0.87	0.53	1.44	0.72	0.33	1.58
Ethnicity Hispanic (ref = White)	1.74	1.06	2.87	1.32	0.66	2.62
Ethnicity African American (ref = White)	1.65	1.00	2.73	2.26	0.99	5.15
Ethnicity Other (ref = White)	2.09	0.80	5.42	0.40	0.07	2.17
Family Affluence Moderate (ref = Low)	1.14	0.74	1.76	1.19	0.43	3.30
Family Affluence High (ref = Low)	0.95	0.54	1.66	1.38	0.66	2.86
Parent Education Bachelor or Higher (ref = High School or less)	1.26	0.70	2.28	0.54	0.14	2.12
Parent Education Some College (ref = High School or less)	1.47	1.00	2.16	1.23	0.48	3.14
Time 1 Weekday Sleep Insufficiency	1.73	1.22	2.44	--	--	--
Time 1 Weekend Sleep Insufficiency	--	--	--	2.86	0.93	8.84
School Type Community (ref = University)	0.96	0.36	2.54	3.28	0.94	11.43
School Type No School (ref = University)	0.42	0.16	1.07	3.56	1.10	11.54
Work Hours (< 20 hours (ref = none)	1.24	0.76	2.02	0.96	0.20	4.65
Work Hours 21+ hours (ref = none)	1.32	0.65	2.70	2.42	0.58	10.07
School * Work Interaction Community/Tech*21+ Hours per week	1.13	0.36	3.60	0.57	0.11	2.91
School * Work Interaction Community /Tech*(< 20 Hours per week	0.56	0.17	1.83	1.18	0.17	8.21
School * Work Interaction No School*21+ Hours per week	1.56	0.37	6.53	0.54	0.07	4.07
School * Work Interaction No School*(< 20 Hours per week	2.21	0.19	26.04	0.74	0.07	8.13

Note. OR = Odds ratio, greater than 1 indicates more likely to experience insufficient sleep at Time 2. CI = confidence interval. **Bold** indicates significant odds ratios at $p < .05$.

Two analyses were conducted separately for weekday and weekend.