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Patterns and predictors of state adult obesity prevention legislation enactment in US states: 2010–2013

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Abstract

Objective—This study examined bill- and state-level factors associated with enactment of adult obesity prevention legislation in US states.

Methods—A review of bills in the Rudd Center for Food Policy and Obesity's legislative database identified 487 adult obesity prevention bills, or proposed legislation, introduced between 2010 and 2013. Multilevel models were constructed to examine bill- and state-level characteristics associated with enactment.

Results—From 2010 to 2013, 81 (17%) of obesity prevention bills introduced were enacted across 35 states and the District of Columbia. Bills introduced in 2010 were more likely to be enacted than in 2013 (OR = 9.49; 95% CI: 2.61–34.5). Bills focused on access to healthy food, physical activity, general and educational programs, as well as modifying rules and procedures (e.g., preemption) had greater odds of enactment relative to food and beverage taxes (OR = 8.18;

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Ethics approval

This study was determined to be exempt by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board (#00000287).

Author contributions

E.A. Donaldson conceptualized the study, carried out the data analysis, interpreted the results, and wrote the article. J.E. Cohen, L. Rutkow, C.L. Barry, A.C. Villanti, and N.F. Kanarek supervised the analysis, participated in data interpretation, assisted in writing the article, and critically reviewed the article.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

95% CI: 2.85–23.4 healthy food; OR = 17.3; 95% CI: 4.55–65.7 physical activity; OR = 15.2; 95% CI: 4.80–47.9 general; OR = 13.7; 95% CI: 3.07–61.5 rules).

Conclusion—The year of bill introduction and overall bill enactment rate were related to adult obesity prevention legislation enactment in states. This study highlights the importance of a bill's topic area for enactment and provides insights for advocates and policymakers trying to address enactment barriers.

Keywords

Obesity; Policy; Legislation

Introduction

More than two-thirds of US adults are overweight and over one-third are obese (Flegal et al., 2010). To address this high prevalence rate, state governments can draw on a range of interventions including those emphasizing individual behavior change (Lemmens et al., 2008), as well as population-level strategies, such as legislation (Lee, 2012; Kremers et al., 2010; Nestle and Jacobson, 2000). State and local governments traditionally have broad legal authority to protect the public's health, and they often rely on legislation and accompanying regulations to accomplish this goal (Gostin, 2001). Legislation is widely used in public health because it has been effective in reducing other behavioral risk factors for disease, such as tobacco use (Glickman et al., 2012; Sallis et al., 2008; Gostin, 2001; Rose, 1985; Gortmaker et al., 2011; Magnusson, 2008). Legislation targeting obesity has, for example, included labeling changes to restaurant menus and trans fat bans (Glickman et al., 2012; WHA57 R. 17, 2004; Sallis et al., 2008; Gostin, 2001; Rose, 1985; Gortmaker et al., 2011; Magnusson, 2008; Levi et al., 2012).

Previous research summarized childhood obesity prevention legislation and examined state-level predictors of enactment (Eyler et al., 2012; Cawley and Liu, 2008; Boehmer et al., 2007, 2008; Brennan et al., 2011; Brownson et al., 2009; Hersey et al., 2010). This research, conducted between 2003 and 2009, found that bill topic, sponsorship, and state-level factors such as the political party in power, funding, and obesity prevalence were important for enactment (Eyler et al., 2012; Cawley and Liu, 2008; Boehmer et al., 2007, 2008; Brennan et al., 2011; Brownson et al., 2009; Hersey et al., 2010). Factors that influence child-focused obesity prevention bill enactment may differ from those that affect bills targeting adults. Two studies explored a dataset of obesity laws aimed at both children and adults between 2001 and 2010 (Lankford et al., 2013; Marlow, 2014). Most enacted bills created a taskforce or involved schools (Lankford et al., 2013). States with a higher percentage of Hispanic and African American residents were more likely to enact legislation (Marlow, 2014).

Given that the policy landscape may have changed since 2010 and no study has focused exclusively on legislation targeting adults, the current study describes patterns of adult obesity prevention legislation and examines bill-level and state-level correlates of enactment in US states between 2010 and 2013. Based on prior research, it was hypothesized that the topic area of a bill would be associated with enactment (Eyler et al., 2012; Boehmer et al., 2008). In addition, it was anticipated that state-level variables, such as the state having a

single dominant political party (e.g. governor and state legislature majority are Democrats), would be associated with enactment (Boehmer et al., 2008). Lastly, state-level obesity prevalence was expected to be inversely associated with enactment.

Methods

The Rudd Center for Food Policy and Obesity's legislative database was used to identify obesity prevention bills introduced in all US states between January 1, 2010 and December 31, 2013 (Yale Rudd Center for Food Policy and Obesity Legislative Database, 2015). This database contains obesity prevention bills captured by a search strategy using Capital Watch (Capital Watch Legal Solutions, 2015; Personal Communication with Yale Rudd Center for Food Policy and Obesity Database Manager, 2013). In the current study, the full text of all bills in the database was reviewed ($n = 1053$) for the study period. Bills were excluded based on several criteria (Appendix A). Fifty-four bills were excluded because they did not focus on prevention. Four hundred forty-four bills were excluded because they focused on children. Childhood laws differ from adult laws by their focus solely on children, including school policies such as increasing exercise during the school day. Adult and childhood laws are not mutually exclusive as a tax could modify parental behavior in a way that influences children. Sixty-one bills were companion bills, such that the same bill was proposed in both of a state's legislative chambers and had identical text. Among companion bills, the bill that made it the furthest in the legislative process was retained. If they were in the same stage of the process, the House bill was retained. Seven bills were removed because they focused on the local, rather than state, level. The final sample included 487 bills.

Bill-level variables

Bill-level variables were coded by a study author (ED) after a review of the complete bill text. The variables are described in detail in Appendix B. The primary outcome of interest was enactment status, included as a binary variable. A bill was considered "enacted" if it was passed by the state legislature and was signed into law by the governor.

The primary predictor of interest was the bill topic, included as a categorical variable. One of eight mutually exclusive topics was assigned and when a bill addressed more than one topic, the topic that best fit the overall bill objectives was assigned. The eight topics were: access to healthy food (e.g., fresh fruit and vegetable subsidies); marketing, advertising and menu labeling (e.g., providing calorie information on restaurant menus); food and beverage taxes; access to unhealthy foods (e.g., banning trans fats); physical activity (e.g., bike paths); general and educational (e.g., public education campaigns); modifying rules and procedures (e.g., state-level preemption of localities from enacting stronger menu labeling laws); and other. Bills in the "other" category were excluded in the main analyses of the study. Findings were qualitatively similar in a sensitivity analysis that included this category.

Bills in the sample were also assigned a sector of the food system that they would likely affect including: food production; food processing and distribution; marketing and advertising; retail; restaurants and food service; infrastructure and planning; sports and recreation; multiple sectors; other. Categorizing bills according to food sector was informed by the work of Sacks et al. (2009) and Lyn et al. (2013), which conceptualized the system

surrounding food policy (Sacks et al., 2009; Lyn et al., 2013). Additional information for each bill was coded including the political party of the bill's primary sponsor (i.e. Democrat, Republican, or Other), whether the bill had a companion bill, and the year in which the last action (e.g., veto, signed into law) for the bill occurred.

State-level variables

The state-level variables explored in this study concern the political, health, and sociodemographic characteristics of the state. The total number of state bills introduced and enacted of any type, not just bills focused on obesity, was recorded for legislative sessions between 2010 and 2013 using the StateNet database (State Net: A LexisNexis Company, 2015). The average state enactment rate was calculated with this information by averaging the proportion of all bills enacted out of the total introduced in the state legislative sessions from 2010 to 2013. In addition, a variable reflecting the proportion of adult obesity prevention bills introduced out of the total bills introduced in the legislature was created.

Additional state characteristics included the political party of the governor and state legislature: Democrat, Republican, Other. The political parties in power were assessed in each legislative session from 2010 through 2013 (State Net: A LexisNexis Company, 2015). A binary variable compared states with one dominant political party (e.g. governor and both legislative chambers were Democrats) to those with a divided government because a dominant party may indicate a reduced likelihood of veto (Klarner and Karch, 2008). Legislative session frequency (annual or biannual) was coded (State Net: A LexisNexis Company, 2015).

Other state-level characteristics considered were the average proportion of the state's population living in poverty, completing a bachelor's degree or higher, or not completing high school between 2010 and 2013. These variables, as well as the average proportion of the state's population that was non-White, were obtained from the Current Population Survey (2013 Current Population Survey et al., 2015). The 2012 state adult obesity prevalence and the absolute change in the proportion of obese adults between 1997 and 2010 were included from the Behavioral Risk Factor Surveillance System (Centers for Disease Control and Prevention (CDC), 2012). This thirteen year period was selected because it was a period of great change in US obesity rates (Centers for Disease Control and Prevention (CDC), 2012). Obesity was defined as a body mass index greater than or equal to 30 kg/m (Lemmens et al., 2008) (Centers for Disease Control and Prevention (CDC), 2012). Lastly, bill enactment by US region was explored based on Census Bureau classification (United States Census Bureau and Geography Division, 2015).

Statistical analysis

The difference in the proportion of bills enacted by bill-level characteristic was examined using the chi-square statistic. Simple logistic regressions with a random-intercept were fit for each bill- and state-level variable. The continuous state-level variables retained in the final model were split at their median and included as binary variables. Variable selection was informed by the approach of Hosmer and Lemeshow (2000) and used in previous

research (Eyler et al., 2012) which considered variables for the final model based on a priori hypotheses and those with a p -value <0.05 in the simple regression models.

In the multivariable analyses, a hierarchical model with a random intercept and no covariates was fit to estimate the overall average enactment across states. Multivariable models were fit with one extending the random intercept model to include bill-level variables and the second extending it further to include state-level variables. Multicollinearity was assessed and a bill's food sector (e.g., retail), was highly collinear with the bill topic (e.g., taxes). Therefore, only bill topic was retained. The variance of the state-specific random intercepts was compared between the models. Goodness-of-fit was assessed with Akaike's Information Criterion. All analyses were conducted using Stata 11 (StataCorp, 2011).

Results

Overall, from 2010 to 2013, 81 of the 487 bills introduced (16.6%) were enacted in 36 jurisdictions, including the District of Columbia. Fig. 1 illustrates the bill introduction and enactment patterns, ranging from 71 bills introduced in New York to no bills introduced in Montana or Wyoming. In exploring bill enactment by US region, Western states had the highest enactment (28.2%), followed by the South (16.9%), the Midwest (12.7%) and the Northeast (8.9%).

Table 1 shows the frequency of bills introduced and enacted by bill-level characteristic, including those for which enactment differed significantly. Sixty-two percent of bills were introduced by a Democratic sponsor. However, a greater proportion of Republican-sponsored bills were enacted compared to those introduced by Democrats and Others (24%, 13%, and 20%, respectively; p -value <0.05). A greater proportion of bills were enacted in 2010 (42%) compared to later years; however, only 38 bills were introduced in 2010 as compared to more than 100 introduced in 2011, 2012, and 2013. Most bills focused on diet; however, a significantly greater proportion of physical activity bills were enacted relative to diet (37%, 13%, respectively; p -value <0.001). The bills varied with regard to the obesity prevention topic they addressed. The most prevalent topics were food and beverage taxes and access to healthy food, with the fewest bills introduced that modified rules and procedures or focused on physical activity. Enactment differed by bill topic (p -value <0.001). Bills focused on physical activity and modifying rules and procedures had the highest proportion of enactment relative to the other topics (43% and 37%, respectively). The food and beverage tax category was among the topics with the lowest proportion of bills enacted (8%). The food system sector that the bill would operate within was varied, with most focused on the retail or food processing and distribution sectors. However, enactment differed by sector, with the highest proportion of enactment among infrastructure bills (42%; p -value <0.001).

State legislatures varied in regard to the number of bills introduced and enacted overall from 2010 to 2013, regardless of a focus on obesity prevention (Table 2). The average enactment rate for all bills introduced in state legislatures was 23.3% between 2010 and 2013, ranging

from 5% in Minnesota to 77% in Arkansas. Bills focused on adult obesity prevention made up a very small proportion (0.2%) of the total bills introduced.

The three fitted multivariable hierarchical models with random intercepts are summarized in Table 3. The intercept-only model illustrates that the overall odds of enactment across states was 0.19 (95% CI: 0.12–0.29). In the second model, extended to include bill characteristics, year was a significant predictor with bills considered in 2010 having 8 times the odds of enactment compared to bills in 2013 (OR = 8.10; 95% CI: 2.50–26.3). Compared to taxes, bills were more likely to be enacted if they focused on access to healthy food, physical activity, general and educational programs, or changing legislative rules and procedures.

In the third model, year and bill topic remained significant predictors in this model after adjustment for bill and state covariates. Bills concerning access to healthy food, physical activity, general and educational programs, as well as modifying rules and procedures had over 8 times the odds of enactment compared to food and beverage taxes (OR = 8.18; 95% CI: 2.85–23.4 healthy food; OR = 17.3; 95% CI: 4.55–65.7 physical activity; OR = 15.2; 95% CI 4.80–47.9 general OR = 13.7; 95% CI: 3.07–61.5 rules). The average enactment rate between 2010 and 2013 of any type of bill (i.e., obesity or other) was related to obesity prevention bill enactment. States with greater than 20% average bill enactment had 3 times the odds of enacted obesity prevention bills compared to states with lower an average enactment rate (OR = 3.07; 95% CI: 1.24–7.60). Lastly, in exploring the variation explained by the models, the standard deviation of the state-specific intercept decreased when the state characteristics were included.

Discussion

The current study examined bill- and state-level factors associated with enactment of adult obesity prevention legislation in US states between 2010 and 2013. The enactment rate observed in this study (17%) was similar to two studies that found a 17% obesity law enactment rate from 2003 to 2005 (Boehmer et al., 2008) and 15% from 2001 to 2010 (Lankford et al., 2013). Adult obesity legislation enactment was lower compared to the average rate of enactment (23%) for state legislation overall.

In exploring the factors associated with enactment, this study found that a bill's topic was important for enactment in this and previous studies (Eyler et al., 2012; Boehmer et al., 2008). Legislation that initiated farmer's markets, increased access to walking trails, created obesity task forces, and allowed a state to preempt local menu labeling was more likely to be enacted relative to soda taxes (Eyler et al., 2012; Boehmer et al., 2008). Legislation patterns observed may reflect public support for these laws, as well as challenges in moving them through the legislative process. For example, although enactment was low, taxes were introduced more often than bills in other topic areas from 2010 to 2013, which could indicate increased interest in this approach.

If policymakers and advocates are aware that the topic matters, it could help them in drafting feasible bills. Bills that restrict, such as food and beverage taxes, were less likely to be enacted relative to bills that added a choice by increasing access to healthy foods or built

environment changes like building bike paths. A feasible bill, however, is not necessarily the same as one that may reduce obesity. Therefore, as evidence emerges about effective strategies that are less politically feasible, proponents could consider the current findings that bills involving a restriction were less likely to be enacted than those adding a new option. Future research should explore whether framing a proposed bill to emphasize its contributions to the environment or combining a restriction with a new choice influences passage, such as a soda tax that funds farmer's markets.

In exploring political characteristics, the bill sponsor's political party and the party in control of the state legislature were not important factors for enactment in contrast to other studies (Eyler et al., 2012; Cawley and Liu, 2008; Boehmer et al., 2008). However, states with a higher overall enactment rate were more likely to enact adult obesity prevention legislation. These findings are useful for advocates considering whether a particular state may be more amenable to a policy proposal based on the overall productivity of a state's legislature.

Most of the state health and demographic characteristics were not associated with enactment. In contrast to the hypothesis, but similar to previous research (Eyler et al., 2012), this study found that obesity prevalence in 2012 was not associated with enactment. These findings may reflect limited variation in the current prevalence and change over the past decade. Alternatively, legislators may not consider obesity prevalence when making decisions because all states experienced a substantial increase.

Overall, in comparison to the level of childhood obesity prevention legislation introduction and enactment (Eyler et al., 2012; Cawley and Liu, 2008), adult obesity prevention legislation is enacted at lower rates. Enacting adult obesity legislation may warrant consideration of the legislative topics that have been successful and the reasons why certain topics are more difficult to enact. However, it may be that regardless of the topic, state legislation is a less feasible approach relative to local laws, particularly if localities are not preempted from enacting strong laws, as illustrated by the uptake of local smoke-free laws (American Nonsmokers' Rights Foundation, 2013). Furthermore, decision makers may be less supportive of legislation if they think that their constituents view obesity as an individual's responsibility (Turner et al., 2009; Niderdeppe et al., 2012; Kim and Willis, 2009). A national poll in 2013 found that despite thinking that the obesity has societal consequences most people do not support government interventions like legislation (Research Center, 2013). Additionally, a survey of state legislators found that perceiving obesity as serious societal issue was associated with obesity prevention policy support (Welch et al., 2012). The current study offers a starting point and further research is warranted to understand barriers to enacting certain topics, such as taxes. For example, qualitative research may be useful to explore the legislative process as adult obesity prevention bills are considered.

The current study has several limitations. First, bills were retrieved from a publically available database and the study authors were not involved in the search to populate this database. Therefore, this study may have missed some bills given that the database may have excluded bills that were of unknown relevance to this analysis. Second, bill

characteristics were coded by one person; therefore, reliability could be of concern. Third, the analysis was limited to state legislation and may underestimate total action by not including local laws, regulations, litigation, executive orders, and community interventions. Fourth, the characteristics selected were based on childhood obesity legislation enactment which may differ from adult legislation in important and unexplored ways, resulting in this analysis omitting important variables. Fifth, bills in this study covered a range of approaches. For example, the food and beverage tax category included both proposed vending tax increases as well as tax exemptions. A sensitivity analysis was conducted and separating bills with potentially differing effect did not change the analysis. Sixth, New York was an outlier in terms of typical state enactment of bills of any type, as well as introduction of obesity prevention bills. A sensitivity analysis was conducted and excluding New York did not alter the analysis.

Conclusion

Legislation is one approach used widely as a public health strategy to modify the environment in ways that facilitate and impede behavior. As illustrated, bills introduced to address adult obesity can range from healthy food access to infrastructure changes. The legislation topic was associated with enactment such that advocates and researchers should consider why some bills were more successful in being passed compared to others. However, feasibility of enactment is only one consideration in deciding what legislation to pursue. The law's potential effectiveness in modifying obesity risk factors is also critical for stemming the epidemic. Given the relatively small number of laws that have been enacted, opportunities to evaluate their effect are limited. Therefore, this study offers a first step in understanding enactment patterns to guide future advocacy efforts and to inform research on the legislative process.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Fig. 1. Number of adult obesity prevention bills introduced and enacted by state, 2010–2013. *Note:* Enactment of a bill or resolution indicates that it was passed into law on or before December 31, 2013.

Table 1

Frequencies of bill-level variables: state adult obesity prevention bills, 2010–2013.

Variables	Introduced	Enacted <i>a</i>
	No.	No. (% of introduced)
Overall	487	81 (16.6)
Sponsor party *		
Democrat	302	39 (12.9)
Republican	131	31 (23.7)
Committee/ballot/other	54	11 (20.4)
Companion bill		
Yes	61	14 (23)
No	426	67 (15.7)
Year considered *		
2010	38	16 (42.1)
2011	173	30 (17.3)
2012	131	19 (14.5)
2013	145	16 (11.0)
Overall category *		
Diet/nutrition	387	52 (13.4)
Physical activity	38	14 (36.8)
Both/general	62	15 (24.2)
Bill topic *		
Food and beverage taxes	128	10 (7.8)
Access to healthy food	113	27 (23.9)
Marketing, advertising, and menu labeling	75	5 (6.7)
General and educational	67	18 (26.9)
Access to unhealthy foods	49	0 (0)
Physical activity	30	13 (43.3)
Modifying rules and procedures	19	7 (36.8)
Other	6	1 (16.7)
Food system sector *		
Retail	177	17 (9.6)
Food processing and distribution	114	20 (17.5)
Restaurants and food service	59	6 (10.2)
Multiple	35	11 (31.4)
Marketing and advertising	28	2 (7.1)
Infrastructure and planning	24	10 (41.7)
Other	19	6 (31.6)
Food production	17	5 (29.4)
Sports and recreation	14	4 (28.6)

^aEnactment of a bill or resolution indicates that it was passed into law on or before December 31, 2013.

* Indicates that enactment differs significantly by the bill-level characteristic, p -value <0.05 .

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Table 2

Frequencies of state-level variables: state adult obesity prevention bills, 2010–2013.

Variables	No.
State-level (n = 49)	
No. bills introduced in state legislature, mean (SD)	12,486 (11,327)
No. bills enacted in state legislature, mean (SD)	1957 (1338)
Average % enactment in state legislature, mean (SD)	23.3 (16.4)
% obesity prevention bills of total introduced in state legislature, mean (SD)	0.2 (0.1)
No. obesity prevention topic areas introduced, mean (SD) legislature session frequency, %	5.13 (1.5)
<i>Yearly session</i>	91.2
<i>Legislature meets every other year</i>	8.8
Governor political party, %	
<i>Democrat</i>	52.7
<i>Republican</i>	44.4
<i>Independent</i>	2.9
House majority political party, %	
<i>Democrat</i>	53.5
<i>Republican</i>	45.4
<i>Tie</i>	1.1
Senate majority political party, %	
<i>Democrat</i>	52.6
<i>Republican</i>	44.4
<i>Tie</i>	2.9
Legislature and executive political party	
<i>All same party</i>	78.9
<i>Legislature same and governor differs in party</i>	16.1
<i>One house of legislature and governor same</i>	4.9
% obese (BMI ≥ 30 kg/m ²) 2012, mean (SD)	27.6 (3.7)
Change in % obese (BMI ≥ 30 kg/m ²) 1997–2010, mean (SD)	10.8 (2.2)
Average % state population living in poverty 2010 to 2013, mean (SD)	15.3 (2.9)
Average % state population covered by Medicaid 2010 to 2013, mean (SD)	17.1 (3.7)
Average % state population bachelor's degree or higher 2010 to 2013, mean (SD)	21.4 (4.6)
Average % state population high school non-completion 2010 to 2013, mean (SD)	14.2 (2.3)
Average % non-White state population 2010 to 2013, mean (SD)	24.8 (15.6)

Table 3

Multilevel model results: bill-level and state-level predictors of adult obesity prevention bill enactment, 2010–2013.

	Model 1: extended to include bill-level variables	Model 2: extended further to include state-level variables^a
	Estimate odds ratio (95% CI)	Estimate odds ratio (95% CI)
Intercept	0.02 (0.01, 0.08) *	0.01 (0.00, 5.120.07)
<i>Bill-level variables</i>		
Sponsor party		
Democrat	Ref.	Ref.
Republican	2.07 (0.97, 4.41)	1.521.98 (0.91, 4.32) (0.70, 3.33)
Committee/ballot/other	0.82 (0.28, 2.44)	0.83 0.78 (0.28, 2.45)(0.25, 2.46)
Companion bill (yes vs. no)	1.97 (0.81, 4.82)	2.58 (1.10, 6.05) *2.02 (0.82, 4.97)
Year considered		
2013	Ref.	Ref.
2012	0.93 (0.36, 2.39)	1.070 4 (0.6741, 4.312.65)
2011	2.01 (0.88, 4.60)	2.54 (1.07, 6.05)2.07 (0.87, 4.93) *
2010	8.10 (2.50, 26.3) *	16.7 (4.65, 59.9) *9.49 (2.61, 34.5)
Bill topic		
Food and beverage taxes	Ref.	Ref.
Access to healthy food	5.14 (2.01, 13.1) *	8.59 (3.13, 23.6) *8.18 (2.85, 23.4)
Marketing, advertising, and menu labeling	1.13 (0.32, 3.96)	1.77 (0.49, 6.39)1.76 (0.47, 6.52)
Access to unhealthy foods	0.00 (0.00, ---)	0.00 (0.00, ---)
Physical activity	11.9 (3.58, 39.6) *	12.9 (3.69, 44.9) *17.3 (4.55, 65.7)
General and educational	9.83 (3.40, 28.4) *	16.1 (5.40, 47.9)15.2 (4.80, 47.9) *
Modifying rules and procedures	11.1 (2.61, 47.1) *	12.6 (2.98, 53.3) *13.7 (3.07, 61.5)
<i>State-level variables</i>		
No. bills introduced in state legislature		
<8600 (1111 to 8581)	----	Ref.
>8600 (8901 to 38,125)	----	0.68 (0.24, 1.89)
Enactment in state legislature no. bills introduced in state legislature	----	1.00 (1.00, 1.00)
<20% (4% to 19%)	----	Ref.
>20% (20% to 77%) Average % enactment in state legislature	----	25.73.07 (1.24, 7.60) (3.36, 196.4) *
Legislature and executive political party		
All same party (ref.)	----	Ref.
Legislative branch or executive party differs	----	0.38 (0.17, 0.82) *0.51 (0.20, 1.32)
Governor political party		
Democrat	----	Ref.
Republican	----	1.38 (0.56, 3.42)

	Model 1: extended to include bill-level variables	Model 2: extended further to include state- level variables ^a
	Estimate odds ratio (95% CI)	Estimate odds ratio (95% CI)
% state population obese (BMI ≥ 30 kg/m ²) 2012	-----	1.19 (1.01, 1.40) *
20.5% to 27.3%	-----	Ref.
27.4% to 34.7%	----	0.72 (0.24, 2.14)
Change in % obese in state (BMI ≥ 30 kg/m ²) 1997–2010	-----	0.61 (0.49, 0.77) *
5.5% to 10.7%	-----	Ref.
10.9% to 16.2%		0.54 (0.19, 1.57)
Average % state population bachelor's degree or higher 2010 to 2013		1.04 (0.91, 1.18)
14.5% to 21.4%	-----	Ref.
21.8% to 43.6%	-----	1.52 (0.56, 4.18)
Average % non-White state population 2010 to 2013		1.00 (0.98, 1.03)
4.4% to 20.9%	-----	Ref.
21.4% to 79.6%	-----	1.24 (0.50, 3.06)
Tau-squared (sd_cons) ² = variation between states, the standard deviation of the state-specific intercept	1.06	0.040.48
AIC	356.0	324.3338.8

Note:

* Significant *p*-value; <0.05. Odds ratio estimates in bold indicate statistical significance, *p*-value <0.05.

^a US region was considered as a third level in the final multivariable model. The findings did not differ from the two-level model.