American Journal of Epidemiology
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Vol. 189, No. 5
DOI: 10.1093/aje/kwz221
Advance Access publication:
October 9, 2019

Original Contribution

State School Policies as Predictors of Physical and Mental Health: A Natural Experiment in the REGARDS Cohort

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Initially submitted September 12, 2018; accepted for publication September 19, 2019.

We used differences in state school policies as natural experiments to evaluate the joint influence of educational quantity and quality on late-life physical and mental health. Using US Census microsample data, historical measures of state compulsory schooling and school quality (term length, student-teacher ratio, and attendance rates) were combined via regression modeling on a scale corresponding to years of education (policy-predicted years of education (PPYEd)). PPYEd values were linked to individual-level records for 8,920 black and 14,605 white participants aged ≥45 years in the Reasons for Geographic and Racial Differences in Stroke study (2003–2007). Linear and quantile regression models estimated the association between PPYEd and Physical Component Summary (PCS) and Mental Component Summary (MCS) from the Short Form Health Survey. We examined interactions by race and adjusted for sex, birth year, state of residence at age 6 years, and year of study enrollment. Higher PPYEd was associated with better median PCS ($\beta = 1.28$, 95% confidence interval (CI): 0.40, 1.49) and possibly better median MCS ($\beta = 0.46$, 95% CI: –0.01, 0.94). Effect estimates were higher among black (vs. white) persons (PCS × race interaction, $\beta = 0.22$, 95% CI: –0.62, 1.05, and MCS × race interaction, $\beta = 0.18$; 95% CI: –0.08, 0.44). When incorporating both school quality and duration, this quasiexperimental analysis found mixed evidence for a causal effect of education on health decades later.

education; mental health; physical health; quasiexperiment

Abbreviations: CI, confidence interval; MCS, Mental Component Summary; PCS, Physical Component Summary; PPYEd, policy-predicted years of education; REGARDS, Reasons for Geographic and Racial Differences in Stroke.

Educational attainment is consistently associated with adult health (1) and has been proposed as a key policy goal for improving population health (2). However, it remains controversial whether education causally affects adult health or whether the association reflects confounding by individual factors, such as intelligence, childhood health, personality, or parental socioeconomic advantage (1, 3, 4). Using changes in mandatory schooling policies as natural or quasiexperiments has emerged as a novel, robust approach to evaluate the effect of education on health outcomes independent of individual characteristics (5–14). This research has focused almost exclusively on compulsory schooling laws regulating duration of schooling; however, quality of schooling also affects educational attainment and could influence adult health outcomes (15, 16).

Quasiexperimental approaches offer the best hope of evaluating causal effects of education on health independent of individual characteristics. During the 20th century, all US states changed schooling policies such as mandatory school enrollment age or minimum dropout age. In addition, states differed substantially with respect quality of schooling (e.g., student-teacher ratio and school term length), which might directly influence educational attainment of students (16–18). The timing of such policy changes is unrelated to individual characteristics of children affected by the policies (5, 19). Although some studies have found that increases in compulsory schooling are associated with decreases in

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mortality (19, 20), the larger pattern of findings relating education to physical and mental health outcomes is inconsistent (8, 11–13, 20–22). Policy measures affecting school quality, combined with compulsory schooling laws, could better predict educational experiences and might provide more robust evidence of the causal effect of education on health. Few prior studies have incorporated measures of school quality or examined differences by race.

The aim of this analysis was to evaluate whether improvements in quantity and quality of education between 1908 and 1962, expressed on the scale of years of education, were associated with improved overall perceived physical and mental health in black and white older adults in a large national cohort study. Because increases in school quality and quantity are both expected to increase educational attainment, we used years of education as a scale for combining state-level quality and compulsory schooling laws. Because most black adults aged 55 years or older would have received their education in the southern United States under the influence of Jim Crow laws, we explored whether there were differential associations by race.

METHODS

Participants

The Reasons for Geographic and Racial Differences in Stroke (REGARDS) cohort includes 30,239 non-Hispanic black and white individuals, as detailed elsewhere (23). Briefly, English-speaking, US community-dwelling adults, aged 45 years or older, were enrolled 2003–2007. Race and sex were targeted to be balanced by design, with oversampling of the southeastern United States (the "Stroke Belt") and black participants (45% men, 55% women, 58% white persons, and 42% black persons, with 56% from the southeastern United States and the remainder from the other 40 contiguous states). Computer-assisted telephone interviews and questionnaires gathered demographic information, medical history, and health status. An in-person clinical examination was conducted approximately 2–3 weeks later. The REGARDS study procedures were approved by the institutional review boards of all participating institutions, and all participants provided written informed consent.

A residential history questionnaire (24), was used to link childhood state of residence at age 6 years with data on school quality; 26,883 (89%) participants had a complete residential history, among whom 24,572 lived in a US state at age 6 years. We excluded 1,047 participants who were missing data, for a final sample of 23,525 participants (14,605 white and 8,920 black).

Administrative indicators of school quality and mandatory schooling

Compulsory schooling laws were compiled by Lleras-Muney (7), Acemoglu and Angrist (6), and Glymour et al. (10) using federal education reports usually available biennially. For each state, data were collected on mandatory age at school enrollment, youngest age when it was legal to drop out of school, and youngest age when individuals could receive a work permit. We then calculated the number of years mandated to attend school before either: 1) dropping out, or 2) obtaining a work permit (10, 14).

Three indicators of school quality were extracted from the Federal Digest of Educational Statistics, covering birth years of REGARDS participants: 1908–1962 (25): 1) days in the academic year (term length); 2) fraction of enrolled children who attended on an average day (attendance ratio); and 3) ratio of students to instructional staff (student-teacher ratio). These items were selected because they were reported consistently in most states for most of the 20th century.

We extracted each quality measure separately for schools serving black students and schools serving white students (often reported separately in segregated states prior to 1954). In states without de jure racial segregation of schools, quality measures were set to the same value for white and black schools. Between-year interpolation was completed by estimating mixed models with random intercepts for regions and states and random slopes for year and year-squared, this approach allowed us to include all available data to estimate state-specific longitudinal trends. Interpolation models also included a fixed effect indicator for whether the state had legal racial segregation in that year (segregated black, segregated white, or integrated).

For each state and year, we therefore had 8 correlated administrative indicators of mandatory schooling or school quality.

Physical and mental health

Participants completed the 12-item Short Form Health Survey at baseline (26). The Physical Component Summary (PCS) and Mental Component Summary (MCS) scales are summary measures of physical and mental health functioning and general health-related quality of life. PCS is derived primarily from questions on physical functioning, limitations in activities due to physical health problems, pain, and general health, while the MCS is derived primarily from questions on energy/fatigue, limitations in activities due to mental health problems, social functioning, psychological distress, and psychological well-being. PCS and MCS are composites of weighted item responses with a range of 0–100. The scores are norms-based such that 50 represents the mean in the general US population, with a standard deviation of 10 (27).

Covariates

State of residence at age 6 years, year of birth, race, age at enrollment, year of enrollment, and sex were recorded for each respondent. State-level covariates compiled from Statistical Abstracts of the United States, years 1910–1970, and used in sensitivity analyses included percentage homeownership and infant mortality (among white persons) when the REGARDS respondents were born; percentage black, urban, and foreign-born when the respondents were 6 years of age; and manufacturing jobs per capita and manufacturing wages per manufacturing job when the respondents were 14 years of age (for simplicity, we assumed respondents were in the same state in early childhood). We created a

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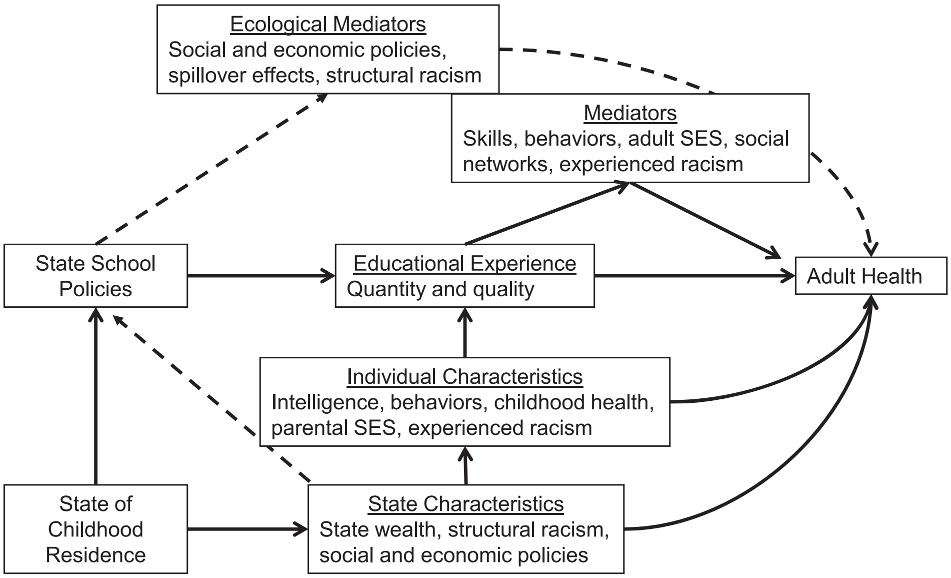

Figure 1. Directed acyclic graph for the effects of state school policies on health. There are multiple mechanisms (mediators) through which adult health might be affected by improved educational experience (incorporating both quality and quantity and scaled to years of education in our approach), such as learning skills and healthy behaviors. Individual characteristics might confound the association between educational experience and health but also overlap with mediators. State school policies (influencing both quality and compulsory schooling laws) affect educational experience and are not influenced by individual characteristics; they can therefore help estimate the causal effect of educational experience on adult health. However, this pathway might be challenging to isolate. State school policies might affect adult health through pathways other than individual educational benefits (e.g., ecological mediators—dashed lines). School policies are influenced by state characteristics that could also influence adult health; we conceptualize that this pathway could be blocked by controlling for state of childhood residence. However, this might not capture effects of time-varying state characteristics, which could be hard to disentangle from ecological mediators (e.g., cyclic changes in school and other policies). Recognizing these limitations, our analysis focused on estimating the overall causal effect of state school policies on adult health independent of individual-level factors. SES: socioeconomic status.

state-level race-based inequality measure using a composite occupational score from the IPUMS USA 1910–1970 US Census 1% microsample (28). A continuous occupational score on a consistent scale was constructed for each of these Censuses by assigning occupational income scores to each occupation, based on the economic rewards for each occupation in 1950 (29). State-based racial inequality was calculated as the difference in average occupational score for white men aged 30–39 years compared with black men aged 30–39 years in each state at each decade's Census. As expected, and providing evidence for construct validity, occupational scores were lower on average for black men compared with white men, and state-based racial inequality was higher in segregated states and earlier decades. Scores were linked to REGARDS respondents based on the year and state of residence at age 6 years.

Statistical analysis

We used a 2-stage analytical approach. First, we summarized the 8 administrative measures on a common scale (years of education); second, we estimated their combined association with late-life health. State school policies have been used as instrumental variables in a number of studies (5–14). We followed this instrumental-variables approach (5, 30, 31), which is not sensitive to individual-level confounding. However, this approach can provide evidence only for the causal effects of educational attainment on adult health if strong assumptions are met: 1) state school policies (the instruments) are associated with attained education; 2) state school policies affect health only through attained education; and 3) state school policies do not share unmeasured common causes with the outcome. Because school policies could be influenced by other state-level factors and also influence health via mechanisms besides educational attainment (Figure 1), instrumental-variables assumptions might be violated, in which case, interpretations of these findings change. While instrumental-variables assumptions cannot be empirically proven, we have included covariate adjustment and sensitivity analyses to identify a plausible range of estimates.

We first summarized the 8 administrative school quality and quantity measures into a single variable, policy-predicted years of education (PPYEd), using a combined 1980 and 1990 US Census 5% microsample from IPUMS USA (28) (n = 11,400,971). PPYEd was calculated based on a linear regression of education on each administrative measure specific to each state and year when the individual turned 6 (a typical age of school entry) (linear terms), interactions by race, and covariates (further details in Web Appendix 1, available at https://academic.oup.com/aje). PPYEd values were predicted by birth year, race, and

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Table 1. School Quality Indicators and Baseline Characteristics According to Race, Reasons for Geographic and Racial Differences in Stroke, United States, 2003–2007

Characteristic	Black (n = 8,920)			White (n = 14,605)		
	No.	%	Mean (SD)	No.	%	Mean (SD)
Year of birth			1940 (9.3)			1939 (10.0)
Age, years			63.8 (9.0)			65.2 (9.3)
Male sex	3,207	36.0		7,307	50.0	
Region of residence at age 6 years						
West	276	3.1		1,033	7.1	
Midwest	1,094	12.3		3,335	22.8	
Northeast	597	6.7		2,346	16.1	
Segregated state	5,807	65.1		6,969	47.7	
≤12 years of education attained	3,831	43.0	13.6 (2.6)	4,322	29.6	14.5 (2.4)
Minimum compulsory schooling, years						
Based on dropout age			7.9 (0.9)			7.9 (1.0)
Based on work-permit age			8.7 (0.9)			8.8 (0.9)
State school variables in schools serving black children[a]						
Student-teacher ratio			34.1 (6.4)			31.9 (6.7)
Term length, days			167.5 (15.2)			171.2 (14.3)
Attendance ratio			0.84 (0.05)			0.85 (0.05)
State school variables in schools serving white children[a]						
Student teacher ratio			29.0 (2.7)			28.5 (3.1)
Term length, days			175.2 (7.2)			176.1 (6.9)
Attendance ratio			0.85 (0.04)			0.86 (0.04)
Policy-predicted years of education			11.3 (1.1)			12.4 (0.8)
Physical Component Score[b]			45.3 (10.6)			47.4 (10.3)
Mental Component Score[b]			53.5 (9.0)			54.6 (7.8)

Abbreviation: SD, standard deviation.
[a] School quality measures for schools for black and white children are identical in desegregated states.
[b] Summary scores from the 12-item Short Form Healthy Survey.

state and merged to the individual-level REGARDS data. PPYEd can be interpreted as the years of attained education expected for the individual, given his or her race, sex, state, year of birth, and variations in state compulsory schooling and school quality prevailing in the state and year s/he entered school. The second stage (Web Appendix 1) used PPYEd to predict either PCS or MCS for REGARDS participants.

We used quantile regression (32), which estimates the median (50th percentile) of the outcome conditional on predictors, and robust regression (33), an alternative to linear regression that excludes outliers. We estimated race-specific models by including an interaction between race and PPYEd; we also reported pooled estimates if estimated race difference could be due to chance alone. We also assessed the association between self-reported years of education and PCS and MCS in similar models to provide a comparison with PPYEd estimates.

We conducted several sensitivity analyses. We examined the impact on primary estimates of 1) inclusion of only quality indicators used for PPYEd estimation, without mandatory schooling measures, 2) additional adjustment for state-level covariates and time trends (modeled with a region by year interaction), and 3) additional adjustment for self-reported completed years of education, given that we expected most of the association between school policies and any health outcome to operate through years of education. Finally, we used quantile regression at the 10th, 25th, 50th, 75th, and 90th percentiles of PCS or MCS. This allowed us to capture differences in the association between PPYEd and PCS or MCS for those with very poor, poor, average, good, and very good health scores. These analyses were conducted for pooled samples because evidence for substantial differences by race (e.g., interaction) was lacking. Confidence intervals (95%) were estimated with 1,000 bootstrap replications (34). All tests were 2-sided, with α level set to 0.05. Analyses were performed using STATA, version 14 (StataCorp LP, College Station, Texas).

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Figure 2. Term length according to state for black (A) and white (B) participants in 1935 (race-stratified) and in 1959 (C), Reasons for Geographic and Racial Differences in Stroke, United States, 2003–2007. Black and white participants are shown together in 1959, which was after legal desegregation throughout the United States. Darker shades correspond to longer term lengths.

RESULTS

Participants were born during 1908–1962 (age 6 years from 1914–1968). Mean age at baseline was 64.7 (standard deviation, 9.2) years. Average school measures according to race are shown in Table 1. School quality generally increased over time and varied across states and, within segregated states, by race. Figure 2 contrasts school term length in 1935 and 1959.

PPYEd (1st stage) was estimated in the US Census based on 11,400,971 observations; for the association of all school policy variables with years of education, F statistic = 2,760.72. Among REGARDS participants, a 1-year difference in PPYEd was associated with a 0.37-year difference in self-reported education (95% confidence interval (CI): 0.20, 0.53; F statistic = 19.58), with adjustment for sex, race birth year, state at age 6 years, year of questionnaire, and birth year × race and region × race interactions.

Both self-report and PPYEd associated with PCS and MCS (Table 2). PPYEd estimates were comparable in size to self-reported education; however, the confidence intervals were much wider for PPYEd relative to self-reported years of education. Estimates for white participants were slightly lower (with confidence intervals often including 0) compared with the effect estimates in black participants. However, we also report pooled estimates (Table 2) because there was not strong evidence for interaction with PPYEd (median regression: PCS × race, $\beta = 0.22$, 95% CI: –0.62, 1.05; and MCS × race, $\beta = 0.18$, 95% CI: –0.08, 0.44). Estimates were higher for PCS than MCS across models. The estimates from robust regression, which estimates the mean response, were generally lower than median-based effect estimates.

Figure 3 shows results from sensitivity analyses, based on pooled estimates. When only education quality measures were used to predict PPYEd, the estimated associations between PPYEd and median PCS was 11% higher (1.28 vs. 1.43 points per year of PPYEd) and the estimated associations between PPYEd and median MCS was of a similar magnitude but more precise. Compared with the primary model, adding time-varying state-level covariates partially reduced the magnitude and precision of the associations for PCS and the precision (but not magnitude) for MCS. Adding self-reported education to the model reduced the magnitude of the associations only partially compared with the primary model. Estimates and confidence intervals are listed in Web Table 1.

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Table 2. Estimated Associations of Self-Reported Education or Policy-Predicted Years of Education With Physical and Mental Component Summary Scores From the 12-Item Short Form Health Survey, According to Race and Pooled, Reasons for Geographic and Racial Differences in Stroke, United States, 2003–2007[a]

Model	Black		White		Pooled[b]	
	β	95% CI	β	95% CI	β	95% CI
Physical Component Score						
Self-reported education[c]	0.89	0.79, 1.00	0.62	0.54, 0.69	N/A	
PPYEd	1.41	0.43, 2.38	0.75	−0.44, 1.94	1.28	0.40, 1.49
PPYEd robust regression	0.63	−0.12, 1.39	0.48	−1.06, 1.44	0.59	−0.12, 1.29
Mental Component Score						
Self-reported education[c]	0.31	0.25, 0.38	0.07	0.03, 0.11	N/A	
PPYEd	0.53	0.03, 1.02	0.20	−0.44, 0.83	0.46	−0.01, 0.94
PPYEd robust regression	0.52	0.07, 0.98	0.11	−0.42, 0.64	0.40	−0.02, 0.82

Abbreviations: CI, confidence interval; N/A, not applicable; PPYEd, policy-predicted years of education.

[a] Based on quantile regression for the median score unless otherwise specified. All models included adjustment for birth year (cubic splines), birth year × race interactions, sex, state of residence at age 6 years, region × race interaction, and year of enrollment. Race-stratified estimates are based on interaction between race and education.

[b] Pooled estimates shown for models without strong evidence for interaction.

[c] Self-reported education was missing in 35 participants.

Further examination of differences in effect estimates across the distribution of PCS and MCS revealed two patterns (Figure 4). The magnitude of the association between PPYEd and PCS was strongest for the 50th percentile of PCS (difference in PCS per additional year of PPYEd was 1.28 points). The association between PPYEd and PCS for the lowest and highest percentiles of PCS was weaker, trending towards an inverse association. The magnitude of the association between PPYEd and MCS was strongest for the 25th percentile of MCS (1.33 points, 95% CI: 0.28, 2.38), and the association was weaker at higher percentiles of MCS (Web Table 2).

DISCUSSION

In one of the first approaches to integrate measures of both school quality and quantity, we found evidence that increases in educational attainment induced by state-mandated higher quantity and quality of schooling were associated with better PCS and MCS in REGARDS participants, even decades after completing schooling. Higher state-level school quality and quantity was linked to higher self-reported education. Potential long-term health benefits of state school policies were seen overall, with adjustment for state and birth cohort fixed effects, even when we considered only state school-quality measures. In race-stratified analyses the effect estimates of schooling policies were stronger for black and weaker for white participants. Including additional adjustment for time-varying state effects and characteristics, estimates were less precise and attenuated for PCS; thus, it is possible that our findings could be due to the influence of other aspects of state characteristics on health. However, estimates were all in the same direction and qualitatively similar across different sensitivity analyses. Interestingly, educational quality and quantity were stronger determinants of physical or mental health among the individuals within the middle range of the PCS and lower range of MCS. This novel finding might reflect other factors, such as late-life health conditions, being stronger determinants of the extremes of physical and mental health in later-life. Together these results suggest small and potentially differential causal effects of state school policies on late-life physical and mental health.

This study is an important extension of prior work in the United States on estimating the beneficial effect of education policies on health outcomes. Education might promote healthy behaviors, improve occupational opportunities, and strengthen self-efficacy—all of which could improve health (35). However, some research indicates that much of the association between education and health might be due to shared confounders, such as cognitive and noncognitive skills, parental SES, childhood health status, or genetics (4, 36–38). We used a quasiexperimental approach, which suggests that the association between education and health cannot be fully attributed to confounding by individual characteristics. Several prior studies have used compulsory schooling laws to study this question, with mixed results (8, 11–13, 20–22). One possible explanation for this variability is that most studies have not had adequate study power (12). Our estimates suggested small but positive associations; however, effect estimates had wide confidence intervals.

Several strong assumptions are required to interpret these findings as demonstrating a causal effect for longer duration or higher quality of education on adult health. In particular, there should be no uncontrolled pathways between state school policies and physical and mental health other than through increases and improvements in educational

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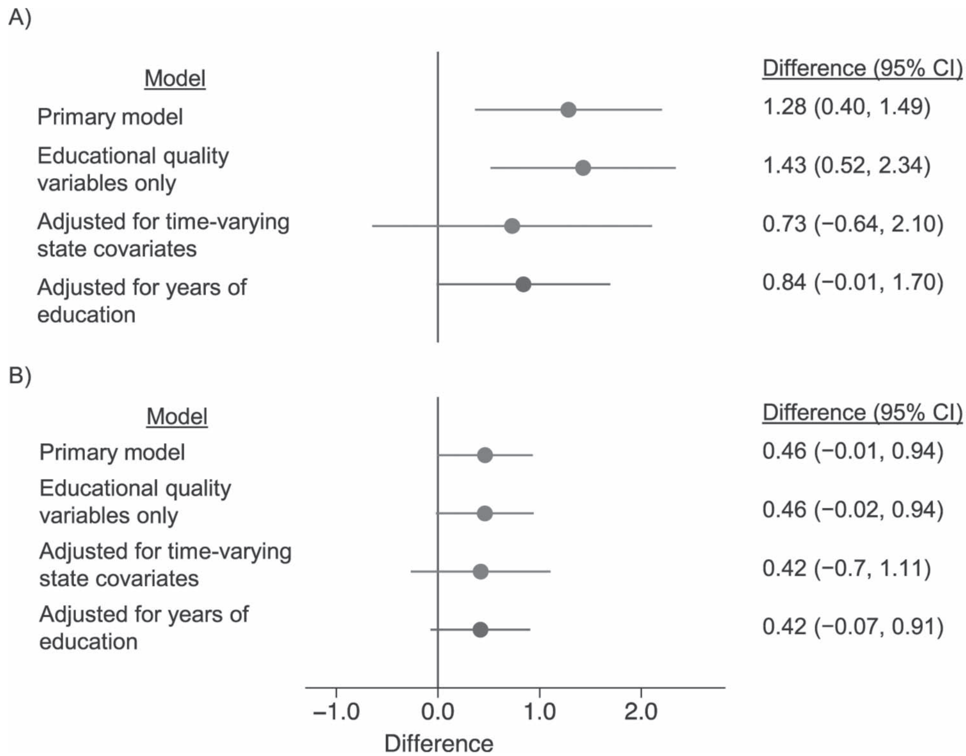

Figure 3. Coefficient plots for sensitivity analyses for the association between policy-predicted years of education (PPYEd) and Physical (A) and Mental (B) Component Summary scores from the 12-item Short Form Health Survey, Reasons for Geographic and Racial Differences in Stroke, United States, 2003–2007. Coefficients describe the difference and 95% confidence interval in median health score for a 1-year increase in PPYEd. All models included adjustment for birth year (cubic splines), birth year × race interactions, sex, state of residence at age 6 years, region × race interaction, and year of enrollment. "Primary model" = PPYEd calculated with quality and compulsory schooling laws. "Education quality variables only" = PPYEd calculated with only quality schooling laws. "Adjusted for time-varying state covariates" = primary model + time-varying state-level covariates + region × year interaction. "Adjusted for years of education" = primary model + self-reported years of education. CI, confidence interval.

attainment. Inclusion of self-reported years of education attained by each individual did not fully attenuate estimates of the association between PPYEd and health. There might be other important pathways linking education policy to health that are not fully mediated by the individual's own educational attainment. For example, knowing that the policies in the schools one attended systematically provided less education to black students than to white students might have a direct effect on adult health. There could be spillover effects in the community and impact on family income. State school policies might also influence other state characteristics and policies, which could in turn affect late-life health outcomes.

Our effect estimates can alternatively be interpreted as estimates of the effects of the set of policies that increase children's educational attainment by 1 year, which might not be fully mediated by education experiences per se. Because years of education is familiar and meaningful, and was measured in all REGARDS participants, we chose this as the scale for state school policies. Years of education probably does not capture all of the benefits of increased educational quality or compulsory schooling laws on educational attainment.

Although we included adjustment for state effects, there is potential for unmeasured time-varying common causes of school policies and adult health to affect results. Estimates were quite similar across sensitivity analyses for MCS but slightly reduced for PCS with inclusion of additional time-varying state characteristics. Other indicators of state wealth, social and economic policies, and racial inequalities could in part explain the relationships between PPYEd and PCS, in particular. However, including robust adjustment for time-varying state-level factors, which could be colinear or caused by prior school policies, might underestimate the true effect of increases in school quality and quantity on adult health (39). Future work is needed to tease apart the influence of other state-level characteristics from school policies and their effects on adult health.

Formally incorporating school quality indicators is a major contribution of this study. Our sensitivity analyses using quality measures alone were as robust as our primary findings, implying that enhancements in quality are important for improving population-level health. Given the link between quality and quantity, most conventional analyses of educational quantity probably incorporate some effects of educational quality as well. One implication of

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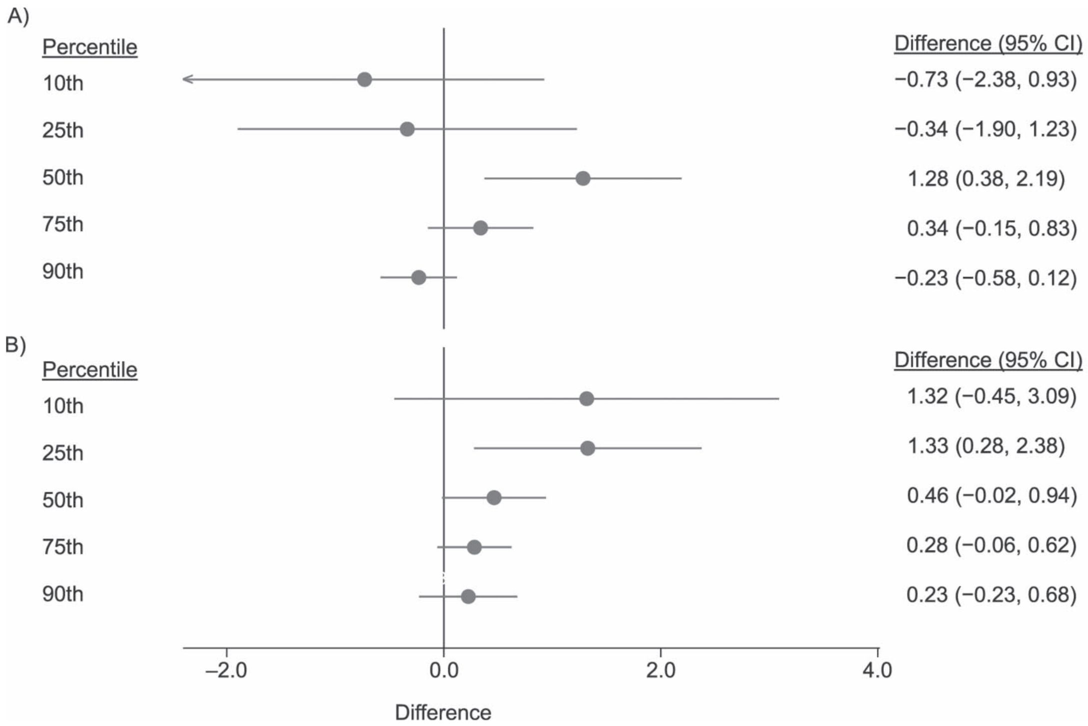

Figure 4. Quantile regression estimates between policy predicted years of education (PPYEd) and Physical (A) and Mental (B) Component Summary scores from the 12-item Short Form Health Survey, Reasons for Geographic and Racial Differences in Stroke, United States, 2003–2007. Coefficients describe the difference and 95% confidence interval at different percentiles of health score for a 1-year increase in PPYEd; estimates for the 10th, 25th, 50th, 75th, and 95th percentiles are shown. All models adjusted for birth year (cubic splines), birth year × race interactions, sex, state of residence at age 6 years, region × race interaction, and year of enrollment. CI, confidence interval.

this result might be that quantity matters only insofar as it is correlated with quality. Stratified analyses suggested stronger associations for non-Hispanic black (compared with white) persons. High-quality education might help counteract the negative effects of racism. Other studies suggest that increases in school quality for black students are associated with lower risk of disability and hypertension, particularly for black women (40, 41). White participants in this study were also more likely to have a college education in general, which might dilute the link between schooling laws for primary and secondary education and health outcomes. However, further research is needed to clarify these potential racial differences and to identify specific quality measures that might inform future policies.

This nationwide sample of black and white men and women from across decades of birth years afforded substantial heterogeneity in educational policy so we could leverage the state school policies and quality indicators as natural experiments. Most prior studies focus only on white subjects; the large sample of black persons and oversampling of Stroke Belt residents allowed a unique and informative study on racial similarities and differences in the impact of education on health. We used a composite measure of state school policies relating to quality and quantity; these measures were chosen because of the availability in historical administrative records, not because they were the most theoretically relevant measures of quality. Future studies will be needed to build on our results and establish the specific modifiable policy levers that influence school quality and adult health in beneficial ways. The PCS and MCS are summary measures based on self-report and reflect overall quality of life; future studies looking at objectively measured health diagnoses might help clarify which aspects of health are most affected.

Our findings are generally consistent with a causal role of state-based school quality and quantity policies on improved late-life mental and physical health, especially for black older adults. Although we cannot exclude the possibility that these findings are driven by other time-varying state policies or characteristics, state school policies might impact adult health through additional duration and quality of education or through other mechanisms. The effects of state school policies are likely modest and could be overcome by other factors experienced through life that push health to the extremes. That educational benefits most strongly affected the lowest ends of mental health might have important implications for reducing poor mental health in late life. Recognizing limitations in our approach, future research should include replication with objective health outcomes and focus on specific school quality indicators to inform future policy. However, our findings suggest investments in improving educational quality could promote health for decades into adulthood.

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ACKNOWLEDGMENTS

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This project was supported by the National Institute on Aging (Conference on Advanced Psychometrics Methods in Cognitive Aging Research grant R13 AG030995, T32 AG049663 (W.D.B. and C.W.E.), K01 AG040197 (T.H.), RF1 AG056164 (J.J.M. and M.M.G.), and R01AG051170 (A.R.M.)). REGARDS is supported by the National Institute of Neurological Disorders and Stroke (cooperative agreement U01 NS041588).

We thank the other investigators, the staff, and the participants of the REGARDS study for their valuable contributions. A full list of participating REGARDS investigators and institutions can be found at http://www.regardsstudy.org/. Additional support was provided by the National Institute on Aging (grant R01 AG039588).

The study sponsors had no role in the study design, interpretation of results, or writing of the manuscript. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Neurological Disorders and Stroke or the National Institutes of Health. Representatives of the funding agency have been involved in the review of the manuscript but not directly involved in the collection, management, analysis, or interpretation of the data.

Conflict of interest: none declared.

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