Online Supplemental Tables

eTable 1. Years MML were enacted (Column I) for the 48 continuous U.S. states up to 2014 (Column I), and year states were re-coded as positive for dispensaries (Column II)*

State	I. Year MML was enacted	II. Year states were coded positive for having dispensaries*
Arizona	11/2/2010	2010
California	11/8/1996	2003
Colorado	11/7/2000	2000
Connecticut	05/4/2012	2012
Delaware	5/13/2011	2011
Illinois	8/1/2013	2013
Maine	11/22/1999	2009
Maryland	5/22/2003	None
Massachusetts	11/6/2012	2012
Michigan	11/4/2008	None
Minnesota	5/29/2014	2014
Montana	11/2/2004	2004-2011 * *
Nevada	11/7/2000	None
New Hampshire	7/23/2013	2013
New Jersey	1/18/2010	2010
New Mexico	4/3/2007	2007
New York	7/5/2014	2014
Oregon	12/3/1998	None
Rhode Island	1/3/2006	2009
Vermont	5/26/2004	2011
Washington	11/3/1998	None

* The state MML implicitly permitted dispensing via caregivers and amounts per patient, or explicitly acknowledged dispensaries as either permitted or not declared illegal

* * Montana was positive for these years, but not before or since

eTable 2.
Results of Sensitivity Analyses

Sensitivity Analysis	Adjusted OR [a]	95% CI	p-value
Frequency, past-month marijuana use in place of yes/no past-month use			
Overall	0.93	0.82 – 1.06	0.2605
8th graders	0.72	0.62 – 0.85	<0.0001
10th graders	1.03	0.88 – 1.20	0.7270
12th graders	0.97	0.83 – 1.12	0.6391
MML year adjusted to 1 year post-passage for laws passed after July			
Overall	0.92	0.80 – 1.05	0.1968
8th graders	0.71	0.61 – 0.83	<0.0001
10th graders	1.03	0.88 – 1.19	0.7323
12th graders	0.95	0.82 – 1.10	0.4772
MML year adjusted from year passed to 1 year post-passage			
Overall	0.96	0.88 – 1.05	0.3579
8th graders	0.74	0.65 – 0.83	<0.0001
10th graders	1.08	0.96 – 1.21	0.2258
12th graders	1.00	0.89 – 1.12	0.9950
MML year adjusted from year passed to 2 years post-passage			
Overall	1.08	0.94 – 1.24	0.2862
8th graders	0.81	0.68 – 0.96	0.0154
10th graders	1.21	1.02 – 1.44	0.0275
12th graders	1.10	0.94 – 1.30	0.2404
MML considered positive if states did *not* have dispensaries			
Overall	0.89	0.74 – 1.08	0.2398
8th graders	0.71	0.57 – 0.88	0.0023
10th graders	1.00	0.81 – 1.24	0.9650
12th graders	0.87	0.70 – 1.07	0.1964
MML considered positive if states had dispensaries			
Overall	0.96	0.82 – 1.13	0.6476
8th graders	0.76	0.63 – 0.91	0.0032
10th graders	1.06	0.88 – 1.27	0.5338
12th graders	1.04	0.87 – 1.24	0.6821
Past-year marijuana use as outcome rather than past-month			
Overall	0.93	0.80 – 1.09	0.3593
8th graders	0.75	0.64 – 0.89	0.0007
10th graders	1.02	0.87 – 1.19	0.8537
12th graders	0.99	0.84 – 1.17	0.9276

a Models adjusted for individual-, school- and state-level variables described in statistical analysis section.

Online Supplemental Methodological Material

The multilevel logistic regression model included fixed effects and random effects at the state level as demonstrated in the SAS proc glimmix code below. Fixed effects included individual (gender, age, grade, parent education, and race), school (class size, public/private, and population density), and state (percent male, white, young, and no high school) level main effects. Additionally, fixed effect interactions for race with age and parent education were included as they improved model fit based on BIC, while no other interaction terms between individual level or individual and school level covariates improved fit. Similarly, improvement in fit based on BIC was found when random effects for race and education were included (BIC = 1519160 with race and education random effects compared to BIC = 1524079 without), indicating differential effects of these individual-level covariates across states. The final model had a ratio of the generalized chi-square to its degrees of freedom equal to 1.10, which is close to 1 and indicates that the variability in the data has been properly modeled and there is no residual overdispersion (Snijders, Tom A.B., and Bosker, Roel J. *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*, second edition. London : Sage Publishers, 2012). Contrasts were formed for the MMLstate and PrePostMML indicators in order to form the odds ratios and associated tests of interest separately by grade.

Adjusted prevalence estimates (shown in Figure 2) for MML and non-MML states across all 24 years were derived from the fitted fixed effect values from the multilevel model. Individual and school level covariates were held fixed at the overall US distributions based on the aggregation of the US census data for each year. Because states passed MML in different years, adjusted prevalence estimates for each year scale the modeled pre-post change effect by the cumulative proportion of the population exposed to MML in that particular year. For example, prior to 1996, 0% of US adolescents were exposed to MML, so none of the post-law change effect (i.e. PrePostMML) is included in the adjusted prevalence for years prior to 1996. In 1996 (when the first state, California, passed a MML) until 1997, 12% of U.S. adolescents were exposed (i.e. the % of the US adolescent population living in California) or 12%/46% = 26% of the adolescents who would eventually be exposed by 2014. The denominator 46% comes from the proportion of all US adolescents who are eventually exposed to MML by 2014, aggregating the 21 states that have MML. Therefore, the estimated prevalence in 1996 and 1997 includes 26.0% of the post-law change effect. In 1998, Oregon and Washington passed MML, so the US fraction exposed increased to 15.5% and therefore the estimated prevalence in MML states in 1998 incorporated 34% (15.5/46%) of the post-law change effect. For Tables 2 and 3, aggregate summaries of the prevalence estimates were obtained by taking simple averages of the corresponding year-specific estimates.

SAS code for multilevel logistic regression model with interaction by grade:
The MMLstate variable is a 0-1 indicator =1 for the 21 states that pass MML between 1991-2014 and =0 for all other states (regardless of year). The PrePostMML variable is a time-varying 0-1 indicator =1 in states in the year they pass a law and for all years afterward, and =0 in states in the years before they pass a MML (including the states that did not pass MML by 2014). Year is treated as a continuous variable and yr1998 is zero for all years less than 1998 and equal to the year itself for all years from 1998 onward. Yr2006 is zero for all years less than 2006 and equal to the year itself for all years from 2006 onward The combination of year, yr1998 and yr2006 variables form the piecewise cubic polynomial spline.

```
proc glimmix data = MTF19912014 ic=q;
      class statename age grade gender race parentEduc
            CLASS_SIZE PUBLIC POP_DENS MMLstate;
      model mj_month = age race grade gender parentEduc
                       age*race race*parentEduc
                       CLASS_SIZE PUBLIC POP_DENS  /*school covariates*/
                       MALE_PCT WHITE_PCT PCT10_24 PCT_NoHS /*state census covariates*/
                       year year*year year*year*year yr1998*yr1998*yr1998
```

```
                    yr2006*yr2006*yr2006
                    MMLstate PrePostMML grade*MMLstate grade*PrePostMML
                / dist=binomial link=logit solution;

      random int grade race parentEduc
             year year*year year*year*year yr1998*yr1998*yr1998 yr2006*yr2006*yr2006
             PrePostMML grade*PrePostMML/subject=statename s;

      estimate "MMLstate 1 vs 0, 8th Graders" MMLstate -1 1 grade*MMLstate -1 1 0 0 0 0;
      estimate "MMLstate 1 vs 0, 10th Graders" MMLstate -1 1 grade*MMLstate 0 0 -1 1 0 0;
      estimate "MMLstate 1 vs 0, 12th Graders" MMLstate -1 1 grade*MMLstate 0 0 0 0 -1 1;
      estimate "PrePostMML 1 vs 0, 8th Graders" PrePostMML 1 PrePostMML*grade 1 0 0;
      estimate "PrePostMML 1 vs 0, 10th Graders" PrePostMML 1 PrePostMML*grade 0 1 0;
      estimate "PrePostMML 1 vs 0, 12th Graders" PrePostMML 1 PrePostMML*grade 0 0 1;
run;
```