Supplemental Information

SUPPLEMENTAL APPENDIX 1

In this section, we provide additional details on the statistical analyses.

Equations for ITS

The following models were estimated in the current study:

$$\begin{aligned}&\text{homophobic bullying}_{ti}\\&\quad= b_0 + b_1 \times time + b_2 \times time^2\\&\qquad + b_3 \times post\text{-}vote_t + b_4 \times time\\&\qquad \times post\text{-}vote_t + b_5 \times time^2\\&\qquad \times post\text{-}vote_t + u_i + e_{ti}\end{aligned}$$

$$\begin{aligned}&\text{homophobic bullying}_{ti}\\&\quad= b_0^{'} + b_1^{'} \times time + b_2^{'} \times time^2\\&\qquad + b_3^{'} \times GSA_{ti} + b_4^{'} \times time\\&\qquad \times GSA_{ti} + b_5^{'} \times time^2 \times GSA_{ti}\\&\qquad + b_6^{'} \times post\text{-}vote_t + b_7^{'} \times time\\&\qquad \times post\text{-}vote_t + b_8^{'} \times time^2\\&\qquad \times post\text{-}vote_t + b_9^{'} \times post\text{-}vote_t\\&\qquad \times GSA_{ti} + b_{10}^{'} \times time\\&\qquad \times post\text{-}vote_t \times GSA_{ti} + b_{11}^{'}\\&\qquad \times time^2 \times post\text{-}vote_t \times GSA_{ti}\\&\qquad + u_i^{'} + e_{ti}^{'}\end{aligned}$$

In the first model, the rate of homophobic bullying at time t for school i was estimated. Variable (*time*) was centered on the 2008–2009 academic year. Coefficient b_0 represents the intercept. Coefficients b_1 and b_2 represent fixed effects of (*time*) and ($time^2$) before the vote, or the prevote linear and quadratic trends. The variable *post-vote* was dummy coded such that postvote = 0 (2001–2002 through 2007–2008) and postvote = 1 (2008–2009 through 2014–2015). Coefficients b_3, b_4, and b_5 represent prevote-to-postvote changes in the intercept, linear trend, and quadratic trend, respectively. Random errors u_i and e_{ti} represent the random intercept for homophobic bullying for each school and residual error at each time.

In the second model, the main and moderation effects of the time-varying covariate (GSA) were also estimated. Coefficients b'_0, b'_1, and b'_2 represent the prevote intercept, linear trend, and quadratic trend, respectively, for schools without a GSA. Coefficients b'_3, b'_4, and b'_5 represent the differences between schools with and without a GSA in the prevote intercept, linear trend, and quadratic trend, respectively. Coefficients b'_6, b'_7, and b'_8 represent prevote-to-postvote changes in the intercept, linear trend, and quadratic trend, respectively, for schools without a GSA. Coefficients b'_9, b'_{10}, and b'_{11} represent the differences between schools with and without a GSA in the prevote-to-postvote intercept, linear trend changes, and quadratic trend changes, respectively.

Variance Explained

Our statistical models are mixed-effect models with random intercepts. Variance explained (R^2) is not readily available for these models, but one can calculate the variance on the basis of the equation below[30]:

$$R^2 = \left(V_{\text{intercept\_only}} - V_{\text{full model}}\right) / V_{\text{intercept\_only}}$$

On the basis of this equation, R^2 for the main model (Table 2) is (40.13 − 38.70)/40.13 = 0.036, whereas R^2 for the moderation model (Table 3) is (40.92 − 38.57)/40.92 = 0.058.

SUPPLEMENTAL APPENDIX 2

We conducted supplementary analyses to examine whether variations in homophobic bullying could be explained by other school characteristics for which we had readily available data, including racial and/or ethnic diversity, school size (enrollment), and socioeconomic status (as measured by the percentage of students on free or reduced-price meals). These characteristics were chosen on the basis of previous research suggesting that they are school-level factors associated with general forms of bullying.[17,31,32] We had data on these 3 characteristics from the California Department of Education beginning in the 2009–2010 academic year.

As shown below, these variables were weakly but statistically significantly associated with homophobic bullying between the years of 2009–2010 and 2014–2015 (Supplemental Table 5).

Given these correlations, we conducted supplemental analyses to examine whether the estimated linear trend of the rate of homophobic bullying since 2009–2010 was different when models were estimated with these time-varying covariates included (the quadratic trend was also estimated but was not significant and thus dropped). As shown in Supplemental Tables 6 and 7, the trend estimates for the model with the school covariates are

generally consistent with the model without covariates, and our conclusion about the postvote trend would not change. Because we do not have data available for academic years before 2009–2010, we cannot estimate the full models with covariates for the entire time span of our study. Nevertheless, the available data indicate that our results are robust to the inclusion of other school-level characteristics.

SUPPLEMENTAL APPENDIX 3

We conducted supplementary analyses to determine if the timing of the survey (spring semester versus fall semester) affected the interpretation of the study findings. This analysis was important because the question on bias-based bullying asks respondents about experiences in the past 12 months. Consequently, students answering in the fall semester have a different reference point than those answering in the spring semester.

Our data set only provides information on the semester in which the survey assessment was conducted through the spring of 2009. An analysis of these data (Supplemental Table 8) indicates that spring reports of homophobic bullying are higher than fall reports for each available year. However, the overall trend for fall and spring semesters is nearly identical to the trends observed when using average rates across the academic year (ie, an increase each year leading up to Proposition 8, with the 2008 year showing the highest rate of homophobic bullying across years) with only 1 exception (the rate of homophobic bullying in spring of 2004 is lower than the rate in 2003). Thus, with the data that we have available, there is little evidence that the timing of assessment affects our interpretation of trends in homophobic bullying.

SUPPLEMENTAL APPENDIX 4

The CHKS was conducted every 2 years. Supplemental Table 9 shows the numbers of schools that participated during the first school year only, during the second school year only, and annually. To address the issue of possible bias in the results, we conducted independent samples *t* tests for school participation status. The results indicated that schools participating during 1 of the 2 years versus annually did not differ in rates of homophobic bullying for any school year.

SUPPLEMENTAL APPENDIX 5

The CHKS data set that we used in our study assessed 3 other types of bias-based bullying in addition to homophobic bullying: bullying because of race, religion, and gender. We presented specificity analyses for forms of bias-based bullying other than homophobic bullying, and we showed that the association between Proposition 8 and bias-based bullying was not present among respondents who reported being bullied because of their race and/or ethnicity, religion, or gender but not their sexual orientation (Table 4). In this section, we describe additional specificity analyses.

First, we examined the rates of bias-based bullying due to sexual orientation, race and/or ethnicity, religion, and gender separately, regardless of whether students reported >1 type of bias-based bullying (Supplemental Table 10). Although 2008–2009 is the peak year only for those reporting homophobic bullying, there were similar increases in the other types of bias-based bullying in the pre–Proposition 8 years.

This finding led us to examine the correlations among the 4 different types of bias-based bullying. As shown in Supplemental Table 11, we found considerable overlap; that is, students who reported 1 type of bias-based bullying (eg, homophobic bullying) were significantly more likely to report another type (eg, bullying due to gender).

Because this table included students who did not report any type of bias-based bullying (73.17%), we next examined only those students who reported at least 1 type. Among all students, 11.63% reported being bullied for >1 reason, and 15.20% reported being bullied for just 1 of the 4 reasons. Thus, for students who reported any bias-based bullying, nearly half (43.35%) reported >1 type. Together, these data show that there is considerable overlap among these 4 different types of bias-based bullying.

These findings therefore led us to consider whether the trends might be different if we restricted analyses to those students who only reported a single form of bias-based bullying. Thus, we conducted 2 sets of specificity analyses comparing the group of respondents who only reported homophobic bullying to the group of respondents who only reported bias-based bullying due to their race and/or ethnicity, religion, or gender. As described below, both of these analyses revealed that the results are concentrated in the group who only reported homophobic bullying.

Specificity Analysis 1

In Supplemental Table 12, we present the rates of bias-based bullying for students who only reported a single type of bias-based bullying over the entire study period (2001–2014). As shown in this table, 2008–2009 (during the Proposition 8 vote) represented the year with the highest rate of bias-based bullying only for those reporting homophobic bullying (3.4%). None of the other groups experienced their peak rate during that school year. Furthermore, the trend lines increase in the years leading up to Proposition 8 for

homophobic bullying but not for the other 3 groups.

Specificity Analysis 2

In a second analysis, we tested these trends more formally by rerunning our original ITS analysis, examining the students who only reported homophobic bullying (ie, excluding individuals who reported being bullied because of their gender, race and/or ethnicity, and religion). The results (Supplemental Table 13) showed that the 2008–2009 academic year (during which Proposition 8 occurred) served as an inflection point for homophobic bullying. In addition, the linear trends were similar to those reported previously (Table 2): the rate of homophobic bullying increased linearly before Proposition 8 (b_{linear} = 0.05; $P < .001$) and decreased linearly (b_{linear} = −0.12; $P < .001$) after Proposition 8.

Summary of Specificity Analyses

Taken together, these supplemental analyses provide support for result specificity. Specifically, when we examine the trends among students who report only a single form of bias-based bullying (ie, due to race and/or ethnicity, gender, religion, or sexual orientation), we show that the association between Proposition 8 and bias-based bullying is concentrated among students who only report homophobic bullying. This association is not observed among students who report any other type of bias-based bullying except homophobic bullying (ie, bullying due to race and/or ethnicity, religion, and gender).

SUPPLEMENTAL TABLE 5 Correlations Between Homophobic Bullying and School Covariates

Correlations	Free or Reduced-Price Meals, %	School Size (Enrollment)	Racial and/or Ethnic Diversity
Bivariate	0.03*	−0.17***	0.05***
Partial	0.04**	−0.12***	0.09***
Semipartial	0.04***	−0.12***	0.09***

* $P < .05$.
** $P < .01$.
*** $P < .001$.

SUPPLEMENTAL TABLE 6 Linear Trend for the Percentage of Students Reporting Homophobic Bullying

	Model Without Covariates		Model With Covariates	
	b	SE	*b*	SE
Linear trend	−0.33***	0.04	−0.37***	0.04
Free or reduced-price meal, %	—	—	0.01*	0.005
School enrollment	—	—	−0.001***	0.0001
Ethnic diversity	—	—	0.035***	0.006
Random effect				
School mean[a]	11.23	2.39	7.87	2.13
Residual[a]	40.97	3.53	32.74	3.43

—, not applicable.
[a] Values refer to variance.
* $P < .05$.
*** $P < .001$.

SUPPLEMENTAL TABLE 7 Linear Trend for the Percentage of Students Reporting Homophobic Bullying: The Moderating Role of School GSAs

	Model Without Covariates		Model With Covariates	
	b	SE	*b*	SE
Linear trend	−0.34***	0.05	−0.40***	0.05
GSA	−2.25***	0.30	−1.07**	0.32
Linear trend*GSA	0.16	0.09	0.17	0.10
Free or reduced-price meal, %	—	—	0.01**	0.005
School enrollment	—	—	−0.001***	0.0001
Ethnic diversity	—	—	0.037***	0.006
Random effect				
School mean[a]	8.56	1.74	6.86	1.72
Residual[a]	39.98	3.32	32.01	3.26

—, not applicable.
[a] Values refer to variance.
** $P < .01$.
*** $P < .001$.

SUPPLEMENTAL TABLE 8 Homophobic Bullying by Timing of Survey Assessment

Academic Year and Semester	Homophobic Bullying, %
Fall 2001	7.2
Spring 2002	8.1
Fall 2002	7.3
Spring 2003	8.7
Fall 2003	8.2
Spring 2004	8.3
Fall 2004	8.6
Spring 2005	9.3
Fall 2005	8.8
Spring 2006	9.5
Fall 2006	9.5
Spring 2007	9.7
Fall 2007	10.2
Spring 2008	11.8
Fall 2008[a]	10.6
Spring 2009	10.9

[a] Proposition 8 voting took place in November of the 2008–2009 academic year.

SUPPLEMENTAL TABLE 9 Rates of Homophobic Bullying by School Participation Status

Years	*N*	Participation	*n*	Mean (SD)	*t*	d*f*	*P*
2001–2003	2235	Year 1	1203	8.6 (7.5)	0.13	1309	.89
		Annual	108	8.5 (4.9)			
		Year 2	924	8.6 (7.5)	0.09	1030	.93
		Annual	108	8.5 (4.4)			
2003–2005	2998	Year 1	1833	8.9 (5.8)	−0.15	1996	.88
		Annual	165	9.0 (8.3)			
		Year 2	1000	9.8 (6.2)	1.25	1163	.21
		Annual	165	9.1 (8.4)			
2005–2007	3168	Year 1	2018	10.1 (6.4)	1.32	2089	.19
		Annual	73	9.1 (3.7)			
		Year 2	1077	10.5 (7.0)	0.78	1148	.43
		Annual	73	9.8 (4.0)			
2007–2009	3231	Year 1	2046	11.9 (7.1)	0.69	2151	.49
		Annual	107	11.4 (6.0)			
		Year 2	1078	12.6 (8.3)	1.41	1183	.16
		Annual	107	11.4 (5.5)			
2009–2011	3039	Year 1	1871	11.6 (7.7)	−0.14	2133	.89
		Annual	264	11.7 (7.7)			
		Year 2	904	11.8 (8.2)	0.18	1165	.86
		Annual	264	11.7 (5.6)			
2011–2013	2317	Year 1	1160	11.1 (6.6)	0.08	1403	.93
		Annual	245	11.0 (4.8)			
		Year 2	912	10.9 (6.7)	0.16	1155	.87
		Annual	245	10.8 (4.6)			
2013–2015	2599	Year 1	1325	10.7 (7.2)	—	—	—
		Annual	0	—			
		Year 2	1274	9.7 (7.3)	—	—	—
		Annual	0	—			—

—, not applicable.

SUPPLEMENTAL TABLE 10 Rates of Different Types of Bias-Based Bullying Among California Students (2001–2014)

Academic Year	Type of Bias-Based Bullying			
	Sexual Orientation, %	Race and/or Ethnicity, %	Religion, %	Gender, %
2001–2002	7.6	14.4	9.1	10.3
2002–2003	8.1	15.4	9.5	10
2003–2004	8.3	15.5	9.1	9.7
2004–2005	8.9	16.9	9.7	9.7
2005–2006	9.1	17.2	9.8	9.7
2006–2007	9.6	18	10	10.2
2007–2008	10.6	18.3	10.7	10.8
2008–2009[a]	10.8	17.8	10.6	10.2
2009–2010	10.4	17.4	10.3	9.5
2010–2011	10.3	17.4	10.1	9.4
2011–2012	10.1	16.8	9.9	9
2012–2013	9.9	16	9.7	8.5
2013–2014	9.8	17.2	9.4	8.5
2014–2015	9.2	17.3	9.4	8.8

Categories are not mutually exclusive; that is, students could report multiple types of bullying (eg, students in the sexual orientation category could also have reported being bullied because of their race and/or ethnicity, religion, and/or gender). Rates among students reporting at least 1 type of bias-based bullying were calculated on the basis of the student-level data (N = 4 977 557).

[a] Proposition 8 voting took place in November of the 2008–2009 academic year.

SUPPLEMENTAL TABLE 11 Correlations Among Different Types of Bias-Based Bullying: CHKS (2001–2014)

	Sexual Orientation	Race and/or Ethnicity	Religion	Gender
Sexual orientation	1.0000			
Race	0.29***	1.0000		
Religion	0.31***	0.39***	1.0000	
Gender	0.39***	0.35***	0.37***	1.0000

*** $P < .001$.

SUPPLEMENTAL TABLE 12 Rates of Bias-Based Bullying Among Students Reporting a Single Type: California Students (2001–2014)

Academic Year	Type of Bias-Based Bullying			
	Sexual Orientation, %	Race and/or Ethnicity, %	Religion, %	Gender, %
2001–2002	2.7	6.8	3.0	3.8
2002–2003	2.9	7.3	3.0	3.2
2003–2004	3.0	7.5	2.8	3.2
2004–2005	3.1	8.1	2.8	2.7
2005–2006	3.1	8.1	2.6	2.6
2006–2007	3.0	8.3	2.5	2.6
2007–2008	3.1	7.6	2.3	2.3
2008–2009[a]	3.4	7.4	2.4	2.0
2009–2010	3.2	7.3	2.3	1.8
2010–2011	3.1	7.3	2.1	1.7
2011–2012	3.1	7.1	2.1	1.6
2012–2013	3.0	6.8	2.2	1.4
2013–2014	3.1	7.8	2.3	1.6
2014–2015	2.8	7.6	2.0	1.9

Analyses were restricted to students who reported a single type of bias-based bullying; thus, categories are mutually exclusive (ie, students who reported being bullied because of their race and/or ethnicity did not report being bullied because of their religion, gender, or sexual orientation). Percentages of respondents only reporting a single form of bias-based bullying were calculated on the basis of the student-level data (N = 4 977 557).

[a] Proposition 8 voting took place in November of the 2008–2009 academic year.

SUPPLEMENTAL TABLE 13 ITS Analysis for Students Only Reporting Homophobic Bullying: California Students (2001–2014)

Fixed Effects	*b*	SE	95% CI
Prevote			
Linear trend	0.05***	0.02	0.02 to 0.08
Prevote-versus-postvote change			
Postvote	0.12	0.09	−0.05 to 0.29
Linear trend*postvote	−0.12***	0.02	−0.16 to −0.07
Probed postvote trend			
Linear trend	−0.07***	0.02	−0.10 to −0.04
Random effect			
School mean	1.90	0.48	1.15 to 3.12
Residual	9.70	0.71	8.40 to 11.19

Analyses were restricted to students who only reported homophobic bullying (ie, students who reported being bullied because of their gender, race and/or ethnicity, and religion were excluded). This approach differs from Table 2, in which students who reported homophobic bullying could also report being bullied because of their race and/or ethnicity, religion, and/or gender. Quadratic trend was also tested but was not significant and thus dropped. Time was centered on the 2008–2009 academic year (postvote = 0 [2001–2002 through 2007–2008] versus 1 [2008–2009 through 2014–2015]). The coefficient for postvote indicates the prevote-versus-postvote intercept change; the coefficient for linear trend*postvote indicates the prevote-versus-postvote change in the linear trend. The postvote linear trend was probed via post hoc analyses of significant interactions. CI, confidence interval.

*** $P < .001$.

[a] Values refer to variance.

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