Published in final edited form as:

J Am Coll Health. 2017 January ; 65(1): 58–66. doi:10.1080/07448481.2016.1238384.

Variability in Measures of Health and Health Behavior Among Emerging Adults One Year After High School According to College Status

Bruce Simons-Morton, Ed,D, MPH,

Senior Investigator, Health Behavior Branch, Division of Intramural Population Health Research, Associate Director for Prevention, NICHD, 6100 Executive Blvd 7B13Q, Bethesda, MD 20892-7510

Denise Haynie, PhD, MPH,

Staff Scientist, Health Behavior Branch, Division of Intramural Population Health Research, 6100 Executive Blvd 7B13, 7B13, Bethesda, MD 20892-7510

Fearghal O'Brien, PhD,

Research Fellow, Health Behavior Branch, Division of Intramural Population Health Research, 6100 Executive Blvd 7B13, 7B13, Bethesda, MD 20892-7510

Leah Lipsky, PhD,

Staff Scientist, Health Behavior Branch, Division of Intramural Population Health Research, 6100 Executive Blvd 7B13, Bethesda, MD 20892-7510

Joe Bible, PhD, and

Research Fellow, Biostatistics and Bioinformatics Branch, Division of Intramural Population Health Research, 6100 Executive Blvd 7B13, Bethesda, MD 20892-7510

Danping Liu, PhD

Investigator, Biostatistics and Bioinformatics Branch, Division of Intramural Population Health Research, 6100 Executive Blvd 7B13, Bethesda, MD 20892-7510

Bruce Simons-Morton: mortonb@mail.nih.gov

Abstract

Objective—To examine changes in health behaviors among U.S. emerging adults one year after high school.

Participants—The national sample of participants (n=1927), including those attending 4-year college/university (n=884), 2-year colleges/technical schools (n=588), and no college (n=455), participated in annual spring surveys 2013–2014.

Methods—Health behaviors were assessed the last year of high school and first year of college; differences by college status controlling for previous-year values were estimated using regression analyses.

Results—Relative to 4-year college attendees, those attending technical school/community college were less likely to binge drink (OR=.57, CI=.38-.86), but more likely to speed (OR=1.26; CI=1.0–2.84), consume sodas (OR=1.57, CI=1.0–2.47), and report lower family satisfaction ($p<0.01$), with marginally more physical and depressive symptoms. College non-attendees reported more DWI (OR= 1.60, CI=1.05–2.47), soda drinking (OR=2.51, CI=1.76–3.59), over-sleeping (OR= 4.78, CI=3.65–8.63), and less family satisfaction ($p<0.04$).

Conclusions—Health risk behaviors among emerging adults varied by college status.

Keywords

college students; diet; exercise; substance use; driving; mental health; physical health; college health

INTRODUCTION

The transition to emerging adulthood beginning the first year after high school provides unique and important opportunities for experimentation and concomitant challenges to health behavior.¹ Health behaviors of particular importance among emerging adults include alcohol and substance use, risky driving, sleep, diet, mental health, and physical activity. Most previous research has focused on single health behaviors, such as college drinking. While environmental influences on drinking^{2,3} and physical activity⁴ have been shown among emerging adults when they attend college, start working, and live away from home, usually for the first time, little is known about the variability in health behaviors according to college status.

Research from Add Health, a large longitudinal study of adolescents followed periodically since 1994, has provided useful information about emerging adults. Timberlake reported that those who attended college drank less alcohol as adolescents but more than their non-college peers in early adulthood.⁵ Fletcher reported less substance use and fast food consumption among students attending higher quality colleges.⁶ Gordon-Larsen reported consistent declines in physical activity from adolescence to young adulthood, but did not report potential moderating effects of college status.⁷ Maslowsky found that average sleep was at its lowest around the transition out of high school, but again, did not look at the impact of attending college on this trend.⁸

Heavy drinking is associated with motor vehicle crashes, injuries (various causes), violence, addiction, and poor work and school performance.³ The prevalence of drinking to excess increases during late adolescence, peaking among young adults,^{9,10} and the prevalence of heavy drinking among traditional 4-year college students appears to be higher than other emerging adults¹¹. Marijuana use among undergraduates has been associated with major depressive, anxiety, and substance use disorders.¹² Some studies have found marijuana use not to vary according to college status,¹³ while others have found non-college attending young adults to have a higher prevalence.¹⁴

Driver behavior is implicated in many motor vehicle crashes, the leading cause of death for adolescents and young adults.¹⁵ Speeding is possibly the most prevalent and important

factor in fatal crashes, particularly among younger drivers and male drivers of all ages.¹⁵ Secondary tasks that take the drivers eyes off the forward roadway also pose substantial risks.¹⁶ Electronic device use among young drivers is of particular concern because of the attentional demands of reaching for the device, dialing, texting, and reading messages.¹⁷ Driving or riding with a driver impaired due to drowsiness, alcohol or drug use (DWI) increases the risk of a motor vehicle crash, particularly among adolescents and young adults.^{18–20}

Inadequate sleep is associated with health problems such as depression and obesity²¹ and is a common complaint of college students.²² The possible differences among emerging adults attending and not attending college are largely unstudied.

Physical activity (PA) and dietary behaviors are known to be sensitive to environmental influences, including social norms and the availability of suitable space and programs, potentially contributing to the decline sharply from adolescence to young adulthood,³ with less than half meeting national Physical Activity Guidelines of a minimum of 60 minutes of daily or 300 minutes weekly moderate to vigorous PA.^{23,24} Similarly, diet quality declines during adolescence and early adulthood,^{25,26} with lower than recommended consumption of fruit, vegetables and whole grains, higher than recommended intake of empty calories,²⁷ infrequent breakfast,²⁸ and frequent fast food.²⁹ The influence of college status on eating behaviors in U.S. emerging adults has been studied primarily within the context of the Project EAT study of Minnesotan adolescents and young adults. Data from this study indicated that although college food environments were not conducive to health diet,^{30,31} more healthful eating behaviors were observed in 4-year college students relative to 2-year college students and nonstudents,³⁰ and dietary intake quality was more optimal among college students living on campus relative to those living with their parents or in independent housing.³²

While emerging adulthood is a relatively healthy period, depressive symptoms are relatively common, at least among college students.³³ Complaints about headache and backache, which are associated with reduced productivity, absence from work, and loss of wages,³⁴ are common among emerging and young adults relative to other age groups.³⁵ The majority of college students report experiencing headaches at least once or twice a month,^{36–38} and an estimated 36% reported experiencing back pain in the last four weeks.³⁹

There is a paucity of research on the variability in key health behaviors according to college status among emerging adults. While students at traditional 4-year colleges have been reasonably well studied, less research has included emerging adults not attending college or attending community colleges or trade schools. It is of interest to examine the prevalence of health behaviors among emerging adults. The purpose of this paper is to examine associations between college status and health behaviors, including drinking, risky driving, sleep adequacy, physical activity, diet, depressive symptoms, and physical complaints, the first year of college, controlling for previous year values.

METHODS

The NEXT Generation Health Study (NEXT) is a longitudinal study of U.S. adolescents and emerging adults. Using multi-stage sampling, primary-sampling units consisted of school districts or groups of school districts stratified across the nine U.S. Census divisions. Within this sampling framework 81 out of 137 (58.4%) randomly selected schools agreed to participate starting in the 2009–2010 school year. Within each participating school, 10th grade classes in mandatory subjects were randomly selected to participate. African-American participants were oversampled to provide accurate population estimates. Of the 3,796 students invited to participate, 2781 (73%) consented and completed baseline surveys; retention from baseline to wave 4 was 78%. Students were surveyed annually, with a school-based assessment in 10th grade, and annual web-based assessments thereafter. Written parental consent and student assent was obtained. Upon turning 18 years of age, participants provided written consent. The study protocol was reviewed and approved by the Institutional Review Board of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development.

Sample

Data come from Wave 3 (W3, high school seniors) and Wave 4 (W4, 1st year after high school) of NEXT. The current analyses excluded participants still in high school at W4 or with incomplete data at W4. The final sample of 1927 (see Table 1) was comprised of 39% (weighted) male, 63% Caucasian, 11% African American, 14% Latino/Hispanic).

Modest differences were found between those retained from baseline to W4 and those lost to follow-up. Males were significantly more likely to have dropped out by W4, as were participants who reported lower family affluence and those with lower parent education. Participants who dropped out by W4 reported higher levels of binge drinking, marijuana use, and riding with an intoxicated driver at baseline compared with those who were retained in the sample. Additional sensitivity analyses using inverse probability weighting (IPW) were performed to account for the missing data due to drop out. When missing data are not missing completely at random, complete case analyses can lead to biased inferences, and IPW is a commonly used approach to correct for the bias.⁴⁰ Although the sample attrition may not be completely at random, our estimated effect of attrition by school status was minimal (data not shown), allowing complete case analyses.

Measures

Demographics—Demographic variables included sex, race/ethnicity, family affluence, and parent education. Participants self-reported their ethnicity (Hispanic or Latino or not Hispanic or Latino) and race using predefined categories (Black or African American, White, Asian, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander). Responses were categorized as White, African American, Hispanic and Other. Using the Family Affluence Scale, participants were categorized as low, moderate or high affluence.⁴¹ Parent education was reported by the parent completing the consent form and treated as a binary variable: at least one parent with a bachelor's degree or higher vs. neither parent with a bachelor's degree or higher.

College Status—Participants provided information at W4 about school status, high school (excluded from analysis), not attending school, attending technical/community college, or attending university/4-year college. Academic performance was not assessed.

Substance Use—Heavy episodic drinking was measured as the number of times (if any) a participant reported having four (for females)/five (for males) or more drinks on an occasion in the last 30 days.⁴² Responses were operationalized as 0 vs 1+. Marijuana use was assessed with a single item that asked how often in the last 30 days have you used marijuana, operationalized as 0 vs 1+.

DWI—Driving while intoxicated (DWI) was assessed by three questions that asked about the number of days in the last 30 they drove after drinking alcohol, using marijuana, or using other drugs in past 6 months, which were combined to create one variable. Participants also reported the number of times during the last 12 months they rode in a vehicle driven by someone who had been drinking alcohol or using illegal drugs.²³ Responses on both variables were treated as dichotomies (0 vs 1+).

Risky Driving—Participants reported the number of the last 30 days they exceeded the speed limit by 10 – 19 mile per hour, and separately, 20 or more miles per hour; responses to these two questions were combined into a single variable. One item assessed number of days participant drove when drowsy. Responses on both variables were treated as dichotomies (0 vs 1+). Six items assessed the number of the last 30 days participants engaged in secondary tasks while driving, including the following: made/answered a call, read/sent a text message, read/sent an email, checked a website or social network, used an iPad, tablet or computer, looked away from the road while reaching for something.⁴³ Responses were combined into a single variable. Speeding, drowsy driving, and distracted driving were each treated as dichotomous variables (0 vs 1+).

Sleep—Sleep duration was based on total hours of sleep on weekdays. Participants reported sleep duration (e.g. “8 hours, 10 minutes”), which was categorized as insufficient (less than 7 hours), recommended (7–9 hours), or over-sleeping (more than 9 hours).⁴⁴

Physical Activity and Diet—Participants were asked how often they were physically active for a total of at least 60 minutes per day over the past 7 days (response options ranged from 0 to 7 days).²⁰ Examples were provided prior to this question, which included running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, soccer, basketball, football, and surfing. The scores were dichotomized based on meeting the CDC recommendation of engaging in at least 60 minutes per day on 5 or more days versus those who did not.²³ Eating behavior questions were based on previously validated survey measures.²³ Reported soda consumption was operationalized as drinking soda 1 or <1 time per day. The frequency of fruit and vegetable consumption was operationalized as vs < than 3.8 times per day.⁴⁵ Weekday breakfast frequency (days/week) was operationalized as eating breakfast 5 days versus less.

Health Status—Participants completed the physical complaints subscale of the Health Complaints Index,³⁸ reporting how often in the last 6 months they had experienced the

following physical health complaints: headache, stomachache, backache and feeling dizzy. Responses for each complaint were dichotomized (rarely/never versus monthly or more) and summed to create an index.

Family Relationships—A single item assessed participant satisfaction with their family relationships, ranging from “very bad” relationships to “very good” on a scale of 0–10, with higher scores denoting better relationships.³⁹

Depressive Symptoms—Depressive symptoms were assessed with the pediatric Patient-Reported Outcomes Measurement Information System (PROMIS) depressive symptoms Scale. Participants were asked how often in the last 7 days they felt the following: unhappy, sad, lonely, alone, that life was bad, that everything went wrong, that “I could not do anything right”, and that “I could not stop feeling bad” ($\alpha = 0.96$). The response options (1–5) of never, almost never, sometimes, often, and almost always were averaged such that a higher score indicated more depressive symptoms.

Analyses

The variability by school status in each health behavior was analyzed separately by regression analyses, controlling for W3 behavior, sex, race/ethnicity, parent education, and family affluence scale. The rationale of controlling for previous behavior is that W3 behavior might influence school status,² and thus become a confounder of the association between W4 behavior and school status. Logistic regression analyses were performed for dichotomized outcomes (heavy episodic drinking, marijuana use, DWI, RWI, drowsy driving, speeding, distracted driving, meeting PA recommendations, fruit/veg intake, soda intake, and breakfast); multinomial logistic regression analyses were performed for the 3-category sleeping outcome; linear regression analyses were performed for continuous outcomes (physical health complaints, depressive symptoms, and satisfaction with family). Odds ratios were reported for the logistic regressions, and regression coefficients for the linear regressions. The regression coefficients were interpreted as the mean difference in the outcomes between different school status, when other covariates were held fixed. The complex survey design, including stratification, clustering and subject weighting, was accounted for in the analyses by SAS PROC SURVEYFREQ, SURVEYMEANS, SURVEYLOGISTIC and SURVEYREG (version 9.3). A p -value that is smaller than 0.05 indicates significant differences of a health behavior between school attendance groups.

RESULTS

Shown in Table 1 are the percentages or means for each of the variables of interest by college status, sex, and race/ethnicity. Students attending community college or trade school reported more healthful behaviors than either college or no college youth for some behaviors, including lower percentages of binge drinking and marijuana use and higher rates of fruit and vegetable consumption, but somewhat higher percentages of speeding, drowsy and distracted driving, DWI (than college students), and less physical activity. Those not attending school reported somewhat higher marijuana use and RWI, were least likely to eat breakfast, but ate more fruits and vegetables than college students, and were least likely to

report distracted driving. Relative to males, females were less likely to report binge drinking, marijuana use, and DWI, and more likely to report eating breakfast and fruits and vegetables; however, females reported higher average physical complaints and depressive symptoms. With respect to race/ethnicity, higher percentages of whites reported binge drinking, drowsy driving, and speeding, but lower percentages reported insufficient sleep, higher percentages of physical activity and breakfast, but lower percentages of fruit and vegetable consumption.

Shown in Table 2 are the results of the regression analyses for each outcome by college status, controlling for previous year values. Compared with those attending a 4-year college or university, participants in technical school or community college had lower odds of reporting binge drinking (OR=0.57, $p=0.01$), higher odds of speeding (OR=1.68, $p=0.05$) and drinking soda daily (OR=1.57, $p=0.05$), lower satisfaction with family ($\beta = -0.51$, $p<0.01$), and marginally more physical complaints ($\beta = 0.11$, $p=0.07$) and depressive symptoms ($\beta = 0.13$, $p=0.10$). Take the family satisfaction for example. The β coefficient suggested that participants in technical school or community college had an average of 0.51 point lower score in family satisfaction (on a 10-point scale), compared with those who attended university, when all other variables were held fixed. Those not attending college were not different from those attending 4-year schools on heavy drinking (both groups had high percentages). Not-attending college youth were moderately (OR=0.65, $p=0.09$) less likely to engage in distracting tasks while driving report depressive symptoms ($\beta = 0.14$, $p=0.11$), but more likely to DWI (OR=1.6, $p=0.03$), over-sleep (OR=4.78, $p<0.001$), drink soda daily (OR=2.51, $p<0.001$), and report lower satisfaction with family ($\beta = -0.37$, $p=0.04$).

COMMENT

The NEXT Generation Health Study provided a unique opportunity to examine differences in a range of health behaviors among emerging adults who attended 4-year colleges/universities, 2-year college/technical schools, or did not attend college.

In our sample, about 40% reported binge drinking in the last 30-days (46% among college students), higher than other reports of 27% based on Monitoring the Future data for 19–21 year olds and 28% in the College Health Survey, both of which asked about the last 2-weeks, which may explain the disparity.^{14,33} With respect to marijuana use, over 20% reported 30-day use (22% among college students), compared to 23% for 19–21 year olds in Monitoring the Future and 15% in the College Health Survey.^{14,33} These differences in prevalence are likely due in part to differences in the periods of reporting (2-weeks vs 30-days) and to variability in the samples surveyed. Certainly, the binge drinking rates of 33%–46% reported by our study participants are concerning.

College/university students drank more than technical/community college students but did not differ from those not attending college. Previous research has shown that the prevalence of heavy drinking is higher among college youth than non-college youth.² Our findings suggest that heavy drinking among emerging adults may not be entirely due to alcohol-friendly college environments. The higher rates of heavy alcohol use among those not

attending college (relative to those in technical/community colleges) could possibly be due to the unique character of these emerging adults, substantial leisure time, or exposure to leisure of work environments conducive to excess drinking. Some 15% in our survey reported DWI in the past year, measured as driving after drinking or using drugs, compared with about 13% (drinking only) in the college health survey.³³ High percentages of emerging adults reported speeding, drowsy driving, and distracted driving, consistent with other national data,^{47,48} with inconsistent differences by college status.

The 14% percent in our sample reporting meeting the recommended levels of daily physical activity, which is not dissimilar to the 21% of college students reporting moderate activity at least 5 days a week.³³ Despite the impressive facilities, spaces, and opportunities for PA at most 4-year colleges there were no differences in physical activity by school status.

Despite the wide availability and emphases at many 4-year colleges on healthful diet options, college students did not report healthier eating behavior than other groups. In our sample, some 28% (24% among college students) reported eating 3 or more fruits and vegetables daily, comparable to the 33% of college students reporting eating at least 3 servings a day.³³ Less than a third report eating breakfast, regardless of school status. The small proportions of emerging adults eating breakfast and fruits/vegetables daily are a cause for concern.

College students reported marginally lower average physical complaints and depressive symptoms, significantly higher average satisfaction with family, and less risky driving. The somewhat greater presence of depressive symptoms and physical complaints could have impeded college attendance or encouraged the decision to attend a technical school or community college rather than a 4-year college. The findings are not consistent with the notion that the prevalence of these symptoms is higher among college attenders.²² We conjecture that the higher satisfaction with family among college students may be due in part to the independence college status provides. College attendance, particularly among those living away from home, may uniquely foster a sense of autonomy which is thought to enhance relatedness among this group.¹ The relatively higher driving risks among 2-year and non-college youth may be due to their greater exposure to and dependence on driving for school and work relative to 4-year college students, given the restrictions many 1st year students at 4-year colleges experience relative to parking vehicles on campus.⁴⁹

The study included a large national sample of emerging adults, including those not attending college, a group that is difficult to recruit and assess. Analyses controlled for previous year health behaviors and other outcomes, allowing comparisons of the differences in each outcome by college status. Data were collected through self-report measures, which may have resulted in biased reporting due to social desirability or inaccurate recollection. However, many of the behaviors are difficult to observe (e.g. alcohol use), or are best known to the participants themselves (e.g. family satisfaction), and were assessed with standard measures. Analysis showed that those lost to follow-up differed in some significant ways, but the sensitivity analysis suggested little bias resulted. While we assessed college status, we did not assess academic performance.

Our findings indicate that those attending 4-year colleges were more likely to report heavy drinking, but were better or no worse on most other outcomes. Those attending 2-year colleges were less likely to drink heavily, but more likely to speed, drink soda, and reported lower satisfaction with family and marginally more health complaints and depressive symptoms. Those not attending college drank heavily, and reported more DWI, somewhat more distracted driving, more oversleeping, more physical and depressive symptoms, and lower family satisfaction. The health behaviors of emerging adults varied according to college status, with some common and some unique risks for each group.

The year after high school is transitional as young adults attend college, go to work, and experience new social and physical environments that can influence their health behaviors. While college administrators have long been concerned about student health, it may be important for other stakeholders, including employers, trade school administrators, and community agencies, to support healthful behavior among young adults.

Acknowledgments

This research was supported by the intramural research program of the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD), and 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) (contract number HHSN275201200001I). Intramural researchers were responsible for the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

References

1. Arnett JJ. Talk is cheap: the tobacco companies' violations of their own cigarette advertising code. *J Health Commun.* 2005; 10(5):419–431. [PubMed: 16199386]
2. Simons-Morton B, Haynie D, Liu D, Chaurasia A, Li K, Hingson RW. The effect of residence, school status, work status, and social influence on the prevalence of alcohol use among emerging adults. *J Stud Alcohol Drugs.* 2016; 77(1):121–132. [PubMed: 26751362]
3. White A, Hingson R. The burden of alcohol use: excessive alcohol consumption and related consequences among college students. *Alcohol Research: Current Reviews.* 2014; 35(2):201.
4. Kwan MY, Cairney J, Faulkner GE, Pullenayegum EE. Physical activity and other health-risk behaviors during the transition into early adulthood: a longitudinal cohort study. *Am J Prev Med.* 2012; 42(1):14–20. [PubMed: 22176841]
5. Timberlake DS, Hopfer CJ, Rhee SH, et al. College attendance and its effect on drinking behaviors in a longitudinal study of adolescents. *Alcohol Clin Exp Res.* 2007; 31(6):1020–1030. [PubMed: 17403064]
6. Fletcher JM, Frisvold DE. College selectivity and young adult health behaviors. *EconEduc Rev.* 2011; 30(5):826–837.
7. Gordon-Larsen P, Nelson MC, Popkin BM. Longitudinal physical activity and sedentary behavior trends: Adolescence to adulthood. *Am J Prev Med.* 2004; 27(4):277–283. [PubMed: 15488356]
8. Maslowsky J, Ozer EJ. Developmental trends in sleep duration in adolescence and young adulthood: evidence from a national United States sample. *J Adolesc Health.* 2014; 54(6):691–697. [PubMed: 24361237]
9. Administration SAMHSA. , editor. Results from the 2011 National Survey on Drug Use and Health: summary of national findings. Rockville, MD: 2012.
10. Hingson R, White A. New research findings since the 2007 Surgeon General's Call to Action to Prevent and Reduce Underage Drinking: a review. *J Stud Alcohol Drugs.* 2014; 75(1):158–169. [PubMed: 24411808]

11. Carter AC, Brandon KO, Goldman MS. The college and noncollege experience: a review of the factors that influence drinking behavior in young adulthood. *J Stud Alcohol Drugs*. 2010; 71(5): 742–750. [PubMed: 20731981]
12. Keith DR, Hart CL, McNeil MP, Silver R, Goodwin RD. Frequent marijuana use, binge drinking and mental health problems among undergraduates. *A J Addict*. 2015; 24(6):499–506.
13. White HR, McMorris BJ, Catalano RF, Fleming CB, Haggerty KP, Abbott RD. Increases in alcohol and marijuana use during the transition out of high school into emerging adulthood: The effects of leaving home, going to college, and high school protective factors. *J Stud Alcohol*. 2006; 67(6): 810–822. [PubMed: 17060997]
14. Johnston, LD., O'Malley, PM., Bachman, JG., Schulenberg, JE., Miech, RA. Monitoring the Future: college students & adults ages 19–55. Vol. 2. Ann Arbor: University of Michigan; 2015.
15. Administration NHTSA. , editor. NHTSA. Traffic safety facts: fatal crashes involving young drivers. Washington, DC: 2009.
16. Klauer SG, Guo F, Simons-Morton BG, Ouimet MC, Lee SE, Dingus TA. Distracted driving and risk of road crashes among novice and experienced drivers. *N Engl J Med*. 2014; 370(1):54–59. [PubMed: 24382065]
17. Klauer SG, Ehsani JP, McGehee DV, Manser M. The effect of secondary task engagement on adolescents' driving performance and crash risk. *J Adolesc Health*. Jul; 2015 57(1 Suppl):S36–43. [PubMed: 26112736]
18. O'Malley PM, Johnston LD. Driving after drug or alcohol use by US high school seniors, 2001–2011. *Am J Public Health*. 2013; 103(11):2027–2034. [PubMed: 24028266]
19. Tefft BC. Prevalence of motor vehicle crashes involving drowsy drivers, United States, 1999–2008. *Accid Anal Prev*. 2012; 45:180–186. [PubMed: 22269499]
20. Nelli, D., Hansen, M., O'Neil, M. State data system crash data report: 2000–2009. NHTSA. , editor. Washington, DC: National Highway Traffic Safety Administration; 2014.
21. Foundation NS. , editor. 2006 Sleep in America Poll: summary of findings. wba Market Research; 2006.
22. Lund HG, Reider BD, Whiting AB, Prichard JR. Sleep patterns and predictors of disturbed sleep in a large population of college students. *J Adolesc Health*. 2010; 46(2):124–132. [PubMed: 20113918]
23. Kann L, Kinchen S, Shanklin SL, et al. Youth risk behavior surveillance—United States, 2013. *MMWR Suppl*. 2014; 63(4):1–168.
24. Services UDoHaH. , editor. CDC. 2008 physical activity guidelines for Americans: fact sheet for health professionals on physical activity guidelines for older adults. Washington, DC: 2008.
25. Demory-Luce D, Morales M, Nicklas T, Baranowski T, Zakeri I, Berenson G. Changes in food group consumption patterns from childhood to young adulthood: the Bogalusa Heart Study. *J Am Diet Assoc*. 2004; 104(11):1684–1691. [PubMed: 15499355]
26. Lien N, Lytle LA, Klepp KI. Stability in consumption of fruit, vegetables, and sugary foods in a cohort from age 14 to age 21. *Prev Med*. 2001; 33(3):217–226. [PubMed: 11522162]
27. Hiza H, Guenther PM, Rihane CI. Diet quality of children age 2–17 years as measured by the Healthy Eating Index-2010. *Nutrition Insight*. 2013; 52
28. Deshmukh-Taskar PR, Radcliffe JD, Liu Y, Nicklas TA. Do breakfast skipping and breakfast type affect energy intake, nutrient intake, nutrient adequacy, and diet quality in young adults? NHANES 1999–2002. *J Am Coll Nutr*. 2010; 29(4):407–418. [PubMed: 21041816]
29. French SA, Story M, Neumark-Sztainer D, Fulkerson JA, Hannan P. Fast food restaurant use among adolescents: associations with nutrient intake, food choices and behavioral and psychosocial variables. *Int J Obes Relat Metab Disord*. 2001; 25(12):1823–1833. [PubMed: 11781764]
30. Nelson MC, Story M. Food environments in university dorms: 20,000 calories per dorm room and counting. *Am J Prev Med*. 2009; 36(6):523–526. [PubMed: 19356889]
31. Pelletier JE, Laska MN. Campus food and beverage purchases are associated with indicators of diet quality in college students. *Am J Health Promot*. 2013; 28(2):80–87. [PubMed: 23631451]

32. Laska MN, Larson NI, Neumark-Sztainer D, Story M. Dietary patterns and home food availability during emerging adulthood: do they differ by living situation? *Public Health Nutr.* 2010; 13(2): 222–228. [PubMed: 19691902]
33. ACHA-NCHA-II. Spring 2015 reference group report. American College Health Association-National College Health Assessment II; Hanover, MD: 2015.
34. Stewart WF, Ricci JA, Chee E, Morganstein D. Lost productive work time costs from health conditions in the United States: results from the American Productivity Audit. *J Occup Environ Med.* 2003; 45(12):1234–1246. [PubMed: 14665809]
35. Kalaydjian A, Merikangas K. Physical and mental comorbidity of headache in a nationally representative sample of US adults. *Psychosom Med.* 2008; 70(7):773–780. [PubMed: 18725426]
36. Curry K, Green R. Prevalence and management of headache in a university undergraduate population. *J Am Acad Nurse Pract.* 2007; 19(7):378–382. [PubMed: 17680903]
37. Sweileh WM, Sawalha AF, Zyoud SH, Al-Jabi SW, Shamsheh FF, Khalaf HS. Epidemiological, clinical and pharmacological aspects of headache in a university undergraduate population in Palestine. *Cephalalgia.* 2010; 30(4):439–446. [PubMed: 19673913]
38. Bottos S, Dewey D. Perfectionists' appraisal of daily hassles and chronic headache. *Headache.* 2004; 44(8):772–779. [PubMed: 15330823]
39. Handrakis JP, Friel K, Hoeffner F, et al. Key characteristics of low back pain and disability in college-aged adults: a pilot study. *Arch Phys Med Rehabil.* 2012; 93(7):1217–1224. [PubMed: 22516875]
40. Robins JM, Rotnitzky A, Zhao LP. Analysis of semiparametric regression models for repeated outcomes in the presence of missing data. *J Am Stat Assoc.* 1995; 90:106–121.
41. Currie C, Molcho M, Boyce W, Holstein B, Torsheim T, Richter M. Researching health inequalities in adolescents: the development of the Health Behaviour in School-Aged Children (HBSC) family affluence scale. *Soc Sci Med.* 2008; 66(6):1429–1436. [PubMed: 18179852]
42. Johnston, LD., O'Malley, PM., Miech, RA., Bachman, JG., Schulenberg, JE. Monitoring the Future national results on drug use: 1975–2013: overview, key findings on adolescent drug use. Abuse TNIOd. , editor. Ann Arbor: Institute for Social Research, The University of Michigan; 2014.
43. Hartos J, Eitel P, Simons-Morton B. Parenting practices and adolescent risky driving: a three-month prospective study. *Health Educ Behav.* 2002; 29(2):194–206. [PubMed: 11942714]
44. Hirshkowitz M, Whiton K, Albert SM, et al. National sleep foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health.* 2015; 1(1):40–43.
45. Guenther PM, Casavale KO, Reedy J, et al. Update of the Healthy Eating Index: HEI-2010. *J Acad Nutr Diet.* 2013; 113(4):569–580. [PubMed: 23415502]
46. Irwin DE, Stucky B, Langer MM, et al. An item response analysis of the pediatric PROMIS anxiety and depressive symptoms scales. *Qual Life Res.* 2010; 19(4):595–607. [PubMed: 20213516]
47. NHTSA. Speeding. Traffic safety facts 2006. NHTSA National Center for Statistics and Analyses; Washington, DC: 2009.
48. Huisinigh C, Griffin R, McGwin G. The prevalence of distraction among passenger vehicle drivers: a roadside observational approach. *Traffic Inj Prev.* 2015; 16(2):140–146. [PubMed: 24761827]
49. The Association for the Advancement of Sustainability in Higher Education. Campus car bans. Available at: <http://www.aashe.org/resources/campus-car-bans>. Accessed March 18, 2016

Table 1

Summary statistics for health behaviors among emerging adults in the NEXT Generation Study by school status, gender, and race/ethnicity (n=1927)

		School			Gender		Race/Ethnicity			
Variable	N ^I	No School	Community College	College/University	Female	Male	Hispanic	African American	White	Other
		Weighted Percent			Weighted Percent		Weighted Percent			
Binge Drinking ^a	1903	40	33	46	37	46	34	27	45	38
Marijuana ^c	1905	26	19	22	19	27	15	29	23	23
DWI ^d	1305	17	16	12	11	19	11	19	15	4
RWI ^e	1907	30	24	25	26	26	23	24	28	21
Drowsy ^f	1305	46	49	44	45	48	40	34	49	44
Speeding ^g	1306	45	56	48	48	52	48	46	51	46
Distraction ^h	1299	24	35	31	30	32	29	32	30	45
Weekday Sleep ⁱ	1899									
Insufficient sleep		133	216	337	417	269	185	234	220	46
Oversleep		59	36	34	75	54	40	29	58	2
PA Rec ^m	1922	14	10	14	8	20	7	10	15	11
Breakfast ^j	1887	21	27	30	30	22	25	14	29	42
Fruit/Veg ^k	1927	31	29	24	29	25	32	37	24	32
Soda ^l	1927	38	28	18	25	28	23	34	25	30
		Mean (SE)			Mean (SE)		Mean (SE)			
Physical Health	1911	1.9 (0.1)	2.0 (0.1)	1.9 (0.1)	2.1 (0.1)	1.7 (0.1)	1.7 (0.0)	1.8 (0.1)	2.0 (0.1)	2.1 (0.1)
Depressive Symp	1907	2.1 (0.1)	2.1 (0.1)	1.9 (0.1)	2.1 (0.1)	1.7 (0.1)	2.0 (0.1)	2.1 (0.1)	2.0 (0.0)	2.1 (0.2)
Family Satisfaction	1913	7.6 (0.2)	7.4 (0.2)	8.0 (0.1)	7.7 (0.1)	7.8 (0.2)	7.8 (0.1)	7.5 (0.2)	7.7 (0.1)	7.7 (0.3)

^aPercent who engaged in binge drinking.

^bPercent of licensed drivers who had experienced an alcohol-related blackout.

^cPercent who reported marijuana use.

^dPercent who engaged in driving under the influence.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

- Percent who rode with a driving under the influence.
- Percent of licensed drivers who reported driving while drowsy.
- Percent of licensed drivers who engaged in speeding.
- Percent of licensed drivers who engaged in distracted driving.
- Percent who sleep less than 7 hours and percent who sleep more than 9 hours.
- Percent who always eat breakfast.
- Percent who consumed recommended levels of fruit and vegetables.
- Percent who consume high levels of soda.
- Percent who met recommended levels of Physical Activity.
- Numbers do not equal 2047 due to missing values for some variables or data collected only on subsamples (e.g., licensed drivers)

Table 2

Logistic and linear regressions comparing the prevalence of health behaviors among emerging adults in the NEXT Generation Study according to college status (with college/university as the referent) the first year after high school.

Logistic Regression Odds Ratios and 95% Confidence Intervals ^a				
	College Status ^b	OR	95% CI	<i>p</i>
Substance Use:				
Binge Drinking	Tech/CC	0.57	0.38–0.86	0.01
	Not attending	0.66	0.40–1.10	0.11
Marijuana	Tech/CC	0.81	0.48–1.37	0.43
	Not attending	1.01	0.53–1.93	0.97
DWI	Tech/CC	1.48	0.83–2.64	0.18
	Not attending	1.60	1.04–2.47	0.03
RWI	Tech/CC	1.22	0.73–2.04	0.45
	Not attending	1.41	0.89–2.24	0.14
Driving:				
Drowsy	Tech/CC	1.40	0.80–2.44	0.24
	Not attending	1.26	0.68–2.36	0.47
Speeding	Tech/CC	1.68	1.00–2.84	0.05
	Not attending	0.83	0.52–1.34	0.44
Distracted	Tech/CC	1.20	0.73–1.97	0.47
	Not attending	0.65	0.40–1.07	0.09
Sleep:				
Insufficient Sleep	Tech/CC	1.19	0.78–1.80	0.42
	Not attending	1.24	0.85–1.78	0.27
Oversleep	Tech/CC	1.37	0.60–3.12	0.45
	Not attending	4.78	2.65–8.63	<0.001
PA/Diet:				
Meet PA Rec	Tech/CC	0.95	0.55–1.63	0.84
	Not attending	1.02	0.50–2.06	0.96
Breakfast	Tech/CC	0.95	0.44–2.03	0.89
	Not attending	0.97	0.57–1.64	0.90
Fruit/Vegetables	Tech/CC	0.84	0.58–1.22	0.36
	Not attending	0.80	0.53–1.22	0.30
Soda	Tech/CC	1.57	1.00–2.47	0.05
	Not attending	2.51	1.76–3.59	<0.001
Linear Regression Estimates ^a				
Mental/Physical Health:		Estimate	Standard error	<i>p</i>
Physical Health Complaints	Tech/CC	0.11	0.06	0.07

Logistic Regression Odds Ratios and 95% Confidence Intervals ^a				
	College Status ^b	OR	95% CI	p
	Not attending	0.06	0.08	0.46
Depression	Tech/CC	0.13	0.08	0.10
	Not attending	0.14	0.08	0.11
Family Satisfaction	Tech/CC	-0.51	0.17	0.01
	Not attending	-0.37	0.17	0.04

^a All models control for W3 values, Gender, Race (White=referent, African American, Other), Family Affluence Scale (Low, Moderate=referent, High, and Parent Education (Bachelor's degree or more=referent, some college or less).

^b School status referent = University/4-year College.