The association between school term length and cardiovascular risk factors among adults in the US

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Introduction

Required annual number of days of instruction varies widely across countries. While the average days of instruction for OECD countries is 190 days per school year, the annual average days of instruction is only 180 in the US (US Department of Education). However, this number may vary widely across the US. According to one estimate, thirty states have 180-day school years, two have school years longer than 180 days, and 11 have school years shorter than 180 days in the US (Education Commission of the States, 2004). Previous social science research has shown an additional year of schooling is casually linked with decreased body mass index (BMI) and decreased likelihood of chronic illness (Brunello, Fabbri, Fort, 2009; Reinhold, 2010). However, there is limited research on whether variation in annual days of instruction is associated with any health benefits. This purpose of this study is to quantify the association between school term length and cardiovascular risk factors (e.g. systolic blood pressure, diastolic blood pressure, body mass index).

Methods

Study sample. We merged data from the first two waves of the National Health and Nutrition Examination Survey (NHANES). NHANES I was conducted from 1971-1975 and NHANES II was conducted from 1976 to 1980. NHANES 1 interviewed approximately 32,000 people from 1 to 74 years of age and NHANES II approximately 28,000 people from 6 months to 74 years of age. Respondents provided sociodemographic information such as state of birth, year of birth, race, education and income in household surveys. In both waves a subset of persons aged 25-74

received a detailed medical exam with measured data on height and weight and cholesterol. Study sample was restricted to US-born respondents. Furthermore, because our information on compulsory days of instruction ranged from 1919 to 1951, only individuals with birth years between 1911 and 1939 were included in this study. The final sample size for this study is 7,356 respondents. Sample weights and complex survey design were accounted for in all analyses to obtain unbiased estimates for the full population.

Outcomes. We used risk factors for cardiovascular disease as our outcomes of interest: body mass index (BMI), total cholesterol, current smoking status, diastolic blood pressure, and systolic blood pressure. BMI was calculated as weight in kilograms divided by height in meters squared. All outcome variables were log transformed so exponentiated regression coefficients can be interpreted as percent change.

Exposure. Most schools in the US were large segregated by race for most of the 20th century. Such segregation was often de jure; legal statures ordained different annual school term lengths for black and white children born in the same place and time. We calculated the average annual school term length for each person when they were between the ages of 8-12. This age span was chosen because it covers mandatory school age across states and across time.

Potential confounders. We included age and a quadratic term for age as potential confounders in our adjusted models.

Analysis. We used ordinary least squares regression to model the association between average annual school term length at ages 8-12 and our outcomes. All analyses were stratified by gender and race. Previous research suggests education may be gender and race-specific. Furthermore, we conducted secondary analysis where we further stratified our analyses by educational attainment (e.g. highest degree obtained). Standard errors were adjusted for clustering by state.

Preliminary results

Our study sample consisted largely of females (52%), Non-Hispanic white (88%) participants between 35 and 69 years old. Approximately X1% of males and X2% of females are classified as overweight in the two waves of the NHANES. About 45% have less than a high school degree but this varied widely by race and gender (Table 1).

Overall, an additional ten days of instruction was associated with an approximately 1% decrease in systolic and diastolic blood pressure for black females while the impact on white females was negligible. Although not statistically significant, an additional ten days of instruction was associated with decrease in systolic blood pressure, diastolic blood pressure, and BMI for black males with a HS degree or more. For white males, an additional ten days of instruction was associated with increase in systolic blood pressure, diastolic blood pressure, and BMI.

Conclusion

Preliminary results suggest longer school term length is associated with decreased cardiovascular risk factors for black women. Our study had several limitations. Firstly, we assume that individuals went to school in their state-of-birth, which might result in some mismatching. Mismeasurement may also arise from time variability within a school day. Nevertheless, this study provides valuable insight on the role education has on the health of disadvantaged populations. Results suggest policies improving socioeconomic equality may also improving population health outcomes and address health disparities.

Table 1: Sociodemographic characteristics according to gender and race, NHANES I & II [a]

	Black Male	**Black Female**	**White Male**	**White Female**
N	358	459	2688	3056
Mean age	53 (52-54)	52 (52-53)	54 (53-54)	53 (53-54)
Less than HS degree (%)	74 (69-79)	72 (68-76)	42 (42-45)	39 (38-41)
Mean systolic blood pressure	149 (139-159)	152 (142 -162)	138 (136-140)	138 (135-140)
Mean diastolic blood pressure	91 (89-93)	89 (88-91)	86 (85-86)	83 (82-84)
Overweight/obese (%)	58 (53-63)	75 (71-79)	60 (58-62)	48 (46-50)

[a] Unweighted

Table 2: Percentage change in the specified outcomes associated with a 10-day increase in annual school term length, NHANES I & II

	White Males			White Females		
	All	HS degree/ College	Less than High school	All	HS degree/ College	Less than High school
Systolic blood pressure	0.6 (-0.1, 1.4)	0.8 (-0.8, 2.4)	0.6 (-0.6, 1.6)	-0.7 (-1.7, 0.3)	-0.6 (-1.6, 0.5)	-0.4 (-1.9, 1.0)
Diastolic blood pressure	0.2 (-0.7, 1.1)	0.5 (-1.0, 1.9)	-0.2 (-1.3, 0.9)	-0.4 (-1.3, 0.6)	-0.3 (-1.3, 0.8)	-1.9 (-1.4, 1.0)
BMI	0.8 (0.2, 1.4)	0.7 (-0.2, 1.7)	0.9 (0.2, 1.6)	0.3 (-0.4, 1.1)	0.3 (-0.7, 1.2)	1.3 (0.2, 2.3)

	Black Males			Black Females		
	All	HS degree/ College	Less than High school	All	HS degree/ College	Less than High school
Systolic blood pressure	-0.6 (-2.0, 0.9)	-4.0 (-10.0, 2.1)	0.7 (-0.5, 1.9)	-1.1 (-2.2, 0.0)	-0.6 (-2.2, 1.1)	-0.9 (-2.6, 0.7)
Diastolic blood pressure	0.1 (-1.0, 0.7)	-0.7 (-2.6, 1.2)	0.0 (-1.1, 1.1)	-1.0 (-1.9, -0.2)	-0.8 (-0.2, 0.9)	-1.0 (-2.0, 0.0)
BMI	0.5 (-0.2, 1.3)	-0.2 (-1.9, 1.5)	0.4 (-0.7, 1.4)	-0.7 (-1.7, 0.4)	-0.1 (-1.3, 1.2)	-0.7 (-2.0, 0.7)