Beyond Education Gradient: College Major and Health Risk Behaviors

Abstract

Numerous studies have documented education gradient in health. Individuals with college education show better health behaviors and health status than those with lower levels of education. However, relatively few studies consider the potential heterogeneity of the effects, particularly at the college education level. Given that heterogeneity of curriculum and learning activities across majors in higher education by design, does all college education, regardless of the field of study, lead to the same health benefits? This study analyzed 1,033 individuals from the National Longitudinal Survey of Youth 97 who obtained a bachelor's degree from 2001 to 2011 to examine the associations between college major and engagement in three health risk behaviors during the college years: smoking, binge drinking, and marijuana use. Results from longitudinal analyses showed that respondents who majored in business were more likely to smoke, binge drink frequently, and use marijuana than respondents who majored in STEM. Business majors were also more likely to smoke than health sciences majors, binge drink more frequently than arts & humanities majors, and more likely to use marijuana than education majors. Gaps could not be explained by demographic characteristics, family SES background, and employment experience. This study demonstrated substantial heterogeneity in smoking, binge drinking, and marijuana use among individuals with college education by major. Findings imply that not all college majors lead to equally healthy lifestyles. Different majors not only provide different curriculum but also offer different social contexts which can have different health consequences. Implications for policy and theory are discussed.

Keywords: education, college major, health behaviors, health disparities, substance use

Introduction

Education is a robust determinant of health. One key reason is that higher education promotes healthier behaviors and lifestyles (Cutler & Lleras-Muney, 2006; Ross & Wu, 1995). However, the health benefits of education have been understood only in relation to educational attainment. It is well-documented that college graduates are healthier and exhibit greater healthy behaviors than those with lower level of education (Cutler & Lleras-Muney, 2006; Lawrence, 2017; Miech, Pampel, Kim, & Rogers, 2011; Miech & Shanahan, 2000; Ross & Wu, 1995), but no study has examined how college field of study (or, "college major") impacts individual health risk behaviors. College education, by nature, is more heterogeneous than secondary education. Even within the same college, curriculum as well as learning and professionalization environment vary by major. The ways how students learn specialized knowledge, gain hands-on experience, and collaborate for group projects also vary from field to field. These variations may potentially produce differences in health knowledge and socialization contexts that may differentially affect individuals' likelihood of engaging in health risk behaviors. However, we know little about whether and to what extent college field of study predicts health risk behaviors. This study aims to addresses this key, unexplored question: Do different college majors produce different health risk behaviors?

Of various health risk behaviors, the present study focuses on smoking, binge drinking, and marijuana use. While these health risk behaviors appear to differ in some aspects, this study examines them simultaneously for several reasons. First, all three have been the long-term foci of health behavior literature. There are numerous studies aim to understand the causes and consequences of these health risk behaviors. Second, these health risk behaviors are also important in its own right. They can have negative consequences toward learning and healthy

development for young adults. For example, college students who are binge drinkers are more likely to get injured (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994), have lower performance and drop from college (Jennison, 2004), and lower cognitive function in working memory (Crego et al., 2009). Marijuana can impair neuropsychological functioning and thus affect individuals' learning and work performance (Pope & Yurgelun-Todd, 1996). Smoking is associated with lower cognitive function among college students, including lower level of verbal or auditory competence (Fried, Watkinson, & Gray, 2006). Third, these health risk behaviors are prevalent during adolescent years and young adulthood (Rigotti, Lee, & Wechsler, 2000; Schulenberg et al., 2019; Wechsler & Kuo, 2000). These health risk behaviors are also considered as pressing health issues among college students (Patrick, Grace, & Lovato, 1992). For example, the U.S. national Monitoring the Future 2018 survey indicates that among full-time college students, 15.3 percent are cigarette users, 29 percent are binge drinkers, and 42.3 percent are using marijuana (Schulenberg et al., 2019). Finally, they all represent a key mechanism through which education produces health benefits, that is, healthier behaviors and lifestyles. An investigation of college major and health risk behaviors improves our understanding of the role of education, in particular higher education, in promoting health.

Relative few studies consider college major an influential factor for young adults' health risk behaviors. However, there are strong theoretical reasons to believe that engagement of health risk behaviors may vary by college major. First, not all majors expose students to knowledge of human health and physiology at the same level. Differences in health knowledge may lead to differences in behaviors. Second, different fields of study may expose students to different social norms and expectations through activities in different college majors. Weidman's undergraduate socialization model (1989) indicates college and university as a key socialization

field for an individual's future success and integration in society through extra-curricular activities, social interactions, and engagement in organized activities. Through these activities, students of different majors are socialized into the norms of the discipline and become successful in related professional fields. Such a socialization process may shape individuals' health behaviors. Social learning theory argues that individuals learn health behaviors (i.e., alcohol consumption) through various forms of learning from peers and colleagues (Akers, Krohn, Lanza-Kaduce, Radosevic, 1995; Higgins & Makin, 2004; Ward & Gryczynski, 2009). For example, health-related majors may be trained to be very attentive to health behaviors as they will work in smoke-free and drug-free workplaces. Business majors, due to the needs of meeting and interacting with clients, may be socialized to be more tolerate toward smoking and binge drinking. Hence, differential socialization environment and processes offer by different college majors experience during their college years have different implications for health behaviors. Finally, the amount of time and effort that students need to spend on studying may differ by major. Some majors are considered 'difficult majors' by students and are required more effort and may make students more stressful than 'easier' majors. Many prior studies have showed that stress and mental health are associated with the engagement of health risk behaviors among youths and young adults, including college students (Lasser et al., 2000; Pelletier, Lytle, & Laska, 2016). Hence, different levels of pressure from different majors may cause students in some majors more likely to engage in health risk behaviors.

Despite the importance of the research question and strong theoretical support, empirical evidence about college major and health risk behaviors is very limited. Studies of health risk behaviors of college students often rely on surveys of a single college or university. Even fewer consider college field of study as an influential factor in producing variations in health risk

behaviors. And almost no study relies on large-scale, national sample with longitudinal data. This study aims to address these limitations by investigating whether and how three health risk behaviors (i.e., smoking, binge drinking, and marijuana use) vary by college major.

Methods

National Longitudinal Survey of Youth 1997

This study used data from the National Longitudinal Survey of Youth 1997 (NLSY97), a nationally representative sample of youths who were born between 1980 and 1984. NLSY97 started with interviewing 8,984 respondents whose ages ranged from 12 to 18 in 1997-1998 (round 1). Respondents were followed every year until 2013-2014 (round 16). After that, respondents were followed every two years (Hagerty, 2015). NLSY97 aims to understand U.S. youths' transition from school to work and into adulthood. A unique strength of the dataset is its collection of detailed information regarding educational experiences and health behaviors over time. Specifically, NLSY97 collected information on post-secondary education enrollment and college majors, allowing for an investigation of the health behaviors of recent cohorts of college students. More information about the design of the NLSY97 and the data collection process can be found in Moore, Pedlow, Krishnamurty, and Wolter (2000).

This study pooled data of all individuals who completed college and obtained a bachelor's degree from 2001 to 2011. Though transcript data in the NLSY97, we identified when a respondent started college and s/he has received a college degree. College transcripts provide the most accurate information regarding when individuals started college and whether individuals received a bachelor's degree. In total, NLSY97 has 1,336 respondents who have completed college and obtained a degree between 2001 and 2011. This study did not use data

from after 2011 because no college transcript data was collected after that year. As such, we won't be able to verify whether a respondent received a bachelor's degree after 2011. In addition, this study excluded individuals whose college majors cannot be identified or whose college major was missing. We have 1,099 youths who have obtained a college degree with information of college majors. This study further excluded individuals with missing values for health behaviors of interest (i.e., smoking, binge drinking, and marijuana use). Only a small proportion of respondents has missing values in these variables, leading us to a final sample of 1,033 for longitudinal analysis.

Classification of college major

In each round of NLSY97 data collection, for those who enrolled in college, respondents were asked, "What was your major?" We used this information to identify the field of the college degree.

This study relied on answers from self-reporting, rather than college transcript data, to identify college majors for a key reason: available college transcript data from NLSY97 did not provide raw data of each specific major. It grouped college majors into categories such as liberal arts, sciences, general studies, and humanities. Thus, it is unclear the exact college major of a respondent and how each category is defined. It also does not allow for a re-classification of college majors based on different definitions and research needs. We matched answers of college majors to the year when respondents received a bachelor's degree according to the college transcript data.

College majors were grouped into seven categories. Classification of college majors varies in the education literature, and there is no single best way to classify college majors

(Engberg & Wolniak, 2013; Liu, Sun, & Winters, 2019; Webber, 2016). This study followed the definitions of Liu, Sun, & Winters (2019) to identify STEM majors as sciences (physical sciences, agriculture sciences, biological sciences, computer/information sciences), technologies (communication technologies, engineering technologies, science technologies), engineering, and mathematics (including statistics). This study also categorized six other college majors. such as health, education, arts and humanities, social sciences, business, and others. Detailed definitions of each group are presented in Table 1. Seven categories of college majors were examined in the analysis, including STEM (17.69%), health (4.84%), education (9.50%), arts and humanities (22.44%), social sciences (19.65%), business (21.88%), and others (4.00%).

Measures of health risk behaviors

This study focused on three health risk behaviors—smoking, binge drinking, and marijuana use. These three health behaviors have been widely investigated and are crucial for youths to avoid in order to set a healthy life course. For smoking, respondents were asked: "During the past 30 days, on how many days did you smoke a cigarette?". For binge drinking, the question was: "On how many days did you have five or more drinks on the same occasion during the past 30 days?". For marijuana use, the survey question was: "On how many days have you used marijuana in the last 30 days?" Responses ranged from zero to 30 days, and valid skip (i.e., respondents were not required to answer the question, because of not demonstrating the behavior). Because the majority of respondents were non-smokers and did not use marijuana, we converted answers regarding smoking and marijuana use questions to binary variables. The two variables were coded 'one' if a respondent's answer indicated his or her engagement of the health risk behavior during the past 30 days and coded 'zero' if otherwise. Binge drinking was

measured as a continuous variable and ranged from 0 (zero days), 1 (1 day), 2 (2 days) to 5 (five days or more).

Covariates

This study also controlled for potential founders of health risk behaviors in statistical analysis. These included race/ethnicity, gender, highest level of parental education, age, baseline mental health problems (i.e., physical/emotional/mental conditions, learning/emotional problems, and other chronic conditions), years to degree, self-rated general health, number of weeks working for employed job during the year, and income-to-poverty ratio for each year.

In the baseline survey, parents were asked if the respondent has the following three mental health problems that may potentially limit school: (1) a physical/emotional mental condition, (2) a learning/emotional problem, and (3) a chronic condition. The inclusion of these three indicators helped us to account for the influence of respondents' mental health conditions in early life.

Empirical Strategy

Our analysis was based on two time points: the year of college entrance and the year of college completion. The statistical analysis began with descriptive statistics of key variables of these two time points. Next, we used regressions to link college majors to health behaviors (i.e., smoking, binge drinking, and marijuana use). To assess the association between college majors and health behaviors, this study used linear and logistic regression (e.g., logistic regression for smoking and marijuana use and linear regression for binge drinking) to examine the health behaviors. Random-coefficient models were applied to estimate the associations between college majors and health behaviors. For all regressions, we selected STEM majors as the reference

group, and we tested the differences across all majors. All regressions controlled for potential confounders. All analysis was done using Stata 16.

Results

Table 2 presents sample characteristics for all respondents who obtained a bachelor's degree between 2001 and 2011. About 7 out of every 10 respondents were white. The sample included 15% African American, 12% Hispanic, and 3% Asian. Females comprised 58% of the sample. Additionally, over 50% of the respondents have at least one parent with a bachelor's degree.

Table 2 also shows respondents' health behaviors at the time of entering college and at the time of graduation by college major. Upon the time of entering college, we observe substantial variations in terms of engaging in health risk behaviors by college major. For example, those who major in health sciences were less likely to smoke. Students who ended up with a business degree had spent more days on binge drinking. Education majors were the least likely to use marijuana. Taking a closer look at the trends of health risk behaviors by college major, Table 2 suggests an increasing trend in smoking in individuals majoring in STEM, health, arts and humanities, and business, but an opposite trend in education, social sciences, and other majors. Upon the time of graduation, binge drinking became more prevalent in all majors. However, the trend of using marijuana decreased for all respondents.

Table 3 presents longitudinal results from the random-effect models, estimating the changes in health behaviors by college majors between two time points. Longitudinal results showed that individuals who majored in arts and humanities (OR = 2.61; 95% CI = 1.15, 5.94), social sciences (OR = 2.44; 95% CI = 1.02, 5.80) and business (OR = 3.23; 95% CI = 1.42, 7.31)

were more likely to smoke cigarettes, compared to individuals in STEM majors. Additionally, individuals in business majors were two times more likely to use marijuana (OR = 2.10; 95% CI = 1.10, 4.02) and binge drank more frequently (Coef. = 0.47; 95% CI = 0.17, 0.77) than individuals in STEM majors. Differences in health behaviors across college majors cannot be explained by respondents' family SES background, current economic well-being, and time spent on on-campus or off-campus employment. Additional statistical tests that do pair-wise comparisons across majors (Table 4) indicate some interesting patterns. For example, not only less 'healthy' than STEM majors, individuals in the business major were also more likely to smoke than individuals in a health major, binge drank more frequently than individuals in arts and humanities, and use marijuana more than education majors. Other than that, there was no other difference between college majors regarding health behaviors.

Next, this study examined whether trends of engaging in health risk behaviors during the college years vary across college majors. We found no evidence that trends of health risk behaviors differed by major. Taken together, analysis showed that college graduates with business majors appeared to had a higher probability of engaging unhealthy behaviors than those in STEM majors, and some evidence that business majors were more likely to demonstrate some aspects of health risk behaviors than arts & humanities, education, and social sciences majors.

Finally, the authors conducted a number of sensitivity analyses to check the robustness of the results. These include: (1) investing whether college major is associated with engaging in a specific health risk behavior in the past year (instead of the past 30 days), and (2) using multiple imputation instead of listwise deletion to recover missing values. Results from the first and the second sensitivity analyses were similar to results in the main analysis. The results of all sensitivity analyses are available upon request.

Discussion

Epidemiological, population health, and social sciences research has demonstrated robust education gradient in health (e.g., Cutler & Lleras-Muney, 2006). One of the key sources of education benefits on health is through its behavioral mechanism: people with higher education (i.e., having a college degree or more) were the least likely to engage in health risk behaviors (Brunello et al., 2016; Ross & Wu, 1995). Nevertheless, the literature of education and health overlooks the potential heterogeneity within the same level of education. The issue is particularly important for higher education. Given that heterogeneity of curriculum and learning activities across majors in higher education by design, do all college degrees promote health behaviors in the same way regardless of college field of study? Using longitudinal data from NLSY97, this study provides one of the first evidence of this crucial question. Longitudinal results show that majoring in business was associated with higher prevalence of three health risk behaviors than those majoring in STEM. There was some evidence that business majors showed more unhealthy behaviors than individuals with arts & humanities, education, and health sciences majors. In this sense, we find some evidence in support of our hypothesis of heterogeneity effects of higher education on health behaviors.

The finding that business majors were less 'healthy' in terms of higher likelihood of engaging in health risk behaviors than other majors deserves further discussion. First, it is possible that differences in health literacy across majors contribute to variations in health risk behaviors. Unfortunately, the NLSY97 does not include health literacy questions during the college years, which prevents a direct test of this hypothesis. However, there are two reasons that health literacy may not be the main cause. First of all, such differences were observed between students in business and other fields of study, including non-health sciences, non-STEM majors.

It is difficult to believe that business majors will have better health knowledge than these non-health sciences, non-STEM majors such as English or history. Additional, individuals do not need to enroll in college-level biological or medical courses to understand the harmful effects of smoking, binge drinking, and marijuana use. Knowledge of health consequences of these three behaviors is also likely to be very widespread due to public health campaigns. In fact, a recent study finds no difference in terms of health literacy by college majors (Dolezel, Shanmugam, & Morrison, 2018). As such, it is very unlikely that college students in business majors are less likely to receive such messages and are unaware of the health consequences of smoking and marijuana use. With this in mind, factors such as socialization environment, internship environment, and peer groups in college may help explain the differences in health behaviors by major. In fact, literature in adolescent health has long recognized the crucial role of peers and social context in engaging risky and unhealthy behaviors (Gardner & Steinberg, 2005; Maxwell, 2002) and some recent studies suggest that college students are no exception (Beck et al., 2013; Pinchevsky et al., 2012). Future studies that investigate the peer influence and social context in explaining smoking or marijuana use initiation can yield valuable insights.

Second, our results have implications for both education and health policies. Because business is one of the most popular majors in college, findings from this study send a strong message for administration and practitioners of college students' health. These students should be the focus of college-level health initiatives on substance use. Furthermore, this study also calls for more research on health and health behaviors among college students. How college promotes students' healthy development receives relatively little attention in public health studies. However, it has been known that the college years are not a life stage without health problems or issues. For example, it is well-established that binge drinking is widespread among college

students (Wechsler et al., 1994). Hunt and Eisenberg (2010) review extant evidence and suggest that mental illness is prevalent among college students. A recent study also finds a high prevalence of food insecurity among college students (Payne-Sturges et al., 2018). Findings from the current study are in line with these efforts by expanding the focus to variations by college majors. Thus, while business majors may be more well-prepared students for a successful career than other majors, it may come with a price of promoting health risk behaviors.

Despite the strength of this study, we recognize a few limitations. First, since students did not randomly select into different fields of study, therefore, results are not causal. Even with longitudinal data and controlling for a wide range of potential confounders, findings remain associational. Second, the NLSY97 did not include measures of mental health in every wave of the survey. Hence, we could not control for mental health during the college years. Yet, not able to control for mental health may not yield substantial biases in our estimates. Unless there are considerable systematic differences in mental health by college major, not including mental health as a covariate should not lead to a huge bias in our analysis.

Limitations notwithstanding, this study demonstrates that even among people who have completed college, there are variations in terms of engagement in health risk behaviors. The associations cannot be explained by demographic characteristics, family SES background and respondents' employment and economic well-being. Our findings suggest a reconsideration of the role of education on health by not only considering education achievement but also focusing on college majors. Also, our findings call for greater attention to the health implications of different how each college major provides distinct learning and professionalization context. A more comprehensive understanding of how such contexts affect students' learning as well as

healthy development help us provide a better college experience for students to set a successful career and life course.

References

Akers, R. L., Krohn, M. D., Lanza-Kaduce, L., & Radosevich, M. (1995). Social learning and deviant behavior: A specific test of a general theory. In *Contemporary Masters in Criminology* (pp. 187-214). Springer, Boston, MA.

Beck, K. H., Caldeira, K. M., Vincent, K. B., & Arria, A. M. (2013). Social contexts of drinking and subsequent alcohol use disorder among college students. The American Journal of Drug and Alcohol Abuse, 39(1), 38-43.

Brunello, G., Fort, M., Schneeweis, N., & Winter-Ebmer, R. (2016). The causal effect of education on health: What is the role of health behaviors?. *Health economics*, *25*(3), 314-336.

Crego, A., Holguín, S. R., Parada, M., Mota, N., Corral, M., & Cadaveira, F. (2009). Binge drinking affects attentional and visual working memory processing in young university students. *Alcoholism: Clinical and Experimental Research*, *33*(11), 1870-1879.

Cutler, D. M., & Lleras-Muney, A. (2006). *Education and health: evaluating theories and evidence* (No. w12352). National bureau of economic research.

Dolezel, D., Shanmugam, R., & Morrison, E. E. (2018). Are college students health literate?. *Journal of American College Health*, 1-8.

Engberg, M., & Wolniak, G. C. (2013). College student pathways to the STEM disciplines. *Teachers College Record*, *115*(1).

Fried, P. A., Watkinson, B., & Gray, R. (2006). Neurocognitive consequences of cigarette smoking in young adults—a comparison with pre-drug performance. *Neurotoxicology and teratology*, *28*(4), 517-525.

Gardner, M., & Steinberg, L. (2005). Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: an experimental study. *Developmental psychology*, *41*(4), 625.

Hagerty H (2015). *Round 16 of the National Longitudinal Survey of Youth, 1997 Cohort (NLSY97)*. August 9, 2019, retrieved from http://www.norc.org/PDFs/NLSY97/Round%2016%20of%20the%20National%20Longitudinal%20Survey%20of%20Youth%20-%201997%20Cohort.pdf

Higgins, G. E., & Makin, D. A. (2004). Does social learning theory condition the effects of low self-control on college students' software piracy. *Journal of Economic Crime Management*, *2*(2), 1-22.

Hunt, J., & Eisenberg, D. (2010). Mental health problems and help-seeking behavior among college students. *Journal of adolescent health*, *46*(1), 3-10.

Jennison, K. M. (2004). The short-term effects and unintended long-term consequences of binge drinking in college: a 10-year follow-up study. *The American journal of drug and alcohol abuse*, *30*(3), 659-684.

Lasser, K., Boyd, J. W., Woolhandler, S., Himmelstein, D. U., McCormick, D., & Bor, D. H. (2000). Smoking and mental illness: a population-based prevalence study. *Jama*, *284*(20), 2606-2610.

Lawrence, E. M. (2017). Why do college graduates behave more healthfully than those who are less educated?. *Journal of health and social behavior*, *58*(3), 291-306.

Liu, S., Sun, W., & Winters, J. V. (2019). Up in STEM, Down in Business: Changing College Major Decisions with the Great Recession. *Contemporary Economic Policy*, *37*(3), 476-491.

Maxwell, K. A. (2002). Friends: The role of peer influence across adolescent risk behaviors. *Journal of Youth and Adolescence*, *31*(4), 267-277.

Miech, R., Pampel, F., Kim, J., & Rogers, R. G. (2011). The enduring association between education and mortality: the role of widening and narrowing disparities. *American Sociological Review*, *76*(6), 913-934.

Miech, R. A., & Shanahan, M. J. (2000). Socioeconomic status and depression over the life course. *Journal of health and social behavior*, 162-176.

Moore W, Pedlow S, Krishnamurty P, Wolter, K. (2000). *Technical Sampling Report*. August 9, 2019, retrieved from https://www.nlsinfo.org/sites/nlsinfo.org/files/attachments/121221/TechnicalSamplingReport.pdf

Patrick, K., Grace, T. W., & Lovato, C. Y. (1992). Health issues for college students. Annual review of public health, 13(1), 253-268.

Payne-Sturges, D. C., Tjaden, A., Caldeira, K. M., Vincent, K. B., & Arria, A. M. (2018). Student hunger on campus: food insecurity among college students and implications for academic institutions. *American Journal of Health Promotion*, *32*(2), 349-354.

Pelletier, J. E., Lytle, L. A., & Laska, M. N. (2016). Stress, health risk behaviors, and weight status among community college students. *Health Education & Behavior*, *43*(2), 139-144.

Pinchevsky, G. M., Arria, A. M., Caldeira, K. M., Garnier-Dykstra, L. M., Vincent, K. B., & O'Grady, K. E. (2012). Marijuana exposure opportunity and initiation during college: parent and peer influences. Prevention Science, 13(1), 43-54.

Pope, H. G., & Yurgelun-Todd, D. (1996). The residual cognitive effects of heavy marijuana use in college students. *Jama*, *275*(7), 521-527.

Ross, C. E., & Wu, C. L. (1995). The links between education and health. *American sociological review*, 719-745.

Rigotti, N. A., Lee, J. E., & Wechsler, H. (2000). US college students' use of tobacco products: results of a national survey. *Jama*, *284*(6), 699-705.

Schulenberg, J. E., Johnston, L. D., O'Malley, P. M., Bachman, J. G., Miech, R. A. & Patrick, M. E. (2019). *Monitoring the Future national survey results on drug use, 1975–2018: Volume II, College students and adults ages 19–60*. August 9, 2019, retrieved from http://www.monitoringthefuture.org//pubs/monographs/mtf-vol2_2018.pdf

Ward, B. W., & Gryczynski, J. (2009). Social learning theory and the effects of living arrangement on heavy alcohol use: Results from a national study of college students. *Journal of Studies on Alcohol and Drugs*, *70*(3), 364-372.

Webber, D. A. (2016). Are college costs worth it? How ability, major, and debt affect the returns to schooling. *Economics of Education Review*, *53*, 296-310.

Wechsler, H., Davenport, A., Dowdall, G., Moeykens, B., & Castillo, S. (1994). Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. Jama, 272(21), 1672-1677.

Wechsler, H., & Kuo, M. (2000). College students define binge drinking and estimate its prevalence: Results of a national survey. *Journal of American College Health*, *49*(2), 57-64.

Weidman, J. (1989). Undergraduate socialization: A conceptual approach. *Higher education: Handbook of theory and research*, *5*(2), 289-322.

Table 1: Classification of College Majors in the NLSY97 Dataset

STEM physical sciences, agriculture sciences, biological and biomedical sciences, computer/information sciences, communication technologies, engineering technologies, science technologies, military technologies and applied sciences, engineering, mathematics, statistics
Health nursing, health professions, pre-dental, pre-med, pre-vet, residency programs
Education education, high school/secondary programs
Arts & Humanities architecture/environmental design, area studies, communications, journalism, English, ethnic studies, fine and applied arts, foreign languages, history, interdisciplinary studies, philosophy, theology/religion studies, personal and culinary services, general studies and humanities, precision production, visual and performing arts
Social Sciences anthropology, archaeology, criminology, home economics, political science and government, psychology, sociology, pre-law, family and consumer sciences, human sciences, legal professionals, homeland security, law enforcement, firefighting and related protective services, public administration and social service professionals, social sciences,
Business business management, economics, marketing
Others agriculture/natural resources, uncodable, construction trades, mechanic and repair technologies, transportation and materials moving

Table 2: Descriptive Statistics of the NLSY 97 Sample at College Entrance Year and College Completion Year for the Full Sample and By College Fields of Study (N=1,033)

	STEM	Health	Education	Arts & Humanities	Social Sciences	Business	Others	Full Sample
Health Behaviors								
Time 1 (Before Entering College)								
Smoking (%)	15.79	9.62	20.59	24.07	24.64	23.83	23.26	21.60
Binge Drinking (Days in last month)	0.98 (1.68)	0.96 (1.63)	1.00 (1.76)	0.86 (1.67)	1.01 (1.82)	1.42 (1.96)	0.72 (1.53)	1.05 (1.78)
Marijuana Use (%)	14.74	19.23	11.76	15.35	17.54	20	23.26	16.85
Time 2 (After Completing College)								
Smoking (%)	19.27	16.98	16.35	27.94	21.23	27.85	22.22	23.21
Binge Drinking (Days in last month)	1.28 (1.79)	1.09 (1.73)	1.28 (1.91)	1.32 (1.88)	1.11 (1.74)	1.63 (1.98)	1.47 (1.98)	1.33 (1.87)
Marijuana Use (%)	11.98	7.55	4.81	14.98	11.79	17.3	20.00	13.21
Time 1 Features (Before Entering College)								
Demographics								
Race/Ethnicity								
White (%)	74.74	69.23	70.59	68.46	57.35	67.23	74.42	67.60
African American (%)	11.05	9.62	12.75	15.35	20.38	14.04	13.95	14.71
Hispanic (%)	8.42	13.46	15.69	9.96	17.06	11.91	6.98	12.10
Asian (%)	3.68	0.00	0.98	2.90	2.84	5.11	4.65	3.26
Other and missing (%)	2.11	7.69	0.00	3.32	2.37	1.70	0.00	2.33
Gender								
Male (%)	62.11	15.38	17.65	41.91	29.86	53.19	41.86	41.99
Female (%)	37.89	84.62	82.35	58.09	70.14	46.81	58.14	58.01
Parental Education								
BA & more (%)	62.11	59.62	42.16	61.83	45.97	50.21	44.19	20.48
HS (%)	18.42	11.54	31.37	13.28	29.86	17.87	23.26	22.81
Some College (%)	16.84	26.92	22.55	21.99	22.27	27.66	25.58	53.54
Missing (%)	2.63	1.92	3.92	2.90	1.90	4.26	6.98	3.17

Baseline Mental Health Problem								
Physical/Emotional/Mental Condition (%)	3.16	5.77	2.94	5.81	3.79	3.40	0.00	3.91
Learning/Emotional Problem (%)	2.11	1.92	1.96	4.15	5.69	1.28	0.00	2.98
Chronical Condition (%)	8.95	3.85	5.88	11.62	11.85	9.36	6.98	9.59
Age	18.34	18.69	18.42	18.48	18.56	18.54	18.19	18.48
	(0.91)	(1.28)	(0.94)	(1.13)	(1.25)	(1.35)	(1.01)	(1.16)
Self-Rated General Health	4.27	4.27	4.19	4.18	4.12	4.26	4.12	4.21
	(0.78)	(0.66)	(0.78)	(0.85)	(0.80)	(0.78)	(0.85)	(0.80)
Income to Poverty Ratio	458.17	497.53	413.71	512.65	450.67	556.38	444.81	485.75
	(436.74)	(265.16)	(262.60)	(470.02)	(502.34)	(569.57)	(487.24)	(471.66)
Weeks of Working for Employed Job	582.47	713.41	790.53	593.83	693.53	726.99	703.88	668.75
	(518.13)	(656.86)	(586.52)	(540.78)	(618.20)	(688.90)	(512.55)	(598.91)
Year to Degree	4.79	4.83	5.08	4.88	4.91	4.91	4.93	4.90
	(1.39)	(1.64)	(1.55)	(1.59)	(1.64)	(1.55)	(1.50)	(1.55)
Time 2 Features (After Completing College)								
Age	23.12	23.47	23.43	23.34	23.39	23.40	23.18	23.33
	(1.48)	(1.87)	(1.55)	(1.66)	(1.86)	(1.73)	(1.34)	(1.67)
Self-Rated General Health	4.23	4.26	4.08	4.10	4.11	4.19	4.13	4.15
	(0.76)	(0.65)	(0.75)	(0.83)	(0.77)	(0.76)	(0.87)	(0.78)
Income to Poverty Ratio	355.98	348.38	360.52	448.62	410.11	437.49	315.33	403.62
	(390.78)	(366.77)	(383.55)	(477.22)	(488.86)	(522.83)	(428.31)	(461.69)
Weeks of Working for Employed Job	1320.74	1166.28	1317.60	1346.25	1202.20	1318.33	1433.00	1299.70
	(715.08)	(735.10)	(778.72)	(781.42)	(750.56)	(814.87)	(876.12)	(773.57)
Year to Degree	2005.32	2005.60	2005.55	2005.55	2005.45	2005.42	2004.98	2005.44
	(2.09)	(2.13)	(1.95)	(2.13)	(2.11)	(2.21)	(1.67)	(2.10)

Note: Standard deviations are presented in parentheses.

Table 3: Longitudinal Results of Association Between College Fields of Study and Health Risk Behaviors, Random Effects Model (N=1,033)

	Smoking			Binge Drinking				Marijuana Use		
	O.R.	95% C.I.		Coefficient	S.E.	95% C.I.		O.R.	95% C.I.	
Fields of Study (Ref: STEM)										
Health	0.66	0.16	2.81	0.16	0.25	-0.34	0.66	1.39	0.46	4.21
Education	1.64	0.57	4.70	0.30	0.20	-0.09	0.69	0.70	0.28	1.80
Arts & Humanities	2.61	1.15	5.94	0.04	0.16	-0.26	0.35	1.24	0.64	2.42
Social Sciences	2.44	1.02	5.80	0.20	0.16	-0.12	0.52	1.52	0.75	3.07
Business	3.23	1.42	7.31	0.47	0.16	0.17	0.77	2.10	1.10	4.02
Others	1.50	0.36	6.26	-0.02	0.27	-0.54	0.51	2.29	0.78	6.73
Demographics										
Race/Ethnicity (Ref: White)										
African American	0.08	0.03	0.20	-0.95	0.14	-1.23	-0.67	0.44	0.23	0.86
Hispanic	0.46	0.20	1.07	-0.48	0.16	-0.80	-0.16	0.50	0.24	1.06
Asian	0.74	0.17	3.15	-0.19	0.29	-0.75	0.38	0.64	0.19	2.11
Other and missing	2.72	0.56	13.30	-0.21	0.33	-0.85	0.43	0.64	0.15	2.71
Female	0.59	0.34	1.02	-0.55	0.11	-0.76	-0.34	0.53	0.34	0.83
Parental Education (Ref: BA and Higher)										
HS	0.97	0.48	1.97	-0.11	0.14	-0.38	0.15	0.62	0.34	1.15
Some College	0.78	0.41	1.50	-0.21	0.12	-0.45	0.03	0.65	0.38	1.11
Missing	1.68	0.38	7.30	0.41	0.29	-0.16	0.98	0.99	0.30	3.29
Age	0.97	0.90	1.04	0.02	0.01	-0.01	0.05	0.91	0.85	0.98
Baseline Mental Health Problem										
Physical/Emotional/Mental Condition (Ref: No)										
Yes	1.15	0.29	4.51	0.30	0.27	-0.24	0.83	2.09	0.72	6.08
Missing	0.68	0.24	1.91	0.35	0.20	-0.03	0.74	1.31	0.57	2.98
Learning/Emotional Problem (Ref: No)										
Yes	1.11	0.25	4.93	-0.21	0.30	-0.80	0.38	1.12	0.33	3.81

Chronical Condition (Ref: No)										
Yes	1.06	0.44	2.56	-0.16	0.17	-0.50	0.17	0.94	0.46	1.93
Years to Degree	1.16	0.98	1.39	-0.04	0.03	-0.11	0.02	1.11	0.96	1.28
Self-Rated General Health	0.76	0.57	1.00	-0.06	0.06	-0.17	0.05	0.83	0.65	1.06
Weeks of Working for Employed Job	1.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Income to Poverty Ratio	1.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Constant	0.20	0.02	1.78	1.36	0.43	0.51	2.21	1.23	0.17	9.03

Table 4: Pairwise Comparisons across College Majors from Longitudinal Regressions

Smoking	STEM	Health	Education	Arts & Humanities	Social Sciences	Business	Others
STEM							
Health	-						
Education	-	-					
Arts & Humanities	AH > STEM	-	-				
Social Sciences	SS > STEM	-	-	-			
Business	B > STEM	B > H	-	-	-		
Others	-	-	-	-	-	-	

Binge Drinking	STEM	Health	Education	Arts & Humanities	Social Sciences	Business	Others
STEM							
Health	-						
Education	-	-					
Arts & Humanities	-	-	-				
Social Sciences	-	-	-	-			
Business	B > STEM	-	-	B > AH	-		
Others	-	-	-	-	-	-	

Marijuana use	STEM	Health	Education	Arts & Humanities	Social Sciences	Business	Others
STEM							
Health	-						
Education	-	-					
Arts & Humanities	-	-	-				
Social Sciences	-	-	-	-			
Business	B > STEM	-	B > EDU	-	-		
Others	-	-	-	-	-	-	-

Note: H=Health, EDU=Education, AH=Arts & Humanities, SS=Social Sciences, B=Business major; P-values are presented in parentheses.