Spring 5-4-2019

Impact of Healthcare Delivery and Policies on Children's Outcomes after the Affordable Care Act of 2010

Shreya Roy
University of Nebraska Medical Center

Recommended Citation

Roy, Shreya, "Impact of Healthcare Delivery and Policies on Children's Outcomes after the Affordable Care Act of 2010" (2019). *Theses & Dissertations*. 376.
https://digitalcommons.unmc.edu/etd/376

IMPACT OF HEALTHCARE DELIVERY AND POLICIES ON CHILDREN'S OUTCOMES AFTER THE AFFORDABLE CARE ACT OF 2010

by

Shreya Roy

A DISSERTATION

Presented to the Faculty of
The University of Nebraska Graduate College
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

Health Services Research, Administration & Policy
Graduate Program

Under the Supervision of Professor Fernando A. Wilson

University of Nebraska Medical Center
Omaha, Nebraska

April, 2019

Supervisory Committee:
Fernando A. Wilson, PhD (Chair)
Li-Wu Chen, PhD
Jungyoon Kim, PhD
Fang Yu, PhD

ACKNOWLEDGEMENTS

Just like it takes a village to raise a child, it takes a community to support a doctoral student. I have been very lucky to have the support of many individuals as I made my way through this PhD program.

I am very thankful to my advisor, Dr. Wilson, committee members, members of faculty and staff at the Department of Health Services Research & Administration and the College of Public Health, UNMC for creating such a positive environment for doctoral students to thrive. I want to acknowledge my funding source, the Buffett Early Childhood Institute, for not only providing monetary support for my dissertation work but also for the numerous doors of opportunity that opened for me when I became a Buffett Graduate Scholar. I am grateful for the sense of community I have found here in Omaha, and I have my wonderful friends to thank for that, who have grown to be just like my family in the time we have spent together. I am very blessed to have a wonderful family in India who cheered me on from thousands of miles away. Finally, this dissertation would never have been possible without the unconditional love, support and encouragement of my parents, Mahua and Saptarshi Roy, who taught me to dream big, work hard and stay humble. It is to you both that I owe it all.

IMPACT OF HEALTHCARE DELIVERY AND POLICIES ON CHILDREN'S OUTCOMES AFTER THE AFFORDABLE CARE ACT OF 2010

Shreya Roy, Ph.D.

University of Nebraska, 2019

Supervisor: Fernando A. Wilson, Ph.D.

The Patient Protection and Affordable Care Act (ACA) of 2010 introduced programs to promote integrated pediatric healthcare delivery and to expand public health insurance (Medicaid) eligibility for adults from low-income families in the United States. This dissertation examined whether progress was made towards integration of healthcare delivery for children with developmental disabilities after the implementation of ACA, and also whether expansion of Medicaid for adults impacted the preventive care utilization and school absenteeism of children from low-income families. A cross-sectional study design was used to examine whether integration of pediatric healthcare delivery was accomplished and a quasi-experimental difference-in-differences approach was used to establish the causal impact of Medicaid expansion on children's outcomes. From the findings of this study, it was concluded that much work still needed to be done to accomplish high-quality integration of pediatric healthcare delivery and that expansion of Medicaid eligibility for adults had positive impacts on children's preventive care utilization and school absenteeism.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

Part I: Pediatric care coordination

Care coordination (CC) is defined as the "the deliberate organization of patient care activities between two or more participants (including the patient)" (Agency for Healthcare Research and Quality, 2014). For children, it spans across the care continuum of primary healthcare provider, child care, early intervention, community resources, social services and the child's family (Cooley, 2004). It is the standard of care for all children, but is especially important for children with special healthcare needs and medical complexities (Turchi et al., 2014). Ideally, a "care coordinator" should address the "interrelated medical, social, developmental, behavioral and educational needs" of a child (Antonelli, McAllister, & Popp, 2009). Antonelli and colleagues outlined the critical characteristics of a high-performing care coordination system as being patient and family-centered; providing proactive, planned and comprehensive care; that promotes self-care skills and independence of families and children; and emphasizing cross-organizational relationships to support integration across the continuum of care (Antonelli et al., 2009).

Role of care coordination in improving healthcare quality

One of the first studies to report the outcomes of care coordination in pediatric primary care found that 14% of the care coordination activity encounters were experienced by children and youth with special healthcare needs (CYSHCN) with acute-onset, family-based psychosocial problems and 50% of the care coordination encounters were experienced by non-CYSHCN without any complicating family-based psychosocial problems (Antonelli, Stille, & Antonelli, 2008). Some of the outcomes prevented due to receipt of care coordination included pediatric office visit (58%), Emergency Department (ED) visit (26%), sub-specialist visit (10%), hospitalization (4%) and specialized therapies (1%). The focus of the CC encounters ranged from clinical and medical management (67%) to educational, school (4%) and mental health (3%). The average cost per care-coordination activity encounter varied from \$4.39 to \$12.86, with an overall mean of \$7.78, with the cost being driven up by the CC activities provided by physicians.

Thus, care coordination has the potential to incur cost savings by reducing episode-based utilization and redundancy, improving health outcomes of children, while also improving the family experience of seeking healthcare for children with special needs and simultaneously involving the family in managing their child’s care.

Care coordination after the Patient Protection and Affordable Care Act of 2010

The Patient Protection and Affordable Care Act (ACA) of 2010 introduced numerous programs to promote integrated pediatric healthcare delivery including cross-system communication (Beckmann & Kavulic, 2014; Turchi et al., 2014). An example is the ‘Birth to Five: Watch me thrive’ program (Beckmann & Kavulic, 2014). This program is an effort by different federal agencies to promote universal developmental and behavioral screening for children aged 0-5 years, referral to early intervention and special education, follow-up and closing of the referral loop (Administration for Children and Families, 2017). A goal of this program was to improve communication processes between primary care providers and early child-care and education providers (cross-system communication) (Beckmann & Kavulic, 2014).

AIM 1: MOTIVATION AND PURPOSE

The first study in this dissertation will focus on cross-system communication. In the United States, about 25% of children from 0-5 years of age are at increased risk of developmental, behavioral and social delays (National Survey of Children’s Health, 2011-12). However, only 2-3% of toddlers (0-2 years) receive support in the form of Early Intervention programs and 5-6% of pre-school aged children (3-5 years) receive special education services (Macy, Marks, & Towle, 2014). Thus, many children who need additional support in order to reach age-appropriate developmental milestones may not be receiving it (Macy et al., 2014). Established pathways of cross-system communication between providers in different settings such as healthcare, early intervention, special education, and child care, can facilitate the process of connecting children to necessary evaluation and intervention after a developmental screening and fewer children are likely to be missed (Macy et al, 2014).

The first study of this dissertation will examine, whether, after the introduction of the ACA of 2010, developmental screening for children from 0-5 years of age was associated with increased odds of communication between the child's healthcare provider, child care provider, pre-school or special education program (cross-system communication). Further, the study used a quasi-experimental approach to isolate the impact of receiving a developmental screening on cross-system communication for children with developmental disabilities including autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD) and intellectual disability.

AIM 1: STUDY DESIGN

To address Aim 1, a cross-sectional study design will be used. Logistic regression modeling of cross-system communication will be performed

$$y = \beta_0 + \beta_1 dC + \text{other factors}$$

where, y = outcome of interest

Part II: Medicaid expansion under the Affordable Care Act of 2010

In an effort to improve access to healthcare, the ACA expanded the income eligibility for public health insurance (Medicaid) for adults from low-income families, up to 138% of the Federal Poverty Level (FPL) (Paradise, 2015). Prior to the Affordable Care Act, the median income eligibility for Medicaid for low-income adults in the United States, was at or below 61% of the FPL. The Medicaid expansion filled a historical gap in Medicaid eligibility for adults (Garfield, Orgera, & Damico, 2019). In the expansion states, premium tax credits were available for enrolment in the healthcare marketplace for adults with incomes greater than 100% FPL. As of February 2019, 14 states have not expanded Medicaid (Kaiser Family Foundation, 2019). In these states, the Medicaid eligibility for adults is quite limited, the median income limit for parents in these states is just 43% FPL (Garfield et al., 2018). Also, in these states, those adults who have incomes above Medicaid eligibility limits but below the lower limit for marketplace premium tax credits, fall into a "coverage gap" and are likely to be uninsured (Garfield et al., 2018).

Impact of Medicaid Expansions

Expansion of Medicaid eligibility for children in early childhood has been shown to improve their preventive healthcare utilization and positively impact their health later in childhood (Currie, 2009). Improved health of children due to expansion of Medicaid eligibility for children in the 1980s and 1990s has also been shown to improve high school and college completion rates (Cohodes, Grossman, Kleiner, & Lovenheim, 2016). Medicaid expansion for adults reduced family financial burdens due to having higher household resources and eliminating catastrophic medical expenditures (Baicker et al., 2013; Levy & Meltzer, 2008). Expansion of Medicaid eligibility for adults under the ACA, led to increases in health insurance enrolment for children who were previously eligible for public health insurance but were not enrolled (Hudson & Moriya, 2017).

AIMS 2 & 3: MOTIVATION AND PURPOSE

The second and third aims of this dissertation will examine the impact of expansion of Medicaid eligibility among adults under the Affordable Care Act on the preventive healthcare utilization and school absenteeism of children, respectively. The motivation is to demonstrate that provision of health insurance for adults from low-income families is likely to have a positive impact on the family’s well-being, especially that of the children, due to reduced financial burden and improved access to preventive healthcare (Baicker et al., 2013; Venkataramani, Pollack, & Roberts, 2017).

AIMS 2 & 3: STUDY DESIGN

To address the second and third aims, a difference-in-differences (DID) study design will be used. This is a quasi-experimental design in which an experimental approach is mimicked using pooled cross-sectional data (Imbens & Woolridge, 2007). The DID estimator gives the difference of two differences. The first one is the difference in the outcome before and after the implementation of the policy in the treatment group. The second difference is the difference in the outcome before and after the implementation of the policy in the control group. By doing so, this method removes biases in comparisons between the treatment and control group that could be the result of permanent differences between these groups, as well as biases within the treatment group that could be the result of temporal trends (Imbens & Wooldridge, 2007). Thus, for this study, a difference-in-differences model can be written as

$$y = \beta_0 + \beta_1 dT + \delta_0 d2 + \delta_1 d2*dT + other\ factors + u$$

where, y = outcome of interest.

$d2$ = dummy variable for the post-policy implementation time period

dT = dummy variable for the treatment group (states which expanded Medicaid under the ACA).

δ_1 = the coefficient of interest measuring the effect of the policy.

The difference-in-differences (DID) approach is a powerful method for program and policy evaluations, and is commonly used to establish causality (Imbens & Woolridge, 2007).

CHAPTER 1: DEVELOPMENTAL SCREENING AND CROSS-SYSTEM COMMUNICATION IN EARLY CHILDHOOD FOR CHILDREN WITH DEVELOPMENTAL DISABILITIES

Introduction

The purpose of universal developmental screening programs in the United States is to identify children who are at risk of developmental, behavioral or learning disabilities and to connect them with Head Start, Early Intervention, special education programs, and/or specialized medical care (Moore, Zamora, Patel Gera, & Williams, 2017). Children who might be at risk for developmental delays as a consequence of poverty, foster care, abuse, neglect or other challenging circumstances in early childhood, also benefit from these programs. Interventions can be facilitated as early as birth or even earlier. For example, the federal Head Start program serves pregnant women, infants and toddlers up to age 3 years, from low-income families, by offering learning experiences, health screenings, parenting support and access to mental health and social services (Administration for Children and Families, 2018). The window of opportunity for intervention that arises in the early years of a child’s life can positively affect the child’s school readiness and health later in life (Wright Burak & Odeh, 2018).

Developmental screening at ages 9, 18 and 30 months at well-child visits using standardized screening tools are recommended by the American Academy of Pediatrics (American Academy of Pediatrics, 2019). However, screening using a standardized tool such as the commonly used Ages and Stages Questionnaire (ASQ) or Parents’ Evaluation of Developmental Status (PEDS), is only one snapshot of developmental-behavioral performance using a discrete set of indicators. It is problematic to use these results to make a definitive diagnosis of delay or a decision about treatment (Macy et al., 2014). After a positive developmental screening, a complete evaluation is required to make a diagnosis or determine IDEA (Individuals with Disabilities Education Act) eligibility (U.S. Department of Education, 2019). Infants and toddlers, ages birth through 2 years, receive early intervention (EI) services under IDEA Part C. Children 3 years and older receive special education and related services under IDEA Part B (U.S. Department of Education, 2019).

However, studies have shown that 60-80% of children, who are referred for an evaluation to determine eligibility for IDEA, do not complete it (Jimenez et al., 2014; King et al., 2010; Talmi et al., 2014). Also, it has been found that there are few second chances to enroll children with developmental delays after a first missed opportunity, because providers face difficulties in tracking referrals and often are not familiar with the process of referrals (Hastings, Lumeng, & Clark, 2014; Marks, Page Glascoe, & Macias, 2011). Thus, many children who need to be linked to evaluation and services are missed (Macy et al, 2014). About 25% of children aged 0-5 years in the United States are at moderate or high risk for developmental, behavioral, or social delay (National Survey of Children's Health, 2011-12). However, only 2-3% of toddlers and infants receive Early Intervention and only 5-6% of preschool aged children receive special education. Thus, there exists a gap between children who need these services and those who actually receive these services (Macy et al., 2014).

Established pathways of communication between providers in different settings such as healthcare, early intervention, special education, and child care, can facilitate the process of connecting children to necessary evaluation and intervention after a developmental screening and fewer children are likely to be missed (Macy et al, 2014). Further, communication is also likely to address social health determinants that will affect the health trajectories of children who have a positive developmental screen (e.g., helping a family to overcome barriers such as language and transportation in accessing early intervention services) (Beckmann & Kavulic, 2014).

At the systems level, cross-systems communication across the child's care continuum is a hallmark of high-quality pediatric care coordination (Antonelli et al., 2009). It supports integrated pediatric care delivery, is likely to reduce redundancies in the developmental screening process, therefore, reducing the confusion experienced by families, and supporting families to navigate through multiple settings (Macy et al, 2014).

The ACA introduced numerous programs to promote integrated pediatric healthcare delivery including screening and cross-system communication (Beckmann & Kavulic, 2014). One example is the ‘Birth to Five: Watch me thrive’ program (Beckmann & Kavulic, 2014). This program is a coordinated effort by different federal agencies to promote universal developmental and behavioral screening for children aged 0-5 years, referral, follow-up and closing of the referral loop (Administration for Children and Families, 2017). Under this program, compendiums of developmental screening tools were developed for use by primary healthcare providers, early care and education providers, home visitors, child welfare case workers, behavioral health professionals, early intervention specialists, and various other stakeholders in a child’s care. Further, community guides to develop early childhood systems that promote screening, follow-up and referral were also made available to different partners. Finally, this program created an electronic package of resources for follow-up after a screening and sources of developmental support for families and providers (Administration for Children and Families, 2017).

A goal of this program was to improve communication processes between primary care providers and early care and education providers (Beckmann & Kavulic, 2014).

This study examined whether, after the introduction of the ACA, developmental screening for children from birth to five years of age was associated with increased odds of communication between the child’s healthcare provider, child care provider, pre-school or special education program (cross-system communication). This association is important because cross-system communication after a developmental screening can help to connect children and families with needed intervention. Further, such communication promotes integration of healthcare delivery and prevents duplication of developmental screening across different early childhood settings.

We hypothesize that, for children from ages zero to five years, receiving a developmental screening will be associated with increased odds of communication between the child’s healthcare provider and child care provider, pre-school or special education program (cross-system communication). Further, we hypothesize that for children with developmental, behavioral and learning disabilities such as autism spectrum disorder (ASD), attention-deficit hyperactivity disorder (ADHD) and intellectual disability, developmental screening will increase the predicted probability of cross-system communication, as compared to children who did not receive developmental screening.

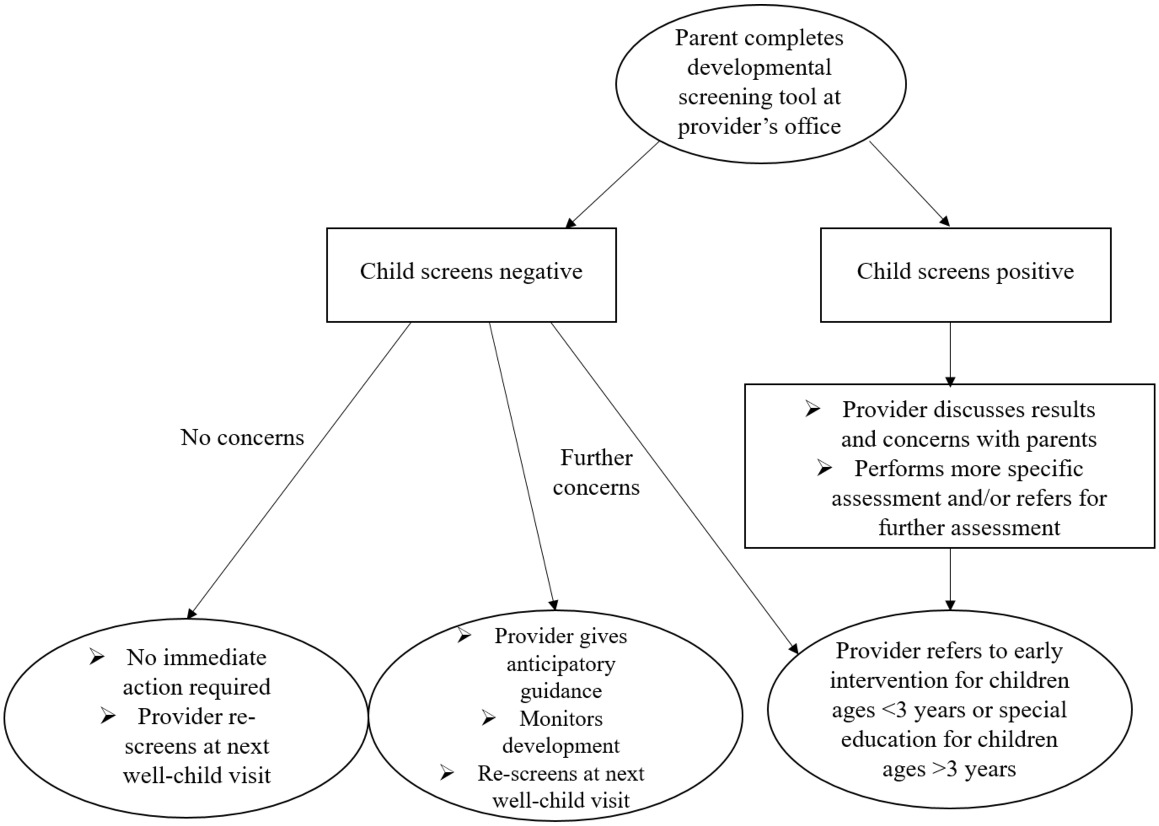

Figure 1: Developmental screening flow-chart
(Adapted from Centers for Disease Control and Prevention, 2018)

Conceptual framework

In this study, developmental screening was conceptualized as an "enabling factor" for necessary cross-system communication to occur (Figure 2). Thus, a developmental screening can be thought of as the first step in receiving necessary services and support for children with developmental disabilities (Centers for Disease Control and Prevention, 2018). Other enabling factors are health insurance coverage and annual family income (Morelli et al., 2014). Children who may "need" their healthcare provider to communicate with their pre-school, child care provider or special education program are those who have developmental disabilities such as autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), intellectual disability (mental retardation), learning disability, speech and language disorder, behavioral and conduct problems or developmental delay (Antonelli et al., 2009; Macy et al., 2014). Also, children who are receiving specialized therapy such as occupational or speech therapy may "need" and benefit from cross-system communication (Antonelli et al., 2009).

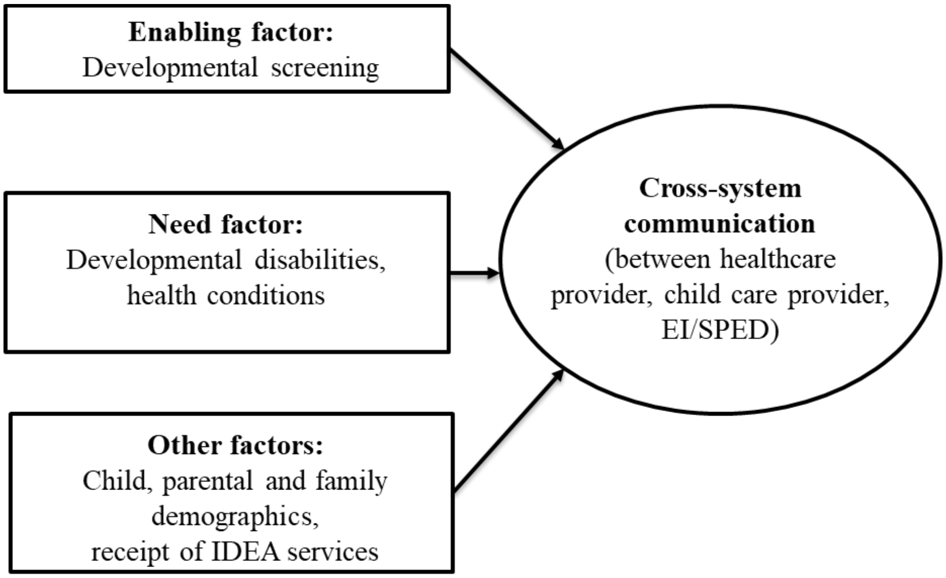

Figure 2: Conceptual framework for cross-system communication
Abbreviations: IDEA, Individuals with Disabilities Education Act; EI, Early intervention; SPED, Special education

Methods

Design and Data

We performed a secondary analysis using cross-sectional and parent-reported data from the 2016 National Survey of Children's Health (NSCH). The NSCH 2016 is representative of all non-institutionalized children in the United States from 0-17 years old and was conducted between June 2016 and February 2017 (Child and Adolescent Health Measurement Initiative, 2017). A mailed screener survey was sent to households to identify all children age 0-17 years, living in the household. One child per household was randomly selected to be the subject of the detailed topical survey, which was filled out online by the child's parent (or primary caregiver) (US Census Bureau, 2018).

Sample

The survey included 14,494 children ages 0-5 years. Of these, there were 3,740 children for whom a need for communication between the child's healthcare provider and child care providers, preschool, or special education program (cross-system communication) was indicated. The need for communication was parent-reported. Observations with missing values in any variable were dropped in the final analysis. The final analytical sample included 3,190 children. Analytical sample size for sensitivity analyses among children ages 9 months-2 years was n=1,156 and among children ages 3-5 years was n=2,034.

Developmental screening variable

Developmental screening was assessed with the following item: "During the past 12-months, did a doctor or other health care provider have you or another caregiver fill out a questionnaire about specific concerns or observations you may have about this child's development, communications, or social behaviors?" This question was asked to parents of children ages 9 months to 5 years, as the first recommended age for receiving a developmental screening is 9 months. The response options were Yes or No.

Cross-system communication variable

The dependent variable was communication between the child’s healthcare provider and child-care provider, preschool or special education program (hereinafter referred to as cross-organizational communication). The survey item was as follows: “In the past 12 months, did the child’s healthcare provider communicate with the child’s school, child care provider or special education program”. For the preschool aged children (3-5 years) in this study, “school” in the survey question may be understood as “pre-school”. The response options were Yes or No. This question was asked only to those children who had any healthcare visit in the past 12 months.

Covariates

For this study, we included covariates shown in past research to be associated with parent-completed developmental screening (Bethell, Reuland, Schor, Abrahms, & Halfon, 2011; Hirai, Kogan, Kandasamy, Reuland, & Bethell, 2018) and care coordination need and access (Litt & McCormick, 2015; Toomey, Chien, Elliott, Ratner, & Schuster, 2013). Child-specific characteristics were age, health insurance in the past year (insured continuously all year; gaps in coverage), sex, race and ethnicity (Hispanic or Latino; non-Hispanic, White; non-Hispanic, Black; other). The family and parental characteristics were income level [categorized according to Children’s Health Insurance Program (CHIP) levels of poverty], family structure (two parents, married; two parents, not married; single mother; other), and highest education level of the child’s primary caregiver (less than high school; high school graduate; greater than high school). Measures of the child’s healthcare needs include variables specifying the number of health conditions (zero, one, two or more) the child currently has out of a list of 27 conditions on which data are available from the survey (see Appendix 1 for complete list) and separate variables for developmental disabilities (autism spectrum disorder, attention deficit/hyperactivity disorders, learning disability, developmental delay, speech or language disorder, intellectual disability, any emotional, developmental or behavioral problems). Variables to account for whether the child was receiving an early intervention plan or special education, or therapy to meet his or her developmental needs, such as speech, occupational or behavioral therapy were also included.

Analysis

We summarized the characteristics of the study sample and examined bivariate associations between developmental screening and cross-system communication. We conducted multivariate analyses using survey logistic regression modeling of cross-organizational communication, adjusting for covariates and a separate sensitivity analysis among children of ages 9 months-2 years. This age range was chosen because developmental screening among children ages 9 months-2 years is a Title V national performance indicator of healthcare quality, designed to align with the recommendations for developmental screenings by the American Academy of Pediatrics (American Academy of Pediatrics, 2019; HRSA Maternal and Child Health, 2019). Sensitivity analysis was also conducted among children ages 3-5 years.

Further, to examine the modifying effect of developmental disabilities, we obtained marginal predicted probability estimates from multivariate logistic regressions of cross-system communication, where the primary independent variables were interaction terms between developmental screening and developmental disabilities and all other covariates were adjusted for. All analyses were weighted and adjusted for the complex survey design using Stata 15.1 (StataCorp LLC, College Station, TX).

Results

Table 1: Characteristics of US children ages 0-5 years whose parents indicated the need for cross-system communication (n=3,740)

Characteristics	**n**	**Weighted%* (95% CI)**
Cross-system communication	937	20% (18%, 23%)
Developmental screening in the past year	1,232	32% (29%, 35%)
Speech or other language disorder	404	10% (8%, 13%)
Developmental delay	353	9% (7%, 11%)
Ongoing emotional, developmental or behavioral problems	271	8% (6%, 10%)
Learning disability	146	5% (3%, 7%)
Attention Deficit Disorder/Attention Deficit Hyperactivity Disorder	85	4% (2%, 6%)
Autism Spectrum Disorder	103	3% (2%, 4%)
Intellectual disability (mental retardation)	38	1% (0.4%, 1.4%)
Early intervention plan or special education	383	9% (7%, 11%)
Specialized therapy (such as physical, occupational or speech)	348	8% (6%, 9%)
Age		
0-2 years	1,470	40% (37%, 44%)
3-5 years	2,270	60% (56%, 63%)
Sex		
Male	2,033	53% (49%, 56%)
Female	1,704	47% (44%, 51%)
Number of current health conditions		
Zero conditions	2,455	69% (66%, 72%)
One condition	724	17% (15%, 20%)
Two or more conditions	561	14% (12%, 16%)
Race and ethnicity		
Hispanic or Latino origin	479	28% (24%, 32%)
White, Non-Hispanic	2,428	46% (42%, 49%)
Black, Non-Hispanic	250	14% (12%, 17%)
Multi-racial/other, Non-Hispanic	547	13% (11%, 15%)
Health insurance in the past year		
Insured continuously all year	3,548	94% (92%, 96%)
Gaps in coverage (includes uninsured all year)	168	6% (4%, 8%)
Family Income		
0-199% FPL	1,059	46% (42%, 49%)
200-299% FPL	560	14% (12%, 16%)
300-399% FPL	532	11% (9%, 12%)
400% FPL or above	1,589	30% (27%, 33%)

Characteristics	**n**	**Weighted%[*] (95% CI)**
Family Structure		
Two parents, currently married	2,740	64% (60%, 67%)
Two parents, not currently married	305	11% (9%, 14%)
Single mother (currently married and living apart, formerly married or never married)	385	14% (12%, 17%)
Other family type	248	10% (8%, 13%)
Highest education level of primary caregiver		
Less than high school	151	16% (13%, 20%)
High school graduate	535	20% (17%, 23%)
More than high school	3,054	64% (60%, 67%)
Primary Household Language		
English	3,375	83% (80%, 87%)
Spanish	126	10% (7%, 14%)
Other	207	6% (5%, 9%)

*Column percentages using survey weights, missing values not included in percentage calculation
Abbreviations: CI, Confidence Interval

Table 2: Developmental screening by age group

Age group	**Developmental screening in past year [Weighted % (95% CI)]**
9 months-2 years (n=1,235)	37% (31%, 42%)
3-5 years (n=2,158)	29% (25%, 33%)

*Row percentages using survey weights, missing values not included in percentage calculation
Abbreviations: CI, Confidence Interval

Sample characteristics

As shown in Table 1, among children ages 0-5 years, whose parents indicated the need for cross-system communication for their child, 20% had a healthcare provider who communicated with other providers in the past year, 32% had a parent-completed developmental screening in the past year, 10% currently had speech or language disorder, 9% currently had developmental delay, 8% currently had ongoing emotional, developmental or behavioral problems, 5% currently had learning disability, 4% currently had Attention Deficit Hyperactivity Disorder (ADHD), 3% had Autism Spectrum Disorder (ASD) and 1% had intellectual disability. Also, 9% received an early intervention plan or special education and 8% used specialized therapy such as physical, occupational or speech therapy.

Out of these children who need cross-system communication, 40% were ages 0-2 years and 60% were ages 3-5 years, 46% were from families with annual incomes between 0-199% FPL, 94% were insured continuously in the past year, 28% had Hispanic/Latino origin and 14% were Black, Non-Hispanic. In addition, 14% lived in single mother households and 16% had parents with less than high school education, and 14% had two or more health conditions. Table 2 shows the proportion of children in each age group who had a developmental screening in the past year. Out of children ages 9 months-2 years, 37% had a developmental screening, and out of children ages 3-5 years, 29% had a developmental screening in the past year.

Table 3: Multivariate regression for cross-system communication for US children ages 9 months-5 years

	Odds of cross-system communication for children who had a developmental screening in the past year (Ref: No developmental screening in past year)
Complete Sample: Children 9 months to 5 years	
Unadjusted odds ratio (95% CI)	**2.1 (1.5, 2.9)**
Fully adjusted* odds ratio (95% CI)	**1.9 (1.4, 2.6)**
Sensitivity analysis: Children 9 months to 2 years	
Unadjusted odds ratio (95% CI)	1.5 (0.8, 2.8)
Fully adjusted* odds ratio (95% CI)	1.5 (0.9, 2.4)
Sensitivity analysis: Children 3-5 years	
Unadjusted odds ratio (95% CI)	**2.5 (1.7, 3.8)**
Fully adjusted* odds ratio (95% CI)	**2.0 (1.4, 3.0)**

*Fully adjusted for child demographic characteristics, presence of developmental disabilities and additional health conditions, parent and family demographic characteristics
Abbreviations: Ref, Reference group; CI, Confidence Interval
Bolded values are statistically significant at $P < 0.05$ level of significance

Multivariate regression of cross-system communication

As shown in Table 3, among children ages 9 months to 5 years, developmental screening using a parent-completed questionnaire about the child's development, communications and social behavior was significantly associated with increased odds of cross-organizational communication, after adjusting for all other covariates. Among children of ages 9 months to 5 years, those who received a developmental screening had nearly twice the odds of cross-system communication [adjusted odds ratio (aOR)= 1.9, 95% CI= 1.4, 2.6], compared to children who did not have developmental screening. Sensitivity analyses results showed that, among children ages 9 months-2 years, developmental screening was not significantly associated with cross-system communication [adjusted odds ratio (aOR)= 1.5, 95% CI= 0.9, 2.4], however, among children ages 3-5 years, developmental screening was significantly associated with cross-system communication [adjusted odds ratio (aOR)= 2.0, 95% CI= 1.4, 3.0]. We also found that among children ages 9 months-2 years, the children whose primary household language is Spanish had significantly lower odds of cross-organizational communication, as compared to children from primarily English-speaking households (adjusted odds ratio=0.2, 95% CI=0.03, 0.88).

Table 4: Marginal predicted probability estimates for children with developmental disability

Developmental Disability*	**Change in predicted probability of cross-system communication upon receiving a developmental screening as compared to no developmental screening# (95% CI)**	***P*-value**
Speech or language disorder		
Ages 9 months-5 years	-0.04 (-0.13, 0.04)	0.31
Ages 9 months-2 years	-0.05 (-0.12, 0.017)	0.14
Ages 3-5 years	-0.03 (-0.16, 0.09)	0.62
Developmental delay		
Ages 9 months-5 years	-0.07 (-0.15, 0.008)	0.08
Ages 9 months-2 years	**-0.08 (-0.15, -0.006)**	**0.03**
Ages 3-5 years	-0.06 (-0.17, 0.04)	0.23
Learning disability		
Ages 9 months-5 years	-0.06 (-0.33, 0.21)	0.66
Ages 9 months-2 years	**-0.77 (-1.07, -0.48)**	**<0.001**
Ages 3-5 years	0.10 (-0.18, 0.36)	0.52
ADHD		
Ages 9 months-5 years	-0.04 (-0.16, 0.08)	0.52
Ages 9 months-2 years	-0.04 (-0.13, 0.05)	0.36
Ages 3-5 years	-0.06 (-0.20, 0.08)	0.43
ASD		
Ages 9 months-5 years	**0.22 (-0.001, 0.44)**	**0.05**
Ages 9 months-2 years	-0.01 (-1.1, 1.07)	0.98
Ages 3-5 years	0.17 (-0.05, 0.39)	0.14
Intellectual disability		
Ages 9 months-5 years	0.07 (-0.19, 0.33)	0.61
Ages 9 months-2 years	-0.03 (-0.43, 0.37)	0.89
Ages 3-5 years	0.13 (-0.17, 0.43)	0.39
Any emotional, developmental or behavioral health condition		
Ages 9 months-5 years	0.05 (-0.17, 0.27)	0.66
Ages 9 months-2 years	-0.14 (-0.35, 0.06)	0.17
Ages 3-5 years	0.14 (-0.13, 0.40)	0.31

Abbreviations: ASD, Autism Spectrum Disorder; ADHD, Attention Deficit/Hyperactivity Disorder

*The reference group was children without a developmental disability

#Marginal predicted probability estimates obtained from multivariate logistic regressions of cross-system communication. Primary independent variables were interaction between developmental screening and developmental disabilities. Models were adjusted for child demographic characteristics, additional health conditions, parent and family demographic characteristics
Bolded values are statistically significant at P < 0.05 level of significance

Marginal predicted probability of cross-system communication for children with developmental disabilities

Table 4 shows the change in predicted probability of cross-system communication upon having a developmental screening as compared to no developmental screening, for children with developmental disabilities. For most children with developmental disabilities, developmental screening did not significantly change the probability of cross-system communication, as compared to no developmental screening. Among children age 9 months-2 years with developmental delay, the predicted probability of cross-system communication was lower by 8 percentage points as compared to those without a developmental screening (P=.03). Among children age 9 months-2 years with learning disabilities, the predicted probability of cross-system communication for those who had a developmental screening was lower by 79 percentage points as compared to those without a developmental screening (P<.001). Among children age 9 months-5 years with ASD, the predicted probability of cross-system communication for those who had a developmental screening was higher by 22 percentage points as compared to those without a developmental screening (P=.05).

Discussion

This study found that developmental screening was associated with significantly higher odds of cross-system communication for children age 3-5 years and who needed cross-system communication. We also found that for children age 9 months-2 years, developmental screening was not significantly associated with cross-system communication. Further, upon examining whether developmental screening was associated with cross-system communication, we found that, for children from age 9 months-2 years with developmental delay and learning disabilities, a developmental screening significantly reduced the probability of cross-system communication. We also found that for children age 9 months-5 years with ASD, a developmental screening increased the probability of cross-system communication, thus supporting our hypothesis that developmental screening will increase the probability of cross-system communication for children with developmental disabilities. However, this finding was only marginally significant. For children with other developmental disabilities like ADHD, developmental screening did not change the probability of cross-system communication.

Our findings for children ages 9 months-2 years do not support our hypotheses. This age range was chosen for sensitivity analyses because developmental screening in this age range is a national performance measure of healthcare quality (HRSA Maternal and Child Health, 2019), and the American Academy of Pediatrics recommends developmental screenings for children in this age group (American Academy of Pediatrics, 2019). However, we find that not only are developmental screening rates low in this age range, but they are also not associated with cross-system communication. A possible reason for this could be that for children younger than 3 years of age, pediatricians adopt a “watch-and-wait” approach if they are unsure about developmental delays (Morelli et al., 2014). They may prefer to repeat the screenings in the future before making any referrals.

These findings are important because cross-system communication in the context of developmental screening can help to link children with developmental disabilities to necessary evaluation and intervention. A developmental screening at the primary care provider’s office is one of the first steps in identifying children who need additional support and services to optimize their developmental and other health-related outcomes (Centers for Disease Control and Prevention, 2018). However, after this step, many children who need support are missed because of lack of communication between the healthcare provider and early intervention agency (Macy et al., 2014). This lack of communication may lead to delayed referrals or a complete lack of services. Moore et al, 2017 found that in a sample of 60 family practitioners and pediatricians in two primary care clinics, 68% were “not” confident that their office would be able to handle the paperwork for an Early Intervention (EI) referral, and 90% were “not” confident that they will receive follow up information from the EI agency about the children they referred.

Absence of referral systems and feedback loops might also be a reason for lower probability of cross-system communication for children with learning disabilities with a developmental screening. Insufficient provider training about EI processes may be another reason. Moore et al., 2017, also found that in their sample, only 31% of family practice physicians were confident about explaining to families the process of starting EI services. Insufficient training was also found to be a barrier affecting a pediatrician’s ability to care for children with educational difficulties in Shah, Kunnavakkam & Msall’s 2013 study. They examined pediatricians’ practices regarding special education and individualized education programs using a national sample of general pediatricians and pediatric residents. They found that while the majority of respondents thought that pediatricians are responsible for identifying children for special education services and inquired if the child is having difficulty at school, far fewer asked parents if they needed assistance obtaining services. Also, less than half of respondents thought that pediatricians should assist in the development of an individualized education plan (Shah, Kunnavakkam, & Msall, 2013).

We also found that, for children with ASD, developmental screening was associated with cross-system communication among children age 9 months-5 years. Although this finding was marginally significant, it may still reflect the correct trend. The reason for this finding may be because of greater awareness about early detection of ASD as compared to other developmental disabilities and specific recommendations for ASD screening at age 18 and 24 months (American Academy of Pediatrics, 2019; Centers for Disease Control and Prevention, 2018).

In our study, we also found that children ages 9 months-2 years whose primary household language is Spanish, have lower odds of cross-system communication, as compared to children whose primary household language is English. Reviews of literature have found that Latino children are less likely to be diagnosed with ASD, and are more likely to be diagnosed at older ages and with more severe symptoms (Zuckerman, Mattox, Sinche, Blaschke, & Bethell, 2014). Thus, future efforts should focus on reducing language barriers in the follow-up and referral after a developmental screening.

The ‘Birth to Five: Watch me thrive’ program was introduced after the Affordable Care Act of 2010, and aimed to promote universal developmental screening for children from 0-5 years of age and ensure that referrals are successful, feedback loops are utilized and follow-up and monitoring occurs (Beckmann and Kavulic, 2014). It also aimed to improve processes of communication between primary care and early childhood care and education. As part of separate efforts, many states received federal implementation grants from 2014-2017 to enhance services of care for children with special healthcare needs through systems integration (Normile & VanLandeghem, 2018). Some of the strategies used by states were systems that closed the referral loop (e.g, once a referral was made by the primary care provider to an early intervention or behavioral health agency), states used agreement templates to define processes and standard guidelines to track outcomes such as whether an appointment was made, whether it occurred and also documented the results of screenings. These agreements were between medical homes and other programs/services in the community. Based on the findings of this study, it is evident that more work needs to be done to improve cross-system communication for children with developmental disabilities. Introducing payment codes for reimbursement of cross-system communication might provide the needed impetus for pediatricians to create awareness about making referrals to early intervention and special education settings in the community and have systems for closing the referral loop, in their practices. Cross-system communication is a function of high-quality care coordination. The American Medical Association introduced payment codes for care coordination in 2013, which allows physicians to bill for care coordination between community service agencies (American Medical Association, 2012). However, pediatricians have to advocate for recognition of the codes via third-party payers in their regions. For children in

Medicaid, states can use the early periodic screening, diagnosis and treatment (EPSDT) benefit to pay for care coordination services. Medicaid doesn’t explicitly define care coordination but it specifies a case management benefit. Also, states can provide care coordination activities in primary care settings or in the community using Medicaid managed care, waivers or accountable care organizations (Johnson & Bruner, 2018).

This study has limitations. First, this study used cross-sectional data, thus it is simply examining an association and cannot be used to establish causality between developmental screening and cross-organizational communication. However, this study paves the path for future studies that may attempt to examine causal pathways. Second, the measure of cross-organizational communication does not indicate if information about referrals was exchanged. Third, the question on developmental screening asks respondents if developmental screenings were conducted using a parent-completed questionnaire. Using parent-reported screening tools are recommended for developmental screenings (American Academy of Pediatrics, 2019). However, some providers may conduct developmental screenings without the use of parent-reported screening tools, and this question fails to capture those children. Finally, if a developmental screening was conducted more than 12 months prior to survey administration, then the survey responses would have failed to capture that. Last, the NSCH data are cross-sectional and, therefore, we cannot infer temporal precedence between developmental screening and cross-system communication.

Conclusion

Programs introduced after the ACA focused on integrating the delivery of services in the developmental screening process and improving cross-system communication between primary care and other early intervention settings in the community. However, this study found that for children with developmental disabilities, receiving a developmental screening does not increase the probability of cross-system communication. Future efforts should focus on improving communication processes, referral systems and feedback loops between pediatric healthcare providers and early intervention and special education providers in the community. This is likely to improve integration of healthcare delivery for children with developmental, behavioral and learning disabilities and less children who need intervention are likely to be missed.

CHAPTER 2: IMPACT OF ACA MEDICAID EXPANSION ON PREVENTIVE CARE UTILIZATION OF CHILDREN IN POVERTY

Introduction

Preventive healthcare visits are a cornerstone of health maintenance in childhood and adolescence. The importance of these visits is emphasized by the American Academy of Pediatrics (AAP), which recommends an annual preventive care visit for children older than 3 years, every 2 months for children up to the age of 6 months and every 3 months for children from 1 to 2 years of age (American Academy of Pediatrics, 2019). Preventive care utilization is associated with completion of immunization schedules and reduced preventable hospitalizations among children (Freed, Clark, Pathman, & Schectman, 1999; Hakim & Bye, 2001). Adequate preventive care in childhood puts children on a positive health trajectory (Currie, 2009). Preventive care visits support population health through the provision of routine immunizations and anticipatory guidance among other services (Park, Macdonald, Ozer, Burg, & Millstein, 2001). For adolescents, preventive visits can be used to prepare for transition to adult healthcare (White, Schmidt, McManus, & Irwin, 2018). Preventive care visits throughout adolescence can be utilized to encourage greater involvement of adolescents in their own care, building their confidence for changing to a clinician for adults and self-care skill development (White et al., 2018). Transition care planning activities are especially important for adolescents with chronic conditions and special healthcare needs (Lebrun-Harris et al., 2018). However, in the United States, preventive healthcare utilization in children declines with increasing age (Black, Nugent, & Anjel, 2016). In 2014, about 21% of adolescents aged 10-17 years did not have a well-child visit in the past year (Black et al., 2016).

The Affordable Care Act (ACA) of 2010 impacted health insurance enrollment for low-income families. Prior to the ACA, the income eligibility for Medicaid for adults in the United States was at or below 61% of the Federal Poverty Line (FPL) on average (Paradise, 2015). The ACA expanded Medicaid to low-income adults at or below 138% of the FPL (Paradise, 2015).

After the ACA implementation, there were increases in health insurance enrollment for children who were previously eligible but not enrolled and whose parents had gained coverage as a result of the Medicaid expansions (Hudson & Moriya, 2017).

Literature shows examples of the link between Medicaid coverage of parents and preventive care utilization for children. Gifford, Weech-Maldonado & Short (2005) examined the impact of parents' Medicaid status on the use of preventive health services by children using data from the 1996 Medical Expenditure Panel Survey (MEPS). They compared preventive care use among three groups of low-income children: when both parent and child had Medicaid coverage throughout the year, when child had Medicaid coverage but parent was uninsured, and when both parent and child were uninsured. While Medicaid coverage for children was positively associated with any well-child visits, the effect of Medicaid coverage on preventive use of children was larger when the parent had Medicaid coverage as compared to being uninsured (Gifford, Weech-Maldonado, & Short, 2005). Venkataramani, Pollack & Roberts, 2017 used state Medicaid eligibility thresholds from 2001-2013 Medical Expenditures Panel Survey (MEPS) data and examined the effect of increases in adult Medicaid eligibility thresholds on the likelihood of receiving an annual well-child visit for children from ages 2-17 years. They found that with an increase of 10 percentage points in the state's parental Medicaid eligibility, there was an increase of 0.27 percentage points (95% CI= 0.058, 0.48) in the probability of a child receiving an annual well-child visit (Venkataramani et al., 2017).

The aim of this study is to examine the effect of the Medicaid expansion for adults under the Affordable Care Act on the preventive healthcare utilization of children from low-income families. We hypothesize that children from low-income families in Medicaid-expansion states will have higher likelihood of having an annual preventive healthcare visit than children from low-income families in non-expansion states.

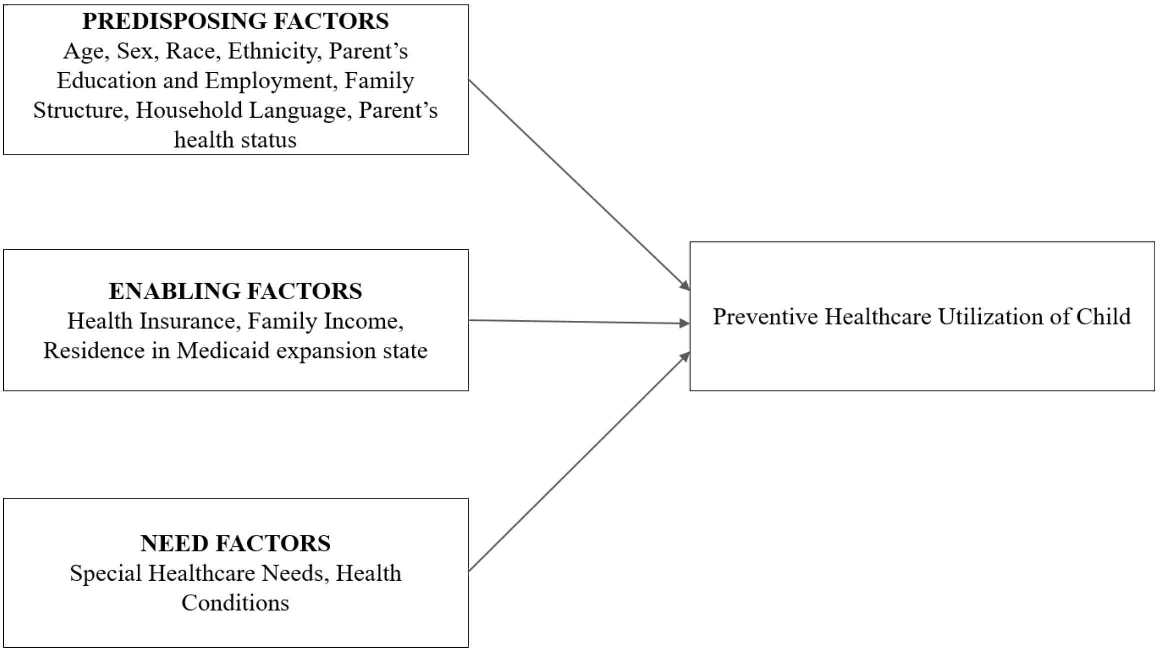

Figure 3: Conceptual Framework for Preventive Healthcare Utilization

Conceptual framework

This study is guided by Andersen and Newman's Healthcare Utilization framework which describes the individual determinants of healthcare utilization (Andersen & Newman, 1973). Variations of this framework have been previously used to examine determinants of children's preventive health services use (Gifford et al., 2005). Thus, pediatric preventive care utilization is predicted by a set of *predisposing, enabling and need factors* (Figure 3). Residence in a Medicaid expansion state is an *enabling factor*. Children from low-income families, who reside in an expansion state may have parents who gained health insurance coverage due to the expansion. The spillover effect of parental Medicaid coverage on preventive care use of child can be due to a number of different reasons. Upon gaining insurance coverage, parents might be better able to navigate the healthcare system for themselves and their family members, thus, leading to increase in parental health-seeking behaviors for their children (Venkataramani et al., 2017). Another reason may be that children who were previously eligible for public insurance, but not enrolled, enroll in Medicaid after their parents gain Medicaid coverage (Welcome-mat effect) (Hudson &

Moriya, 2017). A third possible reason is reduction in family financial burden and elimination of catastrophic medical expenditures due to Medicaid expansion (Baicker et al., 2013; Levy & Meltzer, 2008). Even without any cost-sharing, 13% of families with children in Medicaid or CHIP spend more than 10% of their income on health care services for family members (Medicaid and CHIP Payment and Access Commission, 2015). Reduction in family financial burden may free up resources to access preventive care (Venkataramani et al., 2017). Thus, because of these reasons, Medicaid expansion under the ACA is hypothesized to be positively associated with preventive care utilization among US children.

In this study, the *predisposing factors* of utilization are age in years, race/ethnicity, sex of the child, family and parental characteristics such as the family structure, parent's employment, parent's physical health status, primary household language, highest education level among reported adults in household, and residence in a metropolitan area. These variables have been included in studies of children's preventive health care utilization (Venkataramani et al, 2017), specifically as predisposing factors (Gifford et al., 2005). The *enabling factors* include annual family income and health insurance coverage of the child. Income and health insurance coverage have been categorized as enabling components for preventive care utilization of children in prior literature (Gifford et al., 2005). *The need factors* are variables representing the child's health status including data from special healthcare needs (CSHCN) criteria (i.e., prescription medications use, higher medical care, mental health and educational services use, functional limitations, specialized therapy use and ongoing emotional, developmental or behavioral conditions) and the number of health conditions the child currently has out of a list of 27 conditions[a] on which data is available from the survey (e.g., allergies, asthma, Autism Spectrum Disorder (ASD), anxiety problems, sickle cell disease, vision problems, behavioral problems, intellectual disability) (see Appendix 1 for complete list). The CSHCN criteria have been consistently used in literature as proxy measures of the child's healthcare needs (Toomey et al., 2013; Litt et al., 2015).

Methods

Study Design

To address our aim, a quasi-experimental difference-in-differences approach was used. This approach has been used in evaluations of the impact of the Affordable Care Act to establish the causal effect of the ACA on different outcomes (Hudson & Moriya, 2017; Stimpson & Wilson, 2018). This design eliminates biases that could be the result of permanent differences between the expansion and non-expansion states, as well as biases within the expansion state resulting from temporal trends (Imbens & Wooldridge, 2007).

Data

This study was an analysis of parent-reported, secondary data from the 2017 and 2016 National Survey of Children's Health (NSCH). This survey is representative of all non-institutionalized children in the United States ages 0-17 years old (Child and Adolescent Health Measurement Initiative, 2017). The 2016 survey was administered by the U.S. Census Bureau between June 2016 and February 2017, and the 2017 survey was administered between August 2017 and February 2018 (US Census Bureau, 2019).

Table 5: Medicaid Expansion and Non-expansion States

Treatment: Expansion state	**Control: Non-expansion state**
Louisiana (Expanded in July 2016, after the NSCH 2016 was administered)	Texas
	Mississippi

Medicaid Expansion measurement

The data includes a state identifier, the Federal Information Processing Standards (FIPS) code. Thus, state of residence of individual observations could be identified.

Louisiana was the only state to expand Medicaid between June 2016 and August 2017, thus it was used as the Treatment group (Expansion state) in this study (Table 5). As a control group, neighboring states of Louisiana that did not expand Medicaid as of August 2017, were used. The control group consisted of Texas and Mississippi (Table 5).

Time variable

Data from the 2016 survey constituted the Medicaid pre-expansion period and data from the 2017 survey constituted the post-expansion period.

Preventive healthcare utilization measurement

The main dependent variable was preventive healthcare utilization in the last 12 months. The survey question asked, "In the past 12 months, how many times did this child visit a doctor, nurse or other healthcare professional to receive a preventive check-up?" This question was asked only to those children who had received some kind of medical care in the last 12 months. In the public-use data file, the responses were categorized as zero visits, one visit and two or more visits. For purposes of analysis in this study, the responses were categorized into: zero visits vs at least one visit.

Control variables

Child characteristics that were controlled for: age (0-2 years; 3-17 years), insurance coverage in past year (no coverage; coverage with some gaps; insured continuously for all 12 months), sex (male; female), race/ethnicity (Hispanic or Latino; White, non-Hispanic; Black, non-Hispanic; multi-racial/other, non-Hispanic), special healthcare needs (yes; no), number of current health conditions (zero, one, two or more) and residence in a metropolitan area. Age was categorized into two categories because children below 3 years of age are recommended to have two or more preventive visits in a year, and children from 3-17 years of age are recommended one annual preventive care visit.

Parental and family characteristics included as control variables: highest level of education among reported adults in household (less than high school; high school degree or general educational development; some college or technical school; college degree or higher), family structure (two parents, currently married; two parents, not currently married; single mother; other family type), primary household language (English, Spanish, other), parent's employment in the past year (not employed 50 out of 52 weeks; employed 50 out of 52 weeks), parent's physical health status (poor; fair; good; very good; excellent).

Study Sample

The combined NSCH 2016-2017 data had a total of 3,367 observations from Louisiana, Texas and Mississippi, which included children from 0-17 years of age, from families of all income levels. The study sample included only children from 0-17 years of age, from families with annual incomes of 0-99% FPL, residing in Louisiana, Texas and Mississippi (n=603). In the analytical sample, observations with missing values were deleted, which resulted in an analytical sample size of 467 children from families with annual incomes of 0-99% FPL. Analytical sample sizes for sensitivity analyses among children from families of all income levels and from 100-199% FPL families were 2,831 and 541 respectively.

Analysis Strategy

Difference-in differences analysis using multivariate probit regression was used to examine the impact of Medicaid expansion on preventive care utilization. The primary independent variable was an interaction effect by year and Medicaid expansion status. Probability estimates of preventive care utilization of children were obtained from the probit regression coefficients and holding the values of control variables constant at the mean. A separate difference-in differences analysis was performed to isolate the impact of Medicaid expansion on the health insurance coverage of children. Sensitivity analyses were conducted for all children and children from 100-199% FPL families. All analyses were conducted in Stata 15.1, adjusted for survey weights and statistical significance was assumed at *P* values of less than 0.05.

Results

Table 6: Characteristics of sample population (Children ages 0-17 years, 0-99% FPL)

Characteristics	**Non-expansion states (Texas and Mississippi)**	**Expansion state (Louisiana)**
	n=422	**n=181**
Time		
Pre-expansion (2016)	50%	49%
Post-expansion (2017)	50%	51%
Insurance coverage in past year		
No coverage	12%	5%
Coverage with some gaps	8%	3%
Insured continuously for all 12 months	80%	92%
Age		
0-2 years	15%	15%
3-17 years	85%	85%
Sex		
Male	50%	52%
Female	50%	48%
Race/ethnicity		
Hispanic or Latino	64%	7%
White, non-hispanic	10%	22%
Black, non-hispanic	26%	67%
Multi-racial/Other	0%	4%
Special Healthcare Needs	22%	24%
Number of physical, mental, developmental and behavioral health conditions		
Zero	64%	51%
One	16%	20%
Two or more	20%	29%
Family structure		
Two parents, currently married	40%	22%
Two parents, not currently married	13%	14%

Single mother	35%	44%
Other family type	12%	20%
Primary Household Language		
English	62%	97%
Spanish	37%	2%
Other	1%	1%
Highest level of education among reported adults in household		
Less than high school	25%	16%
High school degree or General Educational Development	39%	46%
Some college or technical school	22%	28%
College degree or higher	14%	10%
Parent's employment 50 out of 52 weeks in the past year	48%	49%
Parent's physical health status		
Poor	3%	2%
Fair	11%	19%
Good	39%	28%
Very good	31%	29%
Excellent	16%	21%
Metropolitan Statistical Area	89%	81%

All percentages are column percentages calculated using survey weights

Sample characteristics

In our sample of children from 0-99% FPL families, in both the expansion and non-expansion states, approximately half of the observations were from pre-expansion (2016) and half were from post-Medicaid expansion (2017) (Table 6). Both in the expansion and non-expansion states, 15% of children were in the age-group of 0-2 years and 85% were in the age-group of 3-17 years. In non-expansion states, 50% of children were males and 50% females, whereas in the expansion state, 52% were males and 48% were females. In non-expansion states, Texas and Mississippi, 64% of the children were Hispanic or Latino, 10% were non-Hispanic, White and 10% were non-Hispanic Black. In expansion state, Louisiana, 67% of the children were non-Hispanic, Black, 22% were non-Hispanic, White and 7% were Hispanic or Latino. In non-expansion states, 22% of children had special healthcare needs, and 20% had two or more current health conditions and in expansion state 24% had special healthcare needs and 29% had two or more current health conditions. Out of children from the non-expansion states, 35% had single mothers, 62% were from primarily English-speaking households, 37% were from primarily Spanish-speaking households, 14% had parents whose highest level of education was college degree or higher, 48% had a parent who was employed for 50 out of 52 weeks in the past year, 16% had parents who had excellent physical health and 89% lived in a metropolitan area. Out of children from the expansion state, 44% had single mothers, 97% were from primarily English-speaking households, 10% had parents whose highest level of education was college degree or higher, 49% had a parent who was employed 50 out of 52 weeks in the past year and 21% had a parent with excellent physical health and 81% lived in a metropolitan area.

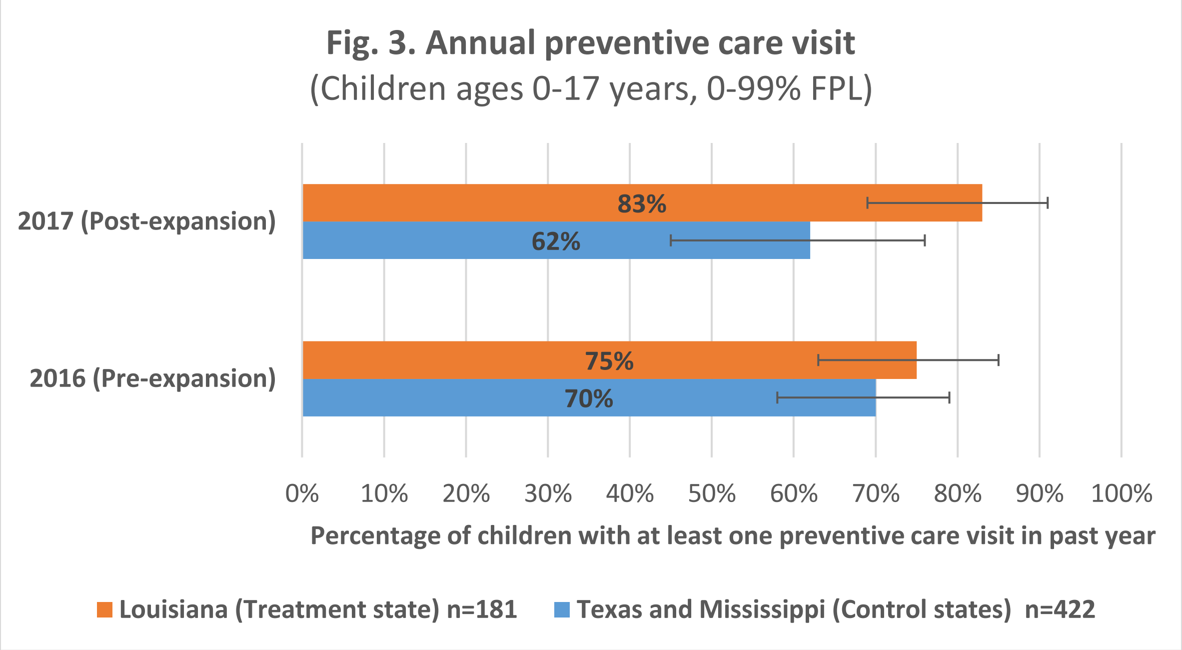

Figure 4: Percentage of children with at least one preventive care visit in the past year, pre-expansion (2016) and post-Medicaid expansion (2017) in Medicaid expansion (Louisiana) and non-expansion (Texas and Mississippi) states

Preventive care utilization

Out of children from 0-99% FPL families in expansion state (Louisiana), prior to Medicaid expansion (in 2016), 75% (95% CI=63%, 85%) had at least one visit (Figure 4). After Medicaid expansion in Louisiana (in 2017), the percentage of children from 0-99% FPL families who had at least one preventive care visit in the past year increased to 83% (95% CI=69%, 91%) (Figure 3).

Out of children from 0-99% FPL families in non-expansion states (Texas and Mississippi), prior to Medicaid expansion (in 2016), 70% (95% CI=58%, 79%) had at least one preventive care visit in the past year (Figure 4). In the post-expansion period (2017), in non-expansion states, Texas and Mississippi, the percentage of children from 0-99% FPL families who had at least one preventive care visit decreased to 62% (95% CI=45%, 76%) (Figure 3).

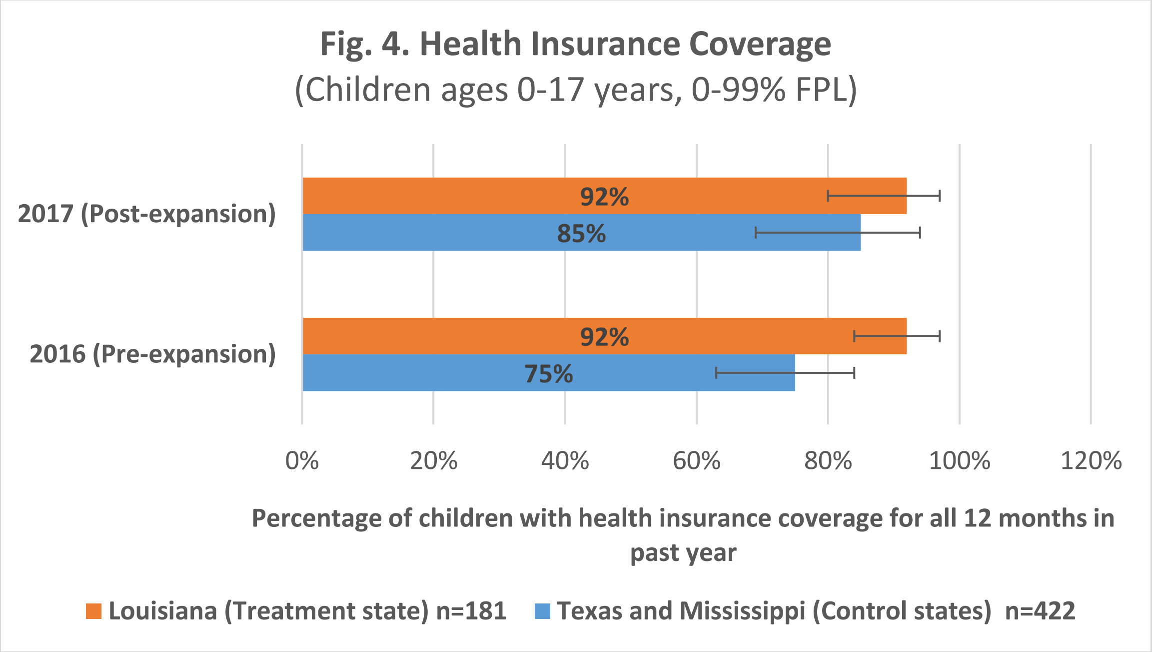

Figure 5: Percentage of children with health insurance coverage, pre (2016) and post-Medicaid expansion (2017) in Medicaid expansion (Louisiana) and non-expansion (Texas and Mississippi) states

Health insurance coverage

Out of children from 0-99% FPL families in expansion state (Louisiana), prior to Medicaid expansion (in 2016), 92% (95% CI=84%, 97%) had health insurance coverage for all 12 months in the past year (Figure 4). After Medicaid expansion in Louisiana (in 2017), the percentage of children from 0-99% FPL families who had health insurance coverage for all 12 months in the past year remained same at 92% (95% CI=81%, 97%) (Figure 5).

Out of children from 0-99% FPL families in non-expansion states (Texas and Mississippi), in the pre-expansion period (in 2016), 75% (95% CI=63%, 84%) had health insurance coverage for all 12 months in the past year (Figure 4). In the post-expansion time period (2017) in the non-expansion states (Texas and Mississippi), the percentage of children from 0-99% FPL families who had health insurance coverage for all 12 months increased to 85% (95% CI=69%, 94%) (Figure 5).

Difference in Differences Analysis

Table 7: Adjusted Association between Medicaid Expansion and at least one preventive care visit for children ages 0-17 years

Poverty level	**Adjusted predicted probability (95% CI)**	***P*-value**
Overall (n=2,831)	0.02 (-0.07, 0.11)	0.713
0-99% FPL (n=467)	**0.26 (0.06, 0.47)**	**0.012**
100-199% FPL (n=541)	-0.09 (-0.32, 0.14)	0.442

Abbreviations: FPL, Federal Poverty Line; CI, Confidence Interval
Results represent the change in predicted probability of at least one preventive care visit for children ages 0-17 years in Louisiana (expansion state) from 2016 to 2017 (pre and post-expansion) (Ref: non-expansion states Texas and Mississippi)

Impact of Medicaid expansion on preventive care utilization

The predicted probabilities shown in Table 7, were obtained from the difference in differences analysis using multivariate probit regression coefficients of the interaction effect between treatment and time variable, while holding the values of control variables constant at their means. We found that in Louisiana, the change in the predicted probability of at least one preventive care visit among children of ages 0-17 years, from 0-99% FPL families, was higher by 26 percentage points after Medicaid was expanded (2017 vs 2016), as compared to the change in the predicted probability (2017 vs 2016) of at least one preventive care visit among children of ages 0-17 years, from 0-99% FPL families in the non-expansion states, Texas and Mississippi (Table 7). The complete model from the regression analysis is included in the Appendix.

Among all children from ages 0-17 years and among children from 100-199% FPL families, no significant differences were observed in annual preventive care visits, pre and post-Medicaid expansion (Table 7).

Table 8: Adjusted Association between Medicaid Expansion and health insurance coverage for children ages 0-17 years

Poverty level	**Adjusted predicted probability (95% CI)**	***P*-value**
Overall (n=2,858)	-0.015 (-0.094, 0.064)	0.712
0-99% FPL (n=474)	-0.12 (-0.34, 0.10)	0.279
100-199% FPL (n=541)	-0.11 (-0.28, 0.06)	0.211

Abbreviations: FPL, Federal Poverty Line; CI, Confidence Interval
Results represent the change in predicted probability of being insured for all 12 months in the past year for children ages 0-17 years in Louisiana (expansion state) from 2016 to 2017 (pre and post-expansion) (Ref: non-expansion states Texas and Mississippi)

Impact of Medicaid expansion on health insurance coverage of children

No significant differences were observed in the predicted probability of having health insurance coverage for all 12 months of the past year, among children in the expansion state, Louisiana, before and after Medicaid expansion, as compared to non-expansion states (Table 8).

Preventive care utilization in expansion state, Louisiana, by age-group

Predicted probabilities of at least one preventive care visit in the past year, in Louisiana, before (2016) and after Medicaid expansion (2017), for children of six different age groups, were also calculated using double-differences probit regression analysis (Appendix 3). Although there were no significant differences in preventive care utilization in any age group from 2016 to 2017, but the graph lines representing predicted probability of at least one preventive care utilization visit in the past year, separated out with increasing age. The largest separation in the line graphs (and thus, the largest increase in predicted probabilities of at least one preventive care visit from 2016 to 2017) was observed among children in the age group 12-14 years, followed by children in the age group 9-11 years.

Discussion

This study used a quasi-experimental difference-in-differences study design and found that expansion of Medicaid eligibility for low-income adults under the Affordable Care Act (ACA) led to an increase in the likelihood of an annual preventive care visit for children from low-income families (0-99% FPL). Children in poverty (0-99% FPL) who were residing in expansion state, Louisiana, had higher likelihood of adhering to the recommended annual preventive care visit as compared to those residing in neighboring non-expansion states, Texas and Mississippi. This study focused on children in families with annual incomes 0-200% FPL because these families were most likely to gain the most from the Medicaid expansions under the Affordable Care Act, which expanded Medicaid eligibility for adults up to 138% of the Federal Poverty Line. These adults received premium tax credits in the health insurance marketplaces (Garfield et al., 2019). In states that did not expand Medicaid, many adults fall into a "coverage gap", because they have incomes above Medicaid eligibility limits, but below the lower limit for premium tax credits in the health insurance marketplaces (Garfield et al., 2019). In non-expansion states, the median income limit for Medicaid eligibility for adults is just at 43% FPL. Thus, adults with annual incomes between 43% FPL and 100% FPL do not receive Medicaid coverage or qualify for marketplace subsidies in non-expansion states (Garfield et al., 2019). The current Medicaid income-eligibility limit in Texas and Mississippi is at 17% FPL and 26% FPL respectively (Kaiser Family Foundation, 2019). These two states were chosen as the control group, because being neighboring states of Louisiana, apart from Medicaid expansion, these states have a similar policy environment as Louisiana, and thus are suited for comparison with Louisiana.

In order to examine if increases in percentage of children with health insurance coverage may be the reason behind increased likelihood of preventive care utilization, this study also isolated the impact of Medicaid expansion for adults under the Affordable Care Act on children's health insurance coverage, and found that there were no increases in the likelihood of having health insurance coverage after Medicaid expansion, in the expansion state. Thus, the reason behind increased likelihood of preventive care utilization is not improvement in insurance coverage of children, but instead is likely to be due to greater engagement of the healthcare system by the parents of these children from low-income families, who gained health insurance coverage under the Medicaid expansion. Previous studies have found that children of parents who engage the healthcare system are more likely to comply with immunization schedules (and thus, preventive visits) as compared to children of parents who do not use healthcare services (Bates, Fitzgerald, Dittus, & Wolinsky, 1994; Freed et al., 1999; Hanson, 1998). Upon gaining insurance coverage under the Medicaid expansion, parents from low-income families might be encouraged to use the healthcare system for themselves and their families.

Another reason behind increases in preventive care utilization for children may be due to decrease in family financial burdens. Studies have shown that Medicaid expansion leads to reduction in financial burdens in low-income families (Levy & Meltzer, 2008; Baicker et al., 2013). In Louisiana, Medicaid covers well-child visits and care is provided at a cost that parents can afford (Georgetown University Health Policy Institute Center for Children and Families, 2017). Even in cases where no cost-sharing is imposed, 12% of low-income families still spend about 10% of their income on healthcare for their families (Medicaid and CHIP Payment and Access Commission, 2015). Reduction of family financial burdens due to Medicaid expansion can free up financial resources to be spent on preventive healthcare for family members.

Preventive care utilization for children declines with age (Centers for Disease Control and Prevention, 2016). Currie, Decker & Lin (2008) found that expanding public health insurance eligibility for older children (9-17 years) improved utilization of preventive care (Currie, Decker, & Lin, 2008).

In our study, adolescents of ages 12-14 years from low-income families of 0-99% FPL had an increasing trend in preventive care utilization after the Medicaid expansion in Louisiana. Although, the increase is not statistically significant, this is an encouraging trend because adolescents can greatly benefit from adherence to preventive care visits by developing confidence and learning skills to manage their own healthcare as they transition to adulthood, receive vaccinations and plan for transition to a healthcare provider for adults.

In Louisiana, 45% of all children are covered by Medicaid and the Louisiana Children’s Health Insurance Program (LaCHIP) (Georgetown University Health Policy Institute Center for Children and Families, 2017). Medicaid is the primary source of coverage for children and the LaCHIP builds on the foundation of Medicaid to cover those children who are not eligible for Medicaid and lack access to affordable private coverage. From a policy perspective, the findings of this study serve as an example for other US states which haven't expanded Medicaid. Currently, out of 14 states which haven't expanded Medicaid, 8 states are in the South and Southeastern United States, some of which are neighboring to Louisiana. The findings demonstrate that the benefits of expansion are not just limited to adults, but also impact the well-being of low-income families.

This study has its limitations. First, the dataset used for the study did not provide information about the health insurance coverage of the parent, thus it could not be included as a control variable in our analysis. However, we conducted sensitivity analyses among children from different poverty levels and included all children whose families were most likely to have gained health insurance coverage from the Medicaid expansion. Second, the survey is parent-reported which may give rise to reporting bias. Third, the survey responses are based on the year prior to survey administration, and in this study, we are making the assumption that the responses to the NSCH 2017 survey will reflect the effect of the Medicaid expansion in Louisiana.

Conclusion

This study found that children in poverty residing in a Medicaid expansion state, Louisiana, have increased likelihood of having an annual preventive care visit after expansion of Medicaid eligibility for adults under the Affordable Care Act of 2010, as compared to children from low-income families residing in neighboring states, Texas and Mississippi, which did not expand Medicaid. Thus, the findings demonstrated that the value of expanding Medicaid eligibility to low-income adults up to 138% of the Federal Poverty Level includes the health and well-being of their families, as preventive care visits are crucial for the health maintenance of children.

CHAPTER 3: IMPACT ON MEDICAID EXPANSION ON SCHOOL ABSENTEEISM OF CHILDREN IN POVERTY

Introduction

The Affordable Care Act (ACA) of 2010 expanded public health insurance coverage (Medicaid) for adults from low-income families. Prior to the ACA, the income eligibility for Medicaid for adults in the United States was at or below 61% of the Federal Poverty Line (FPL) on average (Paradise, 2015). The ACA expanded Medicaid to low-income adults at or below 138% of the FPL (Paradise, 2015). States were given the option to adopt the Medicaid expansion. Currently, as of March 2019, 37 states (including the District of Columbia) have adopted Medicaid expansion.

Some examples in literature have explored the impact of expanding public health insurance coverage for children from low-income families (Medicaid expansion) on children's academic and school outcomes.

Cohodes et al., 2016, examined the impact of Medicaid expansions for children in the 1980s and 1990s on future educational attainment. They found that Medicaid expansions for children from low-income families increases the rate of high-school and college completion (Cohodes et al., 2016). Further, they suggested that better health is one of the mechanisms for higher educational attainment, because Medicaid eligibility translates into better health. Currie et al., 2009, also found that Medicaid eligibility in early-childhood improves the utilization of preventive care for children and positively impacts health later in the childhood.

Another mechanism by which Medicaid expansion may impact academic outcomes is by reducing family financial burdens. Medicaid expansions reduced family financial burdens due to having higher household resources and eliminating catastrophic medical expenses (Levy & Meltzer, 2008; Baicker et al., 2013). Dahl and Lochner, 2012 studied the causal effect of family income on children's math and reading achievement. They found that a $1,000 increase in family income due to large changes in the Earned Income Tax Credit between 1993 and 1997, raised the combined math and reading test scores by 6 percent of a standard deviation in the short run. Test gains are larger for children from low-income families (Dahl & Lochner, 2012).

An important outcome for school-going children is school attendance. Missing school days or absenteeism has been linked to lower reading and math test scores, fewer literacy skills, grade retention, social isolation, behavior disorders and school dropout (Bridgeland, DiIulio Jr, & Morison, 2006; Burton, Marshal, & Chisolm, 2014). Problematic or chronic school absenteeism has been defined differently in different studies, but many school districts define it as 10% missed school days, which amounts to about 18 days in a school year (Education Commission of the States, 2018; U.S. National Center for Education Statistics, 2016). Other researchers have used a cutoff of 15% missed school days for problematic absenteeism (Ingul, Klöckner, Silverman, & Nordahl, 2012). Skedgell & Kearney (2018) examined the risk factors for absenteeism at the 1%+, 10%+ and 15%+ level and found a similar set of risk factors at the 10%+ and 15%+ levels of absenteeism as compared to the 1%+ level. These were low GPA, age 15.5+ years, African American or American Indian ethnicity and grades 1, 6, 7, 8, 10, 11, or 12 (Skedgell & Kearney, 2018). Black & Zablotsky (2018) also found that children with ADHD, autism spectrum disorder and intellectual disability were more likely to have chronic/problematic school absenteeism in the past year than children without these conditions (Black & Zablotsky, 2018). In their study they defined chronic/problematic school absenteeism as missing 15 or more school days in the past year (Black & Zablotsky, 2018). Romero & Lee (2007) examined chronic school absenteeism among a national sample of elementary school students. They found that in all elementary grades, from kindergarten to Grade 5, living in a low-income family increases chronic absenteeism (missing at least 18 days or more in a school year) (Romero & Lee, 2007). Out of children in kindergarten, 21% of children from families with annual incomes below 100% FPL were chronically absent, as compared to only 5% of children from families with annual incomes greater than 300% FPL (Romero & Lee, 2007). Also, in all grades, from kindergarten to Grade 5, American Indian children had the highest absenteeism rates. They also found that there were emerging trajectories in absenteeism and over one-half of chronic absentees in kindergarten were also chronic absentees in first grade (Romero & Lee, 2007).

Thus, the available evidence suggests that low-family income is an important factor associated with chronic/problematic absenteeism, in addition to other factors such as race/ethnicity, developmental disabilities, age and lower academic performance. Medicaid expansion under the Affordable Care Act of 2010 was targeted at low-income adults and their families, in order to increase access to healthcare for these adults and thus, improve the over well-being of these adults and their families. However, the impact of *adult* Medicaid expansion on *children's school outcomes* is largely unexplored in literature. The aim of this study is to examine whether expansion of Medicaid eligibility among adults under the Affordable Care Act affected school absenteeism of children. The rationale behind this study is that provision of health insurance for adults from low-income families has positive impacts on the overall family well-being, due to reduced financial burden and utilization of preventive healthcare (Levy & Meltzer, 2008; Baicker et al., 2013; Venkataramani, 2017). Reduction of family financial burdens is likely to improve academic performance and utilization of preventive healthcare is likely to contribute towards health maintenance of children. Thus, we hypothesize that children from low-income families in Medicaid expansion state will miss fewer days of school as compared to children in a Medicaid non-expansion state.

Conceptual Framework

This study uses an interdisciplinary model of problematic absenteeism (Kearney, 2008). This model accounts for a set of risk factors that contribute to problematic absenteeism. These are child, parent, family, peer, school and community factors (Table 9). All factors impact absenteeism concurrently, all factors are linked and a reciprocal relationship between the risk factors and absenteeism also exists. The primary independent variable, residence in a Medicaid-expansion state, was conceptualized as a child-factor, which also influenced the parent (Medicaid coverage) and the family factors (reduction of family financial burdens). The other control variables have been included in prior studies of problematic absenteeism and academic outcomes for children (Kearney, 2008; Kearney & Skedgell, 2016; Black & Zablotsky, 2018; Romero & Lee, 2007; Currie et al., 2009). Child factors included in the study were race/ethnicity, age, health conditions, developmental disabilities, preventive healthcare utilization and grade retention. Parent factors were highest educational level of parents in household and employment. Family factors include family structure, family income. Peer factors included poor participation in extracurricular activities. Community factors included neighborhood safety. School factors included safety of the child in school.

Table 9: Interdisciplinary model of problematic school absenteeism in children

Risk factors	**Variables**
Child factors	➢ Race/ethnicity, age ➢ Grade retention, ➢ Preventive healthcare utilization ➢ **Residence in Medicaid-expansion state** ➢ Physical, mental, developmental and behavioral health conditions ➢ Developmental disabilities
Parent factors	➢ Highest educational level of parents in household ➢ Parental employment
Family factors	➢ Family structure ➢ Family income
Peer factors	➢ Extracurricular activities
Community factors	➢ Neighborhood safety
School factors	➢ Safety of child in school

Methods

Study Design

This study used a quasi-experimental difference-in-differences design. The study sample was divided into treatment (Medicaid expansion state) and control (Medicaid non-expansion state) groups and differences between and within the groups were calculated over time (before and after Medicaid expansion). This design controlled for temporal trends within the groups as well as permanent differences between the groups (Imbens & Wooldridge, 2007).

Data

This study used parent-reported, secondary data from two consecutive years (2016 and 2017) of the National Survey of Children's Health (NSCH). The survey is representative of all non-institutionalized children in the United States from 0-17 years of age (Child and Adolescent Health Measurement Initiative, 2017). NSCH 2016 was administered by the US Census Bureau from June 2016 to February 2017 and the NSCH 2017 was administered by the US Census Bureau from August 2017 and February 2018 (US Census Bureau, 2019).

Table 10: Medicaid Expansion and Non-expansion States

Treatment: Expansion state	Control: Non-expansion state
Louisiana (Expanded in July 2016, after the NSCH 2016 was administered)	Texas
	Mississippi

Medicaid expansion measurement

The primary independent variable of this study was Medicaid expansion status of child's state of residence. The data includes a state identifier, the Federal Information Processing Standards (FIPS) code, which was used to identify the state of residence of individual observations. Louisiana was the only state to expand Medicaid between June 2016 and August 2017, thus it was used as the expansion state (treatment group) in this study (Table 9). The neighboring states of Texas and Mississippi which did not expand Medicaid as of August 2017 were used as non-expansion states (control group) for comparison (Table 9).

Time variable

Data from the 2016 survey constituted the Medicaid pre-expansion period and data from the 2017 survey constituted the post-expansion period.

Absenteeism measurement

The primary dependent variable was number of school days missed in the past year because of illness or injury. The survey question was asked only to school-going children from 6-17 years of age. In the public-use data file, the responses were categorized as 0 days, 1-3 days, 4-6 days, 7-10 days and 11 or more days. For analysis purposes, the variable was dichotomized into 0-10 days and 11 or more days, in order to best capture problematic absenteeism using the available data. For sensitivity analyses, the variable was also dichotomized into 0 days and 1 or more days.

Control variables

Child characteristics included as control variables were age (6-8; 9-14; 15-17 years), sex (male; female), race/ethnicity (Hispanic or Latino; White, non-Hispanic; Black, non-Hispanic), health insurance coverage in the past year (no coverage; coverage with some gaps; insured continuously for all 12 months), number of preventive care visits in the past year (zero; one or more), number of physical, mental, developmental and behavioral health conditions (zero, one, two or more), presence of the following developmental and behavioral conditions as separate variables (Autism Spectrum Disorder, Attention Deficit Hyperactivity Disorder, behavioral or conduct problems, developmental delay, learning disability, intellectual disability, speech and language disability), grade retention since kindergarten (yes; no), participation in one or more extracurricular activities (yes; no) and residence in a metropolitan area.

Parent characteristics included were highest level of education among reported adults in household (less than high school; high school degree or general educational development; some college or technical school; college degree or higher), parent’s employment in the past year (not employed 50 out of 52 weeks; employed 50 out of 52 weeks) and parent's physical health status (poor; fair; good; very good; excellent).

Family characteristics were, family structure (two parents, currently married; two parents, not currently married; single mother; other family type) and primary household language (English, Spanish, other).

Neighborhood characteristics included were safety of neighborhood (yes; no) and school characteristics included were whether the child was safe at school (yes; no).

Study Sample

The NSCH 2016-2017 combined dataset included a total of 2425 observations from children of ages 6-17 years, from all family income levels, residing in Louisiana, Texas and Mississippi. The study sample included all school-going children from 6-17 years of age, from families with annual incomes 0-99% of the Federal Poverty Line (FPL) residing in Louisiana, Texas and Mississippi, in the study sample (n=433). Observations with missing values were deleted in the analytical sample. Thus, the analytical sample consisted of 294 school-going children from the ages of 6-17 years, from families with annual incomes 0-99% FPL, residing in Louisiana, Texas and Mississippi. Sensitivity analyses were conducted among school-going children of ages 0-17 years from all income levels (n=1,899).

Analysis Strategy

To address the study aim, we used a difference-in-differences approach using estimates from a multivariate probit regression model of school absenteeism. We created a two-way interaction effect by year and Medicaid expansion status, which would isolate the impact of Medicaid expansion on absenteeism rates, after controlling for other covariates. Sensitivity analyses were conducted using the sample of all school-going children ages 6-17 years and also by alternatively categorizing the outcome variable (absenteeism in past year) into zero days and one or more days. We accounted for the complex design of the National Survey of Children's Health using statistical software, Stata 15.1. We assumed statistical significance at *P* values of less than 0.05.

Results

Table 11: Characteristics of sample population (School-going children ages 6-17 years, 0-99% FPL)

Characteristics	**Non-expansion states (Texas and Mississippi) n=302**	**Expansion state (Louisiana) n=131**
Time		
Pre-expansion (2016)	53%	50%
Post-expansion (2017)	47%	50%
Age		
6-8 years	36%	27%
9-14 years	37%	52%
15-17 years	27%	20%
Sex		
Male	51%	55%
Female	49%	45%
Race/ethnicity		
Hispanic or Latino	60%	8%
White, non-Hispanic	12%	20%
Black, non-Hispanic	27%	71%
Insurance coverage in past year		
No coverage	9%	8%
Coverage with some gaps	11%	2%
Insured continuously for all 12 months	80%	90%
Number of preventive care visits in past year		
Zero	43%	25%
One or more	57%	75%
Repeated any grades since kindergarten	9%	23%
Participates in one or more extracurricular activities	64%	60%
Safe at school	97%	98%
Autism spectrum disorder	1%	1%

Attention deficit hyperactivity disorder	11%	15%
Behavioral or conduct problems	10%	9%
Developmental delay	6%	11%
Learning disability	10%	13%
Intellectual disability	0.2%	5%
Speech and language disability	5%	5%
Number of physical, mental, developmental and behavioral health conditions		
Zero	56%	45%
One	18%	22%
Two or more	25%	32%
Highest level of education among adults in household		
Less than high school	33%	18%
High school degree or General Educational Development	36%	47%
Some college or technical school	16%	29%
College degree or higher	14%	6%
Family structure		
Two parents, currently married	47%	18%
Two parents, not currently married	11%	14%
Single mother	33%	41%
Other family type	9%	26%
Primary Household Language		
English	59%	97%
Spanish	41%	3%
Parent employed for 50 out of 52 weeks in the past year	45%	57%
Parent's physical health status		
Poor	5%	2%
Fair	15%	21%
Good	37%	25%
Very good	29%	31%

Excellent	14%	20%
Safe neighborhood	88%	90%
Residence in metropolitan area	89%	82%

Sample characteristics

Our sample included school-going children of ages 6-17 years from low-income families with annual incomes of 0-99% of the Federal Poverty Line (FPL) residing in the states of Texas, Mississippi and Louisiana. As shown in Table 11, in both expansion and non-expansion states, majority of children in our sample were in the age group of 9-14 years (37% in non-expansion group and 52% in expansion group). Also, majority of children in both groups were males (51% in non-expansion group and 55% in expansion group). In Texas and Mississippi (non-expansion group), majority of children were Hispanic or Latino (60%), whereas in Louisiana (expansion group), majority of children were non-Hispanic, Blacks (71%). In non-expansion group, 80% of children were insured continuously for the past 12 months and in the expansion group, 90% of children were insured continuously for the past 12 months. In the non-expansion group, 57% of children had one or more preventive care visits in the past year, whereas in the expansion group, 75% of children had one or more preventive care visits in the past year. In the non-expansion group, 9% of children repeated any grades since kindergarten, 64% participated in one or more extracurricular activities and 97% were safe at school. In the expansion group, 23% of children repeated any grades since kindergarten, 60% participated in one or more extracurricular activities and 98% were safe at school. In the non-expansion group 14% children had parents with a college degree or higher and 45% had parents who were employed for most weeks in the past year, as compared to 6% and 57% respectively, in the expansion group. In the non-expansion group, 33% of children had single mothers as compared to 41% in the expansion group, and 41% had Spanish as the primary household language as compared to only 3% children with Spanish as the primary household language in the expansion group. In the non-expansion group, 88% children lived in a safe neighborhood and in the expansion group, 90% of children lived in a safe neighborhood.

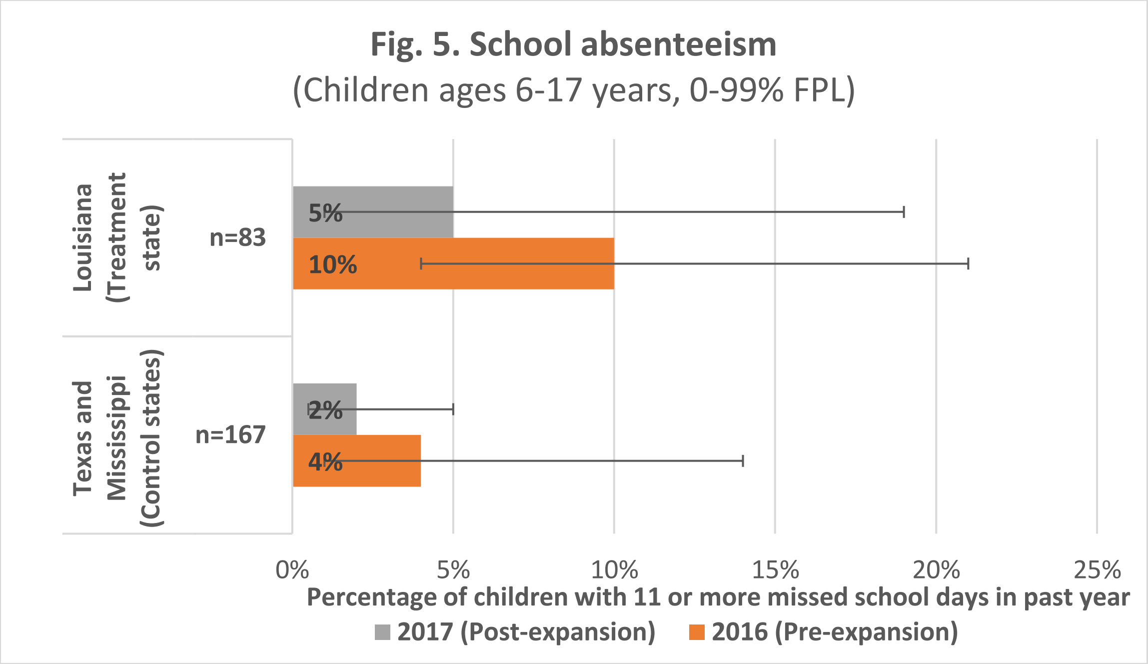

Figure 6: Percentage of school-going children who missed 11 or more school days, pre (2016) and post- Medicaid expansion (2017) in Medicaid expansion (Louisiana) and non-expansion (Texas and Mississippi) states

Absenteeism rates in expansion and non-expansion states before and after Medicaid expansion

Figure 6 shows the percentage of school-going children ages 6-17, from low-income families (0-99% FPL) who missed 11 or more school days in the past year in the expansion and non-expansion states before (2016) and after (2017) Medicaid expansion. Prior to Medicaid expansion in Louisiana (in 2016), 10% (95% CI=4%, 21%) of school-going children ages 6-17, from families with annual incomes 0-99% FPL, missed 11 or more days of school in the past year. This dropped to 5% (95% CI=1%, 19%) after Medicaid expansion in Louisiana, in 2017. In neighboring non-expansion states, in 2016, 4% (95% CI=1%, 14%) of school-going children ages 6-17 years, from low-income families (0-99% FPL) missed 11 or more school days in the past year, which dropped to 2% (95% CI=0.5%, 5%) in 2017.

Table 12: Adjusted Association between Medicaid Expansion and 11 or more missed school days for children ages 6-17 years

Poverty level	**Adjusted predicted probability (95% CI)**	***P* value**
Overall (n=1,897)	-0.03 (-0.07, 0.0006)	0.046
0-99% FPL (n=292)	**-0.18 (-0.31, -0.05)**	**0.007**

Abbreviations: FPL, Federal Poverty Line; CI, Confidence Interval
Results represent the change in predicted probability of 11 or more missed school days for school-going children ages 6-17 years in Louisiana (expansion state) from 2016 to 2017 (pre and post-expansion) (Ref: non-expansion states Texas and Mississippi).

Difference-in-differences analysis for school absenteeism

Table 12 shows the marginal change in predicted probabilities of 11 or more missed school days in the past year in the expansion state, Louisiana after Medicaid expansion (2017 vs 2016), as compared to non-expansion states Texas and Mississippi. Thus, the decrease in the predicted probability of missing 11 or more school days in Louisiana, after Medicaid expansion (2017 vs 2016), among school-going children of ages 6-17 years from low-income families (0-99% FPL), was greater by 18 percentage points in the predicted probability of missing 11 or more school days (p=0.007), as compared to the decrease in the predicted probability of missing 11 or more school days in the neighboring non-expansion states of Texas and Mississippi. Results of sensitivity analyses using the sample of all school-going children ages 6-17 years showed a marginally significant adjusted association between Medicaid expansion and absenteeism. In this sample, in Louisiana, among school-going children ages 6-17 years, after Medicaid expansion, the decrease in the predicted probability of missing 11 or more school days in the past year, as compared to neighboring non-expansion states, Texas and Mississippi was greater by 3 percentage points (p=0.046). When absenteeism was dichotomized into categories of Zero school days missed and one or more school days missed, we found that Medicaid expansion did not have an impact on one or more school days missed (results not shown).

Discussion

In this study, using a quasi-experimental study design, we found that children from low-income families (0-99% FPL) residing in a Medicaid expansion state were less likely to miss 11 or more school days in a year, as compared to children from low-income families residing in neighboring states that did not expand Medicaid. Other covariates associated with higher school absenteeism were, no preventive care visits in the past year, ages 15-17 years, lack of health insurance coverage in the past year, parental education less than high school, single mother family structure, autism spectrum disorder, learning disability, intellectual disability and residence in a metropolitan area. While prior studies have shown association of absenteeism, with ages 15.5+ years (Skedgell, 2018), presence of developmental disabilities (Black & Zablotsky, 2018), parental education and family structure (Kearney, 2008), this is the first study that demonstrated the impact of Medicaid expansion for adults on children's school absenteeism. The mechanism by which Medicaid expansion for adults is likely to impact school absenteeism for children is improvement of overall family well-being due to reduction of family financial burdens (Baicker et al., 2013; Levy & Meltzer, 2008). Another mechanism by which absenteeism is likely to be impacted due to Medicaid expansion is adherence to an annual preventive care visit for children. As the second chapter of this dissertation demonstrated, for children from low-income families, Medicaid expansion had a positive impact on preventive care utilization for children from low-income families. In our study, we find that having at least one preventive care visit in the past year is significantly associated with lower absenteeism. Thus, adherence to the recommended number of preventive care visits in a year has the potential to impact school absenteeism for children (Figure 7). In fact, recent recommendations from the American Academy of Pediatrics, highlight the role that pediatricians can play in addressing school absenteeism at preventive care visits (Allison & Attisha, 2019). They encourage pediatricians to include questions on the child's school absences in the child's medical record, talk about the effects of school absences on school performances and future wellness, support parents in addressing barriers to attendance, help families of children with chronic health issues to complete school action plans so that the families feel secure sending the children to school, provide clear guidance on how to avoid absences from minor illnesses and also connect families with resources in the community that can improve the well-being of the entire family (e.g, family counseling, food pantries, housing assistance) (Allison & Attisha, 2019).

This study used a conceptual framework that addresses the inter-disciplinary risk factors of problematic school absenteeism. In doing so, this study demonstrated how social determinants of health such as poverty, have to be addressed in order to address school absenteeism. A study has shown that youth may be called on to care for sick family members or younger siblings if a parent or primary care-giver is sick or cannot take time off work, which is more likely to occur in low-income families (Ad Council, 2015). Unstable housing conditions and transportation difficulties have also shown to be associated with chronic absenteeism (Rafferty, 1995; Ramirez et al., 2012). Thus, overall family well-being can enable children from low-income families to attend school. Parental Medicaid coverage may likely be contributing to overall family well-being.

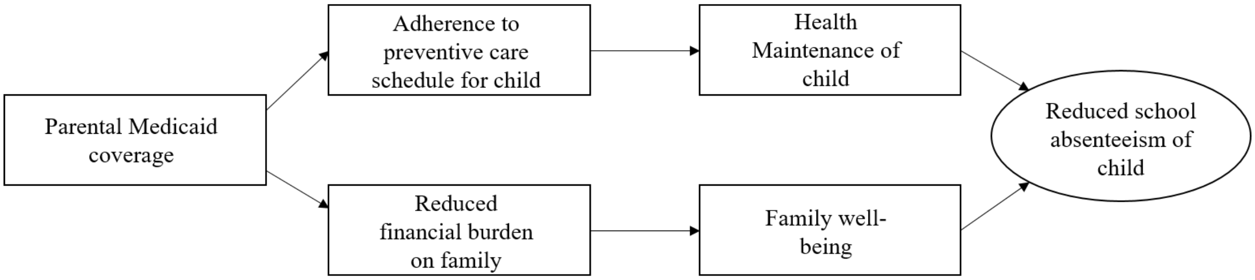

Figure 7: Possible pathways by which parental Medicaid coverage can impact child school absenteeism

Problematic school absenteeism is important to address because it has been shown to be a better predictor of school failure than test scores (Allensworth & Easton, 2007). Chronic school absenteeism in sixth grade is predictive of school drop-out (Ginsburg, Jordan, & Chang, 2014). Also, chronic absenteeism has been shown to be associated with engaging in health risk-behaviors such as smoking cigarettes or marijuana, alcohol and other drug use, risky sexual behavior and juvenile delinquency (Eaton, Brener, & Kann, 2008; Robertson & Walker, 2018). Not only did this study demonstrate the far-reaching impact of Medicaid expansion on school absenteeism of children, but we also suggest potential targets for intervention to improve school absenteeism of children from low-income families, such as adherence to the recommended number of preventive healthcare visits for school-going children. In doing so, we indicate the need for communication and collaboration between two different stakeholders in a child's care, namely healthcare and education.

This study has limitations. The absenteeism variable is unable to exactly capture chronic or problematic absenteeism, which is typically defined as missing 18 days or more in a school year. However, given the data from the survey, we tried to capture what would likely predict problematic absenteeism. A child who missed 11 or more days in the school year is also likely to miss 18 or more days in a school year (Skedgell & Kearney, 2018). Second, the NSCH survey does not include questions on school characteristics such as school climate. However, we included a variable on whether the child was safe in school. The NSCH survey is parent-reported hence all measures reflect parent perceptions which may give rise to reporting bias. Finally, a limitation of the difference-in-differences method is that it cannot control for other policies which may be affecting school absenteeism and may change pre and post Medicaid expansion.

Conclusion

This study identified the causal effect of Medicaid expansion for adults on children's school absenteeism by showing that in Medicaid expansion state, Louisiana, after Medicaid expansion, there was significant decrease in school absenteeism among children from low-income families, as compared to neighboring states that did not expand Medicaid, Texas and Mississippi. Thus, this study demonstrated a far-reaching impact of Medicaid expansion and also identified potential targets for reducing school absenteeism among children in poverty.

REFERENCES

Ad Council. (2015). *California Attendance Parent Survey Results*. Retrieved from https://oag.ca.gov/sites/all/files/agweb/pdfs/tr/toolkit/QuantitativeResearchReport.pdf

Administration for Children and Families. (2017). Birth to 5: Watch Me Thrive! Retrieved from https://www.acf.hhs.gov/ecd/child-health-development/watch-me-thrive

Administration for Children and Families. (2018). Early Head Start Programs. Retrieved from https://eclkc.ohs.acf.hhs.gov/programs/article/early-head-start-programs

Agency for Healthcare Research and Quality. (2014). Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies: Volume 7—Care Coordination. Retrieved from https://www.ahrq.gov/research/findings/evidence-based-reports/caregaptp.html

Allensworth, E. M., & Easton, J. Q. (2007). What Matters for Staying On-Track and Graduating in Chicago Public High Schools: A Close Look at Course Grades, Failures, and Attendance in the Freshman Year. Research Report. *Consortium on Chicago School Research*.

Allison, M. A., & Attisha, E. (2019). AAP COUNCIL ON SCHOOL HEALTH. The link between school attendance and good health. *Pediatrics, 143*(2).

American Academy of Pediatrics. (2019). Recommendations for Preventive Pediatric Health Care. Retrieved from https://www.aap.org/en-us/documents/periodicity_schedule.pdf

American Medical Association. (2012). *2013 CPT (Current Procedural Terminology)*. Retrieved from Chicago, IL:

Andersen, R., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the United States. *The Milbank Memorial Fund Quarterly. Health and Society*, 95-124.

Antonelli, R. C., McAllister, J. W., & Popp, J. (2009). Making care coordination a critical component of the pediatric health system: a multidisciplinary framework.

Antonelli, R. C., Stille, C. J., & Antonelli, D. M. (2008). Care coordination for children and youth with special health care needs: a descriptive, multisite study of activities, personnel costs, and outcomes. *Pediatrics, 122*(1), e209-e216.

Baicker, K., Taubman, S. L., Allen, H. L., Bernstein, M., Gruber, J. H., Newhouse, J. P., . . . Finkelstein, A. N. (2013). The Oregon experiment—effects of Medicaid on clinical outcomes. *New England Journal of Medicine, 368*(18), 1713-1722.

Bates, A. S., Fitzgerald, J. F., Dittus, R. S., & Wolinsky, F. D. (1994). Risk factors for underimmunization in poor urban infants. *JAMA, 272*(14), 1105-1110.

Beckmann, K., & Kavulic, C. (2014). Developmental Screening: How States and Communities Can Use Birth to 5: Watch Me Thrive Retrieved from https://www.acf.hhs.gov/sites/default/files/occ/transcript_birth_to_5_watch_me_thrive_webinar_may_21_2014.pdf

Bethell, C., Reuland, C., Schor, E., Abrahms, M., & Halfon, N. (2011). Rates of parent-centered developmental screening: disparities and links to services access. *Pediatrics, 128*(1), 146-155.

Black, L. I., Nugent, C. N., & Anjel, V. (2016). *Access and Utilization of Selected Preventive Health Services Among Adolescents Aged 10–17*. Retrieved from Hyattsville, MD: https://www.cdc.gov/nchs/data/databriefs/db246.pdf

Black, L. I., & Zablotsky, B. (2018). Chronic School Absenteeism among Children with Selected Developmental Disabilities: National Health Interview Survey, 2014-2016. National Health Statistics Reports. Number 118. *National Center for Health Statistics*.

Bridgeland, J. M., DiIulio Jr, J. J., & Morison, K. B. (2006). The silent epidemic: Perspectives of high school dropouts. *Civic Enterprises*.

Burton, C. M., Marshal, M. P., & Chisolm, D. J. (2014). School absenteeism and mental health among sexual minority youth and heterosexual youth. *Journal of school psychology, 52*(1), 37-47.

Centers for Disease Control and Prevention. (2018). Screening and Diagnosis of Autism Spectrum Disorder for Healthcare Providers. Retrieved from https://www.cdc.gov/ncbddd/autism/hcp-screening.html

Child and Adolescent Health Measurement Initiative. (2017). *Fast Facts: 2016 National Survey of Children's Health*. Retrieved from www.nschdata.org.

Cohodes, S. R., Grossman, D. S., Kleiner, S. A., & Lovenheim, M. F. (2016). The effect of child health insurance access on schooling: Evidence from public insurance expansions. *Journal of Human Resources, 51*(3), 727-759.

Cooley, W. C. (2004). Redefining primary pediatric care for children with special health care needs: the primary care medical home. *Current opinion in pediatrics, 16*(6), 689-692.

Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. *JoUrnal of economIc lIteratUre, 47*(1), 87-122.

Currie, J., Decker, S., & Lin, W. (2008). Has public health insurance for older children reduced disparities in access to care and health outcomes? *Journal of health Economics, 27*(6), 1567-1581.

Dahl, G. B., & Lochner, L. (2012). The impact of family income on child achievement: Evidence from the earned income tax credit. *The American Economic Review, 102*(5), 1927-1956.

Eaton, D. K., Brener, N., & Kann, L. K. (2008). Associations of health risk behaviors with school absenteeism. Does having permission for the absence make a difference? *Journal of school health, 78*(4), 223-229.

Education Commission of the States. (2018). 50-State Comparison: Instructional Time Policies. Retrieved from https://www.ecs.org/50-state-comparison-instructional-time-policies/

Freed, G. L., Clark, S. J., Pathman, D. E., & Schectman, R. (1999). Influences on the receipt of well-child visits in the first two years of life. *Pediatrics, 103*(Supplement 1), 864-869.

Garfield, R., Orgera, K., & Damico, A. (2019). The Coverage Gap: Uninsured Poor Adults in States that Do Not Expand Medicaid. Retrieved from https://www.kff.org/medicaid/issue-brief/the-coverage-gap-uninsured-poor-adults-in-states-that-do-not-expand-medicaid/

Georgetown University Health Policy Institute Center for Children and Families. (2017). *Louisiana: Snapshot of Children's Coverage*. Retrieved from https://ccf.georgetown.edu/wp-content/uploads/2017/02/Louisiana-Medicaid-CHIP-rev-6-21.pdf

Gifford, E. J., Weech-Maldonado, R., & Short, P. F. (2005). Low-income children's preventive services use: Implications of parents' Medicaid status. *Health Care Financing Review, 26*(4), 81.

Ginsburg, A., Jordan, P., & Chang, H. (2014). Absences Add Up: How School Attendance Influences Student Success. *Attendance Works*.

Hakim, R. B., & Bye, B. V. (2001). Effectiveness of compliance with pediatric preventive care guidelines among Medicaid beneficiaries. *Pediatrics, 108*(1), 90-97.

Hanson, K. L. (1998). Is insurance for children enough? The link between parents' and children's health care use revisited. *Inquiry*, 294-302.

Hastings, E. A., Lumeng, J. C., & Clark, S. J. (2014). Primary care physicians’ knowledge of and confidence in their referrals for special education services in 3-to 5-year-old children. *Clinical pediatrics, 53*(2), 166-172.

Hirai, A. H., Kogan, M. D., Kandasamy, V., Reuland, C., & Bethell, C. (2018). Prevalence and variation of developmental screening and surveillance in early childhood. *JAMA pediatrics, 172*(9), 857-866.

HRSA Maternal and Child Health. (2019). National Performance Measures. Retrieved from https://mchb.tvisdata.hrsa.gov/PrioritiesAndMeasures/NationalPerformanceMeasures

Hudson, J. L., & Moriya, A. S. (2017). Medicaid Expansion For Adults Had Measurable 'Welcome Mat' Effects On Their Children. *Health Aff (Millwood), 36*(9), 1643-1651. doi:10.1377/hlthaff.2017.0347

Imbens, G., & Wooldridge, J. (2007). Difference-in-differences estimation. *National Bureau of Economics Research Working Paper*.

Ingul, J. M., Klöckner, C. A., Silverman, W. K., & Nordahl, H. M. (2012). Adolescent school absenteeism: modelling social and individual risk factors. *Child and Adolescent Mental Health, 17*(2), 93-100.

Jimenez, M. E., Fiks, A. G., Shah, L. R., Gerdes, M., Ni, A. Y., Pati, S., & Guevara, J. P. (2014). Factors associated with early intervention referral and evaluation: a mixed methods analysis. *Academic pediatrics*, *14*(3), 315-323.

Johnson, K., & Bruner, C. (2018). *A Sourcebook on Medicaid's Role in Early Childhood: Advancing High Performing Medical Homes and Improving Lifelong Health*. Retrieved from Child and Family Policy Center:

Kaiser Family Foundation. (2019, February 13, 2019). Status of state action on the medicaid expansion decision. Retrieved from https://www.kff.org/health-reform/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-act/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

Kearney, C. A. (2008). An interdisciplinary model of school absenteeism in youth to inform professional practice and public policy. *Educational Psychology Review, 20*(3), 257-282.

King, T. M., Tandon, S. D., Macias, M. M., Healy, J. A., Duncan, P. M., Swigonski, N. L., . . . Lipkin, P. H. (2010). Implementing developmental screening and referrals: lessons learned from a national project. *Pediatrics, 125*(2), 350-360.

Lebrun-Harris, L. A., McManus, M. A., Ilango, S. M., Cyr, M., McLellan, S. B., Mann, M. Y., & White, P. H. (2018). Transition planning among US youth with and without special health care needs. *Pediatrics, 142*(4), e20180194.

Levy, H., & Meltzer, D. (2008). The impact of health insurance on health. *Annu. Rev. Public Health, 29*, 399-409.

Litt, J. S., & McCormick, M. C. (2015). Care coordination, the family-centered medical home, and functional disability among children with special health care needs. *Academic pediatrics, 15*(2), 185-190.

Macy, M., Marks, K., & Towle, A. (2014). Missed, misused, or mismanaged: improving early detection systems to optimize child outcomes. *Topics in early childhood special education, 34*(2), 94-105.

Marks, K. P., Page Glascoe, F., & Macias, M. M. (2011). Enhancing the algorithm for developmental–behavioral surveillance and screening in children 0 to 5 years. *Clinical pediatrics, 50*(9), 853-868.

Medicaid and CHIP Payment and Access Commission. (2015). *The Effect of Premiums and Cost Sharing on Access and Outcomes for Low-Income Children*. Retrieved from Washington, DC: https://www.macpac.gov/wp-content/uploads/2015/07/Effect-of-Cost-Sharing-on-Low-Income-Children.pdf

Moore, C., Zamora, I., Patel Gera, M., & Williams, M. E. (2017). Developmental Screening and Referrals: Assessing the Influence of Provider Specialty, Training, and Interagency Communication. *Clinical pediatrics, 56*(11), 1040-1047.

Morelli, D. L., Pati, S., Butler, A., Blum, N. J., Gerdes, M., Pinto-Martin, J., & Guevara, J. P. (2014). Challenges to implementation of developmental screening in urban primary care: a mixed methods study. *BMC pediatrics, 14*(1), 16.

Normile, B., & VanLandeghem, K. (2018). *State Strategies to Advance Medical Homes for Children and Youth with Special Health Care Needs*. Retrieved from https://nashp.org/wp-content/uploads/2018/06/SIA-Report.pdf

Paradise, J. (2015). Medicaid moving forward. Retrieved from https://www.kff.org/health-reform/issue-brief/medicaid-moving-forward/

Park, M., Macdonald, T., Ozer, E., Burg, S., & Millstein, S. (2001). Investing in clinical preventive health services for adolescents.

Rafferty, Y. (1995). The legal rights and educational problems of homeless children and youth. *Educational Evaluation and Policy Analysis, 17*(1), 39-61.

Ramirez, M., Wu, Y., Kataoka, S., Wong, M., Yang, J., Peek-Asa, C., & Stein, B. (2012). Youth violence across multiple dimensions: a study of violence, absenteeism, and suspensions among middle school children. *The Journal of pediatrics, 161*(3), 542-546. e542.

Robertson, A. A., & Walker, C. S. (2018). Predictors of justice system involvement: maltreatment and education. *Child abuse & neglect, 76*, 408-415.

Romero, M., & Lee, Y.-S. (2007). A national portrait of chronic absenteeism in the early grades.

Shah, R. P., Kunnavakkam, R., & Msall, M. E. (2013). Pediatricians' knowledge, attitudes, and practice patterns regarding special education and individualized education programs. *Academic pediatrics, 13*(5), 430-435.

Skedgell, K., & Kearney, C. A. (2018). Predictors of school absenteeism severity at multiple levels: A classification and regression tree analysis. *Children and Youth Services Review, 86*, 236-245.

Stimpson, J. P., & Wilson, F. A. (2018). Medicaid Expansion Improved Health Insurance Coverage For Immigrants, But Disparities Persist. *Health Affairs, 37*(10), 1656-1662.

Talmi, A., Bunik, M., Asherin, R., Rannie, M., Watlington, T., Beaty, B., & Berman, S. (2014). Improving developmental screening documentation and referral completion. *Pediatrics, 134*(4), e1181-e1188.

Toomey, S. L., Chien, A. T., Elliott, M. N., Ratner, J., & Schuster, M. A. (2013). Disparities in unmet need for care coordination: the national survey of children's health. *Pediatrics*, *131*(2), 217-224.

Turchi, R. M., Antonelli, R. C., Norwood, K. W., Adams, R. C., Brei, T. J., Burke, R. T., . . . Kuo, D. Z. (2014). Patient-and family-centered care coordination: A framework for integrating care for children and youth across multiple systems. *Pediatrics*, *133*(5), e1451-e1460.

U.S. Department of Education. (2019). Individuals with Disabilities Education Act. Retrieved from https://sites.ed.gov/idea/about-idea/

U.S. National Center for Education Statistics. (2016). The Condition of Education 2016. Retrieved from https://nces.ed.gov/pubs2016/2016144.pdf

Venkataramani, M., Pollack, C. E., & Roberts, E. T. (2017). Spillover effects of adult Medicaid expansions on children's use of preventive services. *Pediatrics*, *140*(6), e20170953.

White, P. H., Schmidt, A., McManus, M., & Irwin, C. E. (2018). Readying Youth and Young Adults for Transition to Adult Care During Preventive Care Visits: New Clinician Toolkit. *Journal of Adolescent Health, 63*(6), 673-674.

Wright Burak, E., & Odeh, M. (2018). *Developmental Screenings for Young Children in Medicaid and the Children's Health Insurance Program*. Retrieved from https://ccf.georgetown.edu/2018/03/06/developmental-screenings-for-young-children-in-medicaid-and-the-childrens-health-insurance-program/

Zuckerman, K. E., Mattox, K. M., Sinche, B. K., Blaschke, G. S., & Bethell, C. (2014). Racial, ethnic, and language disparities in early childhood developmental/behavioral evaluations: A narrative review. *Clinical pediatrics*, *53*(7), 619-631.

APPENDICES

Appendix 1: List of 27 health conditions

For each condition (except hearing and vision problems), respondents were asked whether they have ever been told by a health care professional that the child has the condition, and whether the child currently has the condition. Children were grouped according to the number of conditions they **currently** have: none, one, or two or more.

1. Allergies (food, drug, insect or other)

2. Arthritis

3. Asthma

4. Blood disorders (such as Sickle Cell Disease, Thalassemia, or Hemophilia)

5. Brain injury, Concussion or Head Injury

6. Cerebral Palsy

7. Cystic fibrosis

8. Diabetes

9. Down Syndrome

10. Epilepsy or Seizure Disorder

11. Heart Condition

12. Other Genetic or Inherited Condition

13. Frequent or Severe Headaches, including Migraine (3-17 years)

14. Tourette Syndrome (3-17 years)

15. Anxiety Problems (3-17 years)

16. Depression (3-17 years)

17. Behavioral or Conduct problems (3-17 years)

18. Substance Abuse Disorder (3-17 years)

19. Developmental Delay (3-17 years)

20. Intellectual Disability (also known as Mental Retardation) (3-17 years)

21. Other mental health condition (3-17 years)

22. Speech or Other Language Disorder (3-17 years)

23. Learning Disability (3-17 years)

24. Autism Spectrum Disorder (ASD), Asperger's Disorder or Pervasive Developmental Disorder (PDD) (3-17 years)

25. Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder (ADD/ADHD) (3-17 years)

26. Hearing problems

27. Vision problems

Appendix 2: Multivariable probit regression model coefficients for atleast one preventive care visit (0-99% FPL) (N=469)

Measure	Coefficient	Confidence Interval	p-value
Treatment X Time			
Non-expansion state X pre-expansion	Ref		
Non-expansion state X post-expansion	-0.52	(-1.11, 0.06)	0.081
Expansion state X pre-expansion	-0.08	(-0.82, 0.65)	0.825
Expansion state X post-expansion	0.64	(-0.18, 1.46)	0.127
Age			
0-2 years	Ref		
3-17 years	-1.22	(-1.9, -0.54)	<0.001
Insurance coverage in past year			
No coverage	Ref		
Coverage with some gaps	1.88	(0.54, 3.2)	0.006
Insured continuously for all 12 months	2.04	(1.14, 2.94)	<0.001
Sex			
Male	Ref		
Female	-0.3	(-0.83, 0.23)	0.271
Highest level of education among reported adults in household			
Less than high school	Ref		
High school degree or General Educational Development	0.52	(-0.24, 1.27)	0.178
Some college or technical school	0.96	(0.12, 1.80)	0.025
College degree or higher	-0.06	(-0.97, 0.83)	0.886
Family structure			
Two parents, currently married	Ref		
Two parents, not currently married	0.25	(-0.51, 1.02)	0.515
Single mother	0.56	(-0.06, 1.19)	0.079

Other family type	0.19	(-0.63, 1.00)	0.654
Special Healthcare Needs			
No	Ref		
Yes	-0.54	(-1.35, 0.26)	0.186
Number of health conditions			
Zero	Ref		
One	0.73	(0.02, 1.44)	0.043
Two or more	1.13	(0.32, 1.93)	0.006
Race/ethnicity			
Hispanic or Latino	Ref		
White, non-hispanic	-0.06	(-0.72, 0.59)	0.844
Black, non-hispanic	-0.76	(-1.44, -0.08)	0.029
Multi-racial/other, non-hispanic	-2.42	(-4.71, -0.13)	0.038
Primary Household Language			
English	Ref		
Spanish	-0.36	(-1.08, 0.36)	0.326
Adult 1 employment in the past year			
Not employed 50 out of 52 weeks	Ref		
Employed 50 out of 52 weeks	0.33	(-0.18, 0.84)	0.203
Adult 1's physical health status			
Poor	Ref		
Fair	-1.05	(-2.27, 0.16)	0.088
Good	-1.83	(-2.93, -0.73)	0.001
Very good	-1.56	(-2.75, 0.37)	0.01
Excellent	-2.08	(-3.29, -0.88)	0.001
Metropolitan Statistical Area			
No	Ref		
Yes	0.32	(-0.24, 0.89)	0.263
Constant	0.92	(-0.83, 2.67)	0.304

Appendix 3: Predicted probability of at least one preventive care visit by age-group