Adult-Oriented Health Insurance Reform and Children's Health Insurance: the Massachusetts Experience and Implications for the Affordable Care Act

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GLOSSARY OF ABBREVIATIONS

ACA- The Patient Protection and Affordable Care Act
CHIP – Children’s Health Insurance Program
CI – Confidence Interval
CSHCN – Children with Special Health Care Needs
ESI – Employer-Sponsored Insurance
FPL – Federal Poverty Level
NSCH – National Survey of Children’s Health
NS-CSHCN – National Survey of Children’s Health
OOP – Out-of-pocket expenses
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CHAPTER 1. ADULT-ORIENTED HEALTH INSURANCE REFORM AND ITS POTENTIAL EFFECTS ON CHILDREN’S HEALTH INSURANCE

In the United States, approximately 6 million (8%) of the 74 million children and adolescents aged 0-17 years are uninsured for all or part of a given year [1]. 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 [2–6]. Another 14 million (19%) children have insurance, but their insurance does not cover needed services or providers, such as recommended preventive care [7,8]. For children, inadequate insurance has been associated with lower immunization rates and increased risk of serious illness [9–11].

Insurance coverage and access to care are even more important for the 15 million (20%) children who have special health care needs (CSHCN) [12]. CSHCN are a clinically heterogeneous and growing group of children with common chronic conditions (e.g., asthma), rare conditions that respond well to intensive treatment (e.g., cancer) and conditions that affect their life course (e.g., sickle cell) [13,14]. Given their ongoing health issues, uninsured CSHCN are more likely to experience problems accessing care than uninsured non-CSHCN [12,15]. Nearly one in ten CSHCN (9%) are uninsured for all or part of a given year [16]. Among insured CSHCN, one-third of families report that their insurance does not provide access to needed services or providers at a reasonable cost, and unmet need for specialty services has been increasing [8,16,17]. For CSHCN, problems accessing affordable care have been associated with lower quality of care and increased hospitalizations in certain chronic conditions [10,11,18–23].

ADULT-ORIENTED HEALTH INSURANCE REFORM AND CHILDREN: THE POTENTIAL BENEFITS

Adult-oriented health insurance reforms can affect children and CSHCN’s insurance coverage and access to affordable care directly or indirectly. Adult-oriented health reform may include child-specific provisions, which directly affect children’s health insurance. In addition, adult-oriented health reform may have spillover effects on children’s health insurance. For example, the majority of children are insured through their parent’s employer-sponsored insurance (ESI), so changes to ESI eligibility and covered benefits can affect children indirectly [24,25].

In the past ten years, there have been two major adult-oriented health insurance reform laws that could affect children. In 2006, Massachusetts passed major health reform legislation that included an individual mandate, Medicaid expansion, and new regulation of benefits and
cost-sharing for private insurance. In 2010, the federal government passed the Patient Protection and Affordable Care Act (ACA) modeled after Massachusetts reform. While both Massachusetts health reform and the ACA were focused on adults, provisions of each could reduce uninsurance and improve access to care and financial protection for children directly and indirectly. Table 1.1 details the key child-relevant provisions of the Massachusetts health reform and the ACA.

<table>
<thead>
<tr>
<th>Table 1.1 Key Child-Relevant Provisions of Massachusetts Health Reform and the Affordable Care Act</th>
</tr>
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<tbody>
<tr>
<td><strong>PROVISION</strong></td>
</tr>
<tr>
<td>1. Individual Mandate</td>
</tr>
<tr>
<td>2. Medicaid Expansion</td>
</tr>
<tr>
<td>3. Employer Mandate</td>
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<td>4. Employer Dependent Coverage</td>
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<tr>
<td>5. Health Insurance Marketplace</td>
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<td>6. Medicaid Provider Payment</td>
</tr>
<tr>
<td>7. Essential Benefits2</td>
</tr>
<tr>
<td>8. “Free1 Preventive Care</td>
</tr>
<tr>
<td>9. Affordability Provisions</td>
</tr>
</tbody>
</table>

1 Since 1999, Massachusetts offered subsidies for employees at firms with less than 50 employees to purchase ESI [26].
2 Essential benefits technically apply to marketplace plans only. In Massachusetts, all private plans must report to compliance with essential benefits to plan enrollees, likely leading to many private plans to implement essential benefits.

**SOURCES:** [26-36]
For example, the individual mandate provisions within each reform may increase children’s insurance coverage. Under Massachusetts health reform, adults were required to enroll themselves in available insurance or face a penalty. Studies suggest that when adults acquire insurance for themselves, they also enroll their children in insurance programs [37–39]. The ACA took the individual mandate further, requiring parents to enroll themselves and their children in available insurance or face a penalty [33].

The Medicaid expansion provisions within each reform may increase children’s health insurance coverage directly (i.e., newly-eligible children) or indirectly (i.e., via parental coverage). Massachusetts health reform increased children’s eligibility for the state Children’s Health Insurance Program (CHIP) from 200 to 300% of the federal poverty level (FPL) and raised adult eligibility for Medicaid to 100% FPL [29]. Studies of prior state expansions show that offering Medicaid to adults increases enrollment of previously-eligible children in Medicaid and/or CHIP [40–42]. This phenomenon of a Medicaid expansion increasing enrollment among those previously-eligible is known as the “woodwork” effect [43]. The ACA similarly included Medicaid expansion for adults and required states to maintain or increase children’s eligibility levels for Medicaid and CHIP [33].

The employer mandate and marketplace provisions within Massachusetts health reform and the ACA may expand the availability of private health insurance for children and parents [44,45]. The employer mandate provisions required that large employers offer ESI to full-time employees and their children aged 0-26 years or face a penalty. Massachusetts health reform established health insurance marketplaces for individuals not ESI-eligible to purchase private insurance for themselves and their families. The ACA established such private insurance marketplaces nationwide [29]. These reforms may be particularly important for CSHCN because private insurance has historically offered better access to pediatric specialty care [46,47].

Since being insured is highly correlated with access to care, the child-relevant insurance provisions within Massachusetts health reform and the ACA may have positive spillover effects on children’s access to care [9,48]. Nationally-representative surveys report that one in twelve children (7%)—and one in eight CSHCN (13%)—have problems accessing needed care [8]. For public insurance, the Medicaid expansion provision could increase access directly (i.e., newly-eligible and newly-enrolled children) and indirectly (i.e., via parental coverage). Studies suggest
that when low-income adults have access to care, their children are more likely to receive medical care [49–51].

The Medicaid payment and essential benefits provisions within each reform may increase children’s access to care directly. The increases in Medicaid provider payment may increase the number of physicians accepting Medicaid and make it easier for publicly-insured children to obtain care [52–54]. For private insurance, Massachusetts health reform required private insurers to cover pre-specified essential health benefits, such as office visits and hospitalizations [36]. The ACA took essential benefits for children further, explicitly requiring private insurance plans to cover “pediatric services, including oral and vision care” [55].

On the other hand, because of their focus on adults, Massachusetts health reform and the ACA could have negative spillover effects on access to care for children. Children’s access to care could decrease if the influx of newly-insured adults and children overwhelmed existing physician supply (e.g., “crowd-out”) [56–58]. In the two years following Massachusetts health reform, around 400,000 adults and 35,000 children gained insurance in Massachusetts [59–61]. Surveys of Massachusetts physicians reported that on average, post-reform, patients had to wait 10 days longer to see a primary care doctor [62]. Children who receive care from physicians who see both children and adults (e.g., family practitioners) might be particularly likely to experience longer waits in care post-reform [63]. The large influx of newly-insured adults could incentivize physicians—and state Medicaid programs—to shift resources away from childhood disease prevention and toward adult chronic disease management [64].

Since their child-relevant provisions may reduce uninsurance and increase access to care, Massachusetts health reform and the ACA may have positive spillover effects on financial protection for children and CSHCN. Nationally representative surveys report that one in four families experience financial problems due to cost of health care for their child, such as out-of-pocket spending of more than $1000 per year [8,65]. For public insurance, the Medicaid expansion may improve financial protection for families because public insurance programs have low to no cost-sharing and premiums [66–68]. For private insurance, the essential benefits provisions may improve financial protection for families because their insurance may now cover the health services needed by their child or CSHCN.

The preventive care and affordability provisions within each reform may also improve financial protection for children. Massachusetts health reform removed cost-sharing for
preventive care visits (e.g., no co-pay or deductible for well-child visits) and set limits on enrollee cost-sharing (e.g., out-of-pocket maximums). The ACA included similar provisions on preventive care and out-of-pocket expenses to increase the affordability of private insurance.

Table 1.2 summarizes the potential effects of key provisions in Massachusetts health reform and the ACA on children and CSHCN’s health insurance outcomes.

<table>
<thead>
<tr>
<th>MA HEALTH REFORM AND ACA PROVISIONS</th>
<th>CHILDREN OVERALL</th>
<th>CHILDREN WITH SPECIAL HEALTH CARE NEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UNINSURANCE</td>
<td>ACCESS TO CARE</td>
</tr>
<tr>
<td>1. Individual Mandate</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>Parents are required to enroll themselves and their dependents in insurance.¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Adult Medicaid Expansion</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>States opt-in to receive federal funding to enroll low-income adults in Medicaid.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Employer Mandate</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>Large employers are required to offer health insurance to full-time employees and dependents.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Employer Dependent Coverage</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>Mandate Employers (small and large) must provide insurance option for children to age 26.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>States and the federal government establish marketplaces for nongroup insurance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Increased Medicaid Provider</td>
<td>N/A</td>
<td>↑</td>
</tr>
<tr>
<td>Payment N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Essential Benefits</td>
<td>N/A</td>
<td>↑</td>
</tr>
<tr>
<td>Marketplace insurance plans are required to offer a basic benefit plan offering all services specified by the state.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. “Free” Preventive Care</td>
<td>N/A</td>
<td>↑</td>
</tr>
<tr>
<td>Private insurance plans are required to cover preventive care without cost-sharing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Affordability provisions</td>
<td>N/A</td>
<td>↑</td>
</tr>
<tr>
<td>All insurance plans are required to limit out-of-pocket maximum payments.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key: ↓ = Decrease, ↑ = Increase ? = No published evidence

¹ Massachusetts did not require parents to insure their children. ² Massachusetts health reform did not change benefit caps. Massachusetts had guaranteed issue and premium rating since 1996.

SOURCES: Predictions informed by research on Massachusetts health reform in adults (see Table 1.1 for references), research on prior state Medicaid-CHIP expansions for children and CSHCN [41,48], and opinion pieces on the ACA and children [45,48,64,69–71].
ADULT-ORIENTED HEALTH INSURANCE REFORM AND CHILDREN: THE STATE OF THE LITERATURE

Despite these potential benefits, there is little empirical evidence on the effects of adult-oriented health insurance reforms on children’s health insurance. While Massachusetts health reform has been associated with near universal coverage and improved access to care and financial protection for adults, the few published articles on children are limited to the early post-reform period or to specific populations, such as infants [61,72–77].

These early studies found a small (2%) reduction in uninsurance among children under Massachusetts health reform [61,73,75]. However, many key components of Massachusetts health reform, including the individual mandate and essential benefits, were not implemented until after these studies. For adults, studies suggest that the implementation of the individual mandate resulted in further improvements (2-3%) in insurance coverage [78,79]. Given the absence of longer-term studies on children under Massachusetts health reform, there is little information on whether the adult insurance mandate could affect children’s uninsurance.

Three studies examined access to care for children under Massachusetts health reform, finding no change in preventive care visits or emergency room visits at two to three years post-reform [73–75]. For adults, studies suggest that access to care continued to improve up to five years post-reform [78,80,81]. Understanding the longer-term impact of Massachusetts health reform on children’s access to preventive care is important to understanding any potential “crowd-out” effects or gains from the later implementation of essential benefits and “free” preventive care. Moreover, estimates for specialty care, out-of-pocket costs, and CSHCN have not been published. Table 1.3 summarizes the state of the literature on Massachusetts health reform for adults, children, and CSHCN.

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>ADULTS</th>
<th>CHILDREN OVERALL</th>
<th>CHILDREN WITH SPECIAL HEALTH CARE NEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninsurance</td>
<td>↓(\downarrow)</td>
<td>↓/?</td>
<td>?</td>
</tr>
<tr>
<td>Access to a Personal Doctor</td>
<td>↑(\uparrow)</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Access to Preventive Care</td>
<td>↑(\uparrow)</td>
<td>↑</td>
<td>↑(\uparrow)</td>
</tr>
<tr>
<td>Access to Specialty Care</td>
<td>↑(\uparrow)</td>
<td>↑</td>
<td>↑(\uparrow)</td>
</tr>
<tr>
<td>Financial Protection</td>
<td>↑(\uparrow)</td>
<td>↑</td>
<td>↑(\uparrow)</td>
</tr>
</tbody>
</table>

Key: ↑ = Improvement, ↓ = Reduction ↔ = No change, ? = Effects unknown

SOURCES (All studies cited are interrupted time series or difference-in-difference designs unless otherwise noted)

Adults: Uninsurance [81–90], Personal Doctor [81–83,85–87], Preventive Care [81,84,88,90], Specialty Care (2 large pre-post studies on unmet need for specialty care, 6 difference-in-difference studies on surgical access) [78,91–97], Financial Protection [81,83,85,98]

Children: Uninsurance [61,73,75,77], Preventive Care [73]
ADULT-ORIENTED HEALTH INSURANCE REFORM AND CHILDREN: THE IMPORTANCE

Understanding the impact of adult-oriented health insurance reforms on children could help stakeholders in two ways.

First, understanding the impact could help shape future adult-oriented health legislation to have more positive effects for children. Previous federal health insurance reforms, most notably the Children’s Health Insurance Program (CHIP), have carved out children’s coverage and benefits from those of adults [28,99]. Children do experience different health conditions than adults, given the preponderance of a few common diseases (e.g., asthma) and many rare conditions (e.g., sickle cell) in childhood. Children’s health care needs also differ from adults, given the greater need for prevention (e.g., early identification) over chronic disease management [100,101]. Nonetheless, effects of adult-oriented health reform could have potential benefits for children and/or CSHCN. Thus, understanding the spillover effects of Massachusetts health reform on children could allow stakeholders to amend provisions of the ACA and/or future adult-oriented legislation.

Second, understanding the impact of adult-oriented health reform on children may help identify issues that should be addressed through child-specific legislation, such as CHIP reauthorization. Adult-oriented health reforms are unlikely to be sufficient to provide all children with insurance coverage and access to care, so child-specific legislation may be needed. Research on adult-oriented health reform may show different effects on children than on adults, suggesting areas for future child-specific reform. Research may also identify areas in which adult-oriented reforms destabilize prior gains in child health insurance. For example, efforts to standardize adult Medicaid services could inadvertently restrict children’s access to needed care.

AIMS

Thus, the first two aims of this thesis are to examine whether Massachusetts health reform was associated with lower levels of child uninsurance, increased access to care, and improved financial protection for: (1) children generally (Chapter 2) and (2) CSHCN specifically (Chapter 3). The third aim of this thesis is to explore ESI eligibility among uninsured children and CSHCN prior to the implementation of ACA’s individual and employer mandates (Chapter 4); doing so will provide an estimate for ACA effects on child health insurance levels. Together, these chapters will help establish a benchmark for expectations under the ACA.
CHAPTER 2. MASSACHUSETTS HEALTH REFORM AND CHANGES IN UNINSURANCE AND ACCESS TO CARE FOR CHILDREN

INTRODUCTION

In 2006, Massachusetts passed major health reform legislation that aimed to reduce uninsurance and improve access to affordable healthcare. The Massachusetts health reform resulted in near-universal coverage for adults, but few studies have evaluated the reform for its impact on children [72]. Moreover, the studies on children under Massachusetts health reform predate the implementation of key reform components, including the individual mandate and regulations on the essential benefits covered by private insurance [61,73,75]. For adults, studies suggest that the implementation of the individual mandate resulted in further reductions (2-3%) in uninsurance [78,79]. Understanding the experience of children under Massachusetts health reform as fully-implemented is important to setting expectations for children under the ACA.

Of particular interest is the impact of Massachusetts health reform on children previously eligible for Medicaid-CHIP. The expansion of adult Medicaid coverage to 100% FPL may impact low-income children’s insurance coverage and access to care. First, expanded adult coverage may increase enrollment of previously-eligible, but currently unenrolled children in Medicaid (i.e., the “woodwork” effect), reducing uninsurance for these low-income children [40,41,61,102]. Second, expanded adult coverage may increase the likelihood of a previously-eligible child receiving care: studies suggest that when low-income adults have access to care, their children are more likely to receive medical care [49–51]. Conversely, Massachusetts health reform and the expanded adult coverage could decrease access to care for previously-eligible children if the influx of newly-insured children and adults overwhelmed available primary and specialty care resources (i.e., negative “crowd-out” effects) [56–58]. Because previous research on Massachusetts health reform has focused on adults, there is little information on whether the adult-oriented health reform affected insurance and access to care for low-income children.

The impact on children newly-eligible for CHIP is also of interest. Massachusetts health reform increased children’s eligibility for CHIP from 200 to 300% FPL. Expansions of child

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1 An earlier version of this paper was presented at the 2013 AcademyHealth Child Health Services Interest Group meeting (Smith AJB, Chien AT. The Effect of Massachusetts Health Reform on Children. Paper presented at: AcademyHealth Child Health Services Research Interest Group Meeting; 2013 Jun 22; Baltimore MD.)
Medicaid and/or CHIP eligibility have traditionally improved children’s access to care, but have not coincided with large increases in adult Medicaid eligibility [12,48]. Under Massachusetts health reform, children newly-eligible for Medicaid could experience small to no improvements in access to care if there are negative “crowd-out” effects.

Thus, the aims of the present study were to (1) examine whether health reform in Massachusetts was associated with reduced uninsurance and greater access to care for children at one and five years post-reform, (2) examine whether health reform in Massachusetts was associated with changes in uninsurance and access to care for children previously-eligible for Medicaid-CHIP at one and five years post-reform, and (3) examine whether health reform in Massachusetts was associated with changes in uninsurance and access to care for children newly-eligible for CHIP at one and five years post-reform.

**METHODS**

*Study Design*

We used a difference-in-differences (DD) study design to compare changes in child uninsurance levels and parent-reported access to care in our intervention and comparison groups pre (2006 and before) and post-reform (2007 and after). Our intervention group comprised families with children in Massachusetts; our comparison group comprised families with children in the other New England states. Since Massachusetts health reform may have differentially impacted children previously and newly-eligible for Medicaid-CHIP, we stratified analyses for these sub-populations. This study was granted exemption by the Harvard Medical School and Boston Children’s Hospital Institutional Review Boards.

*Data Source*

We used data on children aged 0-17 years from the 2003, 2007, and 2011-2012 National Surveys of Children’s Health (NSCH). The NSCH is a random digit dial survey of families with one or more child at home designed to be representative at the state and national levels. The study population included 5,760 children in the intervention group, Massachusetts, and 28,183 children in the comparison group, other New England states, from 2003 to 2011. We used survey weights to adjust for possible non-response bias, multiple survey years, and the addition of a cellphone sample in the 2011-2012 survey [103–105].
We chose the 2003 NSCH to represent the pre-reform period, the 2007 NSCH to represent the one year post-reform period, and the 2011-2012 NSCH to represent the five year post-reform period. Although the federal CHIP reauthorization passed in 2009, Massachusetts made no changes other than the 2006 health reform to child or adult Medicaid eligibility during the study period. The comparison group of other New England states (Maine, Vermont, New Hampshire, Rhode Island, Connecticut) had stable child Medicaid-CHIP eligibility levels during the study period and are demographically similar to Massachusetts [27,106]. One New England state expanded adult Medicaid eligibility in 2010 under the ACA (Connecticut from 0 to 56% FPL), but this likely had little effect on children’s insurance coverage as parents were already eligible up to 200% FPL [107,108]. Thus, we expect changes in the 2007 and 2011 NSCH in Massachusetts to reflect the state’s health reform.

Main Outcomes
Our first outcome was change in uninsurance. 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 analyzed changes in public and private coverage. We characterized a child as privately-insured if their parent answered “yes” to the NSCH question about having “any kind of health care coverage” and “no” to the question, “[Is that coverage/Is [your child] insured by] Medicaid or the State Children’s Health Insurance Program, S-CHIP?”. We characterized a child as publicly-insured if their parent answered “yes” to having health care coverage and “yes” to having “Medicaid or S-CHIP”. We excluded cases missing insurance status, which were less than 0.1% of cases in each survey year.

Our second outcome was change in access to primary and specialty care. We used two access to primary care variables from the NSCH: (1) Having a personal doctor or nurse, and (2) Receiving one or more preventive care visit. We characterized a child as having a personal doctor or nurse 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?”. The American Academy of Pediatrics recommends at least one preventive care visit annually for children ages 0-17 years [109].

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 question 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 who did not need specialty care were excluded from this outcome measure. The 2003 NSCH included specialty care questions only when parents reported their child had a personal doctor. To standardize across survey years, we limited analyses of specialty care to children with a personal doctor.

We stratified for children previously and newly-eligible for Medicaid-CHIP in Massachusetts. 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 living in families between 200-299% FPL (i.e., child Medicaid-CHIP eligibility under reform). We compared previously and newly-eligible children to children in the same income brackets in the other New England states (i.e., 0-199% and 200-299% FPL).

**Statistical Analysis**
We assessed for baseline differences in demographic characteristics and insurance status between children in Massachusetts and the other New England states using a chi-square test. For unadjusted pre-post differences within the intervention and comparison arms, we subtracted rates of uninsurance and access to care in 2003 from those in 2007 to calculate effects for post-reform year 1. We subtracted rates in 2003 from those in 2011-2012 to calculate effects for post-reform year 5. For unadjusted difference-in-differences, we subtracted pre-post differences in other New England states from pre-post differences in Massachusetts.

The DD approach allowed us to assess differences in time trends between the intervention group (Massachusetts) and comparison group (other New England states), control for baseline differences between the intervention and comparison groups, and account for secular trends in insurance coverage and access to care. For example, if there was a national trend
toward improved access to care during the study period and no additional gains related to Massachusetts health reform, we could see a non-significant or negative difference-in-differences under health reform, even if Massachusetts followed a national trend toward improved access to care.

To calculate the significance of pre-post and DD estimates, we used a multivariate logistic regression model. The pre-post and DD models were adjusted for 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) [110–112]. For race and poverty level, we used NSCH imputations of missing data. Data was missing for 0-5% of dependent variables, so these cases were excluded from the model.

For sensitivity analysis, we compared children in Massachusetts to 2 additional comparison groups: (1) children in states with a similar child Medicaid and/or CHIP expansion (200→300% FPL) and no adult expansion (3 states) and (2) children in all states without a child Medicaid or CHIP expansion over the study’s time period (27 states, includes the other New England states). These additional comparison groups provided further insight for the impact of adult expansion (states with similar child Medicaid-ChIP expansion) and other components of Massachusetts health reform (all states without child 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 difference of ≥3% at a p-value of 0.05. For access to specialty care and analyses for previously and newly-eligible children, we had 80% power to detect pre-post differences of ≥10% at a p-value of 0.05. Analyses were conducted with Stata version 11 (StataCorp, College Station, TX).

RESULTS

Pre-reform, children in Massachusetts and other New England states did not differ in terms of insurance coverage, age, or sex. 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 2.1). Children previously and newly-eligible for Medicaid-ChIP in Massachusetts were also significantly more likely to have
special health care needs and be non-white than children in the same income brackets in other New England states (Appendix Table 2.1).

<table>
<thead>
<tr>
<th>Table 2.1 Demographic Characteristics of Children in Massachusetts and Other New England States before Massachusetts Health Reform, 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>Sample Size</td>
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<tr>
<td>Age (years)</td>
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<tr>
<td>- 0-4</td>
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<tr>
<td>- 5-9</td>
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<tr>
<td>- 10-13</td>
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<td>- 14-17</td>
</tr>
<tr>
<td>% Female</td>
</tr>
<tr>
<td>% White</td>
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<tr>
<td>% Non-English language at home</td>
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<tr>
<td>% Special health care need</td>
</tr>
<tr>
<td>Family income level</td>
</tr>
<tr>
<td>- 0-99% FPL</td>
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<tr>
<td>- 100-199% FPL</td>
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<tr>
<td>- 200-299% FPL</td>
</tr>
<tr>
<td>- 300-399% FPL</td>
</tr>
<tr>
<td>- 400% FPL or greater</td>
</tr>
<tr>
<td>Insurance Status and Type, %</td>
</tr>
<tr>
<td>% Uninsured</td>
</tr>
<tr>
<td>% Privately insured</td>
</tr>
<tr>
<td>% Publicly insured</td>
</tr>
</tbody>
</table>

* 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.

Uninsurance Levels

In Massachusetts, the proportion of uninsured children decreased non-significantly at one year post-reform and significantly at five years post-reform (p-for-trend <0.001) (Table 2.2). In other New England states, the proportion of uninsured child was stable at one year post-reform and also decreased significantly at five years post-reform (p-for-trend <0.001). At one-year post-reform, the difference-in-differences for uninsurance, i.e., the pre-post difference in Massachusetts compared to the pre-post difference in other New England states, was -1.5% and non-significant (p-for-DD = 0.27). At five years post-reform, Massachusetts was associated with a non-significant trend toward decreased uninsurance (DD = -1.1%, p-for-DD = 0.05).

At five years post-reform, public insurance coverage increased, and private insurance coverage decreased, significantly in both Massachusetts and other New England states; the DDs were non-significant.
Table 2.2 Uninsurance for Children before and after Massachusetts Health Reform

<table>
<thead>
<tr>
<th></th>
<th>MASSACHUSETTS</th>
<th>OTHER NEW ENGLAND STATES</th>
<th>DIFFERENCE-IN-DIFFERENCES</th>
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<tbody>
<tr>
<td></td>
<td>Pre (%)</td>
<td>Post (%)</td>
<td>Year 1 (%)</td>
</tr>
<tr>
<td>INSURANCE COVERAGE FOR ALL CHILDREN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninsured</td>
<td>3.6 (2.6-4.7)</td>
<td>2.7 (1.4-3.9)</td>
<td>1.0 (0.4-1.7) **</td>
</tr>
<tr>
<td>Privately-Insured</td>
<td>73.4 (71.0-75.9)</td>
<td>72.3 (69.0-75.7)</td>
<td>66.5 (63.4-69.5) **</td>
</tr>
<tr>
<td>Publicly-Insured</td>
<td>22.9 (20.5-25.3)</td>
<td>25.0 (21.7-28.2)</td>
<td>32.5 (29.4-35.5)**</td>
</tr>
</tbody>
</table>

Within-arm trend compared to pre-reform year: * Significant at p <0.05 level, ** Significant at p <0.01 level
DD = (Massachusetts_{post-reform} – Massachusetts_{pre-reform}) – (Comparison_{post-reform} –Comparison_{pre-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.

Access to Care

Having a personal doctor increased significantly for children in Massachusetts at one and five years post-reform (p-for-trend <0.01); it also increased significantly for children 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 one or five years post-reform.

For children in Massachusetts, the proportion of families reporting their child received one or more preventive care visits increased at one year post-reform (p-for-trend <0.001), but returned to pre-reform levels at five years post-reform (p-for-trend = 0.35). For children in other New England states, the proportion of families reporting one or more preventive care visits increased significantly at both one and five years post-reform (p-for-trend <0.001). Given the stable level in Massachusetts and increase in other New England states, Massachusetts was associated with statistically significant decrease in access to preventive care at five years post-reform in the DD model (DD = -3.4%, p-for-DD = 0.004).

For children in Massachusetts, access to specialty care was stable at one year post reform and increased significantly at five 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 one and five years post-reform. In the DD model, Massachusetts was associated
with a non-significant trend toward increased access to specialty care at five years post-reform (DD = 7.7%, p-for-DD = 0.06).

**Table 2.3 Access to Care for Children before and after Massachusetts Health Reform**

<table>
<thead>
<tr>
<th></th>
<th>MASSACHUSETTS</th>
<th>OTHER NEW ENGLAND STATES</th>
<th>DIFFERENCE-IN-DIFFERENCES</th>
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<tbody>
<tr>
<td></td>
<td>Pre (%)</td>
<td>Post Year 1 (%)</td>
<td>Post Year 5 (%)</td>
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<tr>
<td>Has a personal doctor or nurse</td>
<td>91.4 (89.9-92.9)</td>
<td>95.3 (93.7-97.0) *</td>
<td>96.7 (95.6-97.8) **</td>
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<tr>
<td>Received one or more preventive care visit</td>
<td>92.3 (90.9-93.7)</td>
<td>96.6 (95.2-97.9) **</td>
<td>91.5 (89.6-93.3)</td>
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<tr>
<td>Had no problems accessing specialty care</td>
<td>73.5 (69.2-77.8)</td>
<td>80.4 (75.6-85.2)</td>
<td>82.7 (78.6-86.8) **</td>
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</table>

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

**DD = (Massachusettspost-reform – Massachusettspre-reform) – (Comparisonpost-reform–Comparisonpre-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 Previously Eligible for Medicaid-CHIP**

For children in Massachusetts previously-eligible for Medicaid-CHIP, the proportion uninsured decreased non-significantly at one year post-reform and decreased significantly at five years post-reform (p-for-trend = 0.02) (Table 2.4A). For children in other New England states in this income bracket, the proportion uninsured decreased significantly at five years post-reform (p-for-trend <0.001). Thus, the DDs for uninsurance in previously-eligible children were non-significant at one and five years post-reform.

For children in Massachusetts previously-eligible for Medicaid-CHIP, access to a personal doctor increased significantly at one and five years post-reform (p-for-trend = 0.04 and <0.001). For children in other New England states, access to personal doctor increased significantly at one and five years post-reform (p-for-trend = <0.001). In the DD model, for children previously-eligible for Medicaid-CHIP, Massachusetts was associated with a statistically significant increase in having a personal doctor or nurse at five years post-reform (DD = 6.0%, p-for-DD = 0.04). 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.
### Table 2.4 Uninsurance and Access to Care for Children Previously and Newly-Eligible for Medicaid-CHIP before and after Massachusetts Health Reform

<table>
<thead>
<tr>
<th></th>
<th>Massachusetts</th>
<th>Other New England States</th>
<th>Difference-in-Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre (%)</td>
<td>Post (%)</td>
<td>Year 1 (%)</td>
</tr>
<tr>
<td>A. Children Previously-Eligible (0-199% FPL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninsured</td>
<td>5.8 (3.4-8.2)</td>
<td>5.9 (1.8-10.1)</td>
<td>2.1 (0.1-4.1) *</td>
</tr>
<tr>
<td>Privately-Insured</td>
<td>27.8 (22.3-33.3)</td>
<td>24.3 (17.9-30.6)</td>
<td>16.4 (12.0-20.8) **</td>
</tr>
<tr>
<td>Publicly-Insured</td>
<td>66.4 (60.7-72.1)</td>
<td>69.8 (62.8-76.8)</td>
<td>81.5 (76.8-86.2) **</td>
</tr>
<tr>
<td>Has a personal doctor or nurse</td>
<td>83.4 (78.9-87.9)</td>
<td>91.8 (86.8-96.9) *</td>
<td>95.0 (92.4-97.6) **</td>
</tr>
<tr>
<td>Received one or more preventive care visit</td>
<td>87.2 (83.2-91.2)</td>
<td>92.1 (87.6-96.5)</td>
<td>85.3 (80.4-90.1)</td>
</tr>
<tr>
<td>Had no problems accessing specialty care</td>
<td>66.5 (55.2-77.9)</td>
<td>75.2 (61.8-88.7)</td>
<td>74.1 (63.3-85.0)</td>
</tr>
</tbody>
</table>

### B. Children Newly-Eligible (200-299% FPL)

<table>
<thead>
<tr>
<th></th>
<th>Massachusetts</th>
<th>Other New England States</th>
<th>Difference-in-Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninsured</td>
<td>4.7 (1.5-7.9)</td>
<td>1.6 (0-3.2)</td>
<td>1.3 (0-3.2)</td>
</tr>
<tr>
<td>Privately-Insured</td>
<td>79.0 (73.0-85.0)</td>
<td>74.1 (65.2-83.0)</td>
<td>69.5 (61.6-77.5) *</td>
</tr>
<tr>
<td>Publicly-Insured</td>
<td>16.2 (10.7-21.7)</td>
<td>24.3 (15.5-33.2) *</td>
<td>29.2 (21.4-37.0) **</td>
</tr>
<tr>
<td>Has a personal doctor or nurse</td>
<td>94.0 (91.0-96.9)</td>
<td>96.8 (93.0-100)</td>
<td>92.2 (86.9-97.5)</td>
</tr>
<tr>
<td>Received one or more preventive care visit</td>
<td>89.0 (84.5-93.6)</td>
<td>98.3 (96.7-100) **</td>
<td>87.4 (81.3-93.5)</td>
</tr>
<tr>
<td>Had no problems accessing specialty care</td>
<td>72.5 (62.0-83.0)</td>
<td>87.8 (78.8-96.8) *</td>
<td>85.3 (73.9-96.7)</td>
</tr>
</tbody>
</table>

Within-arm trend compared to pre-reform year: * Significant at p <0.05 level, ** Significant at p <0.01 level  
DD = (Massachusetts_post-reform – Massachusetts_pre-reform) – (Comparison_post-reform – Comparison_pre-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 Newly Eligible for CHIP

For children in Massachusetts newly-eligible for CHIP, the proportion uninsured decreased non-significantly at one and five years post-reform (Table 2.4B). For children in other New England states in the 200-299% FPL income bracket, the proportion uninsured was stable at one and five years post-reform. In the DD model, Massachusetts was not associated with a significant change in uninsurance for newly-eligible children at one or five years post-reform.

Having a personal doctor or nurse was stable at one and five years post-reform in Massachusetts, while it increased significantly for children in this income bracket in other New England states (p-for-trend <0.001). Given the relative increase in other New England states, in the DD model, Massachusetts was associated with a statistically significant decrease in having a personal doctor or nurse at five years post-reform for children newly-eligible for CHIP (DD = -7.3%, p-for-DD = 0.02). The proportion of children receiving one or more preventive care visits increased in both Massachusetts and other New England states, and the DDs at one and five years post-reform were non-significant.

The proportion of families reporting no problems accessing specialty care increased significantly for newly-eligible children in Massachusetts post-reform (p-for-trend = 0.02 and 0.07 at one and five years respectively). In other New England states, the proportion reporting no problems accessing specialty care decreased non-significantly (i.e., more families had problems accessing specialty care). In the DD model, Massachusetts was associated with a statistically significant increase in access to specialty care for children newly-eligible for CHIP at one year post-reform (DD = 17.7%, p-for-DD = 0.03).

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 2.2 and 2.3). In addition, for 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 five years post-reform (DD = 1.0%, p-for-DD = 0.04).

Our sensitivity analyses for insured children only (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 2.4). In addition, for full-year insured children, Massachusetts was associated with increased access to specialty care at five years post-reform (DD = 9.5%, p-for-DD = 0.01).

**DISCUSSION**

This study found that, for children overall, Massachusetts health reform did not reduce uninsurance or improve access to primary or specialty care at one or five years post-reform compared to other New England states. The post-reform period was associated with stable access to care for children in Massachusetts, but significant gains in access to preventive care for children in other New England states. The reform’s effects differed for children previously and newly-eligible for Medicaid CHIP. For children previously eligible for Medicaid CHIP, the post-reform period in Massachusetts was associated with increased access to a personal doctor or nurse compared to other New England states. For children newly eligible for CHIP, the post-reform period was associated with increased access to specialty 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. 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 [113,114]. Moreover, other studies corroborate the trends we found for children under Massachusetts health reform. Our finding of a 1.1% decrease in uninsurance at one year post-reform is similar to the 2-2.8% decrease reported in the three prior difference-in-differences studies on children early post-reform (2 using the Current Population Survey, 1 National Health Interview Survey) [61,73,77]. The slight difference may be due to their choice of alternate comparison groups, survey administration, and/or data processing [115–118].

We found no reduction in uninsurance at five years post-reform after the implementation of the individual mandate. Massachusetts had a low rate of child uninsurance at a baseline, making it challenging to detect any further decrease under health reform (e.g., “floor” effect). We had 80% power to detect pre-post differences of ≤3% at a p-value of 0.05. The study period included the common shock of the Great Recession (2008-2009), which increased unemployment in Massachusetts and other New England states to similar extents [119] When adults lose their jobs, they lose employer-sponsored insurance and may enroll themselves and
their children in Medicaid-CHIP [120]. We observed an increase in the proportion of children with public insurance from 2007 to 2011 in Massachusetts and other states that was likely related to the recession. This may bias our findings on children’s uninsurance under Massachusetts health reform toward the null, although studies of adults continued to show significant reductions in uninsurance during this period. On the other hand, the lack of reduction may be attributable to the exclusion of children from Massachusetts’s individual mandate. Since the ACA’s individual mandate includes children—and applies to states with higher baseline rates of uninsurance—reductions in uninsurance for children may be greater under the ACA than under Massachusetts health reform.

We found a suggestion of a “woodwork” effect for children previously-eligible for Medicaid-CHIP. There was a significant reduction in uninsurance for these children in Massachusetts in the pre-post analysis, but we were unable to detect a significant difference-in-differences, given the understandably smaller sample size of this population. Massachusetts had a high rate of child Medicaid-CHIP enrollment at baseline, so the possible “woodwork” effect may be greater for low-income children in other states under the ACA [121].

We found no evidence of crowd-out among children overall or children previously-eligible for Medicaid-CHIP. In fact, access to a personal doctor improved for previously-eligible children under Massachusetts health reform, despite concerns about primary care shortages [56–58,62]. The lack of crowd-out is consistent with findings in adults and should reassure stakeholders about the low likelihood of negative “crowd-out” effects for previously-insured children under the ACA [57].

Nonetheless, for children overall, Massachusetts health reform did not have the intended effect of improving access to care. This contrasts with the significant gains in access to a personal doctor and preventive care for adults under Massachusetts health reform [81–88,90]. In fact, although access to preventive care was stable in Massachusetts, the comparison states made significant improvements in preventive care during the study period. Prior analyses using the National Health Interview Survey and the Medical Expenditures Panel Survey collaborate this trend, finding that access to preventive care increased in other states, but did not change in Massachusetts from 2000 to 2008 [73,122]. Further innovations, such as accountable care organizations, may be necessary to increase receipt of recommended preventive care for children in Massachusetts [123].
For children newly-eligible for CHIP, improved access to specialty care may be secondary to gains in insurance coverage that we were unable to detect. Alternatively, it could reflect improvement in covered services under health reform from essential benefits (privately-insured children) and/or more providers available with increased Medicaid physician payment (publicly-insured children). Improvements in access to care under the ACA may be greater, given the ACA’s additional incentives to insure children and the specific inclusion of “pediatric services” in essential benefits.

Conclusions
We examined the impact of Massachusetts health reform, the model for the ACA, on children and found no significant reductions in uninsurance or improvements in access to care for children overall. Under Massachusetts health reform, children previously and newly-eligible for Medicaid-CHIP experienced improvements in having a personal doctor and access to specialty care, which suggests it is possible to expand access to care for adults without negatively affecting access for children. Additional child-specific policies may be necessary to improve children’s access to care under the ACA.
<table>
<thead>
<tr>
<th>Appendix Table 2.1 Demographic Characteristics of Children Previously and Newly-Eligible for Medicaid-CHIP in Massachusetts and Other New England States before Massachusetts Health Reform, 2003</th>
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</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>Children Previously-Eligible</td>
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<tr>
<td>Sample Size</td>
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<td>Age (years)</td>
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<td>- 0-4</td>
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<td>- 5-9</td>
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<td>- 10-13</td>
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<tr>
<td>- 14-17</td>
</tr>
<tr>
<td>% Female</td>
</tr>
<tr>
<td>% White</td>
</tr>
<tr>
<td>% Non-English language at home</td>
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<tr>
<td>% Special health care need</td>
</tr>
<tr>
<td>Insurance Status and Type, %</td>
</tr>
<tr>
<td>% Uninsured</td>
</tr>
<tr>
<td>% Privately insured</td>
</tr>
<tr>
<td>% Publicly insured</td>
</tr>
<tr>
<td>Children Newly-Eligible</td>
</tr>
<tr>
<td>Sample Size</td>
</tr>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>- 0-4</td>
</tr>
<tr>
<td>- 5-9</td>
</tr>
<tr>
<td>- 10-13</td>
</tr>
<tr>
<td>- 14-17</td>
</tr>
<tr>
<td>% Female</td>
</tr>
<tr>
<td>% White</td>
</tr>
<tr>
<td>% Non-English language at home</td>
</tr>
<tr>
<td>% Having special health care need</td>
</tr>
<tr>
<td>Insurance Status and Type, %</td>
</tr>
<tr>
<td>% Uninsured</td>
</tr>
<tr>
<td>% Privately insured</td>
</tr>
<tr>
<td>% Publicly insured</td>
</tr>
<tr>
<td>* Significant at p &lt;0.05 level, ** Significant at p &lt;0.01 level</td>
</tr>
</tbody>
</table>

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

A chi-square test was used to assess differences.
Appendix Table 2.2 Difference-in-Differences for Children in Massachusetts compared to States with Similar Medicaid-CHIP Expansion before and after Massachusetts Health Reform

<table>
<thead>
<tr>
<th></th>
<th>Massachusetts</th>
<th>Hawaii, Pennsylvania, DC</th>
<th>Difference-in-Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre (%)</td>
<td>Post Year 1 (%)</td>
<td>Post Year 1 (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Year 5 (%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninsurance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninsured</td>
<td>3.6 (2.6-4.7)</td>
<td>2.7 (1.4-3.9)</td>
<td>1.0 (0.4-1.7) **</td>
</tr>
<tr>
<td>Privately-insured</td>
<td>73.4 (71.0-75.9)</td>
<td>72.3 (69.0-75.7)</td>
<td>66.5 (63.4-69.5) **</td>
</tr>
<tr>
<td>Publicly-insured</td>
<td>22.9 (20.5-25.3)</td>
<td>25.0 (21.7-28.2)</td>
<td>32.5 (29.4-35.5) **</td>
</tr>
<tr>
<td>Access to Care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a personal doctor or nurse</td>
<td>91.4 (89.9-92.9)</td>
<td>95.3 (93.7-97.0) *</td>
<td>96.7 (95.6-97.8) **</td>
</tr>
<tr>
<td>Received one or more preventive care visit</td>
<td>92.3 (90.9-93.7)</td>
<td>96.6 (95.2-97.9) **</td>
<td>91.5 (89.6-93.3) **</td>
</tr>
<tr>
<td>Had no problems accessing specialty care</td>
<td>73.5 (69.2-77.8)</td>
<td>80.4 (75.6-85.2)</td>
<td>82.7 (78.6-86.8) **</td>
</tr>
</tbody>
</table>

Comparison Group: Hawaii, Pennsylvania, DC
Difference-in-Differences (DD): * Significant at p <0.05 level, ** Significant at p <0.01 level
DD = (Massachusetts post-reform – Massachusetts pre-reform) – (Comparison post-reform–Comparison pre-reform)
Statistical significance of difference over time and difference-in-differences determined from multivariable models adjusted for child’s age, sex, race, special health care needs, and non-English language at home.
Appendix Table 2.3 Difference-in-Differences for Children in Massachusetts compared to All States with No Medicaid-CHIP Expansion before and after Massachusetts Health Reform

<table>
<thead>
<tr>
<th></th>
<th>MASSACHUSETTS Pre (%)</th>
<th>MASSACHUSETTS Post Year 1 (%)</th>
<th>MASSACHUSETTS Year 5 (%)</th>
<th>ALL STATES WITH NO EXPANSION Pre (%)</th>
<th>ALL STATES WITH NO EXPANSION Post Year 1 (%)</th>
<th>ALL STATES WITH NO EXPANSION Year 5 (%)</th>
<th>DIFFERENCE-IN-DIFFERENCES Post: Year 1 %</th>
<th>DIFFERENCE-IN-DIFFERENCES Post: Year 5 %</th>
<th>P</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninsured</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninsured</td>
<td>3.6 (2.6-4.7)</td>
<td>2.7 (1.4-3.9)</td>
<td>1.0 (0.4-1.7) **</td>
<td>10.0 (9.6-10.5)</td>
<td>10.1 (9.4-10.9)</td>
<td>6.3 (5.8-6.9) **</td>
<td>-1.1</td>
<td>0.46</td>
<td>1.0</td>
<td>0.04</td>
</tr>
<tr>
<td>Privately-insured</td>
<td>73.4 (71.0-75.9)</td>
<td>72.3 (69.0-75.7)</td>
<td>66.5 (63.4-69.5) **</td>
<td>61.2 (60.5-62.0)</td>
<td>60.3 (59.1-61.5)</td>
<td>55.7 (54.7-56.7) **</td>
<td>-0.2</td>
<td>0.69</td>
<td>-1.4</td>
<td>0.40</td>
</tr>
<tr>
<td>Publicly-insured</td>
<td>22.9 (20.5-25.3)</td>
<td>25.0 (21.7-28.2)</td>
<td>32.5 (29.4-35.5) **</td>
<td>28.6 (27.9-29.3)</td>
<td>29.5 (28.4-30.6)</td>
<td>37.9 (36.9-38.9) **</td>
<td>1.2</td>
<td>0.43</td>
<td>0.3</td>
<td>0.34</td>
</tr>
<tr>
<td>Access to Care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a personal doctor or nurse</td>
<td>91.4 (89.9-92.9)</td>
<td>95.3 (93.7-97.0) *</td>
<td>96.7 (95.6-97.8) **</td>
<td>81.6 (81.0-82.3)</td>
<td>91.6 (91.0-92.3)</td>
<td>89.2 (88.5-89.9)</td>
<td>-6.1</td>
<td>0.15</td>
<td>-2.3</td>
<td>0.13</td>
</tr>
<tr>
<td>Received one or more preventive care visit</td>
<td>92.3 (90.9-93.7)</td>
<td>96.6 (95.2-97.9) **</td>
<td>91.5 (89.6-93.3)</td>
<td>76.4 (75.7-77.0)</td>
<td>87.9 (87.1-88.7)</td>
<td>83.6 (82.9-84.4)</td>
<td>-7.2</td>
<td>0.90</td>
<td>-8.0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Had no problems accessing specialty care</td>
<td>73.5 (69.2-77.8)</td>
<td>80.4 (75.6-85.2)</td>
<td>82.7 (78.6-86.8) **</td>
<td>76.2 (74.8-77.6)</td>
<td>76.9 (74.9-78.9)</td>
<td>76.9 (75.3-78.6)</td>
<td>6.2</td>
<td>0.25</td>
<td>8.5</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Within-arm trends compared to pre-reform year: * Significant at p <0.05 level, ** Significant at p <0.01 level
DD = (Massachusetts post-reform – Massachusetts pre-reform) – (Comparison post-reform–Comparison pre-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.

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%), Rhode Island (250%)
Appendix Table 2.4 Difference-in-Differences for Insured Children in Massachusetts compared to New England States before and after Massachusetts Health Reform

<table>
<thead>
<tr>
<th></th>
<th>MASSACHUSETTS</th>
<th>OTHER NEW ENGLAND STATES</th>
<th>DIFFERENCE-IN-DIFFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre (%)</td>
<td>Post (%)</td>
<td>Pre (%)</td>
</tr>
<tr>
<td></td>
<td>Year 1 (%)</td>
<td>Year 5 (%)</td>
<td>Year 1 (%)</td>
</tr>
<tr>
<td><strong>Partial or Full-year Insured Children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a personal doctor or nurse</td>
<td>92.2 (90.7-93.7)</td>
<td>95.8 (94.3-97.4) **</td>
<td>96.8 (95.7-97.9) **</td>
</tr>
<tr>
<td>Received one or more preventive care visit</td>
<td>92.8 (91.3-94.2)</td>
<td>96.7 (95.3-98.1) **</td>
<td>91.7 (89.8-93.5)</td>
</tr>
<tr>
<td>Had no problems accessing specialty care</td>
<td>73.5 (69.1-77.8)</td>
<td>80.1 (75.2-84.9)</td>
<td>82.6 (78.5-86.8) **</td>
</tr>
<tr>
<td><strong>Full-year Insured Children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has a personal doctor or nurse</td>
<td>92.5 (91.1-94.0)</td>
<td>96.1 (94.6-97.6) **</td>
<td>97.2 (96.1-98.2) **</td>
</tr>
<tr>
<td>Received one or more preventive care visit</td>
<td>93.2 (91.8-94.6)</td>
<td>97.0 (95.7-98.4) **</td>
<td>91.7 (89.8-93.6)</td>
</tr>
<tr>
<td>Had no problems accessing specialty care</td>
<td>73.8 (69.4-78.2)</td>
<td>80.7 (76.0-85.4)</td>
<td>84.8 (80.9-88.6) **</td>
</tr>
</tbody>
</table>

Within-arm trends compared to pre-reform year: * Significant at p <0.05 level, ** Significant at p <0.01 level
DD = (Massachusetts post-reform – Massachusetts pre-reform) – (Comparison post-reform – Comparison pre-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.
CHAPTER 3. MASSACHUSETTS HEALTH REFORM AND ACCESS FOR CHILDREN WITH SPECIAL HEALTH CARE NEEDS

INTRODUCTION
Although Massachusetts health reform was not focused specifically on children with special health care needs (CSHCN), elements of the law could reduce uninsurance for these medically-complex children. For example, the law required that adults purchase full-year health insurance and expanded public insurance eligibility to help low-income individuals meet the individual mandate provisions. However, MA health reform did not require parents to purchase insurance for their children, which could lessen the impact on reducing full or partial-year uninsurance for CSHCN. While nationally-representative surveys estimate that 97% of CHSCN are insured for at least part of the year, nearly one in 10 CSHCN (9%) experience one or more instances without health insurance in a given year [8]. Since prior research on MA reform has focused on adults, there is little information on whether the adult insurance mandate could impact uninsurance in children.

Surveys report that one in twelve CSHCN (7%) has no usual source of care, and one in seven (15%) has problems accessing needed specialty care [8]. Massachusetts health reform could increase privately-insured CSHCN’s access to care because the reform legislation required all private insurers to provide essential benefits and set limits on enrollee cost-sharing (e.g., no copays for preventive care visits, no caps on prescription drug spending) [36]. On the other hand, Massachusetts health reform could decrease access to care for CSHCN. By definition, care for CSHCN is more complex, and often more costly to provide, than care for healthy children, so physicians might preferentially see newly-insured children and adults post-reform [64,124]. For adults, studies suggest that Massachusetts health reform resulted in smaller improvements in access to care for adults with chronic diseases than for healthy adults [79,85].

Nationally-representative surveys report that one in five families (20%) experience financial problems due to the cost of their CSHCN’s care, such as out-of-pocket spending (OOP)

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2 This work was previously published as “Smith AJ, Chien AT. Massachusetts Health Reform and Access for Children With Special Health Care Needs. Pediatrics. 2014;134(2):218–26.” It was also presented in part at:
(1) Smith AJB, Chien AT. The Effect of Massachusetts Health Reform on Children with Special Health Care Needs. Paper presented at: Harvard Medical School Soma Weiss Day; 2014 Jan 16; Boston, MA.
(2) Smith AJB, Chien AT. The Effect of Massachusetts Health Reform on Children. Paper presented at: AcademyHealth Child Health Services Research Interest Group Meeting; 2013 Jun 22; Baltimore MD.
of greater than $1000 per year [8]. Massachusetts health reform could increase financial protection for privately-insured CSHCN because it specified maximum OOP spending for private insurance (e.g., $5000 for individuals, $10,000 for families for in-network services) [36]. The Medicaid-CHIP expansion may also improve financial protection as public insurance programs have low co-pays and premiums. For adults, studies suggest that Massachusetts health reform resulted in small improvements (2-4%) in financial protection from 2006 to 2008 [91,125]. To our knowledge, estimates for CSHCN have not been published.

The aim of this study was to examine whether Massachusetts health reform was associated with reduced instances of uninsurance, greater access to care, and improved financial protection for privately and publicly-insured CSHCN. The experience of CSHCN under Massachusetts health reform is relevant to expectations for CSHCN under the ACA.

METHODS

Study Design

We used a difference-in-differences (DD) study design. Our intervention group was families of CSHCN in MA; our comparison group was families of CSHCN in other states and DC. We defined the pre-reform period as 2006 or before and the post-reform period as 2007 or after. As Massachusetts health reform was constructed to impact private and public insurance differently, we analyzed changes for privately and publicly-insured CSHCN separately. This study was granted exemption by the Boston Children’s Hospital and Harvard Medical School Institutional Review Boards.

Data Source

We used the National Survey of Children with Special Health Care Needs (NS-CSHCN) to assess whether CSHCN (1) were uninsured at any point during the year, (2) had their needs met when accessing health care, and (3) experienced inadequate financial protection. The NS-CSHCN is a random-digit dial survey of 40,000 families of CSHCN per survey year, designed to be representative at state and national levels. The NS-CSHCN response rate was 56% in 2005/2006 and 26% in 2009/2010; interview completion rates after the survey’s screen-in phase were over 80% in both years [104,126]. To adjust for low response rates in 2009/2010, we applied nonresponse-adjusted weighting developed by the Centers for Disease Control (CDC)
Analysis of similar surveys has suggested that non-response effects can be adequately adjusted through survey re-weighting [113,114].

The Massachusetts health reform law was enacted in April 2006 and fully implemented by January 2009. We therefore chose the 2005/2006 NS-CSHCN to represent the pre-reform period and the 2009/2010 survey to signify the post-reform period [104,126]. Of note, although the federal CHIP Reauthorization Act passed in February 2009, Massachusetts made no changes to its Medicaid-CHIP program other than health reform during this period [128,129]. Thus, we expect the 2009/2010 NS-CSHCN in Massachusetts to reflect primarily Massachusetts health reform [130].

**Main Outcomes**

We used fifteen NS-CSHCN questions to assess parent-reported experiences of uninsurance, access to care, and financial protection (Table 3.1). We defined access to primary care with two variables: whether a CSHCN has a (1) personal doctor or nurse or (2) usual source of care. We defined access to specialists, prescription medications, and vision care using NS-CSHCN question pairs on each of these topics. The first question asked parents if such services were “needed,” and the second ascertained whether parents thought their CSHCN received all services needed. Parents had to answer “Yes” to both questions in order for needs to have been considered “met.” We did not study access to physical, occupational or speech therapy, mental health, or substance abuse services because their provision may have been affected by federal parity legislation during our study period [131].

We used four financial protection variables from the NS-CSHCN: (1) OOP spending greater than $1000, (2) OOP spending greater than $5000, (3) unreasonable OOP spending, and (4) family financial problems related to the cost of CSHCN’s health care. Since prior research suggests that average OOP spending for CSHCN is less than $1000, we chose OOP greater than $1000 to represent above-average spending [131–133]. We used affirmative responses to the remaining variables to represent inadequate financial protection.

For all variables, except access to prescription medications and vision care, we had 80% power to detect pre-post difference of 3% or greater at a p-value of 0.05.
### Table 3.1 National Survey of Children with Special Health Care Needs Questions corresponding to Uninsurance, Access, and Financial Protection

<table>
<thead>
<tr>
<th>Domain/Variable</th>
<th>NS-CSHCN Questions</th>
<th>Cutoff Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uninsurance</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| One or More Instances of Uninsurance | (1) At this time, is [S.C.] covered by [ANY] health insurance?  
(2) During the past 12 months, was there any time when [your child] was not covered by ANY health insurance? | Insured: Yes to (1) AND (2)  
Uninsured: No to (1) OR (2) |
| **Access to Care** |                     |               |
| Insurance benefits meets child’s needs | Did the insurance offer benefits or cover services that meet [your child’s] needs? | Needs met: Always/usually  
Needs not met:  
Never/sometimes |
| Insurance provides access to needed providers | Did the insurance allow [your child] to see the health care providers that [he or she] needed? | Needs met: Always/usually  
Needs not met:  
Never/sometimes |
| Has a Personal Doctor or Nurse | Do you have one or more persons you think of as [your child’s] personal doctor or nurse? | Personal doctor/nurse: Yes, one person OR Yes, more than one person  
No personal doctor/nurse: No |
| Has a Usual Source of Care | (1) Is there a place that [your child] usually goes when [he/she] is sick or you need advice about [his/her] health?  
(2) Is there a place that [your child] usually goes when [he/she] needs routine preventive care, such as a physical examination or well-child check-up?  
(3) Is [the place] an emergency room? | Usual source: Yes to (1) and (2)  
AND No to (3)  
No usual source: No to (1) or (2) OR Yes to (3) |
| Needs for Specialists Met | (1) During the past 12 months/ since [his/her] birth, was there any time when [your child] needed care from a specialty doctor?  
(2) Did [your child] receive all the care from a specialty doctor that [he/she] needed? | Needs met: Yes to (1) AND (2)  
Needs not met: Yes to (1) AND No to (2) |
| Needs for Prescription Medications Met | (1) During the past 12 months/ since [his/her] birth, was there any time when [your child] needed prescription medications?  
(2) Did [your child] receive all the prescription medications that [he/she] needed? | Needs met: Yes to (1) AND  
No to (2)  
Needs not met: Yes to (1) AND No to (2) |
| Needs for Vision Care Met | (1) During the past 12 months/ since [his/her] birth, was there any time when [your child] needed eyeglasses or vision care?  
(2) Did [your child] receive all the eyeglasses or vision care that [he/she] needed? | Needs met: Yes to (1) AND  
No to (2)  
Needs not met: Yes to (1) AND No to (2) |
| **Financial Protection** |                     |               |
| Out-of-Pocket Spending Greater than $1000 | [During the past 12 months/ Since [his/her] birth], would you say that the family paid more than $5000, $1000 to $5000, or less than $1000 for [your child’s]’s medical care? | ≥$1000: Yes to spending  
$1000-$5000 OR >$5000  
<$1000: Yes to spending < $1000 |
| Out-of-Pocket Spending Greater than $5000 | [During the past 12 months/ Since [his/her] birth], would you say that the family paid more than $5000, $1000 to $5000, or less than $1000 for [your child’s]’s medical care? | > $5000: Yes to spending  
>$5000  
≤$5000: Yes to spending  
$1000-$5000 OR <$1000 |
| Unreasonable Out-of-Pocket Spending | Are the costs not covered by [S.C.’]’s health insurance reasonable? | Unreasonable:  
Never/sometimes reasonable costs  
Reasonable: Always/usually reasonable costs OR no out-of-Pocket Spending |
| Family Financial Problems | Have [your child]’s health conditions caused financial problems for your family? | Has financial problems: Yes  
No financial problems: No |

Key: NS-CSHCN (National Survey of Children with Special Health Care Needs)
Covariates
For outcomes among insured CSHCN, we conducted separate analyses for CSHCN with private versus public insurance. We classified a CSHCN as privately-insured if they answered “Yes” to the NS-CSHCN question about “having health insurance through an employer or union, military health care, or another health insurance or health care plan” and “No” to “having Medicaid or SCHIP.” We classified CSHCN as publicly-insured if they had public insurance or both public and private insurance. We excluded cases missing insurance status, which was approximately 0.2% of cases in each survey.

We adjusted our model for age, sex, race/ethnicity (white, non-white), non-English language at home, and functional difficulties [134–136]. Given all children were CSHCN, we used fourteen dichotomous NS-CSHCN items to create a 0-7 scale for functional difficulties. We defined seven categories of difficulties: vision, hearing, breathing, body (e.g., metabolism), learning, feeling or behaving, or activity (e.g., problems with self-care) [137]. For missing data, we imputed average values for continuous variables and randomly-chosen values for categorical variables.

Statistical Analysis
We used descriptive statistics of CSHCN in Massachusetts and other states to assess similarities in demographics and insurance status at baseline using a chi-square test. For raw, unadjusted differences over time within intervention and comparison arms, we subtracted rates of uninsurance, access to care, and financial protection in 2005/2006 from those in 2009/2010. For the DD approach, we subtracted pre-post differences in other states from pre-post differences in Massachusetts. This allowed us to assess differences in trends between the intervention (children in Massachusetts) and comparison group (children in other states), control for baseline differences between treatment and control groups, account for secular trends, and isolate effects of Massachusetts health reform.

To calculate the significance of trend and DD estimates, we used a multivariate logistic regression model adjusted for our covariates of interest. We considered an adjusted p-value of 0.05 to be significant. Analyses were conducted in STATA-11(StataCorp, College Station, TX).

For sensitivity analysis, we compared Massachusetts to two additional comparison groups: New England (Connecticut, Maine, New Hampshire, Rhode Island, and Vermont) and
Pennsylvania. Other New England states are demographically similar to Massachusetts and had stable Medicaid-CHIP income eligibility levels (≥200% FPL) from 2005-2010 [106]. Pennsylvania’s Medicaid program had similar benefit design to Massachusetts’s pre-reform and expanded income eligibility to the same level as Massachusetts during the study period [128,138]. This provided comparisons for the impact of eligibility expansion (New England) and other components of Massachusetts health reform (Pennsylvania). We specified public insurance status an additional way: CSHCN with public insurance only versus CSHCN with public and private insurance.

RESULTS
Pre-reform, CSHCN in Massachusetts and other states were not different in terms of age, functional difficulties, sex, or proportion of non-English speakers. Massachusetts CSHCN were significantly more likely to be white, insured, and/or privately-insured (Table 3.2).

Post-reform in Massachusetts, 67% of CSHCN were privately-insured and 32% publicly-insured (p-for-trend = 0.71 and 0.74). Other states’ proportion of privately and publicly-insured CSHCN also remained stable (57% and 39%; p-for-trend = 0.51 and 0.83).

| Table 3.2 Demographic Characteristics of Children with Special Health Care Needs in Massachusetts and Other States before Massachusetts Health Reform, 2005 |
|-----------------------------------------------|-----------------|-----------------|
| Sample Size                                  | 788             | 39,846          |
| Age (SE)                                      | 10.1 (0.2)      | 9.9 (0.04)      |
| Number of functional difficulties (SE)        | 1.9 (0.07)      | 1.8 (0.01)      |
| % Female                                      | 39%             | 41%             |
| % White                                       | 81%             | 70%             |
| % Non-English language at home                | 5%              | 5%              |
| **Insurance Status and Type**                |                 |                 |
| % Uninsured                                   | 1%              | 4%              |
| % Privately insured only                      | 70%             | 61%             |
| % Publicly and Privately insured              | 8%              | 6%              |
| % Publicly insured only                       | 21%             | 29%             |

Student t and Chi-squared tests were used to assess differences in continuous and categorical variables respectively.

Uninsurance
The proportion of CSHCN who had one or more instances of uninsurance during the year increased non-significantly in Massachusetts (5.2% to 5.6%; p-for-trend = 0.77) and significantly in other states (8.9% to 9.4%; p-for-trend = 0.01). The difference-in-differences, i.e., the pre-post
difference in Massachusetts compared to the pre-post difference in other states, was 0.1% and non-significant (p-for-DD = 0.85) (Figure 3.1).

**Figure 3.1 Children with Special Health Care Needs with One or More Instances of Uninsurance before and after Massachusetts Health Reform**

![Graph showing prevalence of uninsured children with special health care needs](image)

**Access to Care**

For privately-insured CSHCN (Table 4.3A), access to specialists increased significantly post-reform in Massachusetts (p-for-trend = <0.001), but decreased non-significantly in other states (p-for-trend = 0.25). In the DD model, Massachusetts was associated with a statistically-significant increase in access to specialists (DD = 6.0%; p-for-DD = <0.001). For access to primary care, the post-reform period was associated with no significant change in Massachusetts (p-for-trend = 0.27), a small, significant decrease in access to a usual source of care in other states (p-for-trend = <0.001), and non-significant adjusted DDs. The proportion of families reporting that their insurance benefits met their CSHCN’s health care needs showed no significant change in Massachusetts (p-for-trend = 0.98), a significant decline in other states (p-for-trend = 0.03), and a non-significant adjusted DD. There were no significant trends in access to prescription medications or vision care for privately-insured CSHCN in Massachusetts or other states.
For publicly-insured CSHCN in Massachusetts, access to prescription medications decreased significantly post-reform (p-for-trend = 0.01), yet remained stable in other states (p-for-trend = 0.18) (Table 4.3B). Massachusetts was associated with a statistically significant decrease in access to prescription medications in the DD model (DD = -7.2%; p-for-DD = 0.003). In Massachusetts, measures of access to primary care remained stable, while in other states, the proportion of CSHCN having a usual source of care decreased (p-for-trend = <0.001). The DDs for measures of access to primary care were non-significant. There was no significant change in access to vision care in Massachusetts or other states post-reform.

<table>
<thead>
<tr>
<th>Table 3.3 Access to Care for Insured Children with Special Health Care Needs before and after Massachusetts Health Reform</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>A. Privately-Insured</strong></td>
</tr>
<tr>
<td>Insurance benefits met child’s health care needs</td>
</tr>
<tr>
<td>Pre (%)</td>
</tr>
<tr>
<td>91.2 (88.5, 93.9)</td>
</tr>
<tr>
<td>Insurance provides access to needed providers</td>
</tr>
<tr>
<td>93.4 (91.1, 95.8)</td>
</tr>
<tr>
<td>Has a Personal Doctor or Nurse</td>
</tr>
<tr>
<td>97.3 (95.7, 98.9)</td>
</tr>
<tr>
<td>Has a Usual Source of Sick and Preventive Care</td>
</tr>
<tr>
<td>96.4 (94.7, 98.1)</td>
</tr>
<tr>
<td>Need for Specialists Met</td>
</tr>
<tr>
<td>94.6 (91.4, 97.8)</td>
</tr>
<tr>
<td>Need for Prescription Medications Met</td>
</tr>
<tr>
<td>99.0 (97.8, 100)</td>
</tr>
<tr>
<td>Need for Vision Care Met</td>
</tr>
<tr>
<td>99.0 (97.0, 100)</td>
</tr>
<tr>
<td><strong>B. Publicly-Insured</strong></td>
</tr>
<tr>
<td>Insurance benefits met child’s health care needs</td>
</tr>
<tr>
<td>87.5 (82.3, 92.7)</td>
</tr>
<tr>
<td>Insurance provides access to needed providers</td>
</tr>
<tr>
<td>93.1 (89.5, 96.8)</td>
</tr>
<tr>
<td>Has a Personal Doctor or Nurse</td>
</tr>
<tr>
<td>94.2 (90.0, 98.4)</td>
</tr>
<tr>
<td>Has a Usual Source of Sick and Preventive Care</td>
</tr>
<tr>
<td>90.6 (85.3, 95.8)</td>
</tr>
<tr>
<td>Need for Specialists Met</td>
</tr>
<tr>
<td>96.7 (93.9, 99.5)</td>
</tr>
<tr>
<td>Need for Prescription Medications Met</td>
</tr>
<tr>
<td>99.8 (99.3, 100)</td>
</tr>
<tr>
<td>Need for Vision Care Met</td>
</tr>
<tr>
<td>94.2 (88.6, 99.8)</td>
</tr>
</tbody>
</table>

* Significant at p <0.05 level. ** Significant at p <0.01 level

Statistical significance of difference over time and difference-in-differences determined from multivariable models adjusted for child’s age, sex, race, non-English language at home, and functional disabilities.
**Financial Protection**

For privately-insured families in Massachusetts, OOP spending increased post-reform: the proportion of families spending greater than $1000 OOP increased significantly (p-for-trend = 0.04) (Table 3.4A). In other states, OOP spending also increased: the proportions of families spending greater than $1000 and $5000 OOP increased significantly (p-for-trend = <0.001 and 0.002). As trends toward increased OOP spending were similar in Massachusetts and other states, the DDs were non-significant. For privately-insured CSHCN in both Massachusetts and other states, there were no significant changes in families reporting unreasonable OOP spending or financial problems.

For publicly-insured CSHCN in Massachusetts, there were no significant changes in financial protection post-reform (Table 3.4B). In other states, financial protection decreased: the proportion of families reporting unreasonable OOP spending increased significantly (p-for-trend = 0.02), as did the proportion reporting financial problems (p-for-trend = <0.001). The DDs were non-significant, suggesting that financial protection for publicly-insured CSHCN was not significantly associated with Massachusetts health reform.

| Table 3.4 Financial Protection for Insured Children with Special Health Care Needs before and after Massachusetts Health Reform |
|---------------------------------|------------------|-----------------|------------------|------------------|
|                                 | MASSACHUSETTS    | OTHER STATES AND DC | DIFFERENCE-IN-DIFFERENCES |
|                                 | Pre (%)          | Post (%)          | Pre (%)          | Post (%)          | (%)             | p     |
| **A. Privately-insured**       |                  |                  |                  |                  |                  |
| Out-of-Pocket Spending         |                  |                  |                  |                  |                  |
| Greater than $1000             | 23.2 (19.0, 27.3)| 32.8 (28.4, 37.2)*| 26.7 (25.8, 27.6)| 32.7 (31.7, 33.8)**| -3.6%           | 0.20 |
| Greater than $5000             | 2.9 (1.3, 4.5)  | 5.9 (3.8, 8.1)   | 3.5 (3.1, 3.9)  | 5.6 (5.1, 6.1)**  | -0.9%           | 0.38 |
| Unreasonable Out-of-Pocket Spending | 29.2 (24.7, 33.7)| 31.4 (26.9, 35.8)| 31.1 (30.1, 32.1)| 33.5 (32.4, 34.6) | 0.2%            | 0.99 |
| Family Financial Problems      | 13.1 (9.7, 16.5)| 15.6 (12.1, 19.1)| 15.3 (14.6, 16.1)| 19.5 (18.5, 20.4)  | 1.7%            | 0.93 |
| **B. Publicly-insured**        |                  |                  |                  |                  |                  |
| Out-of-Pocket Spending         |                  |                  |                  |                  |                  |
| Greater than $1000             | 14.3 (8.6, 20.0)| 12.3 (6.5, 18.0)| 7.3 (6.5, 8.0)  | 8.0 (7.2, 8.7)    | 2.7%            | 0.50 |
| Greater than $5000             | 2.3 (0.4, 8.5)  | 4.8 (0.6, 9.0)   | 1.5 (1.2, 1.9)  | 1.6 (1.2, 2.0)    | -2.4%           | 0.31 |
| Unreasonable Out-of-Pocket Spending | 29.5 (21.7, 37.2)| 24.2 (16.2, 32.3)| 22.8 (21.5, 24.1)| 22.8 (21.5, 24.1)*| 5.3%            | 0.40 |
| Family Financial Problems      | 20.3 (13.5, 27.0)| 25.3 (17.6, 33.0)| 20.7 (19.5, 21.9)| 22.1 (20.8, 23.5)**| -3.6%           | 0.39 |

* Significant at p < 0.05 level. ** Significant at p < 0.01 level
Statistical significance of difference over time and difference-in-differences determined from multivariable models adjusted for child’s age, sex, race, non-English language at home, and functional disabilities.
Sensitivity Analysis

Our sensitivity analysis with two alternate comparison groups (New England, Pennsylvania) confirmed our main findings (Appendix Tables 3.1 and 3.2). Additionally, compared to Pennsylvania, Massachusetts was associated with decreased access to vision care for publicly-insured CSHCN post-reform (DD = 20.1%; p-for-DD = 0.01). Findings were similar when we analyzed public insurance versus dual public and private insurance (Appendix Table 3.3).

DISCUSSION

This study shows that, although Massachusetts health reform did not reduce instances of uninsurance, it was associated with changes in access and financial protection for CSHCN. The reform’s effects differed, depending on whether CSHCN were privately versus publicly-insured. For privately-insured CSHCN in Massachusetts, the post-reform period was associated with increased access to specialists when compared to other states. For publicly-insured CSHCN in Massachusetts, however, the post-reform period was associated with decreased access to prescription medications compared to other states. In Massachusetts, the post-reform period was associated with stable access to primary care for privately and publicly-insured CSHCN, while CSHCN in other states experienced some decline in access to primary care. The post-reform period was not associated with improvements in financial protection for CSHCN in Massachusetts or other states.

Our study was potentially limited by low response rates in the 2009/2010 NS-CSHCN. However, in addition to our usage of recommended survey weights to account for random non-response effects, five other studies corroborate the trends we found. An examination of the Medical Expenditures Panel Survey (MEPS) also found a small, non-significant increase in the prevalence of children experiencing uninsurance nationwide from 2005-2008 [139]. Three studies (one MEPS, two using the National Health Interview Survey) found that access to a usual source had not changed for privately or publicly-insured children in Massachusetts or nationwide from 2000-2010 [73,111]. One of these studies reported a significant increase in cost-related delays in care nationwide [140]. Within MA, a 2010 survey of privately-insured families found that 40% reported higher-than-expected OOP spending post-reform [141]. One MEPS study did find a decrease in OOP spending ($100) for privately-insured CSHCN from 2005-2009; a
difference of this magnitude is not detectable with NS-CSHCN questions on OOP spending [132].

Our study had limitations. We accounted for differences in Medicaid-CHIP income eligibility and benefit design with sensitivity analyses, but cannot account for all differences between states. We had 80% power to detect pre-post differences of ≥3% at p-value of 0.05 in Massachusetts and other states; at times, smaller trends that were non-significant in Massachusetts were found to be so in other states, given the understandably smaller sample size in Massachusetts. Some variables had high rates of positive responses (>95%), making it challenging to improve (a.k.a., “ceiling effects”), which increased the difficulty of detecting significant changes over time.

The lack of reduction in uninsurance for CSHCN may have stemmed from the lack of a child-specific mandate within Massachusetts health reform [61]. It may also be attributable to the fact that Massachusetts had not yet implemented simplifications in Medicaid-CHIP enrollment or renewal, which have been shown to reduce instances of uninsurance for children from low-income families [142–144]. On the other hand, Massachusetts had high Medicaid-CHIP eligibility levels and rates of insurance pre-reform, so the remaining uninsured CSHCN might be hard-to-reach or undocumented [110,145]. Since the ACA specifically includes children in the individual mandate and incentivizes states to simplify Medicaid-CHIP enrollment and renewal, reductions in uninsurance may be greater under the ACA than Massachusetts health reform [28,146].

For privately-insured CSHCN, improved access to specialists post-reform suggests the value of defining minimum essential health benefits for private insurance plans. Massachusetts health reform mandated that all private insurance plans must cover medical and surgical care and placed limits on enrollee cost-sharing (e.g., no copays for preventive care visits) [147].

Our finding of decreased access to prescription medications for publicly-insured CSHCN concurs with findings for adults: prescription medications remain a large unmet needs post-reform [148]. Contemporary with its 2006 health reform, Massachusetts also changed its Medicaid pharmacy program, including adding a formulary and prior authorization [149]. Such changes may have increased drug substitutions and/or wait times for medications [150].

Our study did not find an association between Massachusetts health reform and decreased access to primary care for privately or publicly-insured CSHCN, despite well-publicized
concerns about primary care shortages [57,62]. This may be because, although some CSHCN see family practitioners, the majority (78%) of CSHCN receive care from pediatricians and may be protected from delays observed in adult primary care [63]. Being insured is highly correlated with access to primary care, so increases in access may be greater under the ACA than Massachusetts health reform, given the ACA’s additional incentives to insure children [9,151,152].

Massachusetts health reform did not have the intended effect of improving financial protection for CSHCN. Our findings of increased OOP spending post-reform concur with longer-term findings for adults: although gaining insurance initially increased financial protection, many families and individuals have faced higher than expected OOP spending post-reform [83,85,86,91,141,153]. As OOP spending increased in Massachusetts and other states for CSHCN, the increase may reflect a national trend toward decreased financial protection.

Conclusions
Many of the key provisions in Massachusetts health reform are comparable to those in the ACA, such as the individual mandate, essential health benefits with limits on cost-sharing, and state Medicaid expansion. This study suggests that expectations around the ACA’s effect on access to primary care and financial protection for families of CSHCN should be modest. Privately-insured CSHCN may experience better access to specialists. Further child or CSHCN-specific policy changes may be necessary in order to improve access to affordable health care for CSHCN.
### Appendix Table 3.1 Difference-in-Differences for Children with Special Health Care Needs in Massachusetts compared to New England States before and after Massachusetts Health Reform

<table>
<thead>
<tr>
<th>Uninsurance-All Children</th>
<th>Massachusetts</th>
<th>New England</th>
<th>Difference-in-Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or More Instances of Uninsurance</td>
<td>5.2 (3.2, 7.2)</td>
<td>6.5 (5.4, 7.6)</td>
<td>0.4% (0.47)</td>
</tr>
</tbody>
</table>

**A. Privately-Insured**

<table>
<thead>
<tr>
<th>Insurance benefits met child’s health care needs</th>
<th>91.2 (88.5, 93.9)</th>
<th>88.8 (87.2, 90.4)</th>
<th>-2.4% (0.46)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insurance provides access to needed providers</td>
<td>93.4 (91.1, 95.8)</td>
<td>91.9 (90.7, 93.5)</td>
<td>-1.5% (0.38)</td>
</tr>
<tr>
<td>Has a Personal Doctor or Nurse</td>
<td>97.3 (95.7, 98.9)</td>
<td>97.8 (97.1, 98.4)</td>
<td>0.3% (0.07)</td>
</tr>
<tr>
<td>Has a Usual Source of Sick and Preventive Care</td>
<td>96.4 (94.7, 98.1)</td>
<td>95.8 (94.9, 96.7)</td>
<td>-0.2% (0.85)</td>
</tr>
<tr>
<td>Need for Specialists Met</td>
<td>94.6 (91.4, 97.8)</td>
<td>96.6 (95.3, 97.9)</td>
<td>4.3% (0.01)</td>
</tr>
<tr>
<td>Need for Prescription Medications Met</td>
<td>99.0 (97.8, 100)</td>
<td>99.1 (98.6, 99.7)</td>
<td>0.2% (0.79)</td>
</tr>
<tr>
<td>Need for Vision Care Met</td>
<td>99.0 (97.0, 100)</td>
<td>97.9 (96.8, 99.0)</td>
<td>-1.5% (0.49)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $1000</td>
<td>23.2 (19.0, 21.3)</td>
<td>24.4 (22.3, 26.5)</td>
<td>1.3% (0.60)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $5000</td>
<td>2.9 (1.3, 4.5)</td>
<td>3.6 (2.7, 4.6)</td>
<td>1.0% (0.31)</td>
</tr>
<tr>
<td>Unreasonable Out-of-Pocket Spending</td>
<td>29.2 (24.7, 33.7)</td>
<td>32.6 (26.3, 30.9)</td>
<td>0.3% (0.07)</td>
</tr>
<tr>
<td>Family Financial Problems</td>
<td>13.1 (9.7, 16.5)</td>
<td>16.8 (14.5, 19.1)</td>
<td>0.4% (0.95)</td>
</tr>
</tbody>
</table>

**B. Publicly-Insured**

<table>
<thead>
<tr>
<th>Insurance benefits met child’s health care needs</th>
<th>87.5 (82.3, 92.7)</th>
<th>87.5 (84.6, 90.4)</th>
<th>0.3% (0.99)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insurance provides access to needed providers</td>
<td>93.1 (89.5, 96.8)</td>
<td>89.1 (86.0, 92.2)</td>
<td>1.3% (0.75)</td>
</tr>
<tr>
<td>Has a Personal Doctor or Nurse</td>
<td>94.2 (90.0, 98.4)</td>
<td>94.5 (92.3, 96.7)</td>
<td>1.4% (0.70)</td>
</tr>
<tr>
<td>Has a Usual Source of Sick and Preventive Care</td>
<td>90.6 (85.3, 95.8)</td>
<td>93.8 (91.8, 95.8)</td>
<td>-0.9% (0.89)</td>
</tr>
<tr>
<td>Need for Specialists Met</td>
<td>96.7 (93.9, 99.5)</td>
<td>91.5 (88.1, 94.8)</td>
<td>-3.6% (0.21)</td>
</tr>
<tr>
<td>Need for Prescription Medications Met</td>
<td>99.8 (99.3, 100)</td>
<td>97.6 (96.1, 99.1)</td>
<td>-9.6% (0.01)</td>
</tr>
<tr>
<td>Need for Vision Care Met</td>
<td>94.2 (88.6, 99.8)</td>
<td>96.2 (93.8, 98.5)</td>
<td>-11.7% (0.45)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending ≥ $1000</td>
<td>14.3 (8.6, 20.0)</td>
<td>7.8 (5.9, 9.8)</td>
<td>1.0% (0.91)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending ≥ $5000</td>
<td>2.3 (0.4, 4.8)</td>
<td>1.5 (0.7, 2.2)</td>
<td>-2.6% (0.44)</td>
</tr>
<tr>
<td>Unreasonable Out-of-Pocket Spending</td>
<td>29.5 (21.7, 37.2)</td>
<td>22.3 (18.7, 26.0)</td>
<td>5.0% (0.37)</td>
</tr>
<tr>
<td>Family Financial Problems</td>
<td>20.3 (13.5, 27.0)</td>
<td>20.1 (17.1, 23.1)</td>
<td>-5.6% (0.35)</td>
</tr>
</tbody>
</table>

* Significant at p < 0.05 level. ** Significant at p < 0.01 level

Statistical significance of difference over time and difference-in-differences determined from multivariable models adjusted for child’s age, sex, race, non-English language at home, and functional disabilities.
<table>
<thead>
<tr>
<th>Uninsurance- All Children</th>
<th>MASSACHUSETTS</th>
<th>PENNSYLVANIA</th>
<th>DIFFERENCE-IN-DIFFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or More Instances of Uninsurance</td>
<td>5.2 (3.2, 7.2)</td>
<td>7.6 (5.2, 10.0)</td>
<td>1.2% (0.63)</td>
</tr>
<tr>
<td><strong>A. Privately-Insured</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance benefits met child’s health care needs</td>
<td>91.2 (88.5, 93.9)</td>
<td>89.6 (86.7, 92.5)</td>
<td>88.4 (84.1, 92.7)</td>
</tr>
<tr>
<td>Insurance provides access to needed providers</td>
<td>93.4 (91.1, 95.8)</td>
<td>91.9 (89.4, 94.4)</td>
<td>93.2 (89.5, 96.9)</td>
</tr>
<tr>
<td>Has a Personal Doctor or Nurse</td>
<td>97.3 (95.7, 98.9)</td>
<td>97.7 (96.1, 99.3)</td>
<td>95.5 (92.6, 98.5)</td>
</tr>
<tr>
<td>Has a Usual Source of Sick and Preventive Care</td>
<td>96.4 (94.7, 98.1)</td>
<td>94.9 (92.8, 96.9)</td>
<td>93.8 (90.0, 97.5)</td>
</tr>
<tr>
<td>Need for Specialists Met</td>
<td>94.6 (91.4, 97.8)</td>
<td>98.9 (90.0, 99.9)</td>
<td>96.9 (94.1, 99.6)</td>
</tr>
<tr>
<td>Need for Prescription Medications Met</td>
<td>99.0 (97.8, 100)</td>
<td>99.4 (98.7, 100)</td>
<td>99.1 (97.9, 100)</td>
</tr>
<tr>
<td>Need for Vision Care Met</td>
<td>99.0 (97.0, 100)</td>
<td>97.4 (94.8, 100)</td>
<td>98.9 (97.1, 100)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $1000</td>
<td>23.2 (19.0, 27.3)</td>
<td>32.8 (28.4, 37.2)</td>
<td>55.6 (49.2, 62.1)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $5000</td>
<td>2.9 (1.3, 4.5)</td>
<td>5.9 (3.8, 8.1)</td>
<td>1.8 (0.3, 3.4)</td>
</tr>
<tr>
<td>Unreasonable Out-of-Pocket Spending</td>
<td>29.2 (24.7, 33.7)</td>
<td>31.4 (26.9, 35.8)</td>
<td>29.0 (23.9, 34.7)</td>
</tr>
<tr>
<td>Family Financial Problems</td>
<td>23.1 (9.7, 26.5)</td>
<td>15.6 (12.1, 19.1)</td>
<td>14.6 (10.2, 19.0)</td>
</tr>
<tr>
<td><strong>B. Publicly-Insured</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance benefits met child’s health care needs</td>
<td>87.5 (82.3, 92.7)</td>
<td>87.0 (80.8, 93.1)</td>
<td>92.4 (89.4, 95.3)</td>
</tr>
<tr>
<td>Insurance provides access to needed providers</td>
<td>93.1 (89.5, 96.8)</td>
<td>93.0 (89.2, 96.9)</td>
<td>90.7 (87.1, 94.3)</td>
</tr>
<tr>
<td>Has a Personal Doctor or Nurse</td>
<td>94.2 (90.0, 98.4)</td>
<td>94.8 (90.8, 98.8)</td>
<td>94.7 (91.8, 97.4)</td>
</tr>
<tr>
<td>Has a Usual Source of Sick and Preventive Care</td>
<td>90.6 (85.3, 95.8)</td>
<td>86.5 (78.4, 94.7)</td>
<td>91.2 (87.8, 94.7)</td>
</tr>
<tr>
<td>Need for Specialists Met</td>
<td>96.7 (93.9, 99.5)</td>
<td>91.0 (84.8, 97.3)</td>
<td>94.7 (90.5, 98.8)</td>
</tr>
<tr>
<td>Need for Prescription Medications Met</td>
<td>99.8 (99.3, 100)</td>
<td>91.6 (82.7, 100)</td>
<td>97.3 (94.9, 99.8)</td>
</tr>
<tr>
<td>Need for Vision Care Met</td>
<td>94.2 (88.6, 99.8)</td>
<td>79.6 (59.8, 99.4)</td>
<td>92.2 (87.0, 97.3)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $1000</td>
<td>14.3 (8.6, 20.0)</td>
<td>12.3 (6.5, 18.0)</td>
<td>7.7 (4.8, 10.7)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $5000</td>
<td>2.3 (0.4, 4.8)</td>
<td>4.8 (0.6, 9.0)</td>
<td>2.3 (0.3, 4.3)</td>
</tr>
<tr>
<td>Unreasonable Out-of-Pocket Spending</td>
<td>29.5 (21.7, 37.2)</td>
<td>24.2 (16.2, 32.3)</td>
<td>21.1 (15.8, 26.4)</td>
</tr>
<tr>
<td>Family Financial Problems</td>
<td>20.3 (13.5, 27.0)</td>
<td>25.3 (17.6, 33.0)</td>
<td>18.4 (13.3, 23.5)</td>
</tr>
</tbody>
</table>

* Significant at p <0.05 level. ** Significant at p <0.01 level

Statistical significance of difference over time and difference-in-differences determined from multivariable models adjusted for child’s age, sex, race, non-English language at home, and functional disabilities.
### Appendix Table 3.3 Difference-in-Differences for Children with Special Health Care Needs by Public Insurance in Massachusetts compared to Other States before and after Massachusetts Health Reform

<table>
<thead>
<tr>
<th></th>
<th>MASSACHUSETTS</th>
<th>OTHER STATES AND DC</th>
<th>DIFFERENCE-IN-DIFFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre (%)</td>
<td>Post (%)</td>
<td>Pre (%)</td>
</tr>
<tr>
<td><strong>A. Publicly-Insured Only</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance benefits met child’s health care needs</td>
<td>87.3 (81.1, 93.4)</td>
<td>88.9 (82.1, 95.7)</td>
<td>84.4 (83.1, 85.7)</td>
</tr>
<tr>
<td>Insurance provides access to needed providers</td>
<td>93.6 (89.6, 97.6)</td>
<td>92.2 (86.9, 97.4)</td>
<td>87.9 (86.7, 89.2)</td>
</tr>
<tr>
<td>Has a Personal Doctor or Nurse</td>
<td>95.9 (92.5, 99.3)</td>
<td>93.9 (88.3, 99.4)</td>
<td>91.3 (90.3, 92.3)</td>
</tr>
<tr>
<td>Has a Usual Source of Sick and Preventive Care</td>
<td>88.9 (82.3, 95.5)</td>
<td>83.6 (72.4, 94.8)</td>
<td>91.2 (90.2, 92.2)</td>
</tr>
<tr>
<td>Need for Specialists Met</td>
<td>96.8 (93.6, 100)</td>
<td>88.0 (79.1, 96.9) *</td>
<td>92.4 (91.1, 93.7)</td>
</tr>
<tr>
<td>Need for Prescription Medications Met</td>
<td>99.7 (99.1, 100)</td>
<td>88.1 (76.0, 100) *</td>
<td>97.0 (96.4, 97.7)</td>
</tr>
<tr>
<td>Need for Vision Care Met</td>
<td>96.9 (92.7, 100)</td>
<td>73.6 (49.6, 97.7)</td>
<td>94.0 (92.6, 95.4)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $1000</td>
<td>9.0 (4.0, 14.1)</td>
<td>8.9 (2.0, 15.8)</td>
<td>5.2 (4.4, 5.9)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $5000</td>
<td>0.2 (0.0, 0.6)</td>
<td>4.6 (0.9, 9.9)*</td>
<td>0.8 (0.5, 1.1)</td>
</tr>
<tr>
<td>Unreasonable Out-of-Pocket Spending</td>
<td>31.1 (21.9, 40.4)</td>
<td>23.5 (13.0, 34.0)</td>
<td>21.5 (20.0, 22.9)</td>
</tr>
<tr>
<td>Family Financial Problems</td>
<td>28.8 (11.0, 26.5)</td>
<td>20.3 (11.7, 28.9)</td>
<td>19.5 (18.2, 20.8)</td>
</tr>
<tr>
<td><strong>B. Publicly and Privately-Insured</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance benefits met child’s health care needs</td>
<td>88.0 (78.3, 97.7)</td>
<td>82.7 (70.4, 95.)</td>
<td>83.6 (81.2, 86.0)</td>
</tr>
<tr>
<td>Insurance provides access to needed providers</td>
<td>92.0 (83.8, 100)</td>
<td>94.9 (90.5, 99.2)</td>
<td>88.7 (86.8, 90.6)</td>
</tr>
<tr>
<td>Has a Personal Doctor or Nurse</td>
<td>89.4 (76.8, 100)</td>
<td>96.8 (92.9, 100) *</td>
<td>91.9 (90.1, 93.7)</td>
</tr>
<tr>
<td>Has a Usual Source of Sick and Preventive Care</td>
<td>95.3 (88.2, 100)</td>
<td>92.8 (85.7, 99.9)</td>
<td>91.2 (89.4, 93.0)</td>
</tr>
<tr>
<td>Need for Specialists Met</td>
<td>96.4 (91.0, 100)</td>
<td>97.6 (92.8, 100)</td>
<td>94.2 (91.8, 96.5)</td>
</tr>
<tr>
<td>Need for Prescription Medications Met</td>
<td>No observations</td>
<td>No observations</td>
<td>99.2 (98.7, 99.8)</td>
</tr>
<tr>
<td>Need for Vision Care Met</td>
<td>No observations</td>
<td>No observations</td>
<td>94.7 (91.8, 97.7)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $1000</td>
<td>29.3 (14.0, 44.6)</td>
<td>19.8 (9.1, 30.4)</td>
<td>15.5 (13.2, 17.7)</td>
</tr>
<tr>
<td>Out-of-Pocket Spending Greater than $5000</td>
<td>8.2 (0.0, 17.4)</td>
<td>5.3 (0.0, 11.7)</td>
<td>4.2 (3.0, 5.5)</td>
</tr>
<tr>
<td>Unreasonable Out-of-Pocket Spending</td>
<td>24.8 (11.3, 38.3)</td>
<td>25.7 (13.9, 37.4)</td>
<td>27.7 (25.0, 30.5)</td>
</tr>
<tr>
<td>Family Financial Problems</td>
<td>24.5 (10.7, 38.3)</td>
<td>36.1 (21.2, 51.0)</td>
<td>25.5 (22.7, 28.3)</td>
</tr>
</tbody>
</table>

* Significant at p < 0.05 level. ** Significant at p < 0.01 level

Statistical significance of difference over time and difference-in-differences determined from multivariable models adjusted for child’s age, sex, race, non-English language at home, and functional disabilities.
CHAPTER 4. THE ELIGIBILITY OF UNINSURED CHILDREN FOR EMPLOYER-SPONSORED HEALTH INSURANCE

INTRODUCTION
Employer-sponsored health insurance (ESI) is the major source of coverage for children and adolescents aged 0-17 years in the United States. Since 2009, ESI has covered approximately 55% of US children or around 38 million children every year [24,25]. ESI is particularly important for families living at or below 400% of the federal poverty level (FPL) because employers provide a source of insurance for families who may not be income-eligible for public insurance through their state’s Medicaid or Children’s Health Insurance Program (CHIP) [154–156]. ESI covers 68% of children living in families with incomes above 200% FPL, 28% of children in families living between 100-199% FPL, and 10% of children in families living below 100% FPL [24,154,157,158].

Understanding the coverage options available to uninsured children is important to guide efforts to insure all children, and ESI could be an important source of coverage for the 6 million uninsured children in the US [1]. Prior studies on uninsured children have focused on their eligibility for public insurance [110,121,159,160]. To our knowledge, there are no studies of child ESI eligibility among uninsured children. If a substantial percentage of uninsured children are ESI-eligible, but not enrolled, stakeholders could reduce uninsurance by increasing child ESI enrollment.

ESI may be an option for covering uninsured children with special health care needs (CSHCN) who, because of their ongoing health issues, are likely to face issues with access to, and costs of, care when uninsured [12]. Parents of CSHCN may be motivated to seek employers offering ESI and to enroll their CSHCN in ESI when eligible [161]. If this is the case, we would expect a low percentage of uninsured CSHCN to be ESI-eligible. However, there are no studies on child ESI-eligibility among uninsured CSHCN.

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3 This work was presented in part at the 2015 AcademyHealth Child Health Services Research Interest Group and Annual Research meetings. It received Honorable Mention among student posters at the Annual Research meeting: (1) Smith AJB, Chien AT. The Eligibility of Uninsured Children for Employer-Sponsored Insurance: Findings from the 2011 National Survey of Children’s Health. Paper presented at: AcademyHealth Child Health Services Research Interest Group Meeting; 2015 Jun 13; Minneapolis, MN. (2) Smith AJB, Chien AT, “The Eligibility of Uninsured Children for Employer-Sponsored Insurance: Findings from the 2011 lineNational Survey of Children’s Health. Poster presentation at: AcademyHealth Annual Research Meeting; 2015 Jun 14; Minneapolis, MN.
Little is known about what factors influence children’s eligibility for ESI. Studies in adults suggest that individual and employer factors strongly influence adult ESI-eligibility and enrollment. For example, employers in the Midwest and large employers are much more likely to offer ESI. Adults with greater employer contributions to premiums are more likely to enroll in ESI when eligible [162–165]. Existing studies of child ESI-eligibility focus on low-income, publicly-insured children and may not be representative of uninsured children [39,155,166–168]. To our knowledge, no study has examined the relative contribution of child, family, and employer factors to child ESI-eligibility in uninsured children.

Understanding the potential for child ESI-eligibility is also timely as experts anticipate that ESI will cover even more children with the full implementation of the 2010 Patient Protection and Affordable Care Act (ACA) [44]. Since 2014, the ACA has required that parents enroll their children ages 0-17 years in insurance or face a penalty. As of 2015, the ACA requires that large employers (>50 employees) offer ESI to full-time employees and their children or face a penalty. Initial surveys suggest that, for adults, these provisions are working, increasing ESI enrollment among uninsured, ESI-eligible adults and expanding the number of employers offering ESI [169–172]. Prior experience under Massachusetts health reform, the model for the ACA, showed that a similar mandate increased both ESI-eligibility and ESI-enrollment for adults and children [61,153,173].

The aims of the present study were to: (1) estimate the percentage of uninsured children who were eligible for ESI, but not enrolled; (2) estimate the percentage of uninsured CSHCN eligible for ESI, but not enrolled; (3) examine how child, family, and employer characteristics were associated with child ESI-eligibility; and (4) identify barriers to enrollment among ESI-eligible children in a national sample of uninsured children prior to the implementation of the ACA’s employer and individual mandates. Understanding uninsured children’s ESI-eligibility helps set a benchmark for ACA effects and may assist in targeting future coverage efforts.

METHODS

Study Design

We conducted a cross-sectional study of the 3528 children, including 403 CSHCN, who were uninsured and under 400% FPL in the most recent wave of the National Survey of Children’s
Health (NSCH), 2011-2012. This study was granted exemption by the Harvard Medical School Institutional Review Board.

Data Source
The NSCH is a nationally-representative telephone survey of parents and guardians with at least one child aged 0-17 years in the household. Parents of uninsured children under 400% FPL answered an eight-item survey that allowed us to estimate the proportion of uninsured children who were eligible for insurance through a parent’s employer and to calculate the main barrier that parents reported to obtaining ESI for uninsured, ESI-eligible children. The limitation to uninsured children below 400% FPL was pre-specified in the NSCH’s design and has been previously used in at least one non-NSCH study, given the low rate of uninsurance in higher-income families [37]. We applied survey weights developed by the National Center for Health Statistics to account for possible non-response bias [113,114].

Main Outcomes
Our first outcome was the percentage of uninsured children who were eligible for ESI, but not enrolled. We characterized uninsured children as ESI-eligible if their parent responded “yes” to question, “Does this employer/union offer[s] health insurance that could help pay for doctor visits and hospital stays for [your child]?” This question was asked only of parents who were either insured or ESI-eligible themselves. Children whose parents were both uninsured and not ESI-eligible were automatically characterized as not ESI-eligible.

Our second outcome was the percentage of uninsured CSHCN who were eligible for ESI, but not enrolled. We used a standardized definition of having a special health care need (e.g., having at least one type of ongoing health condition that results in an above routine need for health and related services) from parent response to the NSCH’s CSHCN screener [174].

Our third outcome was the degree to which child ESI-eligibility was associated with child, family, and employer characteristics. For child characteristics, we included having special health care needs, age (0-4, 5-9, 10-13, 15-17 years), gender, race/ethnicity (white, Hispanic, black, multi-racial or other), being previously insured, and length of time uninsured (less than six months, six months to one year, one to three years, more than 3 years, never insured) [110,162,175]. For family characteristics, we included non-English language at home, total
number of children in the home (1, 2, 3, 4+), single parent household, parent education (less than high school graduate, high school graduate, more than high school graduate), and imputed family income level (0-99% FPL, 100-199% FPL, 200-299%, 300-399% FPL) [176]. We included region (North, South, Midwest, West) as the employer variable. Data was missing for 0-5% of covariates, and these cases were excluded from multivariate analyses.

Our fourth outcome was the main barriers parents faced in obtaining ESI for their ESI-eligible children. Parents were asked to choose the single biggest barrier to enrolling their child from five categories (cost, application difficulties, eligibility limitations, negative views of available ESI, or other). To further characterize the cost barrier, we examined expected employer contribution to insurance premiums as “all”, “some” or “none” based on parent response to the question, “If [your child] was covered by insurance provided through this employer/union, would this employer/union pay for all, some, or none of [your child’s] insurance premium?”.

For children with more than one parent or guardian, we labeled the child as having the highest level of insurance eligibility/expected employer contribution (e.g., if a mother was insured and a father uninsured, we considered the child as having insured parent(s)). Nineteen percent of the sample had a discordance in parental insurance status, 16% a discordance in parental ESI-eligibility, and 2% a discordance in expected employer contribution. Data was missing for 1.8-8% of the outcome variables.

Statistical Analysis
Descriptive statistics based on child, family, and employer characteristics were assessed for all uninsured children under 400% FPL. For main outcomes, we report weighted percentages with 95% confidence intervals (CI).

To understand the multifactorial influences on child ESI-eligibility, we used a multivariate logistic regression adjusted for the covariates of interest. We report adjusted odds ratio with 95% CI for each variable. For uninsured, ESI-eligible children, we used repeat bivariate logistic regression models to analyze the association between barriers to enrollment or expected employer contribution with a child having a special health care need, family income level, region, and parent employer size (more than 100, 50-100, or less than 50 employees).

We considered a p-value of <0.05 to be significant. All statistical analyses were conducted within Stata/IC13.1 (StataCorp, College Station, Texas).
RESULTS

Our study population of uninsured children was diverse in age, race/ethnicity, household composition, and length of time uninsured (Table 4.1). Twelve percent of uninsured children had special health care needs (95% CI 9.5-13.9). Three-quarters of uninsured children lived in families below 200% FPL, and the majority had previously been insured (95% CI 70.2-77.0).

| Table 4.1 Demographic Characteristics of Uninsured Children <400% FPL, 2011-2012 |
|---------------------------------|---------------------------------|
| Sample Size (n) | 3528 |
| Child has a Special Health Care Need | 11.7 (9.5-13.9) |
| Child Age (years) |  |
| - 0-4 | 21.8 (18.6-25.1) |
| - 5-9 | 27.9 (24.6-31.3) |
| - 10-13 | 23.3 (20.1-26.4) |
| - 14-17 | 27.0 (23.7-30.1) |
| Child Sex |  |
| - Male | 55.5 (51.8-59.2) |
| - Female | 44.5 (40.8-48.2) |
| Child Race/Ethnicity |  |
| - White, non-Hispanic | 35.8 (32.5-39.1) |
| - Hispanic | 44.1 (40.4-47.9) |
| - Black, non-Hispanic | 11.8 (9.3-14.2) |
| - Multi-racial or other, non-Hispanic | 8.2 (6.5-9.9) |
| Child Previously Insured | 73.6 (70.2-77.0) |
| Child Length of Uninsurance |  |
| - Less than 6 months | 31.8 (28.2-35.4) |
| - Six months to 1 year | 13.3 (10.7-16.0) |
| - One to three years | 21.8 (18.8-24.8) |
| - More than 3 years | 16.7 (14.0-19.5) |
| - Never insured | 16.3 (13.3-19.3) |
| Non-English language at home | 36.6 (32.9-40.3) |
| Single Parent Household | 20.7 (17.7-23.7) |
| Number of Children in Household |  |
| - 1 | 26.7 (23.6-29.8) |
| - 2 | 32.7 (29.3-36.0) |
| - 3 | 26.0 (22.4-29.5) |
| - 4+ | 14.6 (11.6-17.7) |
| Parent Education |  |
| - Less than High School Graduate | 40.1 (36.2-44.1) |
| - High School Graduate | 29.4 (26.0-32.8) |
| - More than High School Graduate | 30.4 (26.8-34.1) |
| Family Income Level |  |
| - 0-99% FPL | 36.6 (32.9-40.3) |
| - 100-199% FPL | 39.3 (35.5-43.0) |
| - 200-299% FPL | 17.0 (14.5-19.4) |
| - 300-399% FPL | 7.1 (5.4-8.9) |
| Region |  |
| - Northeast | 8.9 (7.6-10.1) |
| - South | 47.8 (45.0-50.6) |
| - Midwest | 13.0 (11.8-14.3) |
| - West | 30.3 (27.6-33.0) |
We found that 20.7% (95% CI 17.8-23.6) of uninsured children were eligible for ESI, but not enrolled. Twenty-five percent (24.8, 95% CI 15.6-33.9) of uninsured CSHCN were eligible for ESI, but not enrolled. In families with incomes between 200-399% FPL, 31.2% (95% CI 25.5-36.9) of uninsured children, and 35.1% (95% CI 17.8-52.5) of uninsured CSHCN, were ESI-eligible, but not enrolled.

In multivariate analyses (Table 4.2), having a family income >100% FPL was significantly associated with greater likelihood of child ESI-eligibility. Speaking a non-English language at home and being uninsured for 1-3 years were significantly associated with a lower likelihood of a child being ESI-eligible, but not enrolled. Having special health care needs was not significantly associated with child ESI-eligibility, nor was child age, race/ethnicity, sex, household composition, or region.

Table 4.3 shows reported barriers to ESI and expected employer contributions among uninsured, ESI-eligible children. Cost was the main barrier (69.9%), followed by other reasons (12.9%), difficulties with the application process (12.3%), additional eligibility issues (4.5%), or negative views of available ESI (0.4%). Parents in higher-income families were more likely to report “other” barriers to enrolling their ESI-eligible child than cost or application difficulties (data available on request). Parent-reported barriers to enrollment did not vary significantly with a child having special health care needs, region, or employer size.

For employer contribution, 12.3% of families (95% CI 7.9-16.9) expected employers to pay all of their child’s premiums, 49.8% (95% CI 41.8-57.9) expected employers to pay some of the premium, and 37.8% (95% CI 29.5-46.2) expected employer to pay none of the premium. Level of expected employer contribution was not significantly associated with a child having special health care needs, family income level, or region (data available on request). Uninsured children whose parent worked at a large employer (more than 100 employees) were more likely to expect employers to pay all or some of their child’s insurance premium (OR 2.59, 95% CI 1.20-5.60, p = 0.02) than uninsured children whose parent worked at a small employer.
### Table 4.2 Associations of Child, Family, and Employer Characteristics with ESI-Eligibility among Uninsured Children

<table>
<thead>
<tr>
<th></th>
<th>ALL UNSURED CHILDREN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adjusted OR (95% CI)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Size (n)</strong></td>
<td>3143</td>
</tr>
<tr>
<td>Child has Special Health Care Need</td>
<td>1.11 (0.66-1.86)</td>
</tr>
<tr>
<td><strong>Child Age (years)</strong></td>
<td></td>
</tr>
<tr>
<td>- 0-4</td>
<td>1.0 [Reference]</td>
</tr>
<tr>
<td>- 5-9</td>
<td>1.22 (0.71-2.09)</td>
</tr>
<tr>
<td>- 10-13</td>
<td>1.15 (0.66-2.00)</td>
</tr>
<tr>
<td>- 14-17</td>
<td>1.04 (0.58-1.84)</td>
</tr>
<tr>
<td><strong>Child Sex</strong></td>
<td></td>
</tr>
<tr>
<td>- Male</td>
<td>1.0 [Reference]</td>
</tr>
<tr>
<td>- Female</td>
<td>1.16 (0.82-1.66)</td>
</tr>
<tr>
<td><strong>Child Race/Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>- White</td>
<td>1.0 [Reference]</td>
</tr>
<tr>
<td>- Hispanic</td>
<td>0.58 (0.33-1.03)</td>
</tr>
<tr>
<td>- Black, non-Hispanic</td>
<td>1.49 (0.82-2.71)</td>
</tr>
<tr>
<td>- Multi-racial or Other, non-Hispanic</td>
<td>0.77 (0.44-1.32)</td>
</tr>
<tr>
<td><strong>Child Previously Insured</strong></td>
<td>1.11 (0.66-1.86)</td>
</tr>
<tr>
<td><strong>Child Length of Uninsurance</strong></td>
<td></td>
</tr>
<tr>
<td>- Less than 6 months</td>
<td>1.0 [Reference]</td>
</tr>
<tr>
<td>- Six months to 1 year</td>
<td>1.21 (0.70-2.08)</td>
</tr>
<tr>
<td>- One to three years</td>
<td>0.59 (0.36-0.97)</td>
</tr>
<tr>
<td>- More than 3 years</td>
<td>1.45 (0.84-2.48)</td>
</tr>
<tr>
<td>- Never insured</td>
<td>1.17 (0.47-2.94)</td>
</tr>
<tr>
<td><strong>Non-English language at home</strong></td>
<td>0.52 (0.28-0.93)</td>
</tr>
<tr>
<td><strong>Single Parent Household</strong></td>
<td>0.76 (0.49-1.20)</td>
</tr>
<tr>
<td><strong>Number of Children in Household</strong></td>
<td></td>
</tr>
<tr>
<td>- 1</td>
<td>1.0 [Reference]</td>
</tr>
<tr>
<td>- 2</td>
<td>1.15 (0.75-1.77)</td>
</tr>
<tr>
<td>- 3</td>
<td>0.76 (0.44-1.32)</td>
</tr>
<tr>
<td>- 4+</td>
<td>1.04 (0.54-2.00)</td>
</tr>
<tr>
<td><strong>Parent Education</strong></td>
<td></td>
</tr>
<tr>
<td>- Less than High School Graduate</td>
<td>1.0 [Reference]</td>
</tr>
<tr>
<td>- High School Graduate</td>
<td>1.30 (0.81-2.08)</td>
</tr>
<tr>
<td>- More than High School Graduate</td>
<td>1.56 (0.96-2.52)</td>
</tr>
<tr>
<td><strong>Family Income Level</strong></td>
<td></td>
</tr>
<tr>
<td>- 0-99% FPL</td>
<td>1.0 [Reference]</td>
</tr>
<tr>
<td>- 100-199% FPL</td>
<td>2.46 (1.52-3.99)</td>
</tr>
<tr>
<td>- 200-299% FPL</td>
<td>2.69 (1.63-4.43)</td>
</tr>
<tr>
<td>- 300-399% FPL</td>
<td>2.91 (1.51-5.60)</td>
</tr>
<tr>
<td><strong>Region</strong></td>
<td></td>
</tr>
<tr>
<td>- Northeast</td>
<td>1.0 [Reference]</td>
</tr>
<tr>
<td>- South</td>
<td>1.11 (0.58-2.09)</td>
</tr>
<tr>
<td>- Midwest</td>
<td>1.15 (0.59-2.25)</td>
</tr>
<tr>
<td>- West</td>
<td>1.08 (0.54-2.15)</td>
</tr>
</tbody>
</table>

* Significant at p-value < 0.05 † Significant at p-value < 0.001
Table 4.3 Expected Employer Contribution and Barriers to Enrollment among Uninsured, ESI-Eligible Children

<table>
<thead>
<tr>
<th>MAIN BARRIERS TO ESI ENROLLMENT</th>
<th>% (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size (n)</td>
<td>775</td>
</tr>
<tr>
<td>- Cost¹</td>
<td>69.9 (63.5-76.3)</td>
</tr>
<tr>
<td>- Application difficulties²</td>
<td>12.3 (8.1-16.6)</td>
</tr>
<tr>
<td>- Eligibility limitations³</td>
<td>4.5 (2.2-6.8)</td>
</tr>
<tr>
<td>- Negative views of available ESI⁴</td>
<td>0.4 (0.0-0.8)</td>
</tr>
<tr>
<td>- Other⁵</td>
<td>12.9 (8.2-17.6)</td>
</tr>
</tbody>
</table>

EXPECTED EMPLOYER CONTRIBUTION

<table>
<thead>
<tr>
<th>Sample Size (n)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- All of child’s premium</td>
<td>12.3 (7.9-16.9)</td>
</tr>
<tr>
<td>- Some of child’s premium</td>
<td>49.8 (41.8-57.9)</td>
</tr>
<tr>
<td>- None of child’s premium</td>
<td>37.8 (29.5-46.2)</td>
</tr>
</tbody>
</table>

NSCH questions on barriers included the following per category:

¹ Cost: Cost is too high (69.9%), Traded health insurance for higher pay (no observations)
² Application Difficulties: Intend to apply but just haven’t done so (6.7%), Have applied—now just waiting (4.6%), Don’t know where or how to apply (0.8%), Application process too difficult, takes too much time (0.2%)
³ Eligibility limitations: Child not eligible for some other reason (2.5%), Child not eligible due to length of time at job (1.3%), Insurer refused to cover/pre-existing condition (0.3%), Child not eligible due to type of job (0.2%), Child not eligible due to number of hours worked (0.2%)
⁴ Negative Views of Available ESI: Services provided not conveniently located or not available when needed (0.2%), Do not like doctors/medical staff/clinic in health plan (0.1%), Heard bad things about insurance program (0.1%)
⁵ Other: Does not need insurance/does not get sick (2.0%), Expect to have insurance from another source soon (0.6%), Other (10.3%)

DISCUSSION

Twenty-one percent of uninsured children, and twenty-five percent of uninsured CSHCN, were eligible for employer-sponsored insurance, but not enrolled. CSHCN were no more likely to be eligible for ESI than non-CSHCN. Cost was the largest barrier to ESI enrollment, despite the fact that 62% of families expected their employer to pay all or some of the premium for their ESI-eligible child.

To our knowledge, this is the first study to examine child ESI-eligibility using the National Survey of Children’s Health. Our finding on child ESI-eligibility was within the wide range of estimates inferred from parental insurance—11-38% of uninsured children have privately-insured parents [37,39,155,175]. We found a lower prevalence of child ESI-eligibility among children income-eligible for public insurance—17% of uninsured children in families below 200% FPL were ESI-eligible—than the 18-28% reported in recent surveys of CHIP enrollees [167,168,177,178]. CHIP enrollees are, by definition, insured, so these families may have greater awareness of insurance options, including ESI-eligibility, than families of uninsured children.
Our cross-sectional study and its data had limitations. We studied a period before the full implementation of the ACA: the implementation of the ACA’s individual and employer mandates in 2014-5 may increase children’s ESI-eligibility as well as increase families’ awareness of their insurance status and ESI-eligibility. While focusing on children below 400% FPL may affect our findings’ generalizability, the vast majority (91.6% in the NSCH sample) of uninsured children are in families below this threshold [39,139]. We adjusted for the NSCH’s 23.0% response rate using validated weighting tools for possible non-response bias. While the overall NSCH survey was constructed to be nationally representative, sub-populations may not be. Nonetheless, child and family characteristics of the NSCH’s uninsured children were similar to those in recent analyses of the National Medical Expenditures Panel and National Health Interview Surveys [139,179]. Parent-reported child ESI-eligibility and expected employer contribution are subject to recall and other biases, particularly as parents may interpret questions on ESI-eligibility as whether ESI is affordable [177]. Nevertheless, NSCH respondents were reporting on their children’s ESI eligibility and affordability separately, which may be associated with fewer errors [180,181].

We did not find a significant difference in child ESI-eligibility by special health care needs status, and there were comparably high proportions of uninsured, ESI-eligible CSHCN and non-CSHCN. These findings contrast with studies of public insurance enrollment where CSHCN are significantly more likely to be enrolled when eligible than non-CSHCN [110,182]. Although we did not see any difference in barriers to enrollment or expected employer contribution by CSHCN status, small differences were hard to detect, given the relatively few uninsured, ESI-eligible CSHCN in the sample. Parents of CSHCN are more likely to work part-time and in lower-wage jobs, so they may be less able to afford ESI for their children when eligible [151,183,184]. Making ESI more affordable and enrollment easier could be particularly important for this vulnerable population of children.

The association of child ESI-eligibility with higher household income is consistent with prior studies of ESI-eligibility in adults [39,155,162,163,175]. Lower-income households are less likely to have a parent working full-time, and low-wage employers are less likely to offer ESI to employees and their children. When parents lack access to ESI, their children may remain uninsured [185]. Even when ESI-eligible, our analyses of barriers to enrollment showed that costs were a greater barrier for low-income households. Many of these families may be eligible
for public insurance at low to no cost [121,186]. Maximizing enrollment in available insurance, whether ESI or public insurance, will be important to covering the remaining 6 million uninsured children.

We found no difference by region in child ESI-eligibility or expected employer contribution. In contrast, studies in adults find lower ESI-eligibility and expected employer contribution in the South and West [164]. Regional ESI trends may be less apparent in children because of concurrent regional differences in children’s eligibility for, and enrollment in, public insurance [106,121].

As longer periods of uninsurance are associated with greater unmet need for care, the low likelihood of ESI-eligibility among children uninsured for over a year may be important [187,188]. Policy interventions for enrolling the short and long-term uninsured differ [189]. However, this NSCH question was new and may not be reliable: when we looked at children under one year of age in NSCH, some parents appeared to classify them as never insured, while others classified them by their age (e.g., a seven-month old child uninsured since birth could be classified as never insured or uninsured 6-12 months) (data available on request). Further research is needed to understand the relationship between child ESI-eligibility and length of uninsurance.

To our knowledge, this is the first study to examine barriers to ESI enrollment in uninsured children. Families faced the same administrative barriers seen in public insurance as well as the usual problem of high cost for private insurance [160,177]. Applying methods used to streamline Medicaid-CHIP enrollment, such as a common family application and automated renewal, may increase enrollment for uninsured, ESI-eligible children [190–192].

The association of employer contribution with employer size was consistent with prior studies in adults. Analyses of the Medical Expenditures Panel Survey found that workers at smaller employers are more likely to pay any premium and more likely to pay higher premiums than workers at larger employers [162,170].

Our finding on expected employer contribution (62%) was lower than the average premium contribution in two recent surveys of ESI-enrolled children (89%), while it was higher than expected contribution in a recent survey of ESI-eligible CHIP enrollees (43.5%) [66,162,177]. This is consistent with findings in adults: higher employer contributions increase the likelihood of enrolling in ESI [162–165]. Nonetheless, covering even part of a child’s ESI
premium costs may be unaffordable to many families. In 2015, the annual premium for child-
only ESI ranged from $0-7,250, while the annual premium for a child in Medicaid-CHIP was
less than $300 [66,170,193]. Moreover, even when ESI premiums are affordable, there may not
be an improvement in financial protection if out-of-pocket costs remain high.

These findings have implications for child ESI-eligibility and enrollment under the ACA.
Assuming stable ESI-eligibility since 2012, around 1.2 million uninsured children, including
174,000 uninsured CSHCN, may be eligible for ESI, but not enrolled. When we exclude children
below 200% FPL who may be eligible in Medicaid and/or CHIP, around 450,000 uninsured
children, and 60,000 uninsured CSHCN, may be eligible for ESI, but not enrolled. Our findings
are likely a conservative estimate, given additional children may gain ESI-eligibility under the
ACA’s employer mandate.

Addressing affordability will be key to increasing ESI enrollment among the uninsured,
ESI-eligible children. The ACA provisions do not substantially address ESI affordability, and
families with access to affordable ESI are excluded from premium subsidies for marketplace
insurance [70,194]. However, under ACA regulations, ESI affordability is based the cost on a
single-adult premium, even though family ESI premiums are often double or triple the amount of
single-adult premiums or around $2,100-5,200 more annually per child [66]. Known as the
“family glitch,” an estimated 460,000 low-income children may fall into this gap between what
the ACA defines as affordable and what families may be able to afford [195]. These children
may remain ESI-eligible, but uninsured under the ACA.

Conclusions
In 2012, 21% of uninsured children—around 1.2 million children, including 174,000 children
with special health care needs—were eligible for employer-sponsored insurance, but not
enrolled. Making ESI more affordable, and enrollment easier, will be important to maximizing
ESI enrollment for eligible, uninsured children and CSHCN.
CHAPTER 5. DISCUSSION

After Massachusetts health reform, there remain significant barriers to accessible, affordable health care for children. Table 5.1 summarizes the findings from chapters 2 and 3 on children and CSHCN under Massachusetts health reform. We found no reductions in uninsurance for children or CSHCN post-reform. Uninsurance decreased for children previously-eligible for Medicaid-CHIP (i.e., the “woodwork” effect), but reductions in uninsurance were also seen in states that did not expand Medicaid eligibility for children or adults.

For access to care, we found improvements in access to a personal doctor for children previously-eligible for Medicaid-CHIP, suggesting minimal negative “crowd-out” effects from the influx of newly-insured children and adults. We found improvements in access to specialty care for children newly-eligible for CHIP and privately-insured CSHCN, suggesting improvements in benefits covered by insurance under Massachusetts health reform.

Massachusetts health reform did not have the expected effect of improving financial protection for CSHCN. Out-of-pocket costs continued to increase for CSHCN in Massachusetts and nationwide during the study period.

| Table 5.1 The Impact of Massachusetts Health Reform on Adults and Children: Observed Effects |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                                | ADULTS                          | CHILDREN                        | CSHCN                           |                                |                                |                                |                                |                                |
|                                | OVERALL                        | PREVIOUSLY-ELIGIBLE             | NEWLY-ELIGIBLE                  | OVERALL                        | PRIVATELY-INSURED               | PUBLICLY-INSURED               |                                |                                |
| Uninsurance                    | ↓                               | No change                       | ↓/No change                     | No change                      | N/A                             | N/A                             |                                |                                |
| Access to a Personal Doctor    | ↑                               | No change                       | ↑                                | No change                      | No change                       | No change                       | No change                       | No change                       |
| Access to Primary Care         | ↑                               | No change                       | No change                       | No change                      | No change                       | No change                       | No change                       | No change                       |
| Access to Specialty Care       | ↑                               | No change                       | No change                       | ↑                               | ↑                               | ↑                               | No change                       | No change                       |
| Financial Protection           | ↑/↔                             | ↑                               | ↑/↑/↑/↑                         | ↑                               | ↑                               | ↑                               | No change                       | No change                       |

Key: ↑ = Improvement, ↓ = Reduction, ↔ = Mixed, ? = Effect unknown

Access to primary care: One or more preventive care visits (NSCH); Has a usual source of care (NS-CSHCN)

SOURCES: (All studies cited are interrupted time series or difference-in-difference designs unless otherwise noted)

Adults: Uninsurance [81–90], Personal Doctor [81–83, 85–87], Primary Care [81, 84, 88, 90], Specialty Care [2 large pre-post studies on unmet need for specialty care, 6 difference-in-difference studies on surgical access] [78, 91–97], Financial Protection [81, 83, 85, 98]

Children: Uninsurance [61, 73, 75, 77], Primary Care [196]
The ACA has the potential to have similar or greater impact on insurance coverage and access to affordable health care for children. We found that 21% of uninsured children, and 25% of uninsured CSHCN, were eligible for ESI, but not enrolled, a population likely to become insured under the ACA. Nonetheless, our analysis of uninsured children nationwide highlighted the continuing problem of ESI affordability, especially with the ACA’s “family glitch.”

LIMITATIONS
Our studies had limitations. While the NSCH and NS-CSHCN included the most detailed state-level information on children and CSHCN, their response rates have been declining. Our findings were adjusted for possible non-response and corroborated (where possible) by trends observed in other studies using the National Health Interview and Medical Expenditures Panel surveys. In addition, the NSCH and NS-CSHCN do not determine whether children's private insurance is provided through a parent's employer or directly from a marketplace. Massachusetts health reform may have had different impacts on access to care and financial protection for privately-insured children on ESI or new marketplace plans.

We used a non-randomized difference-in-differences study design. The common shock of the Great Recession (2008-2009), and increased Medicaid enrollment nationwide, may have biased changes under Massachusetts health reform towards the null, although studies of adults found significant reductions in uninsurance nonetheless. The difference-in-differences design assumes that the intervention and comparison groups would experience the same trend in the absence of health reform. States are constantly innovating within their Medicaid and CHIP programs (e.g., streamlining enrollment processes, changing covered benefits), and, although our findings were robust across multiple large comparison groups, we cannot control for all differences between states [197,198]. Neither the DD or cross-sectional design examine individual level effects.

Children in Massachusetts had higher insurance coverage than children in other states pre-reform, which limited the power of our studies and may limit their generalizability. The effect of similar adult-oriented provisions under the ACA may differ substantially in states with higher uninsurance. Massachusetts also had tremendous political will for implementation of its health reform [199]. State political commitment to ACA implementation has been highly
variable with only 24 states and DC establishing state health insurance marketplaces and 31 states expanding Medicaid eligibility for adults [200].

**IMPLICATIONS FOR THE AFFORDABLE CARE ACT**

*Health Insurance Coverage*

Our findings on Massachusetts health reform and uninsured children’s ESI-eligibility give some insight into children’s insurance coverage under the ACA, but studies are needed to estimate the effects of national adult-oriented health reform on children more directly. In other states, there is a potential for greater “woodwork” effect if the expansion of adult Medicaid coverage increases enrollment of previously-eligible children. The Medicaid expansion provision of the ACA more than doubled parent Medicaid eligibility from an average of 64% FPL pre-ACA to 138% FPL in states that expanded Medicaid [108]. Nationwide, around 30% of adults newly-eligible for Medicaid under the ACA are parents [201]. The ACA also included state incentives to make Medicaid and CHIP enrollment easier, which could lead to increased enrollment of eligible children, even in states without adult Medicaid expansion [202]. In some states, less than 75% of Medicaid or CHIP eligible children are enrolled [121].

Since the ACA’s individual mandate provision applies to children, we could see an increase in private insurance enrollment. In our analysis, 1.2 million uninsured children, including 174,000 CSHCN, were eligible for ESI prior to ACA implementation. These children may become enrolled under the ACA since their parents face a penalty when children are uninsured. In addition, the ACA included insurance market reforms, such as prohibiting pre-existing condition exclusions, which particularly affect CSHCN. Since Massachusetts made similar insurance market reforms in 1996, we did not capture any benefits from these reforms in our analyses. One survey of families with CSHCN estimated that 62,000 CSHCN may gain private insurance because of the ACA’s insurance market reforms [27].

The marketplace provisions of the ACA could destabilize insurance coverage for some children. One key difference between Massachusetts health reform and the ACA is that, under the ACA, marketplace insurance is available to low-income children (<300% FPL). Under Massachusetts health reform, children in families below 300% FPL were enrolled in Medicaid-CHIP when their parent enrolled in a marketplace plan [203]. ESI may also become available to more low-income children and families under the ACA’s employer mandate provision. At the
same time, the majority of these children are income-eligible for Medicaid-CHIP [204]. With the choice of public, ESI, and marketplace plans, families may end up with complex insurance arrangements, such as a child enrolled in Medicaid, one parent in ESI, and one parent enrolled in a subsidized marketplace plan [205]. Complex insurance arrangements make it challenging for families to navigate health care and have been associated with lower receipt of preventive care for children [37,38,206].

Moreover, small changes in income may move families above income eligibility thresholds for public insurance or subsidized marketplace plans. As a consequence, children may lose their public or subsidized private insurance and become uninsured. The US Government Accountability Office estimated that 14% of low-income children—750,000 children—may experience one or more instances of uninsurance every year under the ACA [195]. For children, being uninsured even briefly is associated with worse access to primary and specialty care, including lower immunization rates [187,207–212]. Further reforms, such as continuous Medicaid eligibility, may be necessary to provide stable insurance coverage for children [142–144].

Immigrant children may remain uninsured under the ACA. The ACA explicitly excluded undocumented individuals, including an estimated 880,000 uninsured children predominantly from Latin American countries (1% of all children), from marketplace plans; previous legislation excluded undocumented individuals from federally-funded public insurance [195,213,214]. Legal immigrants can enroll through the ACA marketplaces, but outreach has been limited [215,216]. States have the option of expanding Medicaid to legal immigrant children, but only 29 states do so [202]. Massachusetts, in contrast, uses state funds to cover legal immigrant and undocumented children through Medicaid-CHIP, and, according to state data, immigrant children accounted for around half of the increase in child Medicaid-CHIP enrollment under Massachusetts health reform [35,196]. Under the ACA, 1.7 million Hispanic children remained uninsured in 2014, despite the fact that at least half were eligible for public insurance [217].

Access to Care
If more children become insured under the child-relevant provisions of the ACA, one may anticipate positive spillover effects on access to care that may be greater than our findings under Massachusetts health reform. Gains in access to specialty care may be particularly important to
children’s health outcomes: one expert anticipated an increase of 700,000 additional medically-attended injuries alone for children under the ACA [71].

Nonetheless, the national scope of the ACA may decrease access to care in ways not seen under Massachusetts health reform. Between 16 and 18 million adults have gained insurance under the ACA’s Medicaid expansion, employer mandate, and marketplace provisions thus far [218]. While we saw no negative “crowd-out” effects in Massachusetts, Massachusetts has among the highest number of primary care physicians, including pediatricians, per capita in the US [219]. Significantly more physicians in Massachusetts accept Medicaid than the national average; nationwide, one in five pediatricians (20.5%) was not accepting new Medicaid patients in one recent survey [220,221]. In states with fewer primary care physicians (or fewer who accept Medicaid), the ACA could decrease children and CSHCN’s access to care if the influx of 16 to 18 million newly-insured adults overwhelms the physician supply. Children in other states are also more likely to receive care from providers who see both children and adults (e.g., family medicine physicians) than children in Massachusetts [222]. Children in other states may be more vulnerable to experiencing problems with access to care under adult-oriented health reform.

Access to care may differ in unexpected ways for children insured through marketplace plans. Thus far, under the ACA, marketplace plans cover around 1 million children [1]. Our analyses of privately-insured children and CSHCN and Massachusetts health reform were unable to distinguish between ESI and marketplace coverage. To our knowledge, no studies have been published on access to care for children or CSHCN enrolled in the Massachusetts marketplace plans. The Massachusetts experience also does not provide insight into possible effects for low-income children as children <300% were enrolled in Medicaid and/or CHIP under Massachusetts health reform.

Marketplace plans may differ from ESI in what benefits are covered and what providers are included in network, which, in turn, could affect children’s access to care. Although the ACA’s essential benefits provision requires marketplace plans to cover certain benefits, including pediatric services, states have autonomy over what benefits are considered “essential.” Early analysis shows that states vary widely in what pediatric benefits are considered “essential” and thus are required to be covered by private insurance [45,55]. Some marketplace plans have no in-network children’s hospitals, which could limit children’s access to specialty care [223].
Finally, the ACA’s essential benefits provision does not apply to some plans (e.g., “grandfathered” plans). One-third to one-half of CSHCN are estimated to be on these plans [224,225]. CSHCN on grandfathered plans may not experience the gains in access to specialty care we observed for privately-insured CSHCN under Massachusetts health reform. The extension of essential benefits to grandfathered plans and/or CSHCN-specific policies, such as specialized medical homes, may be necessary to improve CSHCN’s access to care [11,226].

Financial Protection

In Massachusetts, we found that, like with adults, many families of CSHCN faced higher than expected OOP spending post-reform [83,85,86,91,153]. The ACA’s provisions on financial protection are largely similar to Massachusetts’, and thus direct gains in financial protection may be less than hoped. ACA provisions that lead to reductions in uninsurance could still have positive spillover effects on families’ financial protection.

The family glitch within the ACA regulations could have a negative spillover effect on financial protection. Under the “family glitch”, an estimated 460,000 low-income children fall into a gap between the ACA’s definition of affordability (single adult premium) and what families may be able to afford [195]. Family ESI premiums are often double or triple the cost of a single-adult premium, a difference of up to $5,200 in annual premiums per child [66].

The marketplace provisions of the ACA could have a neutral or negative effect on financial protection. One study of families with children in the Massachusetts marketplace found that 40% of families enrolled in marketplace plans experienced higher than expected OOP costs [141]. Under the ACA, marketplace plans will cover some low-income children, and these families may experience high OOP. Children in low-income families are more vulnerable to adverse effects of high OOP costs, including delays in needed care and cost-related non-adherence to medication [227–229]. Additionally, the ACA could have less than hoped for spillover effects on financial protection, given the state-to-state variability in essential benefits and exclusion of children’s hospitals from marketplace plans. Families may incur high OOP costs in order to access needed medical care that is not included in their insurance benefits or is out-of-network.

One component of the ACA’s marketplaces provision, a new restriction on Medicaid buy-in programs, may particularly affect financial protection for families of CSHCN. Since the
1980s, some states, including Massachusetts and Pennsylvania, allowed higher-income families to “buy” public insurance for CSHCN (e.g., pay a premium) and supplement their private insurance [230]. For example, a CSHCN might not have access to speech therapy under their private insurance, but their family could pay a premium to have Medicaid as a supplemental insurance and thus access speech therapy services at low cost. In our analyses of the NS-CSHCN, 8% of CSHCN had both public and private coverage in this manner. However, under the ACA, children are not allowed to enroll in both Medicaid and a marketplace plan [64]. With fewer families eligible for Medicaid buy-in, states are ending their programs. Two-thirds of the states that previously offered Medicaid buy-in are no longer doing so under the ACA [202].

Table 5.2 shows our predictions for the impact on children of differences between the ACA and Massachusetts health reform.

<table>
<thead>
<tr>
<th>Table 5.2 The Affordable Care Act’s Differences with Massachusetts Health Reform and the Potential Effect on Children’s Health Insurance Outcomes</th>
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<tbody>
<tr>
<td><strong>CHILDREN</strong></td>
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<tr>
<td><strong>UNINSURANCE</strong></td>
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<tr>
<td>Insurance Coverage</td>
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<td>- Children included in Individual Mandate</td>
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<td>- Insurance Market Reforms</td>
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<td>- Immigration Exclusions</td>
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<td>Access to Care</td>
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<td>- State-variance in Essential Benefits</td>
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<td>- Exclusion of Children’s Hospitals from Marketplace Plans</td>
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<td>- Lack of Essential Benefits in Grandfathered Plans</td>
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<td>Financial Protection</td>
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<tr>
<td>- Family Glitch</td>
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<td>- Restrictions on Medicaid Buy-in</td>
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Key: ↑ = Improvement, ↓ = Reduction ↔= No change, ? = Effects unknown

**ADULT-ORIENTED HEALTH INSURANCE REFORM AND CHILDREN: FUTURE RESEARCH**

Our findings highlight that the impact of adult-oriented health insurance reform on children and CSHCN differs from that on adults. While adults experienced gains in insurance, access to primary and specialty care, and financial protection under Massachusetts health reform, children largely did not. Effects of the ACA may similarly differ for children and adults. Early evidence on the ACA supports this: while 16-18 million adults gained insurance, there has been no significant increase in children’s insurance under the ACA thus far [218,231]. Adult-oriented
health reform is likely insufficient to provide insurance coverage and access to care for all children. Researching the impact of ACA on children will be important to further understand the spillover effects of adult-oriented reforms.

Our findings on Massachusetts health reform highlighted ways in which current and future adult-oriented health reform could be improved for children. The ACA addressed some of these concerns, most notably with the inclusion of children in the individual mandate, but did not address others, such as making ESI more affordable and enrollment easier. Stakeholders may consider additional child-oriented changes as they implement the ACA.

Understanding the impact of the ACA will be important to the future of child-specific health insurance programs, such as CHIP. Early drafts of the ACA eliminated CHIP and planned to move the 8 million children in CHIP to new marketplace plans [28,232]. We have little empirical evidence on children’s experience in marketplace plans. As CHIP is funded only through 2017, researching children insured through the ACA’s marketplace plans will be important to understanding the impact on children’s access to care and financial protection. This evidence base will be important to stakeholders considering CHIP reauthorization.

Finally, "insurance alone will not solve the health problems faced by children and adolescents" [233]. Far more children live in poverty and food-insecure households than are uninsured [234]. These social determinants of health influence children’s participation in insurance, utilization of healthcare when insured, family financial burden, and health throughout their life course. Addressing the social determinants of health, whether through primary care or broader social policy, could be important to improving children’s health insurance outcomes.

CONCLUSIONS
Adult-oriented health insurance reform has the potential to affect children’s health insurance and access to affordable health care. We saw small benefits in some aspects of access to care for children and CSHCN under Massachusetts health reform, but we did not see the reductions in uninsurance or large improvements in access to care seen in adults. Inadequate financial protection, especially out-of-pocket costs for private insurance, remains a significant barrier to children’s insurance coverage and access to care. The ACA is likely to have greater effects on uninsurance and similarly modest effects on access and financial protection. Child-oriented reforms may be necessary to improve access to affordable health care for children and CSHCN.
SUMMARY

BACKGROUND: The Massachusetts health reform and the Affordable Care Act (ACA) were focused on adults, but have the potential to reduce uninsurance and increase access to affordable health care for children. Little is known about the impact of Massachusetts health reform on children, including the vulnerable sub-population of children with special health care needs (CSHCN).

OBJECTIVES: The first two aim of this thesis were to examine whether Massachusetts health reform was associated with lower levels of child uninsurance, increased access to care, and improved financial protection for: (1) children generally and (2) CSHCN specifically. The third aim of this thesis is to explore ESI eligibility among uninsured children and uninsured CSHCN prior to the implementation of ACA’s individual and employer mandates in 2015.

METHODS: For aims 1 and 2, we used a difference-in-differences approach to compare changes in uninsurance, access to care, and financial protection (CSHCN only) in the intervention group, Massachusetts, and the comparison group, other states, before and after Massachusetts health reform. For children overall, we used parent-reported data from the 2003, 2007, and 2011-2012 National Survey of Children’s Health. For CSHCN, we used parent-reported data from the 2005-2006 and 2009-2010 National Survey of Children with Special Health Care Needs. For aim 3, we conducted a cross-sectional analysis using the 2011-2012 National Survey of Children’s Health to estimate the proportions of uninsured children and uninsured CHSCN, who were eligible for ESI, but not enrolled, and to assess the barriers that parents reported to obtaining ESI for their uninsured, ESI-eligible children.

RESULTS: Massachusetts health reform was not associated with significant changes in uninsurance for children overall or CSHCN. Access to a personal doctor increased for children previously-eligible for public insurance and did not change for children overall or CSHCN. Access to specialty care increased for children newly-eligible for public insurance under Massachusetts health reform and for privately-insured CSHCN. For CSHCN, there were no significant changes in financial protection under Massachusetts health reform. Nationwide, one-fifth of uninsured children—around 1.2 million children, including 174,000 uninsured CSHCN—were eligible for ESI, but not enrolled prior to ACA implementation. Cost and application difficulties were the main barriers to ESI enrollment.

CONCLUSION: Massachusetts health reform had some positive impact on children’s access to care, but did not decrease uninsurance or improve financial protection. Comparable provisions within the ACA may produce similarly modest outcomes for children and CSHCN. Child-oriented reforms, including making ESI more affordable and enrollment easier, may be necessary to reduce uninsurance and significantly increase access to affordable health care for children.
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5. Smith AJB, Chien AT. The Eligibility of Uninsured Children for Employer-Sponsored Insurance: Findings from the 2011 National Survey of Children’s Health. Poster presentation at: AcademyHealth Annual Research Meeting; 2015 Jun 14; Minneapolis, MN.

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REFERENCES


15. Toomey SL, Chien AT, Elliott MN, Ratner J, Schuster MA. Disparities in unmet need for
30. Mohan A, Grant J, Batalden M, McCormick D. The health of safety net hospitals following Massachusetts health care reform: changes in volume, revenue, costs, and


44. Buchmueller T, Carey C, Levy HG. Will employers drop health insurance coverage because of the Affordable Care Act? Heal Aff. 2013 Sep;32(9):1522–30. PMID: 24019355


46. Kreider AR, French B, Aysola J, Saloner B, Noonan KG, Rubin DM. Quality of Health


66. Selden TM, Dubay L, Miller GE, Vistnes J, Buettgens M, Kenney GM. Many families may face sharply higher costs if public health insurance for their children is rolled back. Heal Aff. 2015 Apr;34(4):697–706. PMID: 25809641


71. Winston FK, Zonfrillo MR, García-España JF, Miller TR. Anticipated Increases in Medically Attended Injuries by Children and Young Adults With the Affordable Care Act: The Growing Role of Primary Care in the Pediatric Trauma System. Clin Pediatr (Phila). 2013 Jul 19; PMID: 23872343


82. Kolstad JT, Kowalski AE. The Impact of Health Care Reform on Hospital and Preventive Care: Evidence from Massachusetts(☆). J Public Econ. 2012 Dec 1;96(11-12):909–929. PMID: 23180894


122. Abdus S, Selden TM. Adherence with recommended well-child visits has grown, but large gaps persist among various socioeconomic groups. Heal Aff. 2013 Mar;32(3):508–15. PMID: 23459729


157. The Henry J. Kaiser Family Foundation. Health Insurance Coverage of Children 0-18 Living in Poverty (under 100% FPL) [Internet]. Menlo Park, CA; 2015 [cited 2015 Dec


168. Shone LP, Lantz PM, Dick AW, Chernew ME, Szilagyi PG. Crowd-out in the State Children’s Health Insurance Program (SCHIP): incidence, enrollee characteristics and experiences, and potential impact on New York's SCHIP. Heal Serv Res. 2008 Feb;43(1 Pt 2):419–34. PMID: 18199194


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Hill SC, Abdus S, Hudson JL, Selden TM. Adults in the income range for the Affordable Care Act’s Medicaid expansion are healthier than pre-ACA enrollees. Heal Aff. 2014 May;33(4):691–9. PMID: 24670269


Bhargava S, Loewenstein G. Choosing a Health Insurance Plan: Complexity and


