Maternal and Child Health Journal (2019) 23:1008–1024
https://doi.org/10.1007/s10995-019-02731-6

Adult-Oriented Health Reform and Children's Insurance and Access to Care: Evidence from Massachusetts Health Reform

Anna Jo Bodurtha Smith[1] · **Alyna T. Chien**[2,3]

Published online: 10 January 2019

Abstract

Objective A national debate is underway about the value of key provisions within the adult-oriented Affordable Care Act (ACA)—the individual mandate, expansion of Medicaid eligibility, and essential benefits. How these provisions affect child health insurance and access to care may help us anticipate how children may be affected if the ACA is repealed. We study Massachusetts health reform because it enacted these key provisions statewide in 2006. *Methods* We used a difference-in-differences (DD) approach to assess the impact of Massachusetts health reform on uninsurance and access to care among children 0–17 years in Massachusetts compared to children in other New England states. The National Survey of Children's Health provided the pre-reform year and two post-reform years (1 and 5 years post-reform). We analyzed outcomes for children overall and children previously and newly-eligible for Medicaid under Massachusetts health reform, adjusting for age, sex, race/ethnicity, non-English language, and having special health care needs. *Results* Compared to other New England states, Massachusetts's enactment of the individual mandate, Medicaid expansion, and essential benefits was associated with trends at 5 years post-reform toward lower uninsurance for children overall (DD = − 1.1, p-for-DD = 0.05), increased access to specialty care (DD = 7.7, p-for-DD = 0.06), but also with a decrease in access to preventive care (DD=-3.4, p-for-DD = 0.004). At 1 year post-reform, access to specialty care improved for children newly-Medicaid-eligible (DD = 18.3, p-for-DD = 0.03). *Conclusions for Practice* Adult-oriented health reforms may have reduced uninsurance and improved access to some types of care for children in Massachusetts. Repealing the ACA may produce modest detriments for children.

Keywords Federal policy · Legislation · Insurance

Abbreviations

ACA	The Patient Protection and Affordable Care Act
DD	Difference-in-differences
FPL	Federal poverty level
NSCH	National Survey of Children's Heath

Significance

Massachusetts health reform, the model for the ACA, reduced uninsurance and improved access to some types of care for children in Massachusetts. Repealing comparable provisions in the Affordable Care Act may produce modest detriments for children.

Introduction

In the United States, approximately 6 million (8%) of children are uninsured for all or part of a given year (Cohen and Martinez 2015). While fewer children are uninsured than adults, being uninsured in childhood has been associated with increased risk of hospitalization, childhood mortality, and worse adult health outcomes (Shakib et al. 2015; Tom et al. 2013; Hakim and Bye 2001; Johnson and Schoeni 2011; Rosen et al. 2009). Another 14 million (19%) children have insurance, but their insurance does not covered

✉ Anna Jo Bodurtha Smith
asmit230@jhmi.edu

[1] Department of Gynecology and Obstetrics, Johns Hopkins University School of Medicine, Phipps 279, 600 N. Wolfe Street, Baltimore, MD 21287-1281, USA

[2] Boston Children's Hospital, 300 Longwood Avenue, Boston, MA 02115, USA

[3] Harvard Medical School, 260 Longwood Avenue, Boston, MA 02115, USA

needed services or providers, such as specialty care (Kogan et al. 2010, 8). For children, inadequate insurance has been associated with lower immunization rates and increased risk of serious illness (Allred et al. 2007; Tom et al. 2010; Mosquera et al. 2014).

In the past 10 years, there have been two major adult-oriented health reform laws that could affect children—and their health outcomes. In 2006, Massachusetts passed major health reform legislation, including an individual mandate for adults (who were required to purchase insurance for themselves or face a penalty), Medicaid expansion (i.e., children's eligibility for the state's Medicaid-Children's Health Insurance Program (CHIP) increased from 200 to 300% of the federal poverty level (FPL), and adult eligibility for Medicaid increased to 100% FPL), and minimum "essential benefits" for private insurance (i.e., coverage of basic specialty services, no co-pay or deductible for preventive care visits) (Guidance Regarding Minimum Creditable Coverage (MCC) Certification On and After January 1 et al. 2009). For adults in Massachusetts, these provisions led to significant reductions in uninsurance and improvements in access to care (Okoro et al. 2014; Dhingra et al. 2013; Sommers et al. 2014; Long and Dahlen 2014). Based on this success, the federal government passed the 2010 Patient Protection and Affordable Care Act (ACA) modeled after Massachusetts health reform. Key provisions of adult-oriented health reform—the individual mandate, Medicaid eligibility, and essential benefits—have the potential to affect child health insurance status and access to care, but little is known about the potential impact of those provisions on children.

One way to study the ACA's potential impact on children is to examine the impact of the preceding Massachusetts health reform on insurance and access to care (Table 1). For example, while the individual mandate in Massachusetts did not require parents to enroll their children in insurance, studies suggest that, when adults acquire health insurance for themselves, they also enroll their children (DeVoe et al. 2015, 2008). Another example is the Medicaid expansion, which could decrease child uninsurance directly (i.e., the newly-eligible children between 200–299% FPL) or indirectly (i.e., with adult Medicaid expansion and the individual mandate, low-income parents may be more likely to enroll previously-eligible children) (Dubay and Kenney 2003; DeVoe et al. 2015; Kenney et al. 2010; Sonier et al. 2013; Sommers and Epstein 2011). Health reform provisions could also increase the likelihood of previously-eligible children receiving care: studies suggest that when low-income adults have access to care, their children are more likely to receive medical care (Gifford et al. 2005; Guendelman et al. 2006; Davidoff et al. 2003). For privately-insured children, the "essential benefits" provisions of both reforms requires insurers cover preventive care without cost-sharing and basic specialty services, such as office visits and hospitalizations (Guidance Regarding Minimum Creditable Coverage (MCC) Certification On and After January 1 et al. 2009). Like prior requirements that insurers cover maternity care, essential benefits were designed to provide a minimum standard of services for all privately-insured children and adults (Grace et al. 2014).

Alternatively, adult-oriented health reform may have a limited—or even detrimental—impact on children, given provisions were designed for adults. For example, efforts to standardize adult Medicaid services could inadvertently restrict children's access to needed care by omitting child-centered services. Children have a different range of conditions and a greater need for preventive services than adults, so previous federal health insurance reforms, most notably the Children's Health Insurance Program (CHIP), carved out children's coverage and benefits from those of adults (McDonough 2011; Goldstein and Rosenbaum 2013).

To date, there is very little evidence about the impact of ACA or Massachusetts health reform on children. As the debate over the future of the ACA continues, understanding the impact of its precursor in Massachusetts is essential to shape further health insurance legislation for children. Like the ACA, MA health reform was a two-step process with immediate implementation of the Medicaid expansion and later implementation of individual mandate and essential benefits. Available studies on children under Massachusetts health reform focus on 1–2 years post-reform, predating the implementation of the individual mandate (2007) and essential benefits (2008) (Kenney et al. 2010; Meara et al. 2014; Miller 2012; Smith and Chien 2014). Studies on the ACA are similarly limited to early years post-reform (Adams et al. 2018; Sommers et al. 2016; Courtemanche et al. 2017). These studies found minimal change in children's uninsurance and access to care. However, they do not reflect the full potential of such health reform—and thus may underestimate the ACA's impact. For adults under Massachusetts health reform, studies suggest that the implementation of the individual mandate resulted in further reductions in uninsurance (2–3%) and improved access to care (Long et al. 2012; Sabik and Bradley 2015). Use of services included in essential benefits also increased for adults (Long et al. 2012; Ellimoottil et al. 2014). In addition, with the adult and child Medicaid expansions, low-income children may particularly benefit from the ACA and Massachusetts health reforms, but the effect on them is unknown.

Thus, the aims of the present study were to (1) examine whether Massachusetts health reform was associated with reduced uninsurance and greater access to care for children at 1 and 5 years post-reform and (2) examine whether Massachusetts health reform was associated with changes in uninsurance and access to care for low income children at 1 and 5 years post-reform.

Table 1 Adult-oriented health reform and potential effects on child health insurance and access to care

Adult-oriented legislative provisions[a,b]	Massachusetts	ACA	Mechanism for potential impact on children	Anticipated effect on Children		
				Uninsurance	Access to primary care	Access to specialty care
1. Individual mandate	Adults only	Adults and tax-claimed dependents (0–24 years)	If parents become insured, they may insure their children at the same time	↓	↑	↑
2. Medicaid expansion	Children: 200 300% FPL Adults: 100% FPL	Children: No change, states must maintain pre-ACA levels of Medicaid-CHIP eligibility until 2019 Adults: State option to expand to 138% FPL		↓	↑	↑
3. Health insurance marketplaces	Premium assistance: 0-300% FPL	Premium assistance: 100–400% FPL	Private insurance is available to more adults and their children	↓	↑	↑
4. Employer mandate	Employers (> 11 + full-time) are required to offer health insurance to full-time employees and dependents	Same Applies to companies with 50 + full-time workers		↓	↑	↑
5. Employer dependent coverage mandate	Employers (small and large) must provide insurance option for children to age 26	Same		↓	↑	↑
6. Essential benefits	Marketplace insurance plans are required to offer a basic benefit plan offering all services specified by the state	Same	Decreases in out-of-pocket costs make care more accessible to families	N/A	↑	↑
7. "Free" preventive care	Private insurance plans are required to cover preventive care without cost-sharing	Same		N/A	↑	↑
8. Affordability provisions	Insurance plans are required to limit out-of-pocket maximum payments	Same		N/A N/A	↑ ↑	↑ ↑
9. Increased medicaid provider payment	Increased 2006–2009	Increased 2013–2014, higher payment rate for newly-eligible until 2019	More providers may be willing to see publicly-insured children	N/A	↑	↑

Source Predictions informed by research on Massachusetts health reform in adults (Okoro et al. 2014; zDhingra et al. 2013; Sommers et al. 2014; Long and Dahlen 2014; Long et al. 2012; Sabik and Bradley 2015; Ellimoottil et al. 2014), research on prior state Medicaid-CHIP expansions for children and CSHCN(DeVoe et al. 2015, 2008; Dubay and Kenney 2003; Kenney et al. 2010; Sonier et al. 2013; Sommers and Epstein 2011; Gifford et al. 2005; Guendelman et al. 2006; Davidoff et al. 2003), and limited research on Massachusetts health reform and children.(Kenney et al. 2010; Meara et al. 2014; Miller 2012; Smith and Chien 2014)

↓ decrease, ↑ Increase, *?* no published evidence, *N/A* not applicable

[a]The Affordable Care Act includes all of the above provisions of Massachusetts health reform

[b]Massachusetts health reform provisions were fully implemented by January 1, 2008. The individual mandate was implemented in 2007 and essential benefits in 2008. ACA provisions were fully implemented by January 1, 2014

Methods

Study Design

We used a difference-in-differences (DD) study design, a quasi-experimental method that compares differences in trends over time between an intervention and comparison group to approximate the effect of an intervention. The DD approach allows for control of baseline differences between the groups and of secular trends; it is considered one of the best methods to approximate a randomized controlled trial (Dimick and Ryan 2014). Our intervention group comprised families with children in Massachusetts; our comparison group were families with children living in non-Massachusetts states. We considered three different non-Massachusetts choices as comparators and *a priori* specified the other New England states (Maine, Vermont, New Hampshire, Rhode Island, and Connecticut) as our main comparator because they had stable child Medicaid-CHIP eligibility levels during the study period and are socio-economically similar to those for Massachusetts (Appendix 1) (The Henry et al. 2016; Connaughton and Madsen 2012). Our study period includes one-time point before health reform occurred in Massachusetts (2003) and two points post-reform (2007 and 2011). The 2007 time point represents initial post-reform changes, such as the Medicaid expansion, and the 2011 time point represents Massachusetts health reform as fully-implemented, including the individual mandate (implemented in 2007) and essential benefits (implemented in 2008). This study was granted exemption by the Harvard Medical School and Boston Children's Hospital Institutional Review Boards.

Data Source

We used parent-reported data on children aged 0–17 years from the 2003, 2007, and 2011–2012 waves of the National Survey of Children's Health (NSCH). The NSCH is a telephone survey of families with one or more children designed to be representative at the state and national levels. The study population included a total of 5,760 children in the intervention group, Massachusetts, and 28,183 children in the comparison group, other New England states, across the three survey waves. We used pre-specified NSCH survey weights to adjust for possible non-response bias, multiple survey waves, and addition of a cellphone sample in the 2011–2012 wave (Centers for Disease Control and Prevention 2013).

Main Outcomes

Our first outcome was uninsurance levels. We defined a child as uninsured if their parents answered no to the question, "Does [your child] have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicaid?". We excluded cases missing insurance status, which were less than 0.1% of cases in each survey year.

Our second outcome was access to primary and specialty care. We used two variables for access to primary care: (1) Having a personal doctor and (2) Receiving one or more preventive care visit. We characterized a child as having a personal doctor if their parent answered "Yes, one" or "Yes, more than one" to the question, "Do you have one or more persons you think of as [your child]'s personal doctor or nurses?" We defined a child as receiving one or more preventive care visits if their parent answered one or more to the question, "[During the past 12 months/since his/her birth], how many times did [your child] see a doctor, nurse, or other health care professional for preventive medical care such as a physical exam or well-child check-up?".

We derived access to specialty care from two NSCH questions. The first question asked about need for specialty care: "[During the past 12 months/Since [your child's] birth], did you or a doctor think that [he/she] needed to see a specialist?" The second asked about problems accessing specialty care: "How much of a problem, if any, was it to get care from the specialist doctor or doctors?" A child was characterized as having no problems accessing to specialty care if their parent answered "yes" to needing specialty care and "no" to having problems accessing specialty care. Children whose parents answered "no" to needing specialty care were excluded from this measure. As the 2003 wave included specialty care questions only when children had a personal doctor, we limited analyses of specialty care to children with a personal doctor to standardize across survey waves.

To understand how Massachusetts health reform might differentially impact low-income children, we stratified for children previously and newly-eligible for Medicaid-CHIP. For children in Massachusetts, we defined previously-eligible children as those living in families between 0-199% FPL (i.e., pre-reform child Medicaid-CHIP eligibility) and newly-eligible children as those in families between 200–299% FPL (i.e., post-reform child Medicaid-CHIP eligibility). We compared previously and newly-eligible children in Massachusetts to children in the same income brackets in other New England states.

Covariates

We selected covariates that may mediate access to care among insured children and are known to differ between

Massachusetts and other New England states (Smith and Chien 2014). In our regression model, we adjusted for the following covariates: child age (0–5, 6–9, 10–13, 14–17 years); gender; race/ethnicity (white, non-white); non-English language at home; and having special health care needs (yes, no). Children with special health care needs were defined by the NSCH screener as a child with "an ongoing health condition for which he/she experiences one or more of the following: (1) need or use of prescription medications; (2) an above routine use of services; (3) need or use of specialized therapies or services; (4) need or use of mental health counseling (5) a functional limitation."

Statistical Analysis

We assessed for baseline differences in demographic characteristics between children in Massachusetts and the other New England states using the 2003 survey wave and Chi square tests.

Consistent with a DD approach, we first assessed unadjusted pre/post trends within the intervention (Massachusetts) and comparison (other New England states) groups for outcomes of interest. We subtracted the rates of our outcomes of interest in the baseline year 2003 from 2007 and 2011–2012 to calculate pre-post trends for 1 and 5 years post-reform respectively. The base equation was $DD = (Massachusetts_{post\text{-}reform} - Massachusetts_{pre\text{-}reform}) - (Comparison_{post\text{-}reform} - Comparison_{pre\text{-}reform})$. For each outcome of interest, we used a multivariate logistic regression model to evaluate the significance of pre-post trends adjusted for covariates. We used a multivariate logistic regression model to implement our difference-in-differences model adjusted for covariates.

For sensitivity analysis, we compared families and children in Massachusetts to two additional non-Massachusetts groups: (1) states with a similar child Medicaid-CHIP expansion from 200 to 300% FPL and no adult expansion (3 states) and (2) all states without a child Medicaid-CHIP expansion during the study time period (27 states, including the other New England states). These additional comparators provided further insight for the impact of Medicaid expansion. We also analyzed access to care for insured children only (partial or full-year insured, full-year insured).

We considered an adjusted p-value of less than 0.05 to be significant. For uninsurance and access to primary care, we had 80% power to detect pre-post differences of $\geq 3\%$ at a p-value of 0.05. For access to specialty care and analyses of low-income children, we had 80% power to detect pre-post differences of $\geq 10\%$ at a p-value of 0.05. Analyses were conducted with Stata-11 (StataCorp, College Station, TX).

Results

Pre-reform, children in Massachusetts and other New England states did not differ in terms of age, sex, uninsurance, or levels of private and public insurance coverage. Children in Massachusetts were significantly more likely to have a special health care need, be non-white, speak a non-English language at home, and have higher family incomes than children in other New England states (Table 2).

Uninsurance Levels

In Massachusetts, there was no significant difference in uninsurance at 1 year post-reform (p-for-trend = 0.49), but uninsurance was significantly lower at 5 years post-reform (p-for-trend < 0.001) (Table 3). In other New England states, the proportion of uninsured children was not different at 1 year post-reform (p-for-trend = 0.22), but decreased significantly at 5 years post-reform (p-for-trend < 0.001). Thus, at 1 year post-reform, trends in Massachusetts uninsurance rates were not significantly different from those in other New England states (p-for-DD = 0.27). At 5 years post-reform, health reform was associated with a non-significant trend toward decreased uninsurance in Massachusetts (DD = − 1.1, p-for-DD = 0.05).

Access to Care

Having a Personal Doctor

At 1 and 5 years post-reform, having a personal doctor increased significantly for children in Massachusetts (p-for-trend < 0.01) and in other New England states (p-for-trend < 0.001). In the DD model, there was no significant difference in having a personal doctor between Massachusetts and other New England states at 1 or 5 years post-reform (Table 3).

Having One or More Preventive Visits in a Year

For children in Massachusetts, the proportion of families reporting their child received one or more preventive care visits increased at 1 year (p-for-trend < 0.001) and returned to pre-reform levels at 5 years post-reform (p-for-trend = 0.35). For children in other New England states, the proportion reporting one or more preventive care visits increased significantly at both 1 and 5 years post-reform (p-for-trend < 0.001). Given the relative increase in other New England states, at 5 years post-reform, Massachusetts health reform was associated with

Table 2 Demographic characteristics of children in Massachusetts and other New England states before Massachusetts health reform, 2003

	Massachusetts	Other New England states	p-Value
	% (95% CI)	% (95% CI)	
Sample size	2114	9912	
Age (years)			
0–4	27 (25–29)	25 (24–26)	0.08
5–9	27 (25–29)	28 (27–30)	0.37
10–13	24 (21–26)	23 (22–24)	0.79
14–17	23 (21–25)	24 (23–25)	0.28
% Female	49 (46–51)	49 (48–50)	0.97
% White	84 (82–86)	88 (87–89)	< 0.001**
% Non-English language at home	10 (8–11)	6 (5–7)	< 0.001**
% Special health care need	22 (20–24)	20 (19–21)	0.03*
Family income level			
0–99% FPL	10 (8–12)	9 (8–10)	0.24
100–199% FPL	13 (11–15)	17 (16–18)	0.002**
200–299% FPL	15 (13–17)	17 (16–18)	0.12
300–399% FPL	16 (14–18)	16 (15–17)	0.51
400% FPL or greater	37 (35–39)	32 (31–33)	< 0.001**
Insurance status and type			
% Uninsured	4 (3–5)	5 (4–5)	0.15
% Publicly insured	23 (21–25)	25 (23–26)	0.16
% Privately insured	73 (71–76)	71 (70–72)	0.16

*Significant at $p < 0.05$ level, ** Significant at $p < 0.01$ level

Other New England states: Maine, New Hampshire, Vermont, Rhode Island, and Connecticut

A Chi square test was used to assess differences

a statistically significant decrease in access to preventive care (DD = − 3.4, p-for-DD = 0.004).

No Problems Accessing Specialty Care

For children in Massachusetts, the percentage of children having no problems accessing specialty care was not significantly different at 1 year post-reform, but increased significantly at 5 years post-reform (p-for-trend = 0.006). For children in other New England states, the proportion of families reporting no problems accessing specialty care was stable at 1 and 5 years post-reform. Massachusetts health reform was associated with a non-significant trend toward increased access to specialty care at 5 years post-reform (DD = 7.7, p-for-DD = 0.06).

Children Previously Eligible for Medicaid-CHIP (0-199% FPL)

For children eligible for Medicaid-CHIP prior to health reform, uninsurance decreased in both Massachusetts and other New England states at 5 years post-reform (p-for-trend = 0.02 and < 0.001), so Massachusetts health reform was not associated with significant reductions in uninsurance (Table 4a). Massachusetts health reform was associated with a significant improvement in access to a personal doctor (DD = 6.6% (0.4–12.8), p-for-DD = 0.04) at 5 years post-reform. There were no significant changes in access to preventive care or specialty care for previously-eligible children in Massachusetts compared to children in the same income bracket in other New England states.

Children Newly Eligible for CHIP (200–299% FPL)

For children newly Medicaid-eligible, uninsurance decreased non-significantly in Massachusetts and other New England states, so Massachusetts health reform was not associated with a significant reduction in uninsurance at 1 or 5 years post-reform (Table 4b). Massachusetts health reform was associated with a significant improvement in access to specialty care for newly-eligible children at 1 year post-reform (DD = 18.3 (95% CI 2.5–34.0), p-for-DD = 0.03). There were no significant changes in access to preventive care. At 1 and 5 years post-reform, having a personal doctor was stable for this subpopulation of children in Massachusetts, while it increased significantly in other New England states (p-for-trend < 0.001). Given the relative increase in other New

Table 3 Uninsurance and access to care for children before and after Massachusetts health reform

	Massachusetts			Other New England states			Difference-in-differences			
							1 year post-reform		1 years post-reform	
	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	Adjusted % point	Adjusted p-value	Adjusted % point	Adjusted p-value
Uninsured	3.6 (2.6–4.7)	2.7 (1.4–3.9)	1.0 (0.4–1.7)**	4.5 (4.0-5.1)	5.1 (4.4–5.9)	3.0 (2.4–3.6)**	−1.3 (−3.2, 0.6)	0.27	−0.9 (−2.4, 4.6)	0.05
Has a personal doctor or nurse	91.4 (89.9–92.9)	95.3 (93.7–97.0)*	96.7 (95.6–97.8)**	91.3 (90.5–92.1)	96.2 (95.6–96.8)**	95.3 (94.6–96.1)**	−1.3 (−3.6, 1.1)	0.26	0.8 (−1.3, 3.0)	0.25
Received one or more preventive care visit	92.3 (90.9–93.7)	96.6 (95.2–97.9)**	91.5 (89.6–93.3)	87.5 (86.6–88.4)	94.6 (93.9–95.3)**	90.1 (89.1–91.2)**	−3.1 (−5.3, −0.9)	0.85	−4.3 (−6.9, −1.6)	0.004
Had no problems accessing specialty care	73.5 (69.2–77.8)	80.4 (75.6–85.2)	82.7 (78.6–86.8)**	79.0 (76.7–81.3)	80.5 (78.2–82.7)	80.5 (78.1–82.9)	3.9 (−3.2, 11.1)	0.32	6.5 (−0.1, 13.2)	0.06

Within-arm difference compared to pre-reform year: *Significant at $p<0.05$ level, **Significant at $p<0.01$ level

$DD=(Massachusetts_{post\text{-}reform}-Massachusetts_{pre\text{-}reform})-(Comparison_{post\text{-}reform}-Comparison_{pre\text{-}reform})$

Statistical significance of within-arm pre-post difference and difference-in-differences adjusted for child's age, sex, race, special health care needs, and non-English language at home

England states, Massachusetts health reform was associated with a statistically significant decrease in having a personal doctor at 5 years post-reform for newly-eligible children (DD = − 7.4% (95% CI − 14.3, − 0.5), p-for-DD = 0.02).

Sensitivity Analysis

Our sensitivity analyses with 2 alternate comparison groups (states with similar child Medicaid-CHIP expansions, all states with no child Medicaid-CHIP expansion) confirmed our main findings (Appendix Tables 7, 8). In all states with no child Medicaid-CHIP expansion, children's uninsurance decreased significantly, and in the DD model, Massachusetts was associated with a statistically significant increase in uninsurance for children overall at 5 years post-reform (DD = 1.0%, p-for-DD = 0.04).

Our sensitivity analyses of insured children (partial or full-year insurance, full-year insured) found no major differences in pre-post trends or DDs for access to primary care (Appendix Table 9). In addition, for full-year insured children, Massachusetts was associated with increased access to specialty care at 5 years post-reform (DD = 9.5%, p-for-DD = 0.01).

Discussion

This study found that adult-oriented health reform in Massachusetts was associated with a trend toward reduced uninsurance and improved access to specialty care for children overall at 5 years post-reform. For low-income children, health reform was associated with increased access to a personal doctor for children previously Medicaid-eligible and increased access to specialty care for children newly Medicaid-eligible.

The fact that uninsurance rates did not significantly decline after health reform in Massachusetts is likely multifactorial. Massachusetts had a low rate of child uninsurance at a baseline, making it challenging to detect any further decrease related to the Medicaid expansion and the individual mandate of health reform (e.g., "floor" effect). The remaining uninsured may be difficult to reach. The study period also included the common shock of the Great Recession (2008–2009) during which falling family incomes led to more children and adults becoming eligible for, and enrolling in, Medicaid-CHIP nationwide (Rowland 2009). Recession-related increases in Medicaid-CHIP enrollment nationwide may bias later gains under Massachusetts health reform toward the null. Nonetheless, there was a trend toward reduced insurance at 5 years post-reform, which suggests a possible benefit from the adult-only individual mandate. Since the ACA's individual mandate includes

Table 4 Uninsurance and access to care for children previously and newly-eligible for Medicaid-CHIP before and after Massachusetts health reform

	Massachusetts			Other New England states			Difference-in-differences			
	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	1 year post-reform		5 years post-reform	
							Adjusted % point	Adjusted p-value	Adjusted % point	Adjusted p-value
A. Children previously-eligible (0–199% FPL)										
Uninsured	5.8 (3.4–8.2)	5.9 (1.8–10.1)	2.1 (0.1–4.1)*	7.6 (6.0–9.2)	8.4 (6.4–10.4)	4.8 (3.1–6.4)*	−0.4 (−6.3–5.6)	0.96	−1.3 (−5.1–2.5)	0.32
Has a personal doctor or nurse	83.4 (78.9–87.9)	91.8 (86.8–96.9)*	95.0 (92.4–97.6)**	86.5 (84.5–88.5)	93.0 (91.3–94.7)**	92.1 (90.3–93.9)**	2.9 (−4.5–10.4)	0.65	6.6 (0.4–12.8)	0.04
Received one or more preventive care visit	87.2 (83.2–91.2)	92.1 (87.6–96.5)	85.3 (80.4–90.1)	83.9 (81.9–86.0)	92.7 (90.9–94.5)**	85.3 (83.0–87.6)	−4.4 (−10.9–2.1)	0.47	−5.8 (−12.9–13.6)	0.10
Had no problems accessing specialty care	66.5 (55.2–77.9)	75.2 (61.8–88.7)	74.1 (63.3–85.0)	74.3 (68.5–80.2)	76.1 (70.3–81.9)	71.5 (65.5–77.4)	0.0 (−19.8–19.8)	0.99	7.5 (−9.8–24.9)	0.38
B. Children newly-eligible (200–299% FPL)										
Uninsured	4.7 (1.5–7.9)	1.6 (0–3.2)	1.3 (0–3.2)	5.1 (4.0–6.3)	5.1 (3.5–6.6)	4.8 (3.1–6.4)	−3.0 (−7.3–1.3)	0.12	−3.6 (−8.1–1.0)	0.13
Has a personal doctor or nurse	94.0 (91.0–96.9)	96.8 (93.0–100)	92.2 (86.9–97.5)	89.7 (87.4–91.9)	96.4 (95.2–97.7)**	95.2 (93.0–97.3)**	−4.4 (−9.6–0.8)	0.42	−7.4 (−14.3–0.5)	0.02
Received one or more preventive care visit	89.0 (84.5–93.6)	98.3 (96.7–100)**	87.4 (81.3–93.5)	87.1 (84.8–89.5)	93.8 (92.1–95.4)**	90.3 (87.8–92.8)*	3.2 (−2.5–8.8)	0.10	−3.9 (−12.4–4.6)	0.31
Had no problems accessing specialty care	72.5 (62.0–83.0)	87.8 (78.8–96.8)*	85.3 (73.9–96.7)	80.1 (74.9–85.4)	77.7 (72.1–83.3)	79.7 (73.8–85.6)	18.3 (2.5–34.0)	0.03	13.3 (−3.4–29.9)	0.10

Within-arm difference compared to pre-reform year: * Significant at $p < 0.05$ level, ** Significant at $p < 0.01$ level

$DD = (Massachusetts_{post\text{-}reform} - Massachusetts_{pre\text{-}reform}) - (Comparison_{post\text{-}reform} - Comparison_{pre\text{-}reform})$

Statistical significance of within-arm pre-post difference and difference-in-differences adjusted for child's age, sex, race, special health care needs, and non-English language at home

children as well as adults, long-term reductions in uninsurance for children—and thus potential detriments of repeal—are likely greater under the ACA than under Massachusetts health reform.

Similarly, the benefits of adult-oriented health reform for low-income children under the ACA may be greater than that seen in Massachusetts. The increased access to a personal doctor for children previously-Medicaid eligible may reflect indirect benefits of parental coverage on children's access to care, although Massachusetts health reform did not require parents to insure their children. The ACA requires adults to enroll their children in insurance, so gains may be greater under the ACA. Other states also have lower rates of child Medicaid-CHIP enrollment than Massachusetts did pre-reform, so improvements in access to care and any potential effect of adult insurance on child enrollment may be greater for low-income children nationwide under the ACA (Kenney et al. 2015).

The lack of effect of adult-oriented health reform on access to care for children generally contrasts with significant gains seen in adults' access to care and the anticipated effects of essential benefits, including removal of cost-sharing for well-child visits, in Massachusetts (Okoro et al. 2014; Dhingra et al. 2013; Sommers et al. 2014; Long and Dahlen 2014). In fact, although access to preventive care was stable in Massachusetts, the comparison states made more significant improvements in preventive care during the study period for children generally and for children newly Medicaid-eligible. Several New England states implemented large Medicaid medical home projects during the study period, which may have contributed to their relative gains in access to care (Appendix Table 5). Other studies using the National Health Interview Survey and Medical Expenditures Panel Survey collaborate this trend, finding that children's access to preventive care increased in other states from 2000 to 2008 (Miller 2012; Abdus and Selden 2013). Child-specific reforms may be necessary to ensure receipt of recommended preventive care.

Our study had strengths and limitations. It is the first study to use the NSCH to examine Massachusetts health reform, and we examined effects two years further post-reform than prior studies on children. The sample size of low-income children was relatively small, so we had limited power to detect significance of changes in uninsurance and access to care. Our data was potentially limited by declining response rates to the NSCH from 55.0% in 2003 to 46.7% in 2007 to 23.0% in 2011–2012, although we adjusted for possible non-response bias with validated weighting tools (Skalland and Blumberg 2012). While state variability in Medicaid-CHIP eligibility and initiatives as well as demographic differences limits any comparison group, our primary comparison group—other New England states—implemented no changes in Medicaid-CHIP eligibility and experienced similar economic trends from the Great Recession during the study period. These similar economic trends precluded the need to control for economy-level variables, such as parental employment (The Henry et al. 2016; Connaughton and Madsen 2012). Although CHIP was reauthorized in 2009, the main components of the reauthorization, such as outreach grants to increase enrollment, were implemented in late 2010 and 2011. None of the earliest components of the 2010 Affordable Care Act (i.e., dependent coverage expansion for children over age 26) were unlikely to affect children ages 0–17 years old. Our findings are further corroborated by the similar trends using alternative comparison groups in the sensitivity analysis.

Our findings at 1-year post-reform are also corroborated by the earlier post-reform studies. Our 1.1% decrease in uninsurance at 1 year post-reform is similar to the 2-2.8% decrease reported in the two prior difference-in-differences studies on children (1 using the Current Population Survey, 1 National Health Interview Survey), both of which used New England states as the baseline comparison group (Kenney et al. 2010; Miller 2012). For low-income children, the one previous study reported a decrease in uninsurance of 5.2% at 2-years post-reform; our finding of a 1.3% decrease in uninsurance at 1-year post reform fits with this trend (Kenney et al. 2010). The slight differences may be due to samples size, survey administration, and/or data processing (Adams et al. 2015). To our knowledge, our findings represent the first estimates of Massachusetts health reform at 5 years post-reform.

Conclusions

Adult-oriented health reforms may have reduced uninsurance and improved access to some types of care for children in Massachusetts. Repealing comparable provisions in the Affordable Care Act may produce modest detriments in insurance and access to care for children.

Funding Dr. Smith's work on this study was supported by the Arnold P. Gold Foundation and the Harvard Medical School Scholars in Medicine Office. Dr. Chien's work on this study was supported by a Faculty Career Development Fellowship Award from Boston Children's Hospital.

Compliance with Ethical Standards

Conflict of interest The authors have no conflicts of interest relevant to this article to disclose.

Disclosure The authors have no financial relationships relevant to this article to disclose.

Appendix

See Tables 5, 6, 7, 8, 9 and 10.

Table 5 Comparison of Massachusetts and other New England states Medicaid/CHIP initiatives pre and post-Massachusetts health reform

	Massachusetts	Maine	Vermont	New Hampshire	Rhode Island	Connecticut
Pre-reform eligibility level	200%	200%	300%	300%	250%	300%
Post-reform eligibility level	300%	200%	300%	300%	250%	300%
Coverage of lawfully-residing immigrant children without a 5 year wait[a]	Y	Y	Y	N	Y	Y
Medical home initiative	Y	Y	Y	N	Y	Y
2009 CHIPRA outreach grant[b]	Y	Y	N	N	N	Y

Sources

https://kaiserfamilyfoundation.files.wordpress.com/2013/01/8272.pdf

Y = Yes, N = No

https://www.kff.org/medicaid/state-indicator/medicaidchip-upper-income-eligibility-limits-for-children/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

https://medicalhomeinfo.aap.org/national-state-initiatives/at-a-glance-table/Documents/NASHP%20At%20a%20glance%20state%20table%20FINAL.pdf

[a]This option became available to states in 2009 under The Children's Health Insurance Program Reauthorization Act (CHIPRA)

[b]CHIPRA outreach grants were awarded in September 2009 with outreach occurring late 2010–2013. (https://www.insurekidsnow.gov/campaign/funding/2009-cycle-i/summary/index.html)

Table 6 Demographic characteristics of children previously and newly-eligible for Medicaid-CHIP in Massachusetts and other New England States before Massachusetts health reform, 2003

	Massachusetts	Other New England states	p-Value
	% (95% CI)	% (95% CI)	
Children previously-eligible			
Sample size	381	2195	
Age (years)			
0–4	25 (20–30)	26 (23–28)	0.80
5–9	26 (21–31)	29 (26–32)	0.35
10–13	24 (19–29)	23 (20.9–26)	0.78
14–17	25 (19–30)	22 (20–24)	0.35
% Female	47 (41–54)	49 (46–52)	0.67
% White	69 (62–76)	80 (77–83)	0.003
% Non-English language at home	13 (11–15)	23 (18–28)	< 0.001
% Special health care need	29 (24–35)	22 (19–24)	0.01
Insurance status and type, %			
% Uninsured	6 (3–8)	8 (6–9)	0.26
% Privately insured	28 (22–33)	30 (28–33)	0.45
% Publicly insured	66 (61–72)	62 (59–65)	0.20
Children newly-eligible			
Sample size	298	1663	
Age (years)			
0–4	28 (22–34)	23 (21–26)	0.15
5–9	24 (19–30)	30 (27–34)	0.07
10–13	28 (22–35)	23 (20–26)	0.16
14–17	20 (15–25)	23 (21–26)	0.30
% Female	46 (39–53)	50 (46–53)	0.67
% White	89 (85–93)	87 (84–90)	0.003
% Non-English language at home	4 (2–5)	6 (3–9)	< 0.001
% Having special health care need	23 (17–29)	19 (16–21)	0.01
Insurance status and type, %			
% Uninsured	5 (2–8)	2 (1–2)	0.81
% Privately insured	79 (73–85)	73 (71–76)	0.12
% Publicly insured	16 (11–22)	21 (19–24)	0.12

*Significant at $p < 0.05$ level, **Significant at $p < 0.01$ level

Other New England states: Maine, New Hampshire, Vermont, Rhode Island, and Connecticut

A Chi square test was used to assess differences

Table 7 Difference-in-differences for children in Massachusetts compared to states with similar Medicaid-CHIP expansion before and after Massachusetts health reform

	Massachusetts			Hawaii, Pennsylvania, DC			Difference-in-differences					
	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	1 year post-reform			5 years post-reform		
							Unadjusted % point	Adjusted % point	Adjusted p-value	Unadjusted % point	Adjusted% point	Adjusted p-value
Uninsured	3.6 (2.6–4.7)	2.7 (1.4–3.9)	1.0 (0.4–1.7)**	6.2 (5.1–7.2)	6.4 (4.4–8.3)	3.8 (2.4–5.1)	−1.2 (−3.9–1.5)	−1.4 (−4.1–1.4)	0.36	−0.2 (−2.3–1.9)	−0.2 (−2.3–1.8)	0.12
Has a personal doctor or nurse	91.4 (89.9–92.9)	95.3 (93.7–97.0)*	96.7 (95.6–97.8)**	88.4 (87.0–89.9)	95.5 (94.3–96.8)	93.0 (91.3–94.6)	−3.2 (−6.1–0.2)	−3.8 (−6.5–0.1)	0.12	0.7 (−2.2–3.6)	0.2 (−2.6–3.1)	0.15
Received one or more preventive care visit	92.3 (90.9–93.7)	96.6 (95.2–97.9)**	91.5 (89.6–93.3)	83.8 (82.1–85.4)	92.9 (91.2–94.7)	89.9 (88.1–91.7)	−4.9 (−8.0–1.8)	−4.9 (−8.0–1.9)	0.90	−6.9 (−10.4–3.5)	−7.3 (−10.7–3.9)	0.001
Had no problems accessing specialty care	73.5 (69.2–77.8)	80.4 (75.6–85.2)	82.7 (78.6–86.8)**	79.6 (76.0–83.1)	76.8 (71.3–82.2)	84.1 (79.9–88.3)	9.7 (0.6–18.9)	6.3 (−2.6–15.2)	0.18	4.7 (−3.4–12.8)	3.0 (−4.8–10.9)	0.55

Comparison Group: Hawaii, Pennsylvania, DC

Within-arm difference compared to pre-reform year: * Significant at $p < 0.05$ level, ** Significant at $p < 0.01$ level

$DD = (Massachusetts_{post\text{-}reform} - Massachusetts_{pre\text{-}reform}) - (Comparison_{post\text{-}reform} - Comparison_{pre\text{-}reform})$

Statistical significance of within-arm pre-post difference and difference-in-differences adjusted for child's age, sex, race, special health care needs, and non-English language at home

Table 8 Difference-in-differences for children in Massachusetts compared to all states with no Medicaid-CHIP expansion before and after Massachusetts health reform

	Massachusetts			All states with no expansion			Difference-in-differences					
	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	1 year post-reform			5 years post-reform		
							Unadjusted % point	Adjusted % point	Adjusted p-value	Unadjusted % point	Adjusted% point	Adjusted p-value
Uninsured	3.6 (2.6–4.7)	2.7 (1.4–3.9)	1.0 (0.4–1.7)**	10.0 (9.6–10.5)	10.1 (9.4–10.9)	6.3 (5.8–6.9)**	−1.0 (−2.9–0.8)	−0.8 (−2.7–1.1)	0.46	1.1 (−0.3–2.5)	0.4 (−1.4–1.5)	0.04
Has a personal doctor or nurse	91.4 (89.9–92.9)	95.3 (93.7–97.0)*	96.7 (95.6–97.8)**	81.6 (81.0–82.3)	91.6 (91.0–92.3)	89.2 (88.5–89.9)	−6.0 (−8.5–3.6)	−5.8 (−8.1–3.4)	0.15	−2.3 (−4.4–0.2)	−1.7 (−3.7–0.4)	0.13
Received one or more preventive care visit	92.3 (90.9–93.7)	96.6 (95.2–97.9)**	91.5 (89.6–93.3)	76.4 (75.7–77.0)	87.9 (87.1–88.7)	83.6 (82.9–84.4)	−7.2 (−9.4–5.0)	−7.1 (−9.2–4.9)	0.90	−8.1 (−10.7–5.5)	−8.2 (−5.6–10.7)	<0.001
Had no problems accessing specialty care	73.5 (69.2–77.8)	80.4 (75.6–85.2)	82.7 (78.6–86.8)**	76.2 (74.8–77.6)	76.9 (74.9–78.9)	76.9 (75.3–78.6)	6.2 (− 0.6–13.1)	4.2 (−2.8–11.2)	0.25	8.5 (2.2–14.8)	6.2 (0–12.4)	0.05

Comparison group (27 states):

Child Medicaid-CHIP eligibility stable at 200% FPL (16 states): Arizona, Arkansas, Delaware, Florida, Illinois, Kentucky, Maine, Michigan, Mississippi, Nevada, North Carolina, Ohio, South Dakota, Texas, Utah, Virginia

Child Medicaid-CHIP eligibility stable at 300% FPL (4 states): Connecticut, Missouri, New Hampshire, Vermont

Child Medicaid-CHIP eligibility stable at other FPLs (7 states): California (250%), Georgia (235%), Idaho (185%), New Jersey (350%), New Mexico (235%), Oklahoma (185%), and Rhode Island (250%)

Within-arm difference compared to pre-reform year: * Significant at $p < 0.05$ level, ** Significant at $p < 0.01$ level

$DD = (Massachusetts_{post\text{-}reform} - Massachusetts_{pre\text{-}reform}) - (Comparison_{post\text{-}reform} - Comparison_{pre\text{-}reform})$

Statistical significance of within-arm pre-post difference and difference-in-differences adjusted for child's age, sex, race, special health care needs, and non-English language at home

Table 9 Difference-in-differences for insured children in Massachusetts compared to New England states before and after Massachusetts health reform

	Massachusetts			Other New England states			Difference-in-differences					
	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	Pre (%)	1 year post-reform (%)	5 years post-reform (%)	1 year post-reform			5 years post-reform		
							Unadjusted % point	Adjusted % point	Adjusted p-value	Unadjusted % point	Adjusted% point	Adjusted p-value
Partial or full-year insured children												
Has a personal doctor or nurse	92.2 (90.7–93.7)	95.8 (94.3–97.4)**	96.8 (95.7–97.9)**	92.0 (91.2–92.8)	96.5 (95.9–97.1)**	95.8 (95.1–96.2)**	−0.9 (−3.3–1.5)	−1.2 (−3.4–1.1)	0.31	0.8 (−1.3–2.9)	0.4 (−1.8–2.5)	0.49
Received one or more preventive care visit	92.8 (91.3–94.2)	96.7 (95.3–98.1)**	91.7 (89.8–93.5)	88.2 (87.3–89.1)	95.2 (94.5–95.8)**	90.6 (89.6–91.7)**	−3.0 (−5.3–0.8)	−3.2 (−5.3–1.0)	0.78	−3.5 (−6.3–0.8)	−4.3 (−1.6–7.0)	0.004
Had no problems accessing specialty care	73.5 (69.1–77.8)	80.1 (75.2–84.9)	82.6 (78.5–86.8)**	79.0 (76.7–81.4)	80.8 (78.5–83.0)	80.9 (78.5–83.3)	4.9 (−2.4–12.2)	3.5 (−3.8–10.7)	0.40	7.4 (0.5–14.2)	6.2 (−0.5–13.0)	0.08
Full-year insured children												
Has a personal doctor or nurse	92.5 (91.1–94.0)	96.1 (94.6–97.6)**	97.2 (96.1–98.2)**	92.3 (91.5–93.1)	96.5 (95.8–97.1)**	96.0 (95.3–96.8)**	−0.6 (−3.0–1.7)	−0.7 (−3.0–1.5)	0.59	0.1 (−1.2–3.0)	0.6 (−1.5–2.8)	0.32
Received one or more preventive care visit	93.2 (91.8–94.6)	97.0 (95.7–98.4)**	91.7 (89.8–93.6)	88.6 (87.7–89.5)	95.3 (94.7–96.0)**	91.0 (90.1–92.0)**	−2.9 (−5.2–0.7)	−3.0 (−5.1–0.9)	0.99	−3.9 (−1.1–6.6)	−4.7 (−1.9–7.3)	0.002
Had no problems accessing specialty care	73.8 (69.4–78.2)	80.7 (76.0–85.4)	84.8 (80.9–88.6)**	79.5 (77.2–81.9)	81.2 (78.8–83.5)	81.0 (78.6–83.5)**	5.3 (−2.0–12.6)	3.7 (−3.5–11.0)	0.36	9.5 (2.7–16.3)	8.6 (1.9–15.3)	0.01

Within-arm difference compared to pre-reform year: * Significant at $p < 0.05$ level, ** Significant at $p < 0.01$ level

$DD = (Massachusetts_{post\text{-}reform} - Massachusetts_{pre\text{-}reform}) - (Comparison_{post\text{-}reform} - Comparison_{pre\text{-}reform})$

Statistical significance of within-arm pre-post difference and difference-in-differences adjusted for child's age, sex, race, special health care needs, and non-English language at home

Table 10 Regression results for the core model analysis of the impact of health reform on the probability of being uninsured and having access to care for all children in Massachusetts

Uninsured	1-year post-reform			5-years post-reform		
	Odds ratio (95% CI)	Coefficients (95% CI)	p-Value	Odds ratio	Coefficients	p-Value
Massachusetts children × post period (treatment effect)	0.69 (0.36–1.33)	− 0.36 (− 1.01–0.28)	0.27	0.46 (0.21–0.99)	− 0.78 (− 1.55 –0.01)	0.05
Massachusetts children	0.72 (0.50–1.02)	− 0.33 (− 0.69–0.02)	0.06	0.73 (0.51–1.03)	− 0.32 (− 0.67–0.03)	0.08
Post-period	1.15 (0.93–1.42)	0.14 (− 0.07–0.35)	0.20	0.61 (0.48–0.79)	− 0.49 (− 0.73–0.24)	< 0.001
Child is age 5–9 years	1.26 (0.88–1.81)	0.23 (− 0.13–0.59)	0.21	1.34 (0.93–1.94)	0.30 (− 0.07–0.66)	0.11
Child is age 10–13 years	0.99 (0.69–1.43)	− 0.009 (− 0.38–0.36)	0.96	1.09 (0.76–1.56)	0.08 (− 0.28–0.44)	0.65
Child is age 14–17 years	1.47 (1.02–2.14)	0.39 (0.02–0.76)	0.04	1.94 (1.37–2.74)	0.66 (0.32–1.01)	< 0.001
Child is female	0.89 (0.70–1.14)	− 0.11 (− 0.36–0.13)	0.36	1.02 (0.80–1.30)	0.02 (− 0.22–0.26)	0.87
Child's race/ethnicity is white	0.63 (0.44–0.91)	− 0.46 (− 0.83–0.10)	0.01	0.80 (0.56–1.13)	− 0.23 (− 0.57–0.12)	0.20
Child has special health care needs	0.67 (0.49–0.90)	− 0.41 (− 0.71–0.10)	0.009	0.80 (0.58–1.10)	− 0.22 (− 0.54–0.10)	0.18
Child lives in home where primary language is not English	2.95 (1.96–4.45)	1.08 (0.67–1.49)	< 0.001	3.14 (2.15–4.60)	1.15 (0.77–1.53)	< 0.001
Has a personal doctor or nurse						
Massachusetts children × post period (treatment effect)	0.75 (0.46–1.23)	− 0.28 (− 0.77–0.20)	0.26	1.31 (0.82–2.09)	0.27 (− 0.19–0.74)	0.25
Massachusetts children	1.13 (0.90–1.44)	0.16 (− 0.11–0..36)	0.30	1.14 (0.90–1.44)	0.13 (− 0.11–0.37)	0.29
Post-period	2.46 (2.00–3.01)	0.90 (0.69–1.10)	< 0.001	2.12 (1.73–2.61)	0.75 (0.55–0.96)	< 0.001
Child is age 5–9 years	1.00 (0.75–1.33)	0.001 (− 0.28–0.29)	0.99	0.89 (0.68–1.16)	− 0.12 (− 0.39–0.14)	0.37
Child is age 10–13 years	1.25 (0.91–1.71)	0.22 (− 0.10–0.54)	0.18	0.91 (0.68–1.21)	− 0.10 (− 0.39–0.19)	0.51
Child is age 14–17 years	0.92 (0.69–1.22)	− 0.09 (− 0.37–0.20)	0.55	0.71 (0.54–0.92)	− 0.35 (− 0.61–0.08)	0.01
Child is female	1.03 (0.84–1.26)	0.03 (− 0.17–0.23)	0.76	0.95 (0.79–1.15)	− 0.05 (− 0.24–0.14)	0.62
Child's race/ethnicity is white	1.84 (1.38–2.45)	0.61 (0.32–0.90)	< 0.001	1.53 (1.16–2.03)	0.43 (0.15–0.71)	0.003
Child has special health care needs	1.24 (0.92–1.66)	0.21 (− 0.08–0.51)	0.16	1.50 (1.16–1.94)	0.40 (0.14–0.66)	0.002
Child lives in home where primary language is not English	0.47 (0.34–0.67)	− 0.75 (− 1.09–0.41)	< 0.001	0.31 (0.23–0.42)	− 1.17 (− 1.49–0.86)	< 0.001
Received one or more preventive care visit						
Massachusetts children × post period (treatment effect)	0.95 (0.57–1.60)	− 0.049 (− 0.57–0.47)	0.85	0.59 (0.41–0.85)	− 0.52 (− 0.89–0.16)	0.004
Massachusetts children	2.00 (1.57–2.53)	0.69 (0.45–0.93)	< 0.001	2.04 (1.61–2.59)	0.71 (0.47–0.95)	< 0.001
Post-period	2.49 (2.10–2.95)	0.91 (0.74–1.08)	< 0.001	1.43 (1.23–1.65)	0.36 (0.21–0.50)	< 0.001
Child is age 5–9 years	0.39 (0.30–0.51)	− 0.95 (− 1.22–0.68)	< 0.001	0.52 (0.41–0. 66)	− 0.66 (− 0.90–0.41)	< 0.001
Child is age 10–13 years	0.30 (0.22–0.40)	− 1.22 (− 1.51–0.93)	< 0.001	0.48 (0.37–0.61)	− 0.74 (− 0.99–0.49)	< 0.001
Child is age 14–17 years	0.27 (0.21–0.36)	− 1.29 − 1.57–1.02)	< 0.001	0.43 (0.34, 0.54)	− 0.85 (− 1.09–0.61)	< 0.001
Child is female	1.09 (0.93–1.29)	0.09 (− 0.08–0.25)	0.30	0.95 (0.81–1.10)	− 0.06 (− 0.21–0.10)	0.48
Child's race/ethnicity is white	1.29 (0.95–1.74)	0.25 (− 0.05–0.55)	0.10	1.52 (1.22–1.89)	0.42 (0.20–0.64)	< 0.001
Child has special health care needs	2.03 (1.58–2.59)	0.71 (0.46–0.95)	< 0.001	2.02 (1.61–2.53)	0.70 (0.48–0.93)	< 0.001
Child lives in home where primary language is not English	0.56 (0.38–0.84)	− 0.57 (− 0.97–0.18)	0.004	0.48 (0.36–0.63)	− 0.74 (− 1.02–0.46)	< 0.001
Has no problems accessing specialty care						
Massachusetts children × post period (treatment effect)	1.25 (0.80–1.95)	0.22 (− 0.22–0.67)	0.32	1.50 (0.98–2.29)	0.40 (− 0.02–0.83)	0.06
Massachusetts children	0.79 (0.61–1.04)	− 0.23 (− 0.50–0.04)	0.09	0.80 (0.61–1.05)	− 0.22 (− 0.49–0.05)	0.12
Post-period	1.11 (0.91–1.36)	0.11 (− 0.10–0.31)	0.30	1.13 (0.91–1.39)	0.12 (− 0.09–0.33)	0.27
Child is age 5–9 years	0.95 (0.67–1.34)	− 0.05 (− 0.39–0.30)	0.78	0.93 (0.68–1.28)	− 0.07 (− 0.39–0.24)	0.66
Child is age 10–13 years	0.81 (0.58–1.12)	− 0.21 (− 0.54–0.11)	0.20	0.87 (0.63–1.20)	− 0.14 (− 0.46–0.18)	0.39
Child is age 14–17 years	1.17 (0.85–1.60)	0.15 (− 0.16–0.47)	0.33	0.94 (0.69–1.27)	− 0.06 (− 0.37–0.24)	0.68
Child is female	1.09 (0.87–1.36)	0.09 (− 0.13–0.31)	0.44	1.03 (0.83–1.26)	0.03 (− 0.18–0.23)	0.81
Child's race/ethnicity is white	1.52 (1.04–2.24)	0.42 (0.04–0.81)	0.03	1.48 (1.09–2.02)	0.39 (0.08–0.70)	0.01

Table 10 (continued)

Uninsured	1-year post-reform			5-years post-reform		
	Odds ratio (95% CI)	Coefficients (95% CI)	p-Value	Odds ratio	Coefficients	p-Value
Child has special health care needs	0.86 (0.69–1.07)	−0.16 (−0.38–0.06)	0.17	0.67 (0.54–0.83)	−0.40 (−0.61–0.18)	<0.001
Child lives in home where primary language is not English	0.62 (0.35–1.11)	−0.47 (−1.05–0.11)	0.11	0.37 (0.23–0.60)	−0.99 (−1.47–0.51)	<0.001

References

Abdus, S., & Selden, T. M. (2013). Adherence with recommended well-child visits has grown, but large gaps persist among various socioeconomic groups. *Health Aff (Millwood), 32*(3), 508–515. https://doi.org/10.1377/hlthaff.2012.0691.

Adams, S. H., Park, M. J., & Irwin, C. E. (2015). Adolescent and young adult preventive care: comparing national survey rates. *American Journal of Preventive medicine, 49*(2), 238–247. https://doi.org/10.1016/j.amepre.2015.02.022.

Adams, S. H., Park, M. J., Twietmeyer, L., Brindis, C. D., & Irwin, C. E. (2018). Association between adolescent preventive care and the role of the affordable care act. *JAMA Pediatrics, 172*(1), 43–48. https://doi.org/10.1001/jamapediatrics.2017.3140.

Allred, N. J., Wooten, K. G., & Kong, Y. (2007). The association of health insurance and continuous primary care in the medical home on vaccination coverage for 19- to 35-month-old children. Pediatrics, *119*, 4–11. https://doi.org/10.1542/peds.2006-2089C.

Centers for Disease Control and Prevention. (2013). 2011–2012 National Survey of Children's Health Frequently Asked Questions. Retrieved February 8, 2013, from ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/slaits/nsch_2011_2012/01_Frequently_asked_questions/NSCH_2011_2012_FAQs.pdf.

Cohen, R., & Martinez, M. (2015). Health Insurance Coverage: Early Release of Estimates From the National Health Interview Survey, January–June 2015. Retrieved January 2, 2016, from http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201511.pdf.

Connaughton, J. E., & Madsen, R. A. (2012). U.S. State and Regional Impact of the 2008/2009 Recession. *JRAP, 42*(3), 177–187. Retrieved from http://ageconsearch.umn.edu/bitstream/143779/2/12-3-1.pdf.

Courtemanche, C., Marton, J., Ukert, B., Yelowitz, A., & Zapata, D. (2017). Early Impacts of the Affordable Care Act on Health Insurance Coverage in Medicaid Expansion and Non-Expansion States. *Journal of policy analysis and management: [the journal of the Association for Public Policy Analysis and Management], 36*(1), 178–210. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/27992151.

Davidoff, A., Dubay, L., Kenney, G., & Yemane, A. (2003). The effect of parents' insurance coverage on access to care for low-income children. *Inquiry, 40*(3), 254–68. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/14680258.

DeVoe, J. E., Marino, M., Angier, H., O'Malley, J. P., Crawford, C., Nelson, C., … Gold, R. (2015). Effect of expanding medicaid for parents on children's health insurance coverage: Lessons from the Oregon experiment. *JAMA Pediatrics, 169*(1), e143145. https://doi.org/10.1001/jamapediatrics.2014.3145.

DeVoe, J. E., Tillotson, C., & Wallace, L. S. (2008). Uninsured children and adolescents with insured parents. *JAMA, 300*(16), 1904–1913. https://doi.org/10.1001/jama.2008.516.

DeVoe, J. E., Tillotson, C. J., Angier, H., & Wallace, L. S. (2015). Predictors of children's health insurance coverage discontinuity in 1998 versus 2009: Parental coverage continuity plays a major role. *Maternal and Child Health Journal, 19*(4), 889–896. https://doi.org/10.1007/s10995-014-1590-0.

DeVoe, J. E., Tillotson, C. J., Marino, M., O'Malley, J., Angier, H., Wallace, L. S., & Gold, R. (2015). Trends in type of health insurance coverage for US children and their parents, 1998–2011. *Academic Pediatrics, 16*(2), 192–199. https://doi.org/10.1016/j.acap.2015.06.009.

Dhingra, S. S., Zack, M. M., Strine, T. W., Druss, B. G., & Simoes, E. (2013). Change in health insurance coverage in Massachusetts and other New England States by perceived health status: Potential impact of health reform. *American Journal of Public Health, 103*(6), e107–e114. https://doi.org/10.2105/AJPH.2012.300997.

Dimick, J. B., & Ryan, A. M. (2014). Methods for evaluating changes in health care policy: The difference-in-differences approach. *JAMA, 312*(22), 2401–2402. https://doi.org/10.1001/jama.2014.16153.

Dubay, L., & Kenney, G. (2003). Expanding public health insurance to parents: effects on children's coverage under Medicaid. *Health Serv Res, 38*(5), 1283–301. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1360947&tool=pmcentrez&rendertype=abstract.

Ellimoottil, C., Miller, S., Ayanian, J. Z., & Miller, D. C. (2014). Effect of insurance expansion on utilization of inpatient surgery. *JAMA surgery, 149*(8), 829–836. https://doi.org/10.1001/jamasurg.2014.857.

Gifford, E. J., Weech-Maldonado, R., & Short, P. F. (2005). Low-income children's preventive services use: implications of parents' Medicaid status. *Health Care Financ Rev, 26*(4), 81–94. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/17288070.

Goldstein, M. M., & Rosenbaum, S. (2013). From EPSDT to EHBs: the future of pediatric coverage design under government financed health insurance. Pediatrics, *131 Suppl*(Supplement_2), S142–S148. https://doi.org/10.1542/peds.2013-0252e.

Grace, A. M., Noonan, K. G., Cheng, T. L., Miller, D., Verga, B., Rubin, D., & Rosenbaum, S. (2014). The ACA's pediatric essential health benefit has resulted in a state-by-state patchwork of coverage with exclusions. *Health Aff (Millwood), 33*(12), 2136–2143. https://doi.org/10.1377/hlthaff.2014.0743.

Guendelman, S., Wier, M., Angulo, V., & Oman, D. (2006). The effects of child-only insurance coverage and family coverage on health care access and use: recent findings among low-income children in California. *Health Serv Res, 41*(1), 125–147. https://doi.org/10.1111/j.1475-6773.2005.00460.x.

Guidance Regarding Minimum Creditable Coverage (MCC) Certification On and After January 1, 2009. (n.d.). Boston, MA. Retrieved January 26, 2016, from https://betterhealthconnector.com/wp-content/uploads/rules-and-regulations/AdminBulletin01-08.pdf.

Hakim, R. B., & Bye, B. V. (2001). Effectiveness of compliance with pediatric preventive care guidelines among Medicaid

beneficiaries. *Pediatrics, 108*(1), 90–7. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11433059.

Johnson, R. C., & Schoeni, R. F. (2011). Early-life origins of adult disease: National longitudinal population-based study of the United States. *American Journal of Public Health, 101*(12), 2317–2324. https://doi.org/10.2105/AJPH.2011.300252.

Kenney, G. M., Haley, J. M., Anderson, N., & Lynch, V. (2015). Children eligible for medicaid or CHIP: Who Remains Uninsured, and Why? *Academic Pediatrics, 15*(3), S36–43. https://doi.org/10.1016/j.acap.2015.01.009.

Kenney, G. M., Long, S. K., & Luque, A. (2010). Health reform in Massachusetts cut the uninsurance rate among children in half. *Health Affairs (Millwood), 29*(6), 1242–1247. https://doi.org/10.1377/hlthaff.2010.0314.

Kogan, M. D., Newacheck, P. W., Blumberg, S. J., Ghandour, R. M., Singh, G. K., Strickland, B. B., & van Dyck, P. C. (2010). Underinsurance among children in the United States. *The New England Journal of Medicine, 363*(9), 841–851. https://doi.org/10.1056/NEJMsa0909994.

Long, S. K., & Dahlen, H. (2014). Expanding coverage to low-income childless adults in Massachusetts: Implications for national health reform. *Health Services Research, 49*(2), 2129–2146. https://doi.org/10.1111/1475-6773.12189.

Long, S. K., Stockley, K., & Dahlen, H. (2012). Massachusetts health reforms: uninsurance remains low, self-reported health status improves as state prepares to tackle costs. *Health Affairs (Millwood), 31*(2), 444–451. https://doi.org/10.1377/hlthaff.2011.0653.

McDonough, J. E. (2011). *Inside national health reform*. Berkeley: University of California Press.

Meara, E., Golberstein, E., Zaha, R., Greenfield, S. F., Beardslee, W. R., & Busch, S. H. (2014). Use of hospital-based services among young adults with behavioral health diagnoses before and after health insurance expansions. *JAMA psychiatry, 71*(4), 404–411. https://doi.org/10.1001/jamapsychiatry.2013.3972.

Miller, S. (2012). The effect of the Massachusetts reform on health care utilization. *Inquiry, 49*(4), 317–26. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/23469675.

Mosquera, R. A., Avritscher, E. B. C., Samuels, C. L., Harris, T. S., Pedroza, C., Evans, P., … Tyson, J. E. (2014). Effect of an enhanced medical home on serious illness and cost of care among high-risk children with chronic illness: A randomized clinical trial. *JAMA, 312*(24), 2640–2648. https://doi.org/10.1001/jama.2014.16419.

National Survey of Children's Health. NSCH 2011/12. Data query from the Child and Adolescent Health Measurement Initiative, Data Resource Center for Child and Adolescent Health website. (n.d.). Retrieved from http://www.childhealthdata.org/browse/survey.

Okoro, C. A., Dhingra, S. S., Coates, R. J., Zack, M., & Simoes, E. J. (2014). Effects of Massachusetts health reform on the use of clinical preventive services. *Journal of General Internal Medicine, 29*(9), 1287–1295. https://doi.org/10.1007/s11606-014-2865-2.

Rosen, H., Saleh, F., Lipsitz, S. R., Meara, J. G., & Rogers, S. O. (2009). Lack of insurance negatively affects trauma mortality in US children. *Journal of Pediatric Surgery, 44*(10), 1952–1957. https://doi.org/10.1016/j.jpedsurg.2008.12.026.

Rowland, D. (2009). Health care and Medicaid–weathering the recession. *The New England Journal of Medicine, 360*(13), 1273–1276. https://doi.org/10.1056/NEJMp0901072.

Sabik, L. M., & Bradley, C. J. (2015). The impact of near-universal insurance coverage on breast and cervical cancer screening: Evidence from Massachusetts. *Health Economics, 25*(4), 391–407. https://doi.org/10.1002/hec.3159.

Shakib, J., Buchi, K., Smith, E., Korgenski, K., & Young, P. C. (2015). Timing of initial well-child visit and readmissions of newborns. *Pediatrics, 135*(3), 469–474. https://doi.org/10.1542/peds.2014-2329.

Skalland, B. J., & Blumberg, S. J. (2012). Nonresponse in the National Survey of Children's Health, 2007. *Vital and health statistics., Ser 2*(156), 1–22. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/23088067.

Smith, A. J. B., & Chien, A. T. (2014). Massachusetts health reform and access for children with special health care needs. *Pediatrics, 134*(2), 218–226. https://doi.org/10.1542/peds.2013-3884.

Sommers, B. D., Chua, K.-P., Kenney, G. M., Long, S. K., & McMorrow, S. (2016). California's early coverage expansion under the affordable care act: A county-level analysis. *Health Services Research, 51*(3), 825–845. https://doi.org/10.1111/1475-6773.12397.

Sommers, B. D., & Epstein, A. M. (2011). Why states are so miffed about Medicaid–economics, politics, and the "woodwork effect". *The New England Journal of Medicine, 365*(2), 100–102. https://doi.org/10.1056/NEJMp1104948.

Sommers, B. D., Long, S. K., & Baicker, K. (2014). Changes in mortality after Massachusetts health care reform: a quasi-experimental study. *Annals of Internal Medicine, 160*(9), 585–593. https://doi.org/10.7326/M13-2275.

Sonier, J., Boudreaux, M. H., & Blewett, L. A. (2013). Medicaid "Welcome-Mat" effect of affordable care act implementation could be substantial. *Health Affairs (Millwood), 32*(7), 1319–1325. https://doi.org/10.1377/hlthaff.2013.0360.

The Henry, J.. Kaiser Family Foundation. (2016). Medicaid/CHIP upper income eligibility limits for children, 2000–2015. Retrieved January 14, 2016, from http://kff.org/medicaid/state-indicator/medicaidchip-upper-income-eligibility-limits-for-children-2000-2015/.

Tom, J. O., Mangione-Smith, R., Grossman, D. C., Solomon, C., & Tseng, C.-W. (2013). Well-child care visits and risk of ambulatory care-sensitive hospitalizations. *The American journal of managed care, 19*(5), 354–60. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/23781890.

Tom, J. O., Tseng, C.-W., Davis, J., Solomon, C., Zhou, C., & Mangione-Smith, R. (2010). Missed well-child care visits, low continuity of care, and risk of ambulatory care-sensitive hospitalizations in young children. *Archives of Pediatrics & Adolescent Medicine, 164*(11), 1052–1058. https://doi.org/10.1001/archpediatrics.2010.201.