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Youth response to state cyberbullying laws

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ABSTRACT

This study examines the relationship between state cyberbullying laws (which require schools to enact effective guidelines to address cyberbullying) and the reporting behavior of youth. The analysis utilizes nationally representative samples of high-school adolescents from the Youth Risk Behavior Surveys and incorporates state-time variation in the implementation of cyberbullying laws in a difference-in-differences framework. Key results indicate that adoption of a cyberbullying law is related to statistically significant increases in the likelihood that students report experiences of being victimized by electronic bullying as well as various forms physical bullying at school. Further empirical analyses signal that the increase in students' reporting of victimization experiences is likely to be driven by the laws' intended increase in victims' reporting rather than by a potential rise in incidence of cyberbullying (and school violence) in the post-implementation period. The regression estimates are robust to the inclusion of multiple sensitivity checks.

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1. Introduction

The primary objective of this paper is to investigate whether cyberbullying laws targeted at school-aged youth increase high-school students' likelihood of reporting their victimization experiences. Bullying commonly refers to repeated incidence of 'unwanted, aggressive behavior among school-aged children that involves a real or perceived power imbalance'.¹ Existing international literature unequivocally recognizes bullying in school as a large public health concern (Cross *et al.*, 2009; Elgar *et al.* 2009; Raskauskas, Gregory, Harvey, Rifshana, & Evans, 2010; Smith, 1999; Zych, Baldry, & Farrington, 2017). Depending on the nature of victimization, bullying among youth can be both direct (such as physical violence or verbal aggression) and indirect/ relational. Indirect form of bullying includes actions that impair victims' social status (Wang, Iannotti, & Nansel, 2009). Cyberbullying is a more recent form of bullying that is defined as a 'wilful and repeated harm inflicted through the use of computers, cell phones, and other electronic devices' in the form of text messages, graphics and videos (Hinduja & Patchin, 2006, 2008). In particular, recent advances in modern electronic technology and growth in social networking sites have increased the risk of cyberbullying victimization among youth (David-Ferdon & Hertz, 2007; Hinduja & Patchin, 2006; Stuart-Cassel, Bell, & Springer, 2011; Washington, 2015).

In response to the rising problem of school violence, researchers have widely discussed the importance of anti-bullying interventions that can effectively address physical bullying and cyberbullying problems in school (Brown, Jackson, & Cassidy, 2006; Orpinas, Horne, & Staniszewski, 2003). Focusing on the United States, this study is among the first empirical analyses to explore the

effectiveness of state-level cyberbullying laws that require schools to adopt operative measures to address cyberbullying among school-aged youth.

Statistical evidence across various US-based youth surveys suggests that annual proportion of American adolescents (aged under 18) reported to be cyberbullied vary between 9 percent and 35 percent (David-Ferdon & Hertz, 2009; Wang *et al.* 2009). Physical separation between offender and victim, means to maintain offenders' anonymity, potential to reach a large audience, and lower levels of parental supervision of children's online activities are some of the important and distinct features of cyberbullying that make it distinct from physical or traditional form of school bullying (Hinduja & Patchin, 2006; Sticca & Perren, 2013; Stuart-Cassel *et al.*, 2011). Cyberbullying victimization is associated with serious physical and mental health disorders leading to several long-term emotional and psychological consequences (Hinduja & Patchin, 2008, 2014; Wolak, Finkelhor, Mitchell, & Ybarra, 2008; Ybarra, 2004).

Growing health and safety concerns resulting from school violence or bullying incidents have prompted all states in the United States to implement anti-bullying legislation at different points in time since 2000. These interventions require schools to adopt proper training procedures and sanctions to address bullying incidents (Sabia & Bass, 2017). In the last decade, most states either extended their existing school anti-bullying legislation or introduced new laws to incorporate electronic form of harassment (cyberbullying) as a form of bullying (National Conference of State Legislatures²; Hinduja & Patchin, 2016a). By 2016, all states, except Alaska,³ have implemented a cyberbullying law targeted at school-age population. In addition to preventing cyberbullying incidents, the efficacy of the state cyberbullying laws relies on whether the state-level intervention is effective in encouraging young people to report their cyberbullying victimization experiences (Hinduja & Patchin, 2014; 2015). The variation in the timing of implementation of state anti-bullying legislation and adoption of cyberbullying law presents an important research scope to analyze the effectiveness of the cyberbullying laws. As such, using a self-reported data based on large-scale nationally representative samples of high-school students, the current analysis attempts to study trends in youth reporting practices related to victimization experiences following the passage of cyberbullying laws. More specifically, the study employs school violence and bullying victimization indicators drawn from individual-level biennial data of Youth Risk Behavior Surveys (YRBS) for the period 2001–2013.

The analysis begins by looking at the relationship between cyberbullying laws and youth reporting on victimization of electronic bullying and physical bullying at school. Based on recent research (Landstedt & Persson, 2014; Schneider, O'donnell, Stueve, & Coulter, 2012), there is an expectation that incidence and reporting of victimization of physical bullying and cyberbullying are positively related. As a verification, the 2011 and 2013 YRBS⁴ are combined to study the state-specific trends in bullying victimization at school and cyberbullying victimization. Figure 1 shows that the two YRBS indicators have comparable trends.

As there are limited information on school bullying (YRBS 2009–2013) and cyberbullying (YRBS 2011–2013) experiences (especially for the period during which the majority of these laws were enacted), the study additionally relies on indicators of school violence experiences, incorporated in the YRBS for the entire study period, as proxies for cyberbullying victimization to test the robustness of the estimated relationship of interest. Utilization of the additional indicators assumes that students' reporting behavior is similar across all forms victimization experiences ranging from physical violence to cyberbullying.

Employing state and time variation in the implementation of cyberbullying laws across states in a difference-in-differences framework, the analysis indicates that adoption of cyberbullying law is positively related to the likelihood of reporting of victimization of electronic bullying and bullying at school. These findings are further supported by a positive relationship between the cyberbullying laws and indicators of being threatened by harmful weapons in school; feeling unsafe going to school; and incidence of suicidal thoughts.

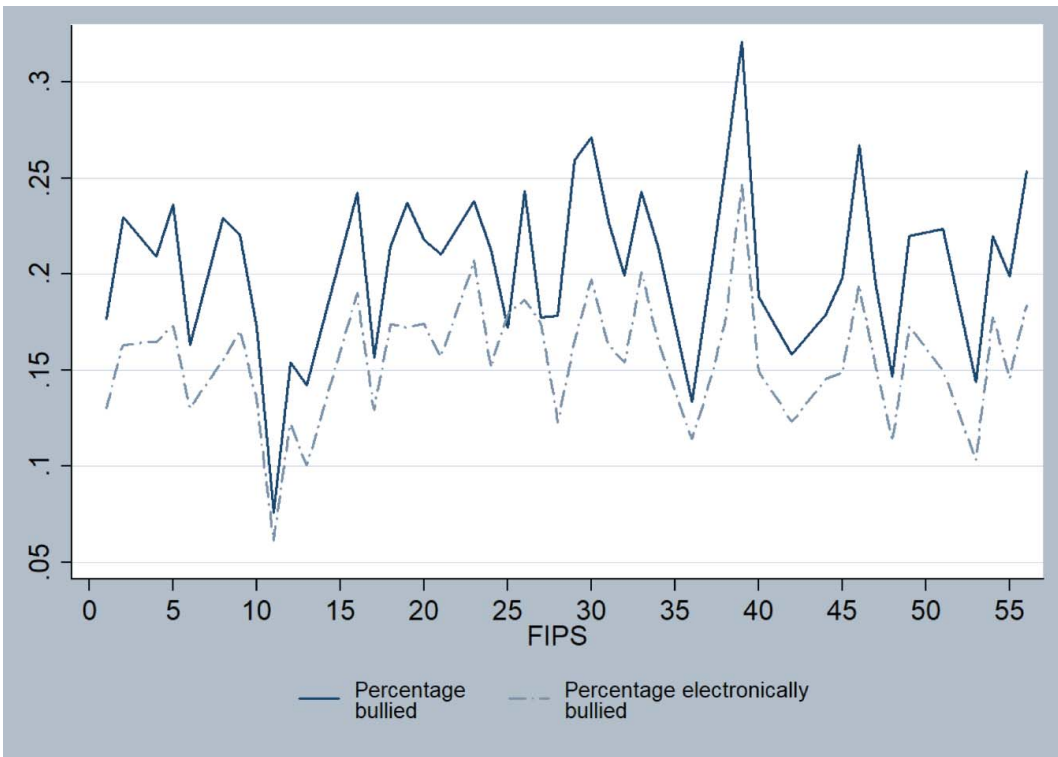


Figure 1. Trends in students' reporting of bullying and cyberbullying experiences across states.

Note: The above figure is based on a sample of 44 states. State-specific percentage reported (Y-axis) has been estimated as proportions of total number of respondents (in combined 2011–2013 YRBS) who reported being bullied and electronically bullied.

However, the above empirical evidence may not allow one to confirm whether cyberbullying laws actually encourage youth reporting of victimization experiences. The positive relationship between cyberbullying intervention and youth reporting practices can also result from an increase in cyberbullying offenses in case the legislative restrictions on cyberbullying prompt a rise in reprisals as a response to victims' reporting. Hence, to substantiate the main empirical results, additional analyses consider state-representative estimates of high-school dropout rates and youth suicide estimates as indicators of the extent of cyberbullying incidence among youth. Insignificant regression estimates from the supplemental analyses support the conjecture that cyberbullying laws promote reporting of victimization experiences among youth. Finally, important insights into the effectiveness of state cyberbullying interventions are presented by analyzing some of the key components of cyberbullying laws (school and criminal sanctions, and legal provisions to address students' off-campus behavior) and exploring sex-specific effects of cyberbullying laws. With respect to the analysis of the important components of states' cyberbullying interventions, criminal sanctions appear to be positively related to most of the YRBS-based youth outcomes. These findings further indicate that punitive measures for cyberbullying offense may increase the incidence of reporting among young victims. The regression estimates obtained in the analyses are robust to the inclusion of multiple sensitivity checks (discussed later in the paper).

The paper is organized as follows: [Section 2](#) discusses youth issues commonly associated with cyberbullying and provides a brief background on the state-level cyberbullying interventions; [Section 3](#) describes the data and the variables used in this study; [Section 4](#) outlines the empirical approach employed in this study; [Section 5](#) reports the key findings obtained from the analysis; and finally [Section 6](#) presents concluding remarks.

2. Background: review of related literature

2.1. Cyberbullying as a unique form of bullying

Cyberbullying is often characterized as one of the most serious forms of bullying, as it bears some distinct features (Hinduja & Patchin, 2011; Schneider *et al.*, 2012). First, since the offenses are performed using electronic media, it is much more difficult to monitor cyberbullying than physical bullying that occurs at school. Second, cyberbullying offenders can maintain physical distance from their victims and remain anonymous to their targets (Hinduja & Patchin, 2014; Shariff, 2009; Shariff & Hoff, 2007; Sticca & Perren, 2013; Stuart-Cassel *et al.*, 2011). As such, these unique characteristics allow cyberbullying offenses to be a more frequent off-campus phenomenon than other forms of bullying (Diamanduros, Downs, & Jenkins, 2008; Hinduja & Patchin, 2014; Mishna, Khoury-Kassabri, Gadalla, & Daciuk, 2012). Finally, cyberbullying offenses can reach to a larger audience through electronic media in the form of e-mails, graphics, and videos (Hinduja & Patchin, 2014; Sticca & Perren, 2013). Substantial growth in young internet users and a rapid increase in public access to modern electronic technology and advanced communication devices have further elevated youth risks of cyberbullying victimization.⁵

2.2. Prevalence and health implications of cyberbullying among youth

As noted earlier, estimates of prevalence of cyberbullying among adolescents in the US vary across youth surveys (and samples studied). Recent data from School Crime Supplement of the National Crime Victimization Survey shows that the proportion of high-school students (ages 12–18 years) who were cyberbullied grew from 6 percent to 9 percent in the period 2009 through 2011 (Devoe & Murphy, 2011; Lessne & Harmalkar, 2013). Tokunaga (2010) reports that the proportion of youth reported to be cyberbullied varies from 20 to 40 percent annually on average. A 2007 study commissioned by the National Crime Prevention Council found that 43 percent of young people ages 13–17 years were victimized by cyberbullying in the year prior to the survey (King, 2010). Based on nine recent studies conducted on random samples of middle- and high-school students across the US, Hinduja and Patchin (2016b) estimated that on an average, around 26 percent of the students were cyberbullied in the period 2007 through 2015.

Youth outcomes associated with cyberbullying and physical form of bullying (including school violence) victimization are largely similar in nature (Hoff & Mitchell, 2009; Kowalski & Limber, 2013; Li, Cross, & Smith, 2012; Tokunaga, 2010). Moreover, a large fraction of young people victimized by physical bullying are at an elevated risk of being cyberbullied (Chang *et al.*, 2013; Erdur-Baker, 2010; Kowalski & Limber, 2013; Li, 2007; Schneider *et al.*, 2012; Slonje & Smith, 2008; Smith *et al.*, 2008). In particular, the common youth health-related problems associated with cyberbullying victimization include mental anxiety, anger, depression, low self-esteem, suicidal intention, delinquency, and substance misuse problems (Chang *et al.*, 2013; Elgar *et al.*, 2014; Hinduja & Patchin, 2007, 2008, 2010, 2014; Hoff & Mitchell, 2009; Juvonen & Gross, 2008; King, 2010; Kowalski & Limber, 2013; Meredith, 2010; Suzuki, Asaga, Sourander, Hoven, & Mandell, 2012; Tokunaga, 2010; Van Geel, Vedder, & Tanilon, 2014; Wolak *et al.*, 2008; Ybarra, 2004). Additionally, cyberbullying victims are more likely to skip schools and tend to have poor academic performance (Hinduja & Patchin, 2014; Schneider *et al.*, 2012).

It is important, but not surprising to note that the mental and emotional problems associated with cyberbullying experiences are not limited to victims only. Cyberbullying offenders tend to suffer from mental depression and high incidence of suicidal ideation (Chang *et al.*, 2013; Hinduja & Patchin, 2011; Kowalski & Limber, 2013). Kowalski and Limber (2013) observe that youth who experience cyberbullying both as offender and as victim are more likely to experience adverse health and psychological problems than others. Given the health implications of cyberbullying victimization, as discussed in the literature, it is therefore important to understand how effective cyberbullying interventions can potentially be in addressing youth problems associated with cyberbullying.

Studies in cyberbullying literature also discuss gender-specific differences with respect to cyberbullying experiences. While some studies (Slonje & Smith, 2008; Tokunaga, 2010; Ybarra & Mitchell, 2004a, 2004b) do not find gender differences in connection with reporting cyberbullying victimization experiences, a few other studies conclude that girls are more likely to be victimized by cyberbullying (Hinduja & Patchin, 2008; Mishna *et al.*, 2012; Robers, Kemp, Rathbun, Morgan, & Snyder, 2014; Smith, Mahdavi, Carvalho, & Tippett, 2006; Wang *et al.*, 2009). Li (2006) and Wang *et al.* (2009) observe that boys are more likely to be cyberbullying offenders. However, Ybarra and Mitchell (2004a, 2004b) and Beckman (2013) observe that girls are equally likely to be cyberbullies as boys. Meredith (2010) argues that girls are more likely to be involved in cyberbullying, both as victims and as offenders. In this context, the current analysis adds to the cyberbullying literature by exploring gender-specific effects of cyberbullying laws on the youth outcomes of interest.

2.3. Emergence of school-bullying and cyberbullying legislation

The Columbine High School shooting incident in 1999 was one of the first major incidents of school violence related to bullying that provided a strong premise for states to adopt legislative measures to respond to bullying on school premises (Stuart-Cassel *et al.*, 2011). Subsequently, the year 2000 marked the inception of the state bullying prevention laws to reduce bullying in schools. As of 2016, all states have implemented anti-bullying laws (Limber & Small, 2003; Sabia & Bass, 2017). Even though there are large heterogeneities in the bullying-related intervention across states, in general the laws primarily require schools to adopt effective measures against bullying. Broadly, the state-specific measures require schools to introduce of sanctions against bullies; develop training programs for educators and school staff members to address bullying incidents; and documenting details on bullying incidents in school (including victims' reports and measures taken to resolve bullying incidents).

The combination of a rise in the risk of youth cyberbullying (induced by a rapid growth in electronic communication) and a number of high-profile incidents substantiated the need for legislative interventions to prohibit cyberbullying and online harassment (Hinduja & Patchin, 2015; King, 2010; Meredith, 2010).⁶ Beginning in 2006, the states sought to widen the scope of their anti-bullying legislation to include electronic form of harassment by incorporating new legislative measures to address electronic form of bullying (Hinduja & Patchin, 2015; National Conference of State Legislatures). These legislative changes are incorporated either by extending the definition of bullying in order to include electronic form of bullying or 'cyberbullying' (such that the schools can exercise their anti-bullying strategies for cyberbullying incidents as well) or by introducing new cyberbullying legislation. Table 1 presents the state-specific statutes related to cyberbullying and the effective year of implementation of the interventions (Hinduja & Patchin, 2016a). Further, Hinduja and Patchin (2016a) document important heterogeneities observed across state-level cyberbullying interventions. Based on the authors' information, Table 1 additionally provides information on three important components of state cyberbullying laws (school sanctions, criminal sanctions and provisions for students' off-campus behavior). In particular, 45 states have school sanctions for bullying and cyberbullying; 18 states have criminal sanctions for cyberbullying; and 15 states account for students' off-campus behavior related to bullying and cyberbullying (Hinduja & Patchin, 2016a); State laws that incorporate criminal sanctions for cyberbullying usually treat cyberbullying as a misdemeanor criminal offense. Criminal sanctions may include financial penalties (ranging from 50 dollars to 2,500 dollars) or jail time (usually ranging from 3 to 18 months) (Hinduja & Patchin, 2015, 2016a). Strictness of criminal sanctions for cyberbullying crimes (which are often incorporated through separate legislation) can vary by age and graveness of offense. For example, adult offenders are likely to face stronger punishments than younger cyberbullies. School sanctions for cyberbullying involve disciplinary actions taken by the school against a student identified as a cyberbullying offender. In most cases, school sanctions are informal in nature. However, serious incidents may involve formal responses from schools. Informal school response includes counselling the victim and the offender, discussing the issue with the parents of the parties involved in cyberbullying, and

Table 1. State cyberbullying/ electronic harassment laws.

State	Electronic Harassment Law	Year of Passage	Components of Law (Year of Passage)		
			School Sanction	Criminal Sanction	Addresses off-campus behavior
Alabama [✓]	The Alabama Student Harassment Prevention Act – House Bill 216, Ala. Code §16-28B-3	2009			
Alaska ^{✓,§}	No Act		2006	2006	
Arizona [✓]	Senate Bill 1266, Section 8-309	2010	2011		
Arkansas	Ark. Code Ann. §6-18-514	2007	2007	2011	2007
California	Assembly Bill 86, Cal. Educ. Code §32 261	2008	2008		2013
Colorado ^{✓,§}	House Bill 11-1254, C.R.S. §22-93-101	2011	2011	2015*	
Connecticut ^{✓,§}	Raised Bill 1138, Conn. Gen. Stat. § 10-222d	2011	2008		2011
Delaware	House Bill 7, Del. Code Ann. Tit. 14, §4112D	2007	2007		
District of Columbia	D.C. Act 19-384—'Youth Bullying Prevention Act of 2012'	2012	2012		2012
Florida	House Bill 669, Fla. Stat. Ann. §1006.147	2008	2008		2013
Georgia [✓]	Senate Bill 250, Ga. Code Ann. §20-2-751.4	2010	2010		
Hawaii	Senate Bill 2094, Chapter 302A	2010	2010		
Idaho	House Bill 750, Idaho Code §18-917A	2006	2006	2006	
Illinois [✓]	Senate Bill 3266, 105 Ill. Comp. Stat. §27-23.7	2010	2012	2008	2014*
Indiana	House Bill 1276, IC 20-19-3-10	2010	2010		
Iowa	Senate File 61,Iowa Code §280.28	2007	2007	2007	
Kansas	House Bill 2758, Kan. Stat. Ann. §72-8256	2008	2008		
Kentucky	House Bill 91, Ky. Rev. Stat. Ann. §525.080	2008	2008	2008	
Louisiana	House Bill 1259, La. Rev. Stat. Ann. §17:416.13	2010	2010	2010	2011
Maine [✓]	SP035501, Sec. 1. 20-A MRSA §6553	2009	2009		
Maryland	House Bill 199, Md. Code Ann., Educ. §7-424	2008	2008	2013	
Massachusetts	Senate Bill 2404, Mass. Gen. Laws §71-370	2010	2010		2010
Michigan	Executive Order 2007-46	2007			
Minnesota	Senate Bill 646, Minn. Stat. §121A.0695	2007	2007		2014*
Mississippi [✓]	Senate Bill 2015, Miss. Code Ann. §37-11-67	2010	2010	2011	
Missouri [✓]	House Bill 1543, Mo. Rev. Stat. §160.775	2010	2010	2008	
Montana ^{✓,§}	'Bully-Free Montana Act'	2015*		2015*	
Nebraska	Legislative Bill 205	2008	2011		
Nevada [✓]	Senate Bill 163, Nev. Rev. Stat. Ann. §388.124	2009		2009	
New Hampshire [✓]	House Bill 1543, N.H. Rev. Stat. Ann. §193-F:3	2010			2010
New Jersey	Senate Bill 993, N.J. Stat. Ann. §18A: 37-14	2007	2007	2014*	2010
New Mexico	N.M. Admin. Code §6.12.7.7	2006	2006		
New York	Senate Bill 7051	2008	2011		2013
North Carolina [✓]	House Bill 1261, N.C. Gen. Stat §14-458.1	2009	2009	2009	
North Dakota ^{✓,§}	House Bill 1465, N.D. Cent. Code 15.1-19 §1-2	2011	2011	2009	
Ohio	House Bill 116, Jessica Logan Act	2012	2012		
Oklahoma	Senate Bill 1941, Okla. Stat. Ann. §70-24-100.3	2008	2008		
Oregon	House Bill 2673, Or. Rev. Stat. §339.351	2007	2007		
Pennsylvania	House Bill 1067, Pa. Cons. Stat. §13-1303.1-A	2008	2008		
Rhode Island	Senate Bill 2012, R.I. Gen. Laws §16-21-26	2008	2008		
South Carolina	House Bill 3573, S.C. Code Ann. §59-63-120	2006	2006		
South Dakota [✓]	Senate Bill 130, S.D. §13-32-19	2012	2012		2012
Tennessee ^{✓,§}	Tenn. Code Ann. § 49-6-1014, Tenn. Code Ann. § 49-6-1015	2012	2012	2009	2014*
Texas ^{✓,§}	House Bill 1942, Texas HB No. 1942	2011	2011		
Utah [✓]	Senate Bill 91, Utah Code Ann. §53A-11a-102, Utah Code Ann. §76-9-201	2009	2009		
Vermont	16 V.S.A. § 11	2011	2011		2011
Virginia [✓]	House Bill 1624, § 22.1-279.6	2009	2009	2001	
Washington [✓]	Senate Bill 5288	2007	2007	2004	
West Virginia ^{✓,§}	W. Va. Code Ann. §18-2C-2/ W. Va. Code Ann. §18-2C-3	2011	2011		
Wisconsin [✓]	Senate Bill 154, Wis. Stats 947.0125	2010	2010	1996*	
Wyoming [✓]	House Bill 223, Wyo. Stat. Ann. §21-4-312	2009	2009		

*: Denotes that the year of implementation does not lie within the study period, 2001–2013.

✓: Denotes states that are considered in the analysis for bullied outcome.

§: Denotes states that are considered in the analysis for e-bullied outcome.

Note: The information on state-specific statutes for cyber-bullying laws and their components are primarily obtained from National Conference of State Legislatures (Accessed on June 22, 2016 from <http://www.ncsl.org/research/education/cyberbullying.aspx>) and Hinduja and Patchin (2016a). Additional sources used for verification of the above information and passage years include LexisNexis, and HeinOnline databases.

condemning cyberbullying incidents. Examples of formal response include detention, suspension, and expulsion of the offender from the school (Chibbaro, 2007; Hinduja & Patchin, 2014).

It is apparent that the main objectives of these laws are to deter cyberbullying offense among youth and support cyberbullying victims to overcome the health and emotional outcomes linked with the victimization experiences. To achieve the desired purpose, the state-level anti-cyberbullying laws in general require schools to involve educators and other staff members in incorporating procedures for reporting, investigating and preventing cyberbullying, both on- and off-campus (Hinduja & Patchin, 2015). However from the empirical research perspective, given the nature of cyberbullying (especially with respect to offenders' ability to maintain anonymity), it is difficult to estimate the deterrent impact of the cyberbullying laws on future likelihood of cyberbullying offense. Nonetheless, analyzing the effects of the state-level interventions on youth reporting of victimization experiences can provide partial but useful insights into the efficacy of the cyberbullying laws. This will allow policy makers to understand whether the state cyberbullying laws are effective in promoting an environment where the marginal benefit of sharing victimization experiences can be expected to be greater than the marginal cost (like fear of future reprisal from their offenders).

2.4. Mechanisms: evidence from related literature

State intervention in the form of cyberbullying legislation has been recognized as an important policy measure to reduce cyberbullying among youth (Cassidy, Jackson, & Brown, 2009; Hinduja & Patchin, 2015; King, 2010; Meredith, 2010; Stuart-Cassel *et al.*, 2011). However, a number of social influences and legal challenges associated with cyberbullying can potentially offset the intended deterrent impact of the laws. Hence, it is important to explore the channels through which cyberbullying laws can affect incidence of cyberbullying and youth's reporting practices.

First, introduction of criminal penalties for cyberbullying offense under state legislation has its own challenges. Criminalizing cyberbullying may often come in conflict with an individual's constitutional rights to freedom of speech and expression provided by the First Amendment to the United States constitution (Hinduja & Patchin, 2011; King, 2010; Servance, 2003). Difficulties in identifying cyberbullying offenders and discerning graveness of cyberbullying incidents further explain states' reluctance to criminalize cyberbullying behavior under their bullying prevention laws (Hinduja & Patchin, 2015). This may reduce the cost of cyberbullying offenses and offset the deterrent impact of anti-cyberbullying legislation.

Second, adopting strict punitive measures for cyberbullying offenses may prompt an increase in incidence of cyberbullying in the form of reprisals. Iyengar (2009) finds that mandating arrests (under state legislation) for domestic violence increases intimate partner homicide rates. This might be due to the possibility that strong punitive measures may result in reduction in reporting from domestic violence victims due to fear of future reprisal from their offenders. The same hypothesis may hold true in cyberbullying incidents. In addition, victims may not report their experiences due to social stigma or fear of school sanctions and/or increased parental supervision (Agatston, Kowalski, & Limber, 2007; Cassidy *et al.*, 2009). This may provide cyberbullying offenders additional incentives to continue abusing their victims.

Prohibiting acts of retaliation or reprisal for reporting of cyberbullying incidents by several states under their respective cyberbullying legislation indicate that reprisal is not an unanticipated phenomenon in cyberbullying (Hayward, 2011).⁷ While laws that encourage reporting can help schools to reduce future occurrence of cyberbullying, acts of reprisal as a reaction to victims' reporting can deter reporting of cyberbullying incidents.

3. Data

3.1. Youth outcomes from the youth risk behavior surveys

The data on the youth outcomes are drawn from the YRBS for the period 2001–2013. The Centers for Disease Control and Prevention (CDC) coordinates the national YRBS biennially by collecting

Table 2. Indicators of youth reporting on school violence and victimization.

Variable name	Survey questions used	Binary outcome	High-school students Mean (S.D)	High-school girls Mean (S.D)	High-school boys Mean (S.D)
e-Bullied ^{✓✓}	<i>'During the past 12 months, have you ever been electronically bullied?'</i>	0- No 1- Yes	0.169 (0.002)	0.229*** (0.420)	0.109 (0.312)
Bullied	<i>'During the past 12 months, have you ever been bullied on school property?'</i>	0- No 1- Yes	0.207 (0.405)	0.227*** (0.419)	0.187 (0.390)
Fights in school	<i>'During the past 12 months, how many times were you in a physical fight on school property?'</i>	0- Never 1- At least once	0.115 (0.319)	0.079*** (0.270)	0.153 (0.360)
Threat	<i>'During the past 12 months, how many times has someone threatened or injured you with a weapon such as a gun, knife, or club on school property?'</i>	0- Never 1- At least once	0.079 (0.269)	0.057*** (0.232)	0.102 (0.302)
Unsafe	<i>'During the past 30 days, on how many days did you not go to school because you felt you would be unsafe at school or on your way to or from school?'</i>	0- 0 days 1- At least once	0.073 (0.260)	0.075*** (0.263)	0.071 (0.257)
Suicide consider	<i>'During the past 12 months, did you ever seriously consider attempting suicide?'</i>	0- No/ Never 1- Yes	0.152 (0.359)	0.189*** (0.392)	0.113 (0.317)

✓✓: Available only in the 2011 and 2013 YRBS.

***—Difference in means of variable for girls and for boys is significantly different from zero at the 1 percent level.

Note: Bullying information is available in the YRBS for the period 2009–2013 only. The reported means/proportions of the variables are based on the respective regression samples used in the analysis. The regression sample sizes for each variable are reported in regression Table 5.

information on different types of health-related behaviors of young high-school students in the US. The individual-level data includes survey responses provided by a nationally representative sample of youth population, ages 12–18 years. Based on state-representative youth samples, the state YRBS are similar to the national YRBS, but are administered by the participating states' education and health agencies. To maximize state-year variation in implementation of cyberbullying laws, the analysis combines the national and state YRBS,⁸ following from the approach employed by some previous empirical research (Anderson, Hansen, & Rees, 2015; Sabia & Anderson, 2014; Sabia & Bass, 2017; Sabia, Pitts, & Argys, 2014).

Table 2 provides descriptive information on all the youth outcome variables based on the individual-level information in the YRBS. Self-reported information on victimization of electronic bullying and bullying at school are available for the period 2011–2013 and 2009–2013, respectively. In addition, since the state cyberbullying interventions are targeted towards schools, the analysis restricts the other youth violence measures to events occurring at schools. In particular, the additional YRBS school violence and safety measures include binary indicators of being involved in physical fights; being threatened/ injured by (someone with) a weapon; feeling unsafe attending school.⁹

Further, following from the evidence in the previous literature regarding the mental health implications of cyberbullying victimization, the study looks at the relationship between cyberbullying laws and individuals' suicidal tendency. As such, the analysis considers binary indicator of whether a person considered attempting suicide prior to the survey.

Utilizing the respective regression samples, Table 2 presents descriptive information of the YRBS-based youth outcomes. While 17 percent of students report being bullied electronically, almost 21 percent of students report being bullied at school. Further, approximately 12 percent of the sample report being involved in physical fights and 8 percent report being threatened by someone with a weapon on school property. After stratifying the YRBS sample by sex, a higher proportion of boys reported being involved in fights and being threatened by weapons on their school property compared to girls. However, proportion of students who were electronically bullied as well physically bullied at school is significantly larger for girls. In addition, girls appear to be more likely to feel unsafe attending school and consider attempting suicide.

Table 3. Descriptive information of state-level covariates.

State-level cyberbullying	Mean (S.D)	Source
–Cyber-bullying law	0.452 (0.498)	–National Conference of State Legislatures, Hinduja and Patchin (2016a), HeinOnline, and Lexis Nexis.
–Includes school sanction	0.335 (0.472)	
–Includes criminal sanction	0.085 (0.280)	
–Addresses off-campus behavior	0.015 (0.120)	
Individual demographic controls		
–Female	0.513 (0.500)	– YRBS
–10th grade	0.269 (0.443)	– YRBS
–11th grade	0.245 (0.430)	– YRBS
–12th grade	0.205 (0.404)	– YRBS
–White	0.464 (0.499)	– YRBS
–Hispanic	0.222 (0.415)	– YRBS
State-level economic and school-level controls		
–Unemployment rate	6.633 (2.077)	–Bureau of Labor Statistics
–Per capita personal income (in 2005 dollars)	37 272.140 (5767.299)	–Bureau of Economic Analysis
–Student-teacher ratio (in public schools)	15.003 (2.555)	–National Center for Education Statistics
–Per pupil expenditure (in 2005 dollars)	10 554.570 (3536.951)	–National Center for Education Statistics
State-level demographic controls		
–Female proportion	0.507 (0.008)	–US. Census Bureau
–Non-adults proportion	0.806 (0.135)	–US. Census Bureau
–White proportion	0.098 (0.095)	–US. Census Bureau
–Hispanic proportion	0.272 (0.021)	–US. Census Bureau
State-level youth suicide and high-school dropout rates		
–Youth suicide rate (per 100,000 cases)	4.651 (2.794)	–CDC WONDER
–High-school dropout rate	0.088 (0.031)	–Current Population Survey
State-level policy controls		
–School anti-bullying law	0.515 (0.500)	–Stuart-Cassel <i>et al.</i> (2011), www.bullypolice.org
–Child witness to domestic violence law	0.356 (0.479)	–Child welfare information gateway, Lexis Nexis, HeinOnline
–Cigarette tax (in 2005 dollars)	1.296 (0.959)	–Tax Burden on Tobacco
–Beer tax (in 2005 dollars)	0.241 (0.208)	–Beer Institute
Sample size	889 173	

The YRBS provides individuals' demographic information including sex, race, ethnicity, and grades, which are further controlled for in the regression analyses. Table 3 presents descriptive information of individual- and state-level covariates used in the study (based on the largest regression sample used). Focusing on the demographic information of the YRBS sample, Table 3 estimates suggest that 51 percent of the sample are girls. Whites account for 46 percent and people belonging to the Hispanic ethnicity account for 22 percent of the total sample. With respect to grades, 28.1 percent of the sample are in the ninth grade (omitted category). Students in the tenth, eleventh and the twelfth grade represent 27 percent, 25 percent and 21 percent of the YRBS sample, respectively.

3.2. Construction of policy variable

The analysis utilizes multiple sources to collect information on the particular state-specific statutes related to cyberbullying laws (National Conference of State Legislatures¹⁰; Hinduja & Patchin, 2016a). Hinduja and Patchin (2016a) provide the most detailed information on state cyberbullying laws and their various components.

To construct the main policy variable (i.e. cyberbullying law), it is important to note that the YRBS are conducted biennially during the spring of odd-numbered years. The surveys include individuals' health and behavioral information based on events that take place prior to the survey date. Hence, laws that are implemented during the odd-numbered years of the study period may not affect youth outcomes recorded in the same years in the YRBS. Further, using the state-specific statute information provided by the aforementioned sources, information on the passage years of the

cyberbullying laws were additionally verified by reviewing state legislations in HeinOnline and Lexis Nexis databases. Most state cyberbullying laws appear to have been enacted in the months of April through December. Therefore, to precisely estimate the laws' impact, a binary indicator 'Law_{st}' is constructed in way such that the variable equals 1 when a state has already enacted a cyberbullying law. Law_{st} equals 0 for years prior to the passage and for the year of implementation of a cyberbullying law. For example, if a state implemented cyberbullying law in year 1999, Law_{st} would equal 1 from the year 2000 and forward. Equating Law_{st} to 1 from the year 1999 would imply that the cyberbullying law can potentially affect youth outcomes recorded in the 1999 survey, which primarily consists of information relating to a period prior to the implementation of the law. For state laws that were enacted in even-numbered years, constructing Law_{st} in this way would not affect the regression analysis.

To study the effects of important components of cyberbullying law, a similar approach (as above) is incorporated to construct three binary indicators, each for inclusion of school sanctions, criminal sanctions, and provisions to address students' off-campus behavior.

3.3. Additional state-specific information

Implementation of cyberbullying laws may be correlated with state-specific characteristics that can potentially affect the youth outcomes of interest. For example, passage of cyberbullying law is likely to be motivated by the presence of other youth welfare policies (such as anti-bullying legislation for schools). Therefore, exclusion of important state-specific heterogeneities can potentially bias the estimates of the effects of cyberbullying laws. To ensure robustness of regression estimates of interest, the empirical analysis controls for a number of state-specific policy, economic, and school quality indicators.

In particular, state policy controls include school anti-bullying laws (source: Stuart-Cassel *et al.*, 2011),¹¹ criminal sanctions of child witness to domestic violence (source: Child Welfare Information Gateway¹²), and state regulations on substance use in the form of cigarette tax (source: Tax Burden on Tobacco) and beer tax (source: Beer Institute). This is based on the expectation that states with strict public welfare policies targeted towards youth are more likely to implement cyberbullying laws. In addition, regression models control for school quality indicators by including student-teacher ratios and annual per-pupil school expenditure in state public schools during the study period (National Center for Education Statistics, Common Core Data). More saturated regression specifications further include state-year youth suicide rates (per 100,000 individuals) as one of the controls. The youth suicide rate is estimated based on the population aged 10–19 (Wide-ranging Online Data for Epidemiologic Research).

Finally, to account for potential biases arising from the exclusion of unobserved state-specific time-variant heterogeneities, the most saturated regression model incorporates state-specific linear time trends.

4. Empirical methodology

The empirical analysis employs variation across states and timing in the implementation of cyberbullying laws in a difference-in-differences framework to estimate the relationship between cyberbullying laws and youth reporting behavior. In particular, to ensure the robustness of estimates, five regression models are estimated, ranging from a baseline to a more saturated model.

The baseline model (Model 1) regresses youth outcome on cyberbullying law by controlling for state and year fixed effects. Model 1 is:

$$Y_{ist} = \alpha_0 + \alpha_1 \text{Law}_{st} + \gamma_s + \lambda_t + \varepsilon_{ist} \quad (1)$$

where Y_{ist} is a dichotomous YRBS-based indicator of youth outcome for individual i in state s and time t . As noted earlier, the variable Law_{st} is a binary indicator for whether state s has implemented

a cyberbullying law at time t . γ_s captures time-invariant state fixed effects and λ_t represents year fixed effects that control for factors affecting the nation as a whole.

Model 2 incorporates individual demographic characteristics (from YRBS) in the right-hand side. Model 3 adds in controls for state – specific economic and school-level indicators. Model 4 controls for state-specific policy variables and yearly estimates of states' youth suicide rate in addition to the Model 3 covariates. Finally, Model 5 (the most saturated model) includes state-specific linear time trends to control for variations in unmeasured state-specific trends in youth outcomes evolving over time. Model 5 is:

$$Y_{ist} = \beta_0 + \beta_1 \text{Law}_{st} + \beta_2' X_{ist} + \beta_3' Z_{st} + \gamma_s + \lambda_t + \Omega_{st} + v_{ist} \quad (2)$$

In addition to the variables defined in Equation (1), X_{ist} is the vector of individual demographic controls and Z_{st} is the vector of state-level controls. Variable Ω_{st} represents the state-specific linear time trends created by interacting state dummies with study year. β_1 is the parameter of interest that estimates the relationship between cyberbullying laws and youth reporting behavior.

Further, states that implement cyberbullying laws may enact the cyberbullying prevention measures as a response to variation in trends in the youth outcomes studied. To further investigate the possibility of policy endogeneity (Granger causality), the analysis employs an event study to estimate the anticipatory and post-treatment effects of cyberbullying laws (Angrist & Pischke, 2009).

To study the effects of the important components of cyberbullying laws across states, separate regression models (to avoid collinearity issue) are estimated (for each component) similar to Equation (2). For binary indicators of youth outcomes, the empirical analysis is performed by estimating linear probability models (LPM). All regressions are weighted by state-year youth population estimates (aged below 20) obtained from the US Census Bureau (Solon, Haider, & Wooldridge, 2015).

5. Results

5.1. Relationship between cyberbullying laws and youth reporting behavior

Table 4 presents the estimated regression coefficients obtained from the LPM regressions with respect to all YRBS-based youth outcomes. Regression results for electronic bullying victimization and bullying victimization on school property are presented in columns (1) and (2) respectively. Regression results reported in columns (3)–(6) are related to measures that are available for the whole study period (2001–2013).

Based on the availability of the data, the difference-in-differences estimation using electronic bullying measure is performed by restricting the YRBS sample to 8 states, which either implemented a cyberbullying law within the period 2011–2013 or never enacted a law (see Table 1 notes). In particular, six states implemented a cyberbullying law within 2011 and 2013 YRBS and two states (Alaska and Montana) do not have a cyberbullying law (for school-age population) during the entire study period. Retention of states that already enacted a cyberbullying intervention before the 2011 YRBS would not affect the regressions due to lack of variation in the key policy variable.

Following a similar approach as above, the analysis related to the indicator of being bullied at school is based on a restricted regression sample of 23 states (see Table 1 notes).

The estimated marginal effects in column (1) of Table 4 indicate that implementation of cyberbullying laws is positively related to the likelihood of reporting of electronic bullying victimization (e-Bullied). The regression coefficient of interest across all the estimated model specifications are statistically significant at the 1 percent level. Given the limited data, since inclusion of state-specific linear time trends may result in collinearity problems, Model 4 is the most saturated regression performed for the 'e-Bullied' variable.¹³ Focusing on the relationship between cyberbullying law and indicator of being bullied at school (column 2), estimated coefficients across all regression specifications are positive and statistically significant at the conventional levels. In particular, controlling for

Table 4. Difference-in-differences estimates of relationship between cyberbullying laws and youth reporting on school violence and safety.

	2011–2013	2009–2013	2001–2013			
	e-Bullied ^{§§} (1)	Bullied (2)	Fights in school (3)	Threat (4)	Unsafe (5)	Suicide consider (6)
Model 1 – Baseline (with state and year fixed effects)						
Cyberbullying law	0.030*** (0.009)	0.019*** (0.008)	–0.001 (0.004)	0.004 (0.003)	0.006 (0.007)	0.005 (0.006)
Model 2 – Model 1 + demographic controls						
Cyberbullying law	0.028*** (0.008)	0.018** (0.007)	–0.003 (0.004)	0.003 (0.003)	0.005 (0.007)	0.005 (0.005)
Model 3 – Model 2 + state economic and school-level controls						
Cyberbullying law	0.049*** (0.004)	0.012** (0.006)	–0.001 (0.005)	0.001 (0.003)	0.003 (0.007)	0.006 (0.005)
Model 4 – Model 3 + state-level- policy controls and youth suicide rate						
Cyberbullying law	0.060*** (0.008)	0.010* (0.006)	–0.001 (0.005)	0.002 (0.004)	0.004 (0.005)	0.005 (0.005)
Model 5 – Model 4 + state-specific linear time trends						
Cyberbullying law	-	0.013* (0.007)	0.001 (0.004)	0.006* (0.003)	0.010* (0.006)	0.008** (0.003)
N	32 639	170 164	812 662	889 173	896 133	897 542

*, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

Note: Weighted linear probability regression estimates are reported in the above table. Standard errors are corrected for clustering on the state (reported in parentheses). All regressions are weighted by state-year youth population estimates (aged under 20). Demographic controls include sex, age, race, and ethnicity. State economic and school-level controls include seasonally adjusted unemployment rate, per-capita personal income, student-teacher ratio, and per-pupil expenditure in public high schools. State-level policy controls include school anti-bullying law, criminal sanctions for child witness of domestic violence, cigarette tax, and beer tax.

^{§§}. For electronic bullying outcomes, model 5 is not estimated, as controlling for state-specific linear time trends using the limited data may lead to collinearity problem. However, the Model 5 estimate remains positive and statistically significant at the 1 percent level.

state-specific linear time trends, the most saturated regression (Model 5) estimates suggest that state-level cyberbullying intervention is related to a 6.2-percent (marginal effect as a proportion of the corresponding sample mean) increase in the probability that students report being bullied at school. Results from columns (1) and (2) indicate that the post-implementation period of the state cyberbullying laws is likely to be marked by an increase in youth reporting of cyberbullying as well as physical bullying experiences.

Regression estimates in column (3) of Table 4 suggest that cyberbullying law does not have any effect on students' reporting of their involvement in fights on school property. It is worth noting that the indicator of physical fights on school property does not necessarily imply victimization, as involvement in physical violence (see Table 2) may also result from aggressive behavior on the part of the survey respondents. However, for all other indicators considered in the analysis (columns 4–6), the regression estimates from the most saturated regression are positive and significantly different from zero (Model 5). In particular, under the Model 5 specification, cyberbullying laws are related to a 7.6-percent (marginal effect relative to the sample mean) increase in the probability that students report being threatened by a weapon at school (column 4). The LPM estimate is statistically significant at the 10 percent level. Further, Model 5 estimates in columns (5) and (6) indicate that adoption of cyberbullying law is followed by a 13.7-percent increase (significant at the 10 percent level) in the probability that students report non-attendance at school due to safety concerns; and a 5.2-percent increase in the probability (significant at the 5 percent level) that students report having suicidal thoughts. The estimated Model 5 regression coefficients across all the YRBS measures indicate that omission of unobserved state-specific heterogeneities may bias the true estimated impact of cyberbullying laws downward.

Although columns (1) and (2) of Table 4 present the most explicit evidence on the potential effects of the cyberbullying laws on youth reporting practices, the data limitation may restrict the

Table 5. Difference-in-differences estimates of relationship between cyberbullying laws and state-level measures of youth outcomes.

	Youth suicide rate (1)	Dropout rate (2)
Model 1 – Baseline (with state and year fixed effects)		
Cyberbullying law	0.070 (0.482)	–0.003 (0.004)
Model 2 – Model 1 + demographic controls		
Cyberbullying law	0.003 (0.454)	0.001 (0.004)
Model 3 – Model 2 + state economic and school-level controls		
Cyberbullying law	–0.183 (0.435)	0.002 (0.003)
Model 4 – Model 3 + state-level- policy controls		
Cyberbullying law	–0.093 (0.419)	0.002 (0.003)
Model 5 – Model 4 + state-specific linear time trends		
Cyberbullying law	–0.101 (0.437)	–0.001 (0.004)
N	663	663

*, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

Note: Weighted ordinary least squares estimates are reported in the above table. Standard errors are corrected for clustering on the state (reported in parentheses). Demographic controls include state-year estimated proportions of females, non-adults (youth), Whites, and Hispanics. State economic and school-level controls include seasonally adjusted unemployment rate, per-capita personal income, student-teacher ratio, and per-pupil expenditure in public high schools. State-level policy controls include school anti-bullying law, criminal sanctions for child witness of domestic violence, cigarette tax, and beer tax.

scope of the analysis. As such, the analysis using additional YRBS indicators of school violence, safety, and suicidal ideation as proxies of cyberbullying victimization provides substantial support to the key findings.

It is important to note however, that the positive relationship between cyberbullying laws and the youth measures considered in Table 4 can be due to (a combination of) two reasons. In particular, increase in students' reporting can be triggered by a rise in incidence of cyberbullying among youth or alternatively can be motivated by the legislative support offered by state-level intervention to the cyberbullying victims. While the former rationale is highly probable, as cyberbullying offenses and reprisals (as a reaction to victims' reporting) can be provoked by the offenders' ability to protect their identity from their victims, it is difficult to test the presumption based on self-reported data. Therefore, it may not be evident from the Table 4 findings whether adoption of cyberbullying laws encourages youth to report their victimization experiences. To test the hypotheses, separate analyses consider state-year estimates of youth suicide rates and high-school dropout rates.¹⁴ More specifically, since an increase in cyberbullying offenses can prompt a rise in incidence of youth suicides and dropping out of schools, the supplemental tests may provide more compelling evidence on the effects of cyberbullying law on youth's reporting practices. The ordinary least squares regression estimates reported in Table 5 suggest that there is no significant change in either of the two youth trends during the post-implementation period. Overall, the empirical evidence provided in Table 5 does not provide any support to the possibility of a rise in incidence of youth cyberbullying upon passage of cyberbullying laws.

It is important to note that the Table 5 regressions are estimated using similar empirical approach as described in Section 4. However, to control for state-level demographic information, the regression models incorporate state-year proportions of female, non-adult (aged under 19) White, and Hispanic population.

Table 6. Analysis of effects important components of cyberbullying laws (2001–2013).

	Bullied (1)	Fights in school (2)	Threat (3)	Unsafe (4)	Suicide consider (5)	Youth suicide rate (6)	Dropout rate (7)
School sanctions	0.012* (0.006)	−0.008 (0.006)	0.001 (0.004)	−0.012** (0.005)	0.003 (0.003)	0.348 (0.461)	0.000 (0.004)
Criminal sanctions	0.024*** (0.008)	0.013** (0.005)	0.013* (0.007)	0.005 (0.005)	0.012*** (0.004)	−0.100 (0.667)	0.000 (0.007)
Off-campus behavior	0.001 (0.006)	0.019 (0.017)	0.015*** (0.005)	0.013* (0.008)	0.006 (0.006)	0.264 (0.748)	−0.004 (0.006)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	470 663	812 662	889 173	896 133	897 542	663	663

*, **, and *** denote significance at the 10%, 5% and 1% level, respectively.

Note: Weighted linear probability regression estimates are reported in the above table. Standard errors are corrected for clustering on the state (reported in parentheses). All regressions are weighted by state-year youth population estimates (aged under 20). The above regressions are estimated using Model 5 specification (see Table 5). The sample sizes for bullied outcome vary by treatment variable due to the variations in the effective years of the different components of cyberbullying laws (see Table 1). The sample size for bullied outcome (column 5) reported in the above table is with respect to laws that address students' off-campus behavior. For school sanctions and criminal sanctions, the sample sizes are 287 315 and 416 439, respectively.

5.2. Considering important heterogeneities

Table 6 documents regression estimates of the analysis that looks at the effects of three important components of the state cyberbullying laws. Estimating Equation (2), linear regression coefficients indicate that criminal sanctions against cyberbullying have a statistically significant and positive relationship across a larger number of YRBS indicators compared to school sanctions and provisions for students' off-campus behavior. More specifically, criminal sanctions do not have any significant relationship only with the likelihood of reporting safety concerns at school (column 3). Further, there are heterogeneities in the effects of school sanctions across youth outcomes. In particular, while school sanctions are positively related to the probability of reporting of school bullying victimization, the same has an inverse relationship with the likelihood that students report feeling unsafe going to school (columns 3 and 5). Finally, provisions for students' off-campus behavior is positively related to the probability of reporting experiences of being threatened on school property and feeling unsafe going to school (columns 4 and 5). However, similar to the Table 5 results, none of the components appears to have any effect on youth suicide and dropout rates (columns 6 and 7). In general, Table 6 results indicate that inclusion of punitive measures to address cyberbullying can be effective in promoting students' reporting practices. While it is often difficult for schools to monitor students' off-campus behavior (especially usage of electronic media), knowledge of punitive legal provisions to deter cyberbullying offense may alleviate victims' reluctance to report their victimization experiences.

Following from the discussion on gender-specific differences documented in the current cyberbullying literature, Table 7 presents empirical evidence on the sex-specific impacts of cyberbullying laws. After stratifying the YRBS sample by sex, LPM estimates indicate that cyberbullying laws are positively related to all YRBS measures for girls, except for indicators of school bullying. On the contrary, for boys, cyberbullying laws are positively and significantly related to their reporting behavior related to bullying on school property.

5.3. Additional test for policy endogeneity: event study

States that implement cyberbullying law can potentially do so as a response to variation in trends in youth violence and health-related problems. This may further affect identification of true β_1 in

Table 7. Difference-in-differences analysis of sex-specific impacts of cyberbullying laws.

	Bullied (1)	Fights in school (2)	Threat (3)	Unsafe (4)	Suicide consider (5)	Youth suicide rate (6)	Dropout rate (7)
Cyberbullying law	0.001 (0.010)	0.007*** (0.002)	0.007* (0.004)	0.017** (0.008)	0.011* (0.006)	-0.672 (0.583)	-0.002 (0.004)
N	89 823	417 342	455 928	459 590	460 839	663	663
Cyberbullying law	0.024*** (0.009)	-0.005 (0.007)	0.004 (0.004)	0.003 (0.004)	0.006 (0.004)	0.438 (0.657)	0.000 (0.004)
N	86 299	395 320	433 245	436 543	436 703	663	663
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-specific linear time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*, **, and *** denote significance at the 10%, 5% and 1% level.

Note: Weighted linear probability regression estimates are reported in the above table. Standard errors are corrected for clustering on the state (reported in parentheses). All regressions are weighted by state-year youth population estimates (aged under 20). The above regressions are estimated using Model 5 specification (see Table 5).

Equation (2). The robustness of the key regression findings (reported in Tables 4 and 5) is further tested by including policy leads and lags in a separate regression analysis (Angrist & Pischke, 2009; Autor, 2003). The event analysis incorporates indicator variables for- one, two, and three years before the law was passed, the year the law was enacted, one and two years after passage of law, and for subsequent years from the third year onwards. Period prior to three years before the law was enacted is treated as the excluded category. The coefficients of the variables can be used to assess the significance of anticipatory and post-treatment effects of cyberbullying laws and test for statistical evidence of policy endogeneity.

Table 8 presents regression estimates obtained from the event study. In the joint test for leads, the results provide no evidence of significant variations in the trends of the youth outcomes before the law was implemented. These findings provide further empirical support in favour of the validity of the empirical specifications used in the main analysis.

Table 8. Event analysis to estimate anticipatory and post-treatment effects of cyberbullying laws (2001–2013).

	Bullied (1)	Fights in school (2)	Threat (3)	Unsafe (4)	Suicide consider (5)	Youth suicide rate (6)	Dropout rate (7)
3 years before	0.029 (0.025)	0.000 (0.006)	0.001 (0.003)	-0.000 (0.007)	0.001 (0.005)	-0.638* (0.368)	0.000 (0.004)
2 years before	0.024 (0.018)	-0.000 (0.008)	-0.007** (0.004)	-0.012 (0.008)	-0.004 (0.007)	0.118 (0.480)	-0.003 (0.005)
1 year before	0.017 (0.035)	0.005 (0.012)	-0.005 (0.005)	0.009 (0.010)	-0.001 (0.008)	-0.542 (0.621)	-0.010 (0.006)
Effective year of law	0.017 (0.035)	0.009 (0.015)	-0.012** (0.006)	0.006 (0.012)	-0.004 (0.009)	-0.761 (0.722)	-0.005 (0.007)
1 year after	0.040 (0.049)	0.009 (0.016)	-0.005 (0.007)	0.018 (0.013)	0.005 (0.010)	-0.948 (0.807)	-0.009 (0.009)
2 years after	0.038 (0.050)	0.012 (0.018)	0-0.006 (0.008)	0.020 (0.014)	0.007 (0.012)	-0.625 (0.959)	-0.008 (0.011)
3+ years after	0.052 (0.062)	0.015 (0.022)	-0.015 (0.009)	0.019 (0.020)	0.004 (0.014)	-1.174 (1.172)	-0.014 (0.014)
F-value of $\beta_{lead1} + \beta_{lead2} + \beta_{lead3} + \beta_{effective} = 0$	F = 0.07 Pr = 0.79	F = 0.11 Pr = 0.74	F = 2.26 Pr = 0.14	F = 0.01 Pr = 0.92	F = 0.07 Pr = 0.80	F = 0.89 Pr = 0.35	F = 0.81 Pr = 0.37
N	176 122	889 173	889 173	896 133	897 542	663	663

*, **, and *** denote significance at the 10%, 5% and 1% level.

Note: Weighted linear probability regression estimates are reported in the above table. Standard errors are corrected for clustering on the state (reported in parentheses). All regressions are weighted by state-year youth population estimates (aged under 20). The above regressions are estimated using Model 5 specification (see Table 5).

6. Discussions

This study is characterized by certain limitations. First, the data used in this study does not allow identification of cyberbullying offenders. Moreover, the self-reported nature of the data used in the study restricts the analysis's scope to test the deterrent impact of cyberbullying laws, as some victims of bullying at school and cyberbullying may choose not to report their victimization experiences due to fear of reprisal and other social consequences. Second, the youth sample used in the analysis may not be representative of the general youth population in the United States. Therefore, all the regressions using YRBS indicators are weighted by state-year population estimates. Finally, limited data availability on youth reporting on cyberbullying victimization requires the analysis to have a greater reliance on indirect indicators such as measures of school violence victimization and safety concerns. Nonetheless, while data limitations in this research space is a common concern across most countries where cyberbullying is recognized as a large public health concern, the YRBS is one of the few data sources that provides a unique opportunity to empirically explore the effectiveness of important measures adopted to address cyberbullying. In this context, although this study is not able to investigate whether cyberbullying laws reduce cyberbullying among youth, the analysis presents important evidence on how cyberbullying victims are likely to respond to public interventions designed to address youth cyberbullying. Using a US-based case study, the analysis contributes to the international literature by opening up a wide scope for future research on exploring some of the channels through which anti-cyberbullying interventions can affect young people's human capital outcomes.

To summarize, the analysis in this paper finds that adopting cyberbullying law is likely to motivate an increase in reporting of victimization experiences from young victims of cyberbullying and physical bullying. Promotion of youth reporting of cyberbullying incidents is important, as states' legislative measures should ideally be able to identify both victims and offenders in order to effectively deter cyberbullying and address the health concerns associated with it. As such, the empirical analysis in this paper offers suggestive evidence that indicates that large-scale cyberbullying intervention can potentially promote an environment in which victims feel safe to report their victimization experiences even if the policy measures may not have an immediate deterrent impact on cyberbullying itself.

Notes

1. Definition accessed from StopBullying.gov, a federal government website managed by the U.S. Department of Health and Human Services; Accessed from <https://www.stopbullying.gov/what-is-bullying/index.html> on February 25, 2018.
2. See details in <http://www.ncsl.org/research/education/cyberbullying.aspx>; Accessed on June 22, 2016.
3. Alaska does not explicitly have a cyberbullying law. However, the state has introduced school sanctions and criminal sanctions for cyberbullying crime. Montana is the last state to implement a cyberbullying law (2015). (see Hinduja & Patchin, 2016a).
4. The only two survey years to provide students' cyberbullying victimization information in the YRBS.
5. Since 2006, 95 percent of US teenagers (ages 12 to 17 years) have access to the internet and 74 percent stay connected to the internet via mobile electronic devices such as smart phones and tablets (Hinduja & Patchin 2014; Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013).
6. Examples of high-profile suicide incidents related to cyberbullying include cases of Ryan Halligan (2003), Megan Meier (2006), Jessica Logan (2008), Hope Witsell (2009), Tyler Clementi (2010), and Amanda Todd (2012). Retrieved from <http://nobullying.com/six-unforgettable-cyber-bullying-cases/> on February 1, 2016.
7. Some of the states that prohibit reprisal or retaliation for reporting cyberbullying incidents include Delaware, Florida, Georgia, Iowa, Maryland, Massachusetts, New Hampshire, New Jersey, Oregon, Rhode Island, South Carolina, Tennessee, and Wyoming (Hayward, 2011; National Conference of State Legislatures).
8. The state-identifiers (FIPS code) provided by YRBS for the national surveys are used to obtain state-level information on the variables of interest. The state YRBS data are available online (see <https://www.cdc.gov/healthyyouth/data/yrbs/data.htm>; retrieved on March 4, 2017).
9. Based on the definition of bullying (discussed earlier), the YRBS information on involvement in physical fights, and victimization of threats by harmful weapons on school property can be treated as proxies for bullying. Sabia

and Bass (2017) use a similar approach to evaluate the effects of state anti-bullying legislations using the YRBS data (the authors find little evidence on the effects of the state anti-bullying legislation on the YRBS outcomes). However, in the more recent survey years, the YRBS additionally incorporates specific information on incidence of bullying on school property and electronic bullying.

10. Accessed from <http://www.ncsl.org/research/education/cyberbullying.aspx>; Retrieved on March 23, 2016.
11. Additional information on passage dates of anti-bullying legislation can be found in <http://bullypolice.org/>; Retrieved on October 5, 2015.
12. Child Welfare Information Gateway. Retrieved from <https://www.childwelfare.gov/> on October 11, 2015 (2015).
13. Due to the limited availability, the e-Bullied variable is not considered in the subsequent regression analyses (from Table 6 onwards).
14. Annual high-school dropout rates are estimated using the Current Population Survey (Annual Social and Economic Supplement) by referring to National Center for Education Statistics' definition of status dropout rate (for people aged 16 to 24).

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Compliance with ethical standards

I hereby declare that this project was not funded by any public or private entity. I also declare that this study does not involve any conflict of interest.

Disclosure statement

No potential conflict of interest was reported by the authors.

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