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D. Mark Anderson

*Montana State University*, [dwight.anderson@montana.edu](mailto:dwight.anderson@montana.edu)

Benjamin Hansen

*University of Oregon*, [bchansen@uoregon.edu](mailto:bchansen@uoregon.edu)

Mary Beth Walker

*Georgia State University*, [mbwalker@gsu.edu](mailto:mbwalker@gsu.edu)

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## The Minimum Dropout Age and Student Victimization

D. Mark Anderson  
Department of Agricultural Economics and Economics  
Montana State University  
[dwight.anderson@montana.edu](mailto:dwight.anderson@montana.edu)

Benjamin Hansen  
Department of Economics  
University of Oregon  
[bchansen@uoregon.edu](mailto:bchansen@uoregon.edu)

Mary Beth Walker  
Andrew Young School of Policy Studies  
Georgia State University  
[mbwalker@gsu.edu](mailto:mbwalker@gsu.edu)

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### Abstract

Over the years, the legal minimum dropout age has been raised to 18 in 21 states. Although these policy changes are often promoted for their educational benefits, they have also been shown to reduce crimes committed by youths in the affected age groups. However, an unintended consequence of increasing the minimum dropout age could be the displacement of crime and delinquency from the streets to schools. To examine this issue, we use data from the national Youth Risk Behavior Surveys to estimate the relationship between minimum dropout age laws and student victimization. Our results suggest that higher minimum dropout ages increase the likelihood that females and younger students report missing days of school for fear of their safety and that younger students are more likely to report being threatened or injured with a weapon on school property. Our results also yield some evidence that students are more likely to report being victims of in-school theft when the minimum dropout age is higher.

## 1. Introduction

Over the last three decades, nearly half of all states have changed their policy to raise the minimum age at which high school students are allowed to drop out of school.<sup>1</sup> Since 2009, Alabama, Michigan, Missouri, New Hampshire, Rhode Island, South Dakota, and West Virginia have all raised their minimum dropout ages (Vessel 2009; Bush 2010; Sanchez 2012).

Ostensibly, these policy changes are intended to increase the educational achievements of residents and thereby improve economic outcomes for the individuals and for the state. National Education Association President Dennis Van Roekel recently commented on minimum dropout age requirements by declaring, “Any young person without a high school diploma is at a severe disadvantage in our high-tech labor market with its accompanying demands for advanced education. We can’t prepare students for the 21<sup>st</sup> century who aren’t in school” (National Education Association 2012).

In addition to the purported educational benefits, new research provides evidence that these policy changes have had the side effect of reducing crimes committed by youths in the affected age groups (Anderson 2012). Specifically, Anderson (2012) found that increasing the minimum dropout age (hereafter MDA) to 18 was associated with large reductions in property and violent crime arrest rates among 16 to 18 year-old males.<sup>2</sup> Moreover, his results were consistent with an incapacitation effect; keeping teenagers in school decreases the time and opportunity available to commit crimes.<sup>3</sup>

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<sup>1</sup> Currently, all states have a minimum dropout age of 16, 17, or 18.

<sup>2</sup> Anderson (2012) also found large effects for drug-related crimes, but these estimates were generally not statistically significant. He also found the crime-reducing effect to be much less pronounced among females.

<sup>3</sup> Other research has found that stricter dropout laws have led to higher income (Oreopoulos 2006; Oreopoulos 2007), better health (van Kippersluis et al. 2011; Kemptner et al. 2011), increased political involvement (Milligan et

However, an unintended consequence of keeping youths from dropping out could be the displacement of criminal activity and delinquency back into schools, to the detriment of the academic achievement and quality of life of other students.<sup>4</sup> In fact, efforts to raise the minimum dropout age are often met with the argument that mandating the attendance of students who no longer want to be in school can be disruptive to their classmates and unfair to teachers (Lewin 2012). This criticism is supported by Eckstein and Wolpin (1999) who found that youths who drop out of high school have different traits than those who graduate, including lower motivation and a lower consumption value of school attendance.<sup>5</sup>

Our study considers the contemporaneous relationship between education and crime from the perspective of the potential victims. Specifically, we seek to quantify the relationship between MDA laws and student victimization.<sup>6</sup> In doing so, our research represents one of the few attempts to analyze the sensitivity of student victimization to state-level education policy.<sup>7</sup> To estimate the relationship of interest, we rely on data from the national Youth Risky Behavior Surveys (YRBS). The temporal and spatial variation in MDA laws allows us to obtain

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al. 2004), a lower incidence of teenage childbearing (Black et al. 2008; Silles 2011), and a lower likelihood of adult criminality (Lochner and Moretti 2004).

<sup>4</sup> Given that Anderson (2012) relied on county-level arrest data, his results do not capture possible increases of within-school crime that do not end in arrest. It is often documented that within-school crime is severely underreported to the police (Jeffrey 2012; Trump 2012).

<sup>5</sup> Bjerk (2012) describes important differences among high school dropouts.

<sup>6</sup> To our knowledge, Anderson (2012) was the first to study the issue of displaced delinquency due to MDA laws. He focused, however, on the asymmetric effects between males and females by analyzing the following outcomes: whether the respondent missed school for fear of safety during the past month, whether the respondent reported having had sexual intercourse during the past month, whether the respondent reported having ever been pregnant. Anderson's (2012) results for the "having missed school for fear of safety" outcome are consistent with our estimates reported below and, interestingly, he also found that females are more likely to report recent sexual intercourse when the MDA is higher.

<sup>7</sup> Previous research has generally focused on school-level policies and is often descriptive in nature. For examples, see Brown (2005), and Marachi et al. (2007). Pennig (working paper, 2012) attempted to address the topic of displaced delinquency, but was limited by a too-short panel and little policy variation.

difference-in-difference-type estimates of the impact of keeping would-be dropouts in school. Our results provide evidence that younger students and girls are more likely to miss school for fear of their safety and that younger students are more likely to report being threatened or injured with a weapon on school property when the MDA is higher. Our results also yield some evidence that students are more likely to report being victims of in-school theft when the MDA is higher.

Our study fits within the broad literature on the determinants of student victimization and in-school crime. Research has established that student victimization is sensitive to individual-level characteristics such as age (Mühlenweg 2010), gender (Khoury-Kassabri 2010), race (Peguero 2009), and sexual orientation (Kosciw et al. 2008), and school-level factors such as school disorder, climate, and organization (Payne et al. 2003; Randa and Wilcox 2010), socio-economic status (Khoury-Kassabri et al. 2004), and school size (Ferris and West 2004; Leung and Ferris 2008). Lastly, and perhaps most relevant to our study, policies that affect attendance have been shown to impact violence within schools (Jacob and Lefgren 2003; Hansen and Lang 2011).

From an academic achievement perspective, it is vital to understand the factors that contribute to student victimization and school crime. Not surprisingly, student exposure to violence and delinquency is associated with increased absenteeism and decreased student performance. The National Center for Education Statistics (2006) reported that six percent of students avoided school or a school activity during the past six months because of fear of attack or harm.<sup>8</sup> In a similar vein, Reid (1989) and Dake et al. (2003) found that victims of bullying are at increased risk of absenteeism, while Grogger (1997) found that both minor and moderate

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<sup>8</sup> This estimate is in line with rates reported in the YRBS data.

levels of school violence led to lower high school graduation rates and decreased the likelihood of college attendance.<sup>9</sup> The effects on academic outcomes are likely due, in part, to the fact that delinquent students disrupt the learning process for others and divert resources away from teaching (Bowen and Bowen 1999).<sup>10</sup>

The remainder of this paper is organized as follows: Section 2 describes the data; Section 3 lays out the empirical strategy; Section 4 discusses the results; Section 5 concludes.

## 2. Data

This paper is based on data from the national YRBS for the period 1993 through 2009.<sup>11</sup> The national YRBS is conducted every other year by the Centers for Disease Control and Prevention (CDC) and provides a nationally representative sample of U.S. high school students.<sup>12</sup> The YRBS data are suited to address a range of topics on youth behavior, and have been frequently employed to examine the impacts of state-level policies.<sup>13</sup> The goal of the survey is to collect information on youth behaviors that impact health. Each wave, students are

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<sup>9</sup> Grogger (1997) used principal reports of student-student and student-teacher conflicts as his measure of violence. His findings were robust even when controlling for the individual's family background and own disruptive behavior.

<sup>10</sup> Others have also found that negative social interactions at school increase the risk of depression and suicidality (Klomek et al. 2007; Hansen and Lang 2012).

<sup>11</sup> The national YRBS was initially conducted in 1991. However, we omitted this survey wave from the analysis because it is based on relatively few schools. We also explored the possibility of including results based on the state YRBS. Like the national YRBS, the state YRBS is school-based and contains information on student victimization. Unfortunately, due to the limited coverage of states in these data that changed their legislation, there was insufficient policy variation to credibly estimate the effects of MDA laws.

<sup>12</sup> Although intended to be nationally representative, not all 50 states are represented in any given year the survey has been conducted.

<sup>13</sup> For examples, see Anderson (2010) on the effect of an anti-methamphetamine campaign on teen meth use; Tremblay and Ling (2005) on the relationship between AIDS education and youth sexual behavior; Carpenter and Cook (2008) on the effect of cigarette taxes on youth smoking; Cawley et al. (2007) on the impact of state physical education requirements on youth physical activity and obesity; Hansen et al. (2011) on the social market for cigarettes in high school; Taber et al. (2011) on the effectiveness of state policies targeting junk food in schools.

asked questions about eating and exercise habits, the use of alcohol, tobacco, and drugs, sexual activity, and other health behaviors that may adversely influence their physical and emotional wellbeing. In addition to health behaviors, students are also asked about victimization and violence within school. We use questions from this portion of the survey to gauge the extent to which crime and delinquency are displaced from the streets to schools when the minimum dropout age is higher.<sup>14</sup> The data also provide information on standard student demographic characteristics, and we employ the restricted use state-identified versions of the national YRBS to link each student with their state of residence.

### **3. Empirical Strategy**

Our empirical analysis is reduced-form, based on the approach taken by previous researchers interested in the effects of MDA laws.<sup>15</sup> Implicit to the relationship between MDA laws and student victimization is that these laws impact attendance rates. Indeed, a large body of research has confirmed that stricter dropout laws reduce dropout rates. For example, Angrist and Krueger (1991) found that 25 percent of potential dropouts in the United States stay in school because of compulsory schooling laws.<sup>16</sup>

To examine the relationship between MDA laws and within-school victimization, we exploit the temporal and spatial variation of these laws and estimate difference-in-difference-

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<sup>14</sup> Studies such as Dukarm et al. (1996) have used the national YRBS to examine determinants of delinquent and violent behavior among high school students.

<sup>15</sup> For examples of other research that has taken a reduced-form approach to analyze the effects of compulsory schooling, see Lleras-Muney (2002), Wenger (2002), Black et al. (2008), and Oreopoulos (2009).

<sup>16</sup> Other research on the effectiveness of compulsory schooling is consistent with Angrist and Krueger (1991). For examples, see Wenger (2002), Lochner and Moretti (2004), Li (2006), and Oreopoulos (2009).



type models that control for both unobserved state-level heterogeneity and national trends.

Specifically, our baseline equation is:

$$(1) \quad Y_{ist} = \beta_0 + \beta_1(MDA_{st} > 16) + \mathbf{X}_{ist}\beta_2 + \mathbf{Z}_{st}\beta_3 + v_s + w_t + \varepsilon_{ist}$$

where  $i$  indexes individuals,  $s$  indexes states,  $t$  indexes years, and  $v_s$  and  $w_t$  represent state fixed effects and year effects, respectively. The variable  $MDA_{st} > 16$  is an indicator for whether the minimum dropout age is higher than 16 in state  $s$  and year  $t$ . The coefficient of interest,  $\beta_1$ , represents the effect of a higher MDA. The dependent variable,  $Y_{ist}$ , represents one of the five following possible binary outcomes: whether the student was threatened or injured with a weapon on school property in the past 12 months, whether the student was in a physical fight on school property in the past 12 months, whether the student missed school for fear of his/her safety in the past 30 days, whether the student was offered, sold, or given an illegal drug on school property in the past 12 months, whether the student had property stolen or damaged on school property in the past 12 months.<sup>17</sup> The descriptive statistics for these binary indicators are shown in Table 1. In some specifications, we add a term to control for state-specific linear time trends to account for omitted factors that trend smoothly over time at the state level.

The vectors  $\mathbf{X}_{ist}$  and  $\mathbf{Z}_{st}$  are comprised of the individual-level and state-level controls listed in Table 1, respectively. In particular, we control for the student's gender, age, grade level, and race. In addition, we include the state-level unemployment rate and income per capita. The unemployment data come from the Bureau of Labor Statistics, while the income per capita data come from the Bureau of Economic Analysis. Previous studies have shown that youth criminal

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<sup>17</sup> Information on property crimes was not collected in the national YRBS in 2009. As a result, we analyze the period 1993 through 2007 for this outcome.

behavior is sensitive to economic conditions (Hashimoto 1987; Grogger 1998). All regressions are estimated as linear probability models and standard errors are corrected for clustering at the state level (Bertrand et al. 2004).

## 4. Results

Table 2 presents results based on the full sample and show the estimated impact of our variable of interest,  $MDA_{st} > 16$ , on the five outcome variables for each of three specifications. Estimates in column (1) are based on a specification that includes only state fixed effects and year effects; estimates in column (2) are based on a specification that also includes the covariates listed in Table 1; and estimates in column (3) are based on the preferred specification that adds state-specific linear time trends. The data are weighted by the sample weights supplied by the YRBS.

As a whole, students report few changes in the school environment as a result of increasing the minimum dropout age. Violent behavior, as measured by threats/injuries with a weapon (Panel A) or fighting on school property (Panel B), appears to be unaffected by the MDA. In Panel C, point estimates indicate a modest increase of just over one percentage point in the incidence of students missing school for fear of safety, but this estimate is not precisely measured.<sup>18</sup> The availability of drugs on school property (Panel D) also appears to be unaffected by the MDA. The single outcome that does show a response to changing MDA laws is the incidence of property crime; Panel E illustrates point estimates that imply a four to six percentage point increase in property crimes, with two of the estimates showing statistical

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<sup>18</sup> It is worth mentioning that we update the “miss school for fear of safety” results from Anderson (2012) by analyzing a longer time period.

significance at the 0.05 level. This effect is substantial, as the average incidence of property crime is just over 30 percent. This finding is consistent with the notion that property crimes are displaced from the streets to schools when the MDA is higher.

While the estimates from Table 2 are informative, they may mask important heterogeneous effects. Guided by predictions from routine activity theory, we explore whether the relationship between MDA laws and student victimization depends on gender or age. Within this framework, the potential offenders are the would-be dropouts and the more vulnerable students (e.g. younger students or females) represent attractive targets for a range of delinquent and aggressive behaviors (Cohen and Felson 1979).<sup>19</sup> The first two columns of Table 3 illustrate results separately for males and females. The estimates for males are never statistically distinguishable from zero and are positive in only two of the five regressions. The estimates for females, however, are always positive in sign. Moreover, the results indicate that the incidence of girls missing school for fear of safety (Panel C) increases by nearly four percentage points when the MDA is higher. This effect is statistically significant at the 0.05 level and is large in magnitude.

The last two columns of Table 3 compare estimates for students under the age of 16 with estimates for students 16 years of age or older.<sup>20</sup> Panel A illustrates that younger students report over a four percentage point increase in the likelihood of being threatened or injured with a weapon on school property when the MDA is higher. This effect is statistically significant at the 0.05 level and is large in magnitude. Similarly, younger students also report a nearly three

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<sup>19</sup> Within routine activity theory, teachers, administrators, and other staff represent capable guardians who cannot always be present in school or at school events.

<sup>20</sup> An additional benefit of restricting the sample to students under the age of 16 is that it ensures our estimates do not incorporate information from students who are kept in school because of a higher MDA. In all states, students under the age of 16 are legally obligated to attend school.

percentage point increase in the fraction missing school for fear of safety (Panel C) when the MDA is higher and this estimate is statistically significant at the 0.05 level. The estimates for students 16 years of age or older do not show the same pattern; there are some positive point estimates, but these are never statistically significant. In fact, older students appear somewhat less likely to be threatened or injured with a weapon on school property when the MDA is higher; however, this estimate is only weakly statistically significant.<sup>21</sup>

## 5. Conclusion

This study examines a possible unintended consequence of changing minimum dropout age laws. Increasing the minimum dropout age could lead to more delinquents being kept in school, and these individuals may impose costs on other students due to their presence. Possible consequences include increased bullying, threats, and gang activity or simply a decrease in the perception of school safety. We quantify the relationship between state-level MDA laws and various measures of student victimization, using data from the national Youth Risk Behavior Surveys. Our results indicate modest impacts on students' experiences of property crime and stronger evidence that younger students and females experience increased violence and concerns about school safety. School administrators and policymakers should take these potential consequences into account and act to mitigate them when there are increases in the minimum dropout age.

Future research should extend our analysis to other outcomes that may be influenced by keeping possible delinquents in school longer. A growing literature suggests that exposure to negative peer effects in school not only impedes academic performance (Robertson and Symons

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<sup>21</sup> In alternative specifications, we assessed the sensitivity of our estimates to the inclusion of proxies for school environment. Our results were robust to the inclusion of these variables. For the sake of brevity, these estimates are not included, but are available from the authors upon request.

2003; Carrell and Hoekstra 2010), but increases the likelihood of substance use (Gaviria and Raphael 2001; Kawaguchi 2004; Powell et al. 2005; Lundborg 2006), misbehavior in the classroom (Carrell and Hoekstra 2010), and cheating (Carrell et al. 2008). Lastly, because high schools in the United States differ widely in their dropout and completion rates, future research might also want to consider important heterogeneous effects. Despite the fact that dropout rates have not been measured uniformly across states, it could still be possible to study the broad differences in school outcomes as MDA laws have changed over the years.

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**Table 1. Descriptive statistics: YRBS 1993-2009**

	<i>MDA &gt; 16</i>	<i>MDA = 16</i>
<b>Dependent variables</b>		
<i>Threatened or injured with a weapon on school property in past 12 months</i>	0.082	0.082
<i>In a fight on school property in past 12 months</i>	0.141	0.138
<i>Missed school for fear of safety in past 30 days</i>	0.068	0.062
<i>Offered an illegal drug on school property in past 12 months</i>	0.281	0.260
<i>Property stolen or damaged on school property in past 12 months</i>	0.317	0.302
<b>Independent variables</b>		
<i>Male</i>	0.496	0.487
<i>Age less than 15</i>	0.095	0.092
<i>Age = 15</i>	0.220	0.223
<i>Age = 16</i>	0.254	0.259
<i>Age = 17</i>	0.264	0.262
<i>Age 18 or older</i>	0.167	0.164
<i>Grade 9</i>	0.244	0.240
<i>Grade 10</i>	0.243	0.248
<i>Grade 11</i>	0.252	0.255
<i>Grade 12</i>	0.259	0.254
<i>Ungraded</i>	0.002	0.003
<i>Black</i>	0.198	0.291
<i>White</i>	0.341	0.418
<i>Other race</i>	0.461	0.291
<i>Unemployment rate</i>	6.181	5.483
<i>Real state income</i>	28,487	29,092
<b>N</b>	<b>71,931</b>	<b>57,863</b>

Notes: Based on unweighted data from the national YRBS. The number of observations

for the independent variables match the sample from Panel A in Table 2.

**Table 2. Minimum dropout age laws and within-school delinquency**

<i>Panel A: Threatened or injured with a weapon on school property in past 12 months</i>			
<i>MDA &gt; 16</i>	0.009 (0.007)	0.006 (0.005)	0.005 (0.011)
N	129,794	129,794	129,794
<i>Panel B: In a fight on school property in past 12 months</i>			
<i>MDA &gt; 16</i>	-0.004 (0.012)	-0.012 (0.009)	-0.001 (0.010)
N	127,922	127,922	127,922
<i>Panel C: Missed school for fear of safety in past 30 days</i>			
<i>MDA &gt; 16</i>	0.017 (0.017)	0.013 (0.016)	0.013 (0.010)
N	129,769	129,769	129,769
<i>Panel D: Offered an illegal drug on school property in past 12 months</i>			
<i>MDA &gt; 16</i>	-0.007 (0.020)	-0.009 (0.018)	0.032 (0.034)
N	128,683	128,683	128,683
<i>Panel E: Property stolen or damaged on school property in past 12 months</i>			
<i>MDA &gt; 16</i>	0.047** (0.019)	0.057*** (0.021)	0.037 (0.051)
N	84,869	84,869	84,869
State Fixed Effects	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes
Covariates	No	Yes	Yes
State Trends	No	No	Yes

\* Statistically significant at 10% level; \*\* at 5% level; \*\*\* at 1% level.

Notes: Each cell represents the results from a separate linear probability model. The samples in Panels A through D are based on YRBS data for the period 1993 through 2009. The sample in Panel E is based on YRBS data for the period 1993 through 2007. The covariates are listed in Table 1. Standard errors, corrected for clustering at the state level, are in parentheses and regressions are weighted using the sample weights from the YRBS.

**Table 3. Minimum dropout age laws and within-school delinquency by gender and age**

<i>Panel A: Threatened or injured with a weapon on school property in past 12 months</i>				
	<u>Male</u>	<u>Female</u>	<u>Age &lt; 16</u>	<u>Age ≥ 16</u>
<i>MDA &gt; 16</i>	-0.010 (0.014)	0.019 (0.019)	0.043** (0.016)	-0.016* (0.010)
<i>N</i>	63,830	65,964	40,940	88,854
<i>Panel B: In a fight on school property in past 12 months</i>				
	<u>Male</u>	<u>Female</u>	<u>Age &lt; 16</u>	<u>Age ≥ 16</u>
<i>MDA &gt; 16</i>	-0.009 (0.044)	0.003 (0.036)	0.023 (0.025)	-0.015 (0.016)
<i>N</i>	62,693	65,229	40,250	87,672
<i>Panel C: Missed school for fear of safety in past 30 days</i>				
	<u>Male</u>	<u>Female</u>	<u>Age &lt; 16</u>	<u>Age ≥ 16</u>
<i>MDA &gt; 16</i>	-0.013 (0.016)	0.039** (0.015)	0.027** (0.013)	0.004 (0.012)
<i>N</i>	63,819	65,950	40,936	88,833
<i>Panel D: Offered an illegal drug on school property in past 12 months</i>				
	<u>Male</u>	<u>Female</u>	<u>Age &lt; 16</u>	<u>Age ≥ 16</u>
<i>MDA &gt; 16</i>	0.011 (0.053)	0.044 (0.055)	0.015 (0.034)	0.040 (0.039)
<i>N</i>	63,166	65,517	40,607	88,076
<i>Panel E: Property stolen or damaged on school property in past 12 months</i>				
	<u>Male</u>	<u>Female</u>	<u>Age &lt; 16</u>	<u>Age ≥ 16</u>
<i>MDA &gt; 16</i>	0.058 (0.063)	0.011 (0.042)	0.008 (0.044)	0.051 (0.065)
<i>N</i>	41,890	42,979	26,774	58,095
State Fixed Effects	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes
State Trends	Yes	Yes	Yes	Yes

\* Statistically significant at 10% level; \*\* at 5% level; \*\*\* at 1% level.

Notes: Each cell represents the results from a separate linear probability model. The samples in Panels A through D are based on YRBS data for the period 1993 through 2009. The sample in Panel E is based on YRBS data for the period 1993 through 2007. The covariates are listed in Table 1. Standard errors, corrected for clustering at the state level, are in parentheses and regressions are weighted using the sample weights from the YRBS.