

# Dropping out of school and chronic disease in the United States

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## Abstract

**Aim** Despite links between education and health, it is unclear to what extent dropping out of school is associated with major chronic health conditions.

**Subjects and Methods** Data from the 2006–2010 United States National Survey on Drug Use and Health (NSDUH) was employed and examined associations between dropping out of school and major chronic health conditions among individuals 18 years or older ( $N=189,896$ ).

**Results** Analyses show that dropout status is associated with increased odds of reporting a major chronic health condition; however, the effect is stronger for Whites and African-Americans than Hispanics.

**Conclusions** Study findings suggest that one important strategy to prevent and reduce health disparities is increased education in general including high school completion. Policies and practices that reduce dropout may in turn impact the prevalence of chronic disease.

**Keywords** Education · Chronic disease · School dropout · Health disparities · Health promotion

## Introduction

High levels of educational attainment are associated with healthy lifestyles. Persons with higher educational levels

enjoy greater income which facilitates access to safer neighborhoods, healthier food choices, exercise and weight control, health information, stable medical insurance, and reduced mortality (Crimmins and Saito 2001; Lleras-Muney 2005; Molla et al. 2004; Winkleby et al. 1992). Conversely, lower levels of education have been linked to poor health in prior investigations (Lantz et al. 1998). Simply stated, dropping out of school results in reduced life chances such as employment instability (Day and Newburger 2002), disease risk (Muennig et al. 2010) and poor eating and exercise habits (James et al. 1997). In turn, these factors increase the probability of developing a chronic health disorder. Even though the precise causal paths have not been fully elucidated, studies on the effects of compulsory schooling laws indicate that those who complete high school report better overall health and well-being (Orepoulos 2007). However, little research has accrued on the relationship between dropping out of school and specific chronic health conditions, especially in population-based samples. This is noteworthy since graduating from high school is a pathway to college and ultimately to higher income and better health. Moreover, high school dropout rates are substantially higher among African-Americans and Latinos compared to Caucasians and Asians (Belfield and Levin 2007; Heckman and LaFontaine 2010). Examining health disparities between these groups in relation to high school completion may shed additional light on factors contributing to health disparities and provide avenues for prevention and intervention.

## Current study focus

Despite the links between education and health, it is not entirely clear to what extent dropping out of school is associated with major chronic health conditions such as asthma, diabetes, heart disease, high blood pressure, hepatitis, and stroke. Further, it may be that the association can be accounted for by covariates such as household income, race, or alcohol

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or drug abuse and thus be spurious. In the present investigation we hypothesize that persons who dropped out of school will be at a higher probability of reporting these major chronic health conditions compared to non-dropouts. We also comparatively explore these effects among Caucasian, African-American and Latino dropouts by stratifying our regression models. The magnitude of these associations is estimated in a nationally representative sample of nearly 200,000 Americans. We estimate our models while taking into account the influence of numerous covariates that may confound the relationship between dropping out of school and aforementioned chronic health conditions.

## Methods

This study is based on public-use data collected each year between 2006 and 2010 as part of the National Survey on Drug Use and Health (NSDUH; Substance Abuse and Mental Health Services Administration 2011). The NSDUH provides population estimates of substance use and health behaviors in the US general population. It utilizes multistage area probability sampling methods to select a representative sample of the US civilian, non-institutionalized population aged 12 years or older for participation in the study. Computer-assisted interviewing (CAI) methodology is used to increase the likelihood of valid respondent reports of health-related behaviors and conditions (Substance Abuse and Mental Health Services Administration 2011). A more detailed description of the NSDUH sampling and data collection procedures are documented in greater detail elsewhere (Substance Abuse and Mental Health Services Administration 2011). The current study restricted analyses to individuals 18 years or older ( $N=189,896$ ).

## Measures

**High school dropout status** Respondents were queried as to their highest level of educational attainment and their current status as students. Respondents who had not completed high school and who were not currently enrolled in school were considered to be high school dropouts ( $N=26,235$ ; 14.50 %). This group was contrasted with respondents who had completed their high school education to form the reference group for study analyses.

**Health conditions** Seven items (0=no, 1=yes) were used to assess the health status of respondents in terms of current diagnoses of serious diseases: asthma ( $N=12,300$ ; 6.58 %), diabetes ( $N=6,557$ ; 6.94 %), heart disease ( $N=629$ , 3.92 %), high blood pressure ( $N=3,902$ ; 19.96 %), stroke ( $N=425$ ; 0.49 %), hepatitis ( $N=574$ ; 0.44 %), and stomach ulcers ( $N=209$ ; 1.14 %). Determination of these illnesses was based

on whether respondents reported being informed by a physician or medical professional during the previous 12 months that they met diagnostic criteria for these disorders. Self-rated perceptions of health were examined via the following question: “Would you say your health in general is excellent, very good, good, fair, or poor?” This item was coded so that higher values corresponded with poorer self-rated perceptions of health.

**Sociodemographic and behavioral covariates** The following demographic covariates were used: Age, gender, race/ethnicity—non-Hispanic white, non-Hispanic black, Hispanic, and other (American Indian or Alaska Native, Asian, other Pacific Islander or Native Hawaiian, and persons reporting more than one race)—total annual family income (less than \$20,000, \$20,000 to \$49,999, \$50,000 to \$74,999, and \$75,000 or more), and marital status (married, divorced, widowed, and never married).

Additionally, given the relationship between tobacco and alcohol use and health outcomes, we adjusted for nicotine and alcohol dependence. Nicotine dependence was determined on the basis of the Nicotine Dependence Syndrome Scale (NDSS) (Shiffman et al. 2010) and the Fagerstrom Test of Nicotine Dependence (Heatherton et al. 1989). Alcohol and marijuana dependence were determined based on the criteria of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*, 4th edn. (American Psychiatric Association 1994). Respondents who met criteria for tobacco or alcohol dependence were coded as 1 and all other respondents coded as 0, respectively.

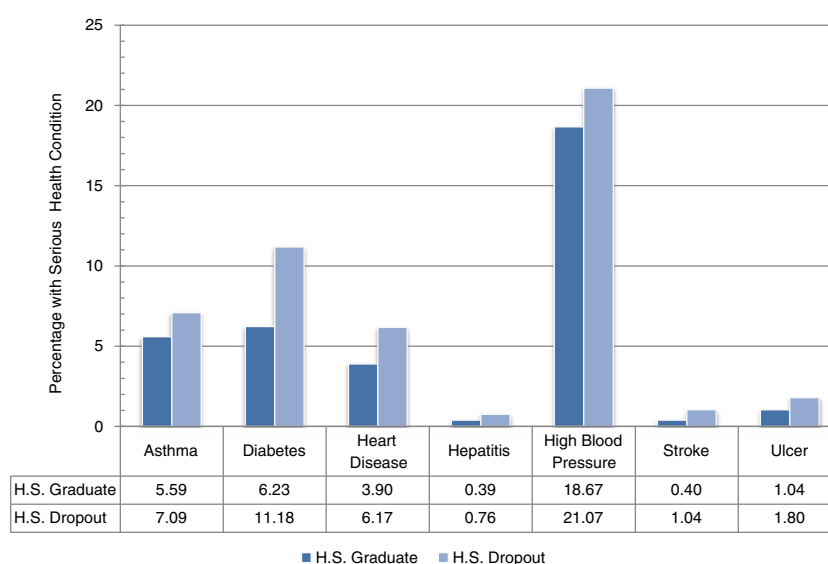
## Statistical analysis

Stratified logistic regression analyses were conducted to compare high school dropouts with high school graduates in terms of chronic health conditions across White, African American, and Hispanic adults. Dropouts in each racial/ethnic category were compared with non-dropouts from the corresponding racial/ethnic category. The health associations for dropouts and non-dropouts were also examined for the total population (i.e. all racial/ethnic groups combined). For all statistical analyses, weighted prevalence estimates and standard errors were computed using Stata 12.1SE (StataCorp 2011). This system implements a Taylor series linearization to adjust standard errors of estimates for complex survey sampling design effects.

## Results

Figure 1 illustrates the prevalence of chronic health conditions among high school dropouts and high school graduates.

**Fig. 1** Prevalence of serious health conditions among high school dropouts and high school graduates, 2006–2010 United States National Survey on Drug Use and Health (NSDUH)



**Table 1** Sociodemographic characteristics of the study population, 2006–2010 United States National Survey on Drug Use and Health (NSDUH)

	Dropped out of high school				Unadjusted		Adjusted	
	No ( <i>n</i> =163,524; 85.50 %)		Yes ( <i>n</i> =26,235; 14.50 %)					
	%	95 % CI	%	95 % CI	OR	(95 % CI)	AOR	(95 % CI)
Sociodemographic factors								
Age								
18–25 years	88.52	(88.2–88.8)	11.48	(11.2–11.7)	1.00		1.00	
26–64 years	87.07	(86.7–87.4)	12.93	(12.6–13.2)	1.07 <sup>a</sup>	(1.05–1.09) <sup>a</sup>	1.20 <sup>a</sup>	(1.17–1.23) <sup>a</sup>
65+ years	76.29	(75.2–77.3)	23.71	(22.7–24.8)	2.40 <sup>a</sup>	(2.25–2.56) <sup>a</sup>	2.81 <sup>a</sup>	(2.56–3.08) <sup>a</sup>
Gender								
Female	86.21	(85.8–86.6)	13.79	(13.4–14.2)	1.00		1.00	
Male	84.74	(84.3–85.1)	15.26	(14.9–15.7)	1.13 <sup>a</sup>	(1.08–1.18) <sup>a</sup>	1.37 <sup>a</sup>	(1.30–1.44) <sup>a</sup>
Race/ethnicity								
White	89.74	(89.4–90.0)	10.26	(10.0–10.5)	1.00		1.00	
African American	82.23	(81.3–83.2)	17.77	(16.8–18.7)	1.89 <sup>a</sup>	(1.76–2.03) <sup>a</sup>	1.68 <sup>a</sup>	(1.56–1.81) <sup>a</sup>
Hispanic	60.03	(63.0–65.0)	35.97	(34.9–37.0)	4.91 <sup>a</sup>	(4.65–5.19) <sup>a</sup>	5.22 <sup>a</sup>	(4.91–5.56) <sup>a</sup>
Other	91.23	(90.2–92.1)	8.77	(7.8–9.8)	0.84 <sup>a</sup>	(0.74–0.95) <sup>a</sup>	0.95	(0.83–1.08)
Family income								
< \$20,000	67.50	(66.6–68.3)	32.50	(31.7–33.3)	1.00		1.00	
\$20,000–\$49,000	81.40	(80.9–81.9)	18.60	(18.1–19.1)	0.47 <sup>a</sup>	(0.45–0.50) <sup>a</sup>	0.43 <sup>a</sup>	(0.41–0.46) <sup>a</sup>
\$50,000–74,999	92.45	(91.9–92.9)	7.55	(7.1–8.1)	0.17 <sup>a</sup>	(0.16–0.18) <sup>a</sup>	0.18 <sup>a</sup>	(0.16–0.19) <sup>a</sup>
> \$75,000	96.54	(96.2–96.8)	3.46	(3.2–3.7)	0.07 <sup>a</sup>	(0.07–0.08) <sup>a</sup>	0.08 <sup>a</sup>	(0.07–0.09) <sup>a</sup>
Marital status								
Married	87.00	(86.6–87.4)	13.00	(12.6–13.4)	1.00		1.00	
Divorced	83.44	(82.6–84.2)	16.56	(15.7–17.4)	1.33 <sup>a</sup>	(1.24–1.42) <sup>a</sup>	0.72 <sup>a</sup>	(0.67–0.78) <sup>a</sup>
Widowed	71.06	(76.3–72.8)	28.94	(27.2–30.7)	2.72 <sup>a</sup>	(2.48–2.99) <sup>a</sup>	1.28 <sup>a</sup>	(1.14–1.43) <sup>a</sup>
Never married	86.83	(86.4–87.2)	13.17	(12.8–13.6)	1.01	(0.97–1.06)	0.62 <sup>a</sup>	(0.58–0.66) <sup>a</sup>

Note: Odds ratios adjusted for age, gender, race/ethnicity family income, and marital status.

<sup>a</sup> Odds ratios are statistically significant ( $p < .05$ ).

Across the board, high school graduates reported lower levels of chronic health conditions compared to high school dropouts. Percentage differences were particularly pronounced in terms of diabetes (6.23 % for graduates versus 11.18 % for dropouts) and heart disease (3.90 % for graduates versus 6.17 % for dropouts) as the percentage of high school graduates reporting a diagnosis of these conditions was roughly half that of high school dropouts.

Table 1 presents estimates of the associations between high school dropout status and sociodemographic factors. In both Tables 1 and 2 adjusted odds ratios (AOR) are reported. These estimates account for the influence of other demographic factors. High school dropout status was significantly associated with middle (26–64 years; AOR=1.20, 95 % CI=1.17–1.23) and older adulthood (65 and older; AOR=2.81, 95 % CI=2.56–3.08). Respondents who did not complete high school were more likely to be male (AOR=1.37,

95 % CI=1.30–1.44) and to be African American (AOR=1.68, 95 % CI=1.56–1.81) or Hispanic (AOR=5.22, 95 % CI=4.91–5.56), but not “other” race. As for family income, high school dropout status was significantly associated with the decreased likelihood of earning family incomes greater than \$20,000/year. In regard to marital status, those who did not complete high school were less likely to be divorced (AOR=0.72, 95 % CI=0.67–0.78) and have never married (AOR=0.62, CI=95 % 0.58–0.66), but were more likely to have been widowed (AOR=1.28, 95 % CI=1.14–1.43).

Table 2 presents estimates of the associations between high school dropout status and chronic health conditions. Adjusted analyses revealed a differential pattern of association between dropout status and chronic illness across race/ethnicity. Among white adults, when controlling for sociodemographic factors and chemical dependency, high school dropout status was significantly associated with asthma (AOR=1.39,

**Table 2** Current Health of High School Dropouts Stratified by Race/Ethnicity, 2006–2010 United States National Survey on Drug Use and Health (NSDUH)

	White high school dropouts		African American high school dropouts		Hispanic high school dropouts		Total population high school dropouts	
	(n=12,061; 10.26 %)		(n=34,64; 17.77 %)		(n=90,39; 35.97 %)		(n=26,235; 14.50 %)	
	AOR	(95 % CI)	AOR	(95 % CI)	AOR	(95 % CI)	AOR	(95 % CI)
Chronic illnesses								
Asthma								
No								
Yes	1.39 <sup>a</sup>	(1.23–1.57) <sup>a</sup>	1.34 <sup>a</sup>	(1.05–1.69) <sup>a</sup>	0.80	(0.64–1.00)	1.27 <sup>a</sup>	(1.15–1.41) <sup>a</sup>
Diabetes								
No								
Yes	1.28 <sup>a</sup>	(1.12–1.46) <sup>a</sup>	1.35 <sup>a</sup>	(1.03–1.76) <sup>a</sup>	1.47 <sup>a</sup>	(1.18–1.83) <sup>a</sup>	1.32 <sup>a</sup>	(1.19–1.46) <sup>a</sup>
Heart disease								
No								
Yes	1.20 <sup>a</sup>	(1.04–1.39) <sup>a</sup>	1.17	(0.81–1.69)	1.04	(0.69–1.56)	1.18 <sup>a</sup>	(1.04–1.33) <sup>a</sup>
Hepatitis								
No								
Yes	1.20	(0.80–1.80)	2.12 <sup>a</sup>	(1.03–4.39) <sup>a</sup>	0.92	(0.44–1.90)	1.26	(0.91–1.72)
High blood pressure								
No								
Yes	0.98	(0.89–1.07)	1.25 <sup>a</sup>	(1.04–1.49) <sup>a</sup>	0.85	(0.70–1.03)	0.99	(0.92–1.06)
Stroke								
No								
Yes	1.96 <sup>a</sup>	(1.29–2.99) <sup>a</sup>	1.41	(0.65–3.07)	0.90	(0.32–2.53)	1.55 <sup>a</sup>	(1.09–2.20) <sup>a</sup>
Ulcer								
No								
Yes	1.36 <sup>a</sup>	(1.07–1.73) <sup>a</sup>	1.76 <sup>a</sup>	(1.09–2.86) <sup>a</sup>	1.06	(0.61–1.85)	1.34	(1.09–1.64) <sup>a</sup>
Total analytic sample	n=122,340		n=22,951		n=28,878		n=189,759	

Note: Odds ratios adjusted for age, gender, race/ethnicity family income, marital status, and nicotine/alcohol dependence.

<sup>a</sup> Odds ratios are statistically significant ( $p < .05$ ).

95 % CI=1.23–1.57), diabetes (AOR=1.28, 95 % CI=1.12–1.46), heart disease (AOR=1.20, 95 % CI=1.04–1.39), stroke (AOR=1.96, 95 % CI=1.29–2.99), and stomach ulcers (AOR=1.36, 95 % CI=1.07–1.73). Among African American adults, high school dropout status was also significantly associated with asthma (AOR=1.34, 95 % CI=1.05–1.69), diabetes (AOR=1.35, 95 % CI=1.03–1.76), high blood pressure (AOR=1.25, 95 % CI=1.04–1.49), hepatitis (AOR=2.12, 95 % CI=1.03–4.39), and stomach ulcers (AOR=1.76, 95 % CI=1.09–2.86), but not heart disease or stroke. Among Hispanic adults, high school dropout status was only significantly associated with diabetes (AOR=1.47, 95 % CI=1.18–1.83).

## Discussion

To our knowledge, this is the largest study examining the association between school dropout and health. We tested the hypothesis that dropping out of school will be positively associated with major chronic health conditions. Results largely support this hypothesis finding that dropping out of school was indeed associated with increased risk for a number of major chronic diseases. As such, present study results are convergent with prior research on the association between education and health (Lantz et al. 1998; Muennig et al. 2010). The largest associations were found for hepatitis among African-Americans who dropped out of school and stroke among white dropouts. The only health condition with associations across all three racial/ethnic groups was for diabetes. Overall, Latinos who dropped out were somewhat less likely than whites and African-Americans to report possessing a major health condition. In addition to examining major health conditions, we also examined self-rated perceptions of poor health and the pattern of odds ratios is relatively uniform for all race/ethnic groups (white: AOR=1.56, 95 % CI=1.51–1.61; black: AOR=1.36, 95 % CI=1.27–1.46; Hispanic: AOR=1.59, 95 % CI=1.51–1.68), suggesting that dropping out of school may matter more than race or ethnicity.

## Limitations

Although the size and scope of the study sample is large and nationally representative, there are important limitations that should be considered. First, study data were cross-sectional and as such the causal relationship between dropping out of school and health is not directly assessed. For instance, given that the NSDUH does not include information about age of first diagnosis, we were unable to identify participants who may have received a diagnosis prior to dropping out of school. Further, data on major health conditions leaves out many important details about the severity and duration of these

conditions across individuals. For example, we were unable to distinguish between particular subtypes of health conditions (e.g. Type 1 versus Type 2 diabetes, hepatitis A versus hepatitis B or C, etc.) as the NSDUH did not collect data at this level of specificity. Moreover, responses were based on self-report and are dependent on contact with medical providers to learn of these disorders. Future studies at the interface of educational disparities and health capable of assessing these variables are a natural extension of the present investigation.

## Conclusions

We found that high school dropouts were at increased odds of reporting a serious chronic health condition (e.g., asthma, diabetes, heart disease, high blood pressure) even after accounting for the influence of age, income, gender, marital status and any alcohol or drug addiction. Stratified results across race and ethnicity (i.e., whites, African-Americans, and Hispanics) revealed that the only health condition associated with dropout across all three racial/ethnic groups was for diabetes. The strongest associations were found for stroke among whites and hepatitis among African-Americans. Hispanic dropouts were less likely than whites and African-Americans to report a chronic health condition.

Study findings suggest that one important strategy to prevent and reduce health disparities is increased education in general including high school completion. As Freudenberg and Ruglis (2007) note about education as a poor health antidote, “If medical researchers were to discover an elixir that could increase life expectancy, reduce the burden of illness, delay the consequences of education, decrease risky health behavior, and shrink disparities in health, we would celebrate such a discovery.” Results presented here indicate that policies and practices that reduce dropout may in turn impact the prevalence of chronic disease.

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**Conflict of Interest Statement** The authors declare that there are no conflicts of interest.

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