BROWN CENTER on
Education Policy
at BROOKINGS

August 2012

COMPULSORY SCHOOL ATTENDANCE

What Research Says and What It Means for State Policy

Reuters Images

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When students are not allowed to drop out, they do better. So tonight, I am proposing that every state, every state, requires that all students stay in high school until they graduate or turn 18.

President Barack Obama, State of the Union address, 2012

The president commented on five education topics in his 2012 state of the union address, recommending federal action on four: job training, teacher effectiveness, learning standards, and college costs. His fifth recommendation, for states to increase the age of compulsory school attendance to 18, was an outlier in that this is an area of undisputed state authority and he proposed no federal action to incentivize states to act. One would imagine that the evidence on the impact of the compulsory school attendance age had to be strong and the imperative for the states to act compelling to justify his foray into this area in his most watched speech of the year.

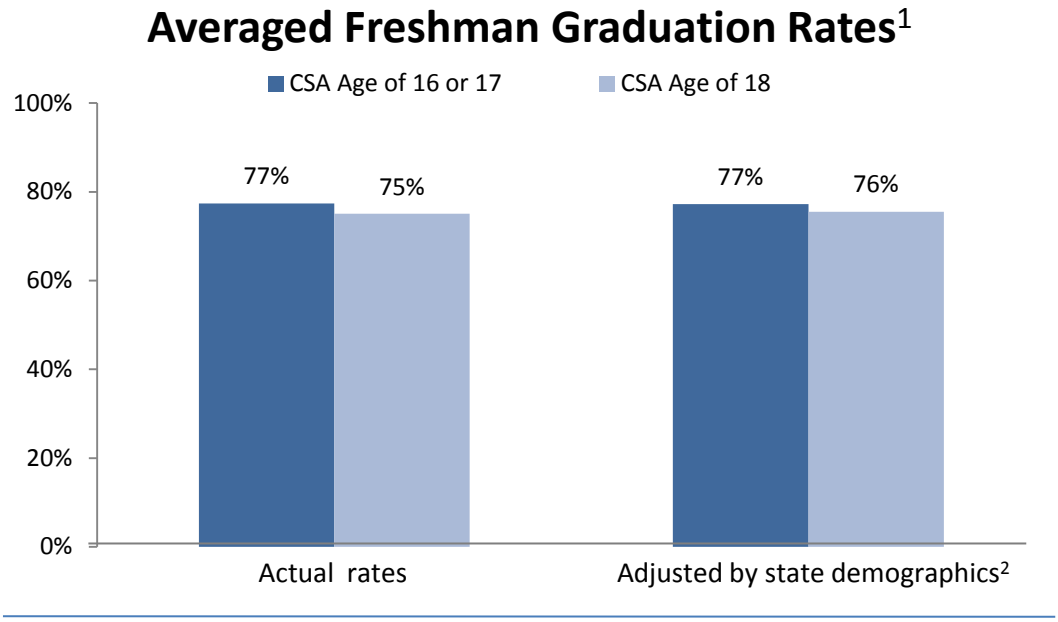
Had President Obama not spoken of this issue at all, it would still be an important policy question. According to the National Association of Secondary School Principals, 13 states were considering legislation to raise the compulsory school attendance age to 18 in 2010.[1] Passing such legislation is hardly automatic. Only one state of the 13, Maryland, has subsequently passed legislation to increase its compulsory school attendance age, and it is doing so in gradual steps that will not lead to a required attendance age of 18 until the 2017-18 school year. One news headline sums it up: Obama Push on Mandatory Attendance Age Stalls in States.[2]

What is the evidence of the effects on student attendance and high school graduation of the compulsory school attendance (CSA) age? Would increasing the CSA age to 18 in states in which it is presently lower produce noticeable benefits in terms of higher graduation rates? What are the costs that might be associated with increasing the CSA age and are these justified by the projected gains for students or society as a whole? The answers to these questions turn out not to be as straightforward as we expected given the president's decision to draw attention to the issue.

We reviewed existing research and conducted original analyses in arriving at the following conclusions:

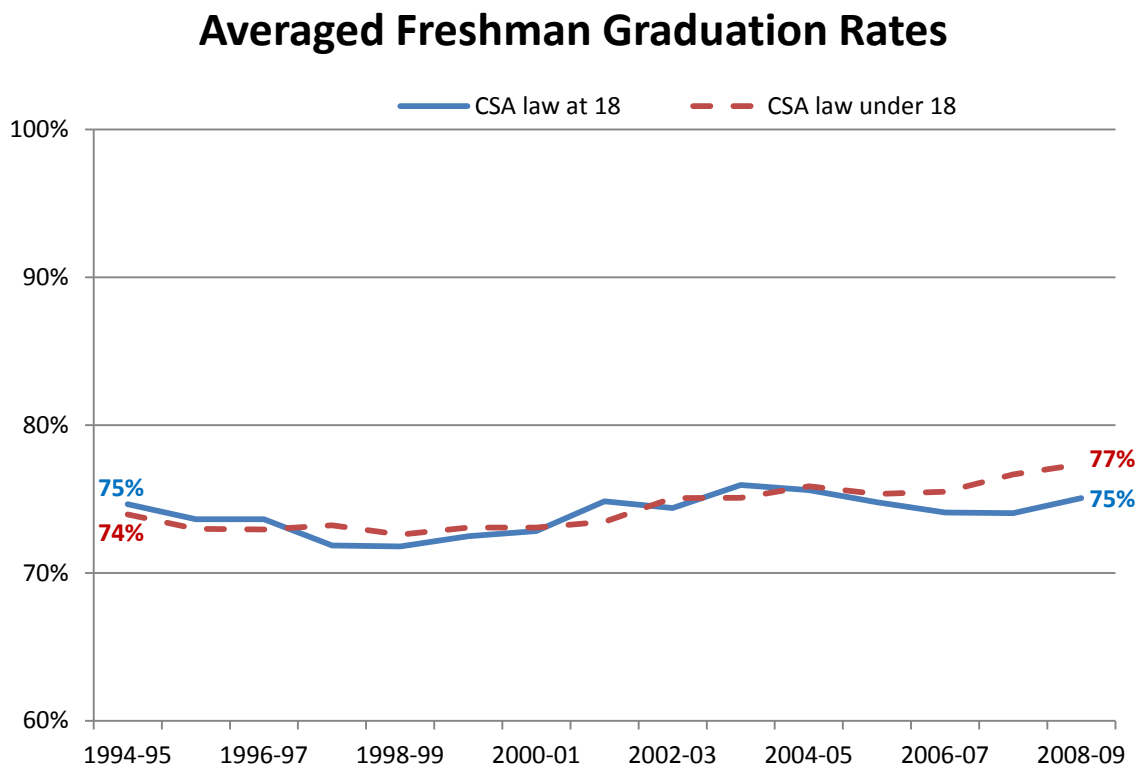
- States with higher CSA ages do not have higher high school graduation rates than states with lower CSA ages.

This conclusion is based on our original analysis. We compared the Averaged Freshman Graduation Rate for the 2008-2009 school year between states that require school attendance until age 18 and states that only require attendance until age 16 or 17.[3] We also conducted the same analysis controlling for state demographics that correlate with graduation rates (e.g., the racial composition of the student population). With or without demographic controls, states that require students to attend school until they are 18 years of age have graduation rates that are 1 to 2 percentage points lower than states that only require attendance until age 16 or 17.[4] This difference is in the wrong direction for those who advocate that every state should require that students stay in school until they are 18.



1. Data are from the 2008-09 school year for the 50 states and DC.
2. Demographics include English Language Learners (ELL), Free & Reduced Lunch Program status, and race.

This is not a quirk of the data from 2008-2009. The subsequent graph displays the Averaged Freshman Graduation Rate for each year from 1994-95 to 2008-09 for states that have a CSA age under 18 vs. a CSA age of 18.[5] Graduation rates have been very similar in the two categories of states over this 14-year period.[6] To the extent that there is any trend, it favors states with a lower CSA age: such states had graduation rates that were 3 percentage points higher in 2008-09 than in 1994-95 whereas the graduation rate for states with a CSA age of 18 was the same in 2008-09 as in 1994-95.



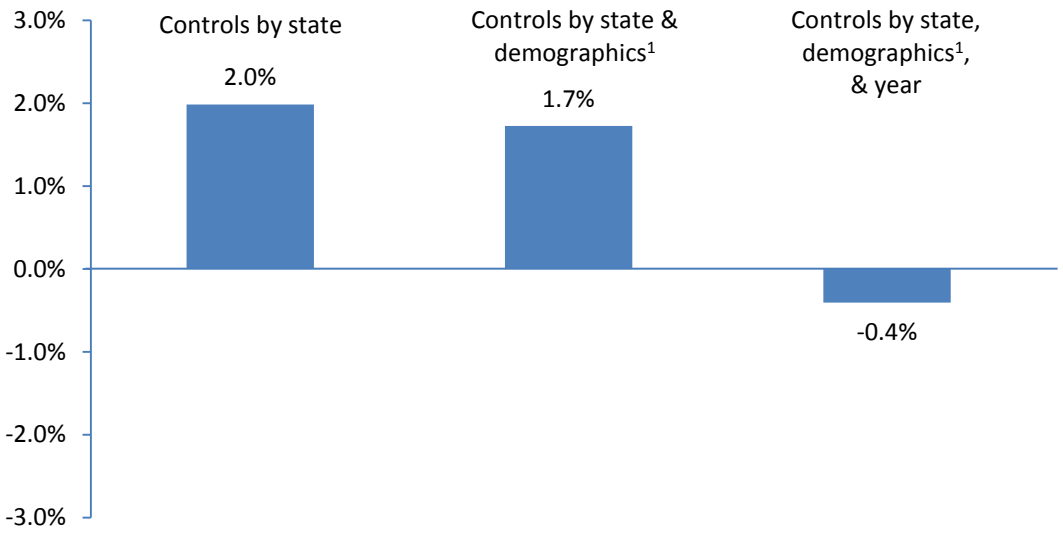
- States that raised their CSA age to 18 during the last 14 years did not experience higher high school graduation rates as a result.

We base this conclusion on our original analyses using Averaged Freshman Graduation Rates from the National Center for Educational Statistics for the 50 states and the District of Columbia for school years 1994-95 to 2008-09. Each state was coded for each year as having a CSA age of < 18 or 18.[7] Ten states increased their CSA age to 18 during this period. We employed a statistical technique called fixed effects to analyze the impact of these changes within states over time.[8] The essence of the state fixed effects approach is a comparison of the average graduation rate in states in the years after the CSA age was increased with the average rate in the same states in the years before the CSA was raised. This controls for characteristics of states that are constant across the before-and-after period, which might include such factors as the makeup of the teacher workforce, the economic climate, the funding formula for public schools, and so forth. To the extent that nothing changed within states over the time period being studied except the CSA age, we could conclude that changes in high school graduation rates associated with the change in CSA were caused by it.

Of course, many characteristics of states are not constant over time and thus aren't controlled by the state fixed effects approach. If, for example, the demographic characteristics of the student population are changing along with a change of the CSA age, or if the underlying trend line in graduation rates has been moving up prior to the change in CSA, then graduation rates may be higher after a change in the CSA age without the change in CSA age having anything to do with it. To address these specific factors we introduce additional controls for changes in demographics and yearly trends. However there are many other factors that could potentially influence high school graduation rates that are not controlled by the state fixed effects approach, with or without additional controls. We discuss this further in Appendix A.

The figure below displays results from the simple state fixed effects analysis, the same analysis with the addition of controls for state demographics, and then with the addition of controls for both demographics and year-to-year trends.

CSA Age Impact Using Time Series Data



1. Demographics include student Free & Reduced Lunch Program status and race. English learner status was not used here as it was in the previous analysis because it was not available across all the years.

The way to read these results is that states that raised their CSA age experienced a 2% higher graduation rate during the period subsequent to the CSA age increase compared to the period before the increase. However, this higher graduation rate disappears entirely when controls for both demographics and yearly trends are introduced. In other words, states that raised their CSA age to 18 did not as a group experience higher graduation rates as a result.

- There is no consistent relationship between the leniency in the laws governing the CSA age and rates of school attendance.

We base this conclusion on research by Oreopoulos, who examined the impact of the CSA age for individuals in the U.S. who were aged 16 between 1987 and 2001.[9] He found small and inconsistent effects on student outcomes of the leniency of state laws as indexed by whether exemptions were easy to obtain and the penalty for violations was consequential. For example, a student in a lenient state would be able to dropout before the mandated CSA age with parental consent or with a work permit, and neither students who dropped out before reaching the CSA age nor their parents would face punishment. In contrast, in a non-lenient state exemptions would be hard to come by and parents would face criminal charges or their children might be unable to obtain a drivers license if the student dropped out before reaching the CSA age. Oreopoulos concludes: "What is notable about these findings is that the effects are small, given that the strict interpretation of the law implies virtually no teenager should be allowed to leave before age sixteen."[10]

Consistent with Oreopoulos' point, we find that in the 2005-06 school year 43% of the population of dropouts in states with a CSA age of 18 were recorded in grades 9 and 10, at which point few if any students would have reached the age of 18 and been able to leave school legally.[11] This would be true of most 11th grade dropouts as well. In other words, "compulsory" is a misnomer with regards to the CSA age in that large numbers of students do not feel compelled to obey the law.

- Raising the CSA age may induce some portion of the population of eventual school dropouts to stay in school a few weeks or months longer in order to reach the legal age at which they can leave school. Some of these students will experience positive long-term effects, e.g., on employment and college-going, as a result of receiving more schooling.

We base this conclusion on a review of dozens of studies that have addressed this question using data from many countries spanning many years. A case in point is the same study by Oreopoulos we described in the previous bullet. He finds that the impact of raising the CSA age by one year is approximately 0.07 additional years of schooling. In other words, we could expect a state that raised its CSA age from 16 to 17 to add the equivalent of about a month more schooling to the experience of the average student in the state. But even though the impact on the average student is small, the impact on those at high risk of dropping out

who were actually influenced to stay in school by the law would be larger. Oreopoulos estimates that a student induced to stay in school a year longer as a result of a state increasing its CSA age by a year would experience a 3.6 percentage point drop in the probability of unemployment. These findings are not unimpeachable, for reasons we discuss in Appendix A, and they over-estimate the effect by describing it for a student who decides to attend school an additional year (rather than an additional month, for example). But there are several studies pointing to the same conclusion despite using different methods, different time spans, and different countries. That is why we believe it is reasonable to conclude that raising the CSA age induces some students to stay in school longer and they benefit as a result.

- The costs of raising the CSA age for additional teachers and classrooms are likely to be minimal because compliance with a higher CSA age will be low.

In the Oreopoulos data, 6.1 percent of 17-year-olds in states with a CSA age of eighteen have dropped out and thus have not complied with the attendance law, compared to the 7.7 percent who have dropped out legally in states with a CSA age of sixteen. If we take the difference between these two numbers (1.6%) as an estimate of the increased student load that schools in a state would face if the CSA age were increased by a year, then increasing the CSA age to 18 is not going to necessitate a flurry of school building construction or the hiring of a lot more teachers as has been alleged in some analyses of the impact of raising the CSA age.[12]

- Raising the CSA age does little to address the root causes of high dropout rates and is unlikely to produce outcomes that will be noticeable to state policymakers and taxpayers.

This conclusion follows directly from the previous points. The best evidence is that the CSA age influences a small percentage of students to stay in school longer, to their benefit, but the effects on high school graduation rates are weak to non-existent.

- There are a number of interventions and policies that target students and schools that experience high dropout rates that have been shown to be effective in increasing persistence and high school completion.

For example, the Institute of Education Sciences' What Works Clearinghouse finds that Check and Connect, a dropout prevention strategy that relies on close monitoring of school performance, as well as mentoring, case management, and other supports, results in a substantially increased likelihood of students staying in school.[13] Several evidence-based approaches to reducing dropouts are described in the What Works Clearinghouse Practice Guide, *Dropout Prevention*.[14] It is easier to defend raising the CSA age as part of a comprehensive set of policies that include such targeted interventions than it is to support it as an isolated legislative event that is supposed to take care of a serious problem.

Conclusions

We find little evidence to support a causal connection between high school graduation rates and the compulsory school attendance age. Compulsory school attendance laws are honored much more in the breech than in the observance. Fifteen-year-olds who drop out of school in a state with a CSA age of 16 aren't going to be any more likely to complete high school if the state raises the age requirement to 18. Further, state enforcement efforts have at best a small effect on this large population of school refusers.

Even though high school graduation rates are not moved much if at all by requiring students to stay in school until they are 18, some students are induced by a higher CSA age to stay in school longer before they drop out. These students may experience some benefits down the line because of the extra time they spent in school, even if it was only a few months.

It costs nothing to raise the CSA age in legislation and very little to implement it in the schools because compliance rates are low. If some students receive some benefit as a result of raising the CSA age, it is rational for a state to set its CSA age at 18. But to the extent that policymakers think that raising the compulsory school attendance age to 18 is going to be the solution to the scourge of high dropout rates they are confusing the appearance of doing something with the reality of what is needed to address a multifaceted and challenging problem. About a quarter of public school students in the U.S. don't obtain a regular high school diploma. That is a tragedy for them and a heavy burden for the nation and the communities and states in which they live. We need to address this problem with the serious attention and policy innovation it requires. Increasing the compulsory attendance age and thinking that the problem has been addressed may not quite be shuffling the deck chairs on the Titanic, but it comes close.

Appendix A: Comparison of Methods

Our conclusions differ somewhat from those found in the published literature, wherein the general interpretation is that increasing the CSA age is a well supported policy. Here we describe why we believe our analyses and conclusions are justified and may not be inconsistent with findings from prior research:

- Much of the existing research examines changes in the CSA age that occurred decades ago whereas we focus on changes from 1994-95 to 2008-09. Presently the vast majority of high school dropouts occur in schools with very high concentrations of minority students living in poverty, whereas in decades past high school completion was not normative in many communities that were largely populated with working class families. Currently, about 10% of the nation's high schools generate about half of the nation's dropouts.[15] We are likely to have seen a shift over the decades from a population of students whose decisions about attending school are affected by society's expectations as signaled through the CSA age to a population of school leavers who are actively refusing school with little regard to law or societal expectations. In any case, studies that have compared the effects of the CSA age in different epochs find that estimates from more recent periods are smaller than from earlier periods.[16] Because our analyses use recent data, our results may differ from those that were obtained with data from earlier time periods.

- Many studies have used students' season of birth to estimate the effect of the CSA age. The approach takes advantage of the fact that students born earlier in a given calendar year reach the age at which they can legally leave school sooner than students born later in the same year. To the extent that students comply with the compulsory attendance law, those who drop out with birthdates that fall later in a school year will receive more schooling before they quit school than students with birthdates that fall earlier in a school year. If we assume that a student's season of birth has no influence on persistence in school except as it affects when the student can legally drop out then a finding that students with a later season of birth complete more high school would demonstrate a causal effect of the CSA age. Unfortunately for this assumption it turns out that season of birth is associated with family background: Children born earlier in the calendar year are more likely than children born in other seasons to have mothers who are younger, less educated, and unmarried.[17] Thus demonstrations that children born later in the year complete

more schooling than children born earlier in the year does not necessarily tell us anything about the effects of the CSA age. Rather, the association between season of birth and persistence in school could be driven in whole or in part by family background. Additionally, the association between season of birth and earnings predates the first CSA laws instituted during the late 19th century, further calling into question the validity of using season of birth to estimate the effects of CSA laws.[18]

- Studies that have compared high school attendance rates and other student outcomes for states that have changed their CSA age have relied on data from the National Center for Education Statistics (NCES) for each state's CSA age and the calendar year in which the CSA age was enacted into law. However, we uncovered numerous anomalies in the NCES data, e.g., states shifting back and forth between higher and lower CSA ages over a short period of time. In response, we compiled the same information independently by searching legal databases for the relevant state statutes. The discrepancies between the NCES data as found in the 2010 Condition of Education and our findings are listed in Appendix B. Even though our results do not change meaningfully when we shift between our coding and the original coding by NCES, it is possible that the errors in the NCES data affected the results of some previously published studies that used different analytic strategies and student outcomes other than the AFGR.

- Whereas our focus is on the effect of CSA age on high school completion, many other studies have examined longer-term outcomes such as labor market participation or shorter-term outcomes such as months of schooling completed. It is quite possible to find an effect of CSA age reflected in an average of one month more schooling in states with a higher CSA age without finding an effect on high school completion rates in those states. Likewise it is possible that an effect equivalent to a few more weeks of schooling could have a small but measureable influence on later employment without having a discernible effect on high school graduation rates. We focus on high school graduation rather than shorter or longer term outcomes because evidence indicates that receipt of a high school diploma is a very important gateway predictor of later outcomes, and because states considering raising their CSA age have typically framed the issue in terms of increasing the high school completion rate.

- Previous studies that have examined the impact of CSA age on high school completions relied on information on education attainment derived from surveys of households carried out by the U.S. Census Bureau. These surveys involve interviews of individuals who report the schooling that has been obtained for themselves and families members. There are several issues with these self-reported data, as described by Heckman and LaFountaine.[19] In particular the Census data do not distinguish between high school completions via a GED versus a regular high school diploma. This issue is evident in the Oreopoulos study we have previously described, wherein 13.4% of the 20-29 year-old population is identified as not having a high school degree.[20] In contrast the percentage of students who don't finish high school as estimated from actual school records is about twice that at 26%. Our new analysis utilizes data on high school completions from actual school records rather than from self-reports from Census interviews. To the best of our knowledge ours is the first analysis of the impact of the CSA age that has used a valid measure of on-time high school graduation as an outcome.

- Many previous reports have utilized outcome data from longitudinal studies of individuals whereas our original analyses utilized data on high school graduation rates derived from administrative records for all public schools from each of the 50 states and the District of Columbia. The former approach involves samples of students from which inferences must be drawn statistically about whether observed differences in student outcomes associated with the CSA age are larger than would be expected by chance. In contrast our approach is based on the universe of data on graduation rates from all schools in all states during the time period we examined. This means that on a purely descriptive level our findings are not sample estimates that have a margin of error that requires tests of statistical significance. Of course, policymakers considering raising the CSA age need to go beyond descriptions of what happened in the past in other states to inferences about what will happened in the future in their state. For that purpose we provide the results of statistical analyses in Appendix C that treat our data from 1994-95 to 2008-09 as if it were sampled.

All studies that try to estimate the causal effect of the CSA age rely on research designs that are causally ambiguous. The strongest conceivable research on the impact of the CSA age would involve experimental variation. One could imagine, for example, a state staggering the implementation of a higher age

requirement over a period of three years, with counties or districts chosen randomly to be in the first or second or third wave of implementation. That would allow the impact of the CSA age to be evaluated cleanly. Of course, such research has not been conducted, for politically understandable reasons. Lacking designs that allow for strong causal conclusions, researchers have had to use weaker approaches that rely on assumptions that may be incorrect. We have already described the flaws in the use of season of birth as a window into the effects of the CSA age. The other approaches, including ours, use some combination of comparisons of states that change their CSA age over time and statistical controls for student demographics to try to isolate the causal effects of the CSA age. But these approaches have obvious limitations in the degree to which they allow the assumption that states that are being compared are equivalent on variables other than the CSA age. For example, states can change or set their CSA age in conjunction with other changes in education policy or in reaction to changes in the economy. It might be those other policy or economic changes that affect student outcomes rather than the CSA age itself. Thus neither the new analyses we present nor previous research on this issue should be considered definitive. As a result we need to acknowledge that a decision by a state to increase its compulsory school attendance age is hardly an empirical slam dunk given presently available research.

Appendix B: Data Sources

We used NCES data from the Common Core of Data (CCD) on Averaged Freshman Graduation Rates (AFGR) and student characteristics—which includes English Language Learner (ELL) status, Free and Reduced Lunch Program (FRLP) status, and race—for school years 1994-95 to 2008-09.[21] All data were aggregated at the state level. All student characteristic variables were coded as percentages of total student enrollment.

Initially, we used data from the National Center for Education Statistics' (NCES) 2010 Digest of Education Statistics for coding the compulsory school attendance age in each state.[22] However, after finding a number of contradictions in the data we constructed a new dataset using the LexisNexis legal database.[23] We coded a change in a state's CSA age as the first year in which it could have an impact on students, rather than when the legislation was passed. For instance, Minnesota passed legislation to raise its CSA age from 16 to 18 several years before it was to go into effect during the 2000-01 school year. We used the 2000-01 year in our analyses

The following table presents our coding of the CSA age for each state for each year and notes when that coding differs from that provided by NCES. The columns in the table are for every two years, replicating the format of the data table provided by NCES. Our state fixed effects analysis utilized each state's CSA age for each year between 1994-1995 and 2008-2009. The footnotes to the table note any instance in which a state changed its CSA age in a year not represented by a column in the table thus allowing anyone interested in doing so to reconstruct our coding for each state for each year.

Data on Compulsory School Attendance Age by State and Year, noting changes in NCES coding[A]

Entries in bold and parentheses are those that differed from the NCES data based on our analysis of the relevant state statutes as found in the LexisNexis legal database.
The column headings for years represent the fall of the relevant year, e.g., 1994 = the 1994-95 school year.

State	1994	1996	1997[B]	2000	2002	2004	2006	2008
Alabama[K]	16	16	16	16	16	16	16	16
Alaska[K]	16	16	16	16	16	16	16	16
Arizona[K]	16	16	16	16	16	16	16	16
Arkansas[K]	17	17	17	17	17	17	17	17
California[K]	18	18	18	18	18	18	18	18
Colorado	16	16	16	-- **(16)**	-- **(16)**	16	16 **(17)**	17
Connecticut[K]	16	16	16	16	18[D]	18	18	18
Delaware[K]	16	16	16	16	16	16	16	16
District of Columbia	17	17	18	-- **(18)**[C]	18	18	18	18
Florida[L]	16	16	16	16	16	16	16	16
Georgia	16	16	16	16	16	16	16	16
Hawaii[N]	18	16 **(18)**	18	18	18	18	18	18
Idaho	16	16	16	16	16	16	16	16
Illinois	16	16	16	16	16	17 **(16)**	17[H]	17
Indiana[K]	16 **(18)**	16 **(18)**	18	16 **(18)**	16 **(18)**	16 **(18)**	18	18
Iowa[K]	16	16	16	16	16	16	16	16
Kansas[K]	16	16	16	18	18	18	18	18
Kentucky[K]	16	16	16	16	16	16	16	16
Louisiana[K]	17	17	17	17	17 **(18)**	17 **(18)**	18	18
Maine[K]	17	17	17	17	17	17	17	17
Maryland	16	16	16	16	16	16	16	16
Massachusetts[K]	16	16	16	16	16	16	16	16
Michigan	16	16	16	16	16	16	16	16
Minnesota[K]	16	16	16	18 **(16)**	16	16	16	16
Mississippi	16 **(17)**	16 **(17)**	17	17	17	16 **(17)**	16 **(17)**	17
Missouri	16	16	16	16	16	16	16	16
Montana[K,O]	16	16	16	16	16	16	16	16
Nebraska	16	16	16	16	16	16	18[I]	18
Nevada[K]	17	17	17	17	17	17	17	18[J]
New Hampshire	16	16	16	16	16	16	16	16 **(18)**[J]
New Jersey	16	16	16	16	16	16	16	16
New Mexico[K]	16 **(18)**	16 **(18)**	18	18	18	18	18	18
New York[M]	16	16	16	16	16	16	16	16
North Carolina	16	16	16	16	16	16	16	16
North Dakota[O]	16	16	16	16	16	16	16	16
Ohio	18	18	18	18	18	18	18	18
Oklahoma	18	18	18	18	18	18	18	18
Oregon[K]	18	18	18	18	18	18	18	18

Data on Compulsory School Attendance Age by State and Year, noting changes in NCES coding[A]

Entries in bold and parentheses are those that differed from the NCES data based on our analysis of the relevant state statutes as found in the LexisNexis legal database.
The column headings for years represent the fall of the relevant year, e.g., 1994 = the 1994-95 school year.

State	1994	1996	1997[B]	2000	2002	2004	2006	2008
Pennsylvania[K]	17	17	17	17	17	17	17	17
Rhode Island	16	16	16	16	16	16	16	16
South Carolina	17	17	17	16 **(17)**	16 **(17)**	16 **(17)**	17	17
South Dakota	16	16	16	16	16	16	16	16
Tennessee	17	18 **(17)**	17	17	17	17	17	17
Texas	17	17	17	18 **(17)**	18[D]	18	18	18
Utah	18	18	18	18	18	18	18	18
Vermont[K]	16	16	16	16	16	16	16	16
Virginia[K]	18	18	18	18	18	18	18	18
Washington[K]	18	18	18	17 **(18)**	17 **(18)**	16	18	18
West Virginia	16	16	16	16	16	16	16	16
Wisconsin	18	18	18	18	18	18	18	18
Wyoming[K]	16	16	16	16	16	16	16	16

A. All original data was compiled from the National Center for Education Statistics' *Digest of Education Statistics*, years 1995 through 2009.

B. NCES does not provide data for 1998.

C. The District of Columbia raised its CSA age to 18 in 1999.

D. Connecticut & Texas raised their CSA ages to 18 in 2001.

H. Illinois raised its CSA age to 17 in 2005.

I. Nebraska raised its CSA age to 18 in 2005.

J. Nevada & New Hampshire raised their CSA ages to 18 in 2007.

K. Child may be exempted from compulsory attendance if he/she meets state requirements for early withdrawal with or without meeting conditions for a diploma or equivalency. (NCES Digest, 2009)

L. Attendance is compulsory until age 18 for Manatee County students, unless they earn a high school diploma prior to reaching their 18th birthday. (NCES Digest, 2009)

M. New York City and Buffalo require school attendance until age 17 unless employed. (NCES Digest, 2009)

N. Students over the age of 16 may withdraw with the approval of a principal and student's guardians, and if an alternative education program exists. (NCES Digest, 2000)

O. Age 16 or completion of eighth grade. (NCES Digest, 2000)

Appendix C: Statistical Results

2008-09 Cross Sectional Data

The following table presents the findings from the comparison of states with a CSA age of 18 vs. those with a CSA age of less than 18, with and without adjustment for demographic differences among states. The data are from the 2008-09 school year.

2008-09 Averaged Freshman Graduation Rates by State CSA Age

	Unadjusted AFGR	Demographically Adjusted AFGR
CSA Age of 16 or 17	77.4%	77.3%
	(1.2)	(0.9)
CSA Age of 18	75.1%	75.5%
	(1.9)	(1.7)

Standard errors in parentheses

Time-Series Analyses

In order to isolate the correlation between CSA age and AFGR, we employed a fixed-effects approach with the following specification:

$$Y_{it} = \alpha(CSA\ age\ 18+)_{it} + X_{it} + \delta + \nu_{it}$$

Where Y is the AFGR in i state on t year, α is the estimated effect of the dummied variable *CSA age 18+*, X is a matrix of student demographics (FRLP status and race), δ captures state and/or year fixed-effects, and ν is the error term. For all fixed-effects models, we use robust clustered standard errors by state. For each model we find that CSA age has no statistically significant relationship with AFGR, as the table below illustrates:

Results of Fixed-Effects Regression of Averaged Freshman Graduation Rate on Compulsory Age Laws

	(1)	(2)	(3)
CSA age 18+	1.98	1.73	-0.41
	(1.41)	(1.81)	(1.71)
Demographic Controls	N	Y	Y
State Fixed-Effects	Y	Y	Y
Year Fixed-Effects	N	N	Y
Constant	73.70***	73.81***	84.88***
	(0.40)	(6.06)	(4.63)
Observations	765	683	683
Adj. R^2	0.867	0.882	0.904

All dependent variable units are in percentages (1-100)
* p<0.05, ** p<0.01, *** p<0.001

Endnotes

[1] "Raising the Compulsory School Attendance Age." National Association of Secondary School Principals. May 7, 2010. Accessed April 3, 2012. http://www.nassp.org/Content.aspx?topic=Raising_the_Compulsory_School_Attendance_Age_Proposed

[2] Ujifusa, Andrew. "Obama Push on Mandatory Attendance Age Stalls in States." State EdWatch, *Education Week*. June 19, 2012. Accessed June 20, 2012. http://blogs.edweek.org/edweek/state_edwatch/2012/06/heavy_lifting_elsewhere_may_have_squashed_obamas_bully_pulpit%20_moment_on_attendance_age.html

[3] As explained by the U.S. Department of Education's National Center for Education Statistics, "The averaged freshman graduation rate provides an estimate of the percentage of public high school students who graduate on time—that is, 4 years after starting 9th grade—with a regular diploma. The rate uses aggregate student enrollment data to estimate the size of an incoming freshman class and aggregate counts of the number of diplomas awarded 4 years later. The incoming freshman class size is estimated by summing the enrollment in 8th grade for one year, 9th grade for the next year, and 10th grade for the year after and then dividing by 3."

[4] Each state's CSA age was derived by us from direct examination of the legal text of the relevant state statutes, as explained in Appendix B.

[5] We begin the time series in 1994-95 because this is the earliest year for which annually continuous AFGR rates for the states are published by NCES.

[6] This is true as well for the demographically adjusted data, which are not presented.

[7] In this and other analyses we combine states with a CSA age of < 18 into the same category to have a sufficient cell size to conduct statistical analyses. When the data are disaggregated there is no suggestion that there is a difference, for example, between states with a CSA age of 16 vs. 17.

[8] All 50 states and DC are included in this analysis, not just the 10 that changed their CSA age. This allows for more precision in estimating yearly trends and demographic relationships.

[9] Oreopoulos, Philip. "Would More Compulsory Schooling Help Disadvantaged Youth? Evidence from Recent Changes to School-Leaving Laws." In *The Problems of Disadvantaged Youth: An Economic Perspective*, edited by Jonathan Gruber, 85-112. Chicago: University of Chicago Press, 2009. Accessed May 1, 2012. http://www.nber.org/chapters/c0588.pdf?new_window=1

[10] Oreopoulos, Philip. "Would More Compulsory Schooling Help Disadvantaged Youth? Evidence from Recent Changes to School-Leaving Laws." In *The Problems of Disadvantaged Youth: An Economic Perspective*, edited by Jonathan Gruber, 85-112. Chicago: University of Chicago Press, 2009. Accessed May 1, 2012. http://www.nber.org/chapters/c0588.pdf?new_window=1

[11] Calculated from Table 2 of Landis, Rebecca N. and Amy L. Reschly. "An Examination of Compulsory School Attendance Ages and High School Dropout and Completion." *Educational Policy* 25, no. 5 (2011): 719-761.

[12] Agostino, Becky and Alex Reese. "Policy Brief: Does Raising the Compulsory School Attendance Age Increase Graduation Rates?" Duke University. November 2010.

Accessed April 5, 2012. http://ncpeo.org/wp-content/uploads/2011/02/Impact-of-Raising-the-Age-of-Compulsory-School-Attendance_BA-AR.pdf

[13] *What Works Clearing House, WWC Intervention Report, Dropout Prevention*. What Works Clearinghouse, U.S. Department of Education. September 21, 2006. Accessed July 2, 2012. http://ies.ed.gov/ncee/wwc/pdf/intervention_reports/WWC_Check_Connect_092106.pdf

[14] Dynarski, Mark, Clarke, Linda, Cobb, Brian, Finn, Jeremy, Rumberger, Russell, and Jay Smink. *Dropout Prevention: A Practice Guide* (NCEE 2008–4025). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. 2008. Accessed June 15, 2012. http://ies.ed.gov/ncee/wwc/pdf/practice_guides/dp_pg_090308.pdf

[15] "Number of Dropout Factories and Percentage of Estimated Dropouts Who Attended Dropout Factories." Johns Hopkins, School of Education, Center for Social Organization of Schools. Accessed June 1, 2012. http://web.jhu.edu/CSOS/images/Number_of_Dropout_Factories_and_Percentage_of_Estimated_Dropouts_who_Attended_Dropout_Factories.pdf

[16] Angrist, Joshua and Alan Krueger. "Does Compulsory School Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics*, 106 (1991): 979-1014.

[17] Buckles, Kasey and Daniel M. Hungerman. "Season of Birth and Later Outcomes: Old Questions, New Answers." National Bureau of Economic Research, Working Paper 14573. December 2008. Accessed May 15, 2012. http://www.nber.org/papers/w14573.pdf?new_window=1

[18] Bound, John and David A. Jaeger. "On the Validity of Season of Birth as an Instrument in Wage Equations: A Comment on Angrist and Krueger's 'Does Compulsory School Attendance Affect Schooling and Earnings?'" National Bureau of Economic Research, Working Paper 5835. November 1996. Accessed June 1, 2012. http://www.nber.org/papers/w5835.pdf

[19] Heckman, James J. and Paul A. LaFontaine. "The American High School Graduation Rate: Trends and Levels." *The Review of Economics and Statistics*. 92, no. 2 (2010): 244-262.

[20] Oreopoulos, Philip. "Would More Compulsory Schooling Help Disadvantaged Youth? Evidence from Recent Changes to School-Leaving Laws." In *The Problems of Disadvantaged Youth: An Economic Perspective*, edited by Jonathan Gruber, 85-112. Chicago: University of Chicago Press, 2009.

[21] Specifically, we used the CCD's *Build a Table* function to construct a dataset for this analysis. See: http://nces.ed.gov/ccd/bat/ . Accessed June 20, 2012.

[22] "Digest of Education Statistics." National Center for Education Statistics, Institute of Education Sciences. Accessed June 1, 2012. http://nces.ed.gov/Programs/digest/

[23] "Lexis Nexis." Accessed June 3, 2012. https://law.lexisnexis.com/

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