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The Adoption of Public Pre-Kindergarten among the American States: An Event History Analysis

Lora Cohen-Vogel[1], James Sadler[1], Michael H. Little[2], Becca Merrill[3], and F. Chris Curran[4]

Abstract

Over the past few decades, we have witnessed a surge in publicly funded pre-K programs in the United States. Today, policy makers in 45 states and the District of Columbia have adopted them. Combining information from twelve datasets, we use event history analysis (EHA) to examine the influence of a set of predictors on states' decisions to adopt public pre-K. Findings indicate that party dominance in the legislature, legislative professionalism, and unemployment rates are associated with pre-K adoption; regional proximity to previously adopting states is also significant. The authors discuss implications for policy makers and advocates considering future legislative action in the early childhood education sector, including the expansion of pre-K eligibility requirements.

Keywords

early childhood, educational policy, state policies, legislative behavior, policy diffusion, policy innovation

[1]University of North Carolina, Chapel Hill, NC, USA
[2]North Carolina State University, Raleigh, NC, USA
[3]Education Northwest, Portland, OR, USA
[4]University of Florida, Gainesville, FL, USA

Corresponding Author:
Lora Cohen-Vogel, School of Education, University of North Carolina at Chapel Hill, Campus Box 3500, Peabody Hall, Chapel Hill, NC 27599, USA.
Email: Lora.cohen-vogel@unc.edu

Amid research that demonstrates the positive effects that quality pre-kindergarten programs (pre-K) produce, state policymakers have invested in early learning (Parker et al., 2018; Vitiello et al., 2017). The National Institute for Early Education Research (NIEER) tracks pre-K programs across the country and reports that there are currently publicly-funded programs in 45 states and the District of Columbia, with the most recent having been established by two legislatures in 2017 (Friedman-Krauss et al., 2019). What factors condition states to adopt public pre-K programs when they do? This article aims to shed light on this question. Using twelve data sources, we constructed a longitudinal dataset for the 40-year timeframe over which American states adopted these programs to help provide some answers.

An early study of state involvement in pre-K suggests that the political and economic circumstances inside of states play a role. Dawson (2008) analyzed states' legislative activity between 1979 and 2000 and found that states with more liberal government ideologies, higher levels of poverty, and, somewhat surprisingly, lower proportions of workforce participation among women were somewhat more likely than others to fund a pre-K program. Since 2000, ten more states have adopted a public pre-K program. With their inclusion and twenty years of additional data, we can both better estimate the influences of a set of predictors on a states' decisions to adopt pre-K and examine whether later-adopting states are influenced by different predictors than early adopters.

Why is this important? There are still five "hold out" states that have not yet adopted a public pre-K program. For every year that passes, nearly a quarter million 4 year olds in these states do not have access to a state-funded pre-K program and the large, positive impacts that research evidence shows they produce (Kids Count Data Center, n.d.). Our study builds understanding not only among policy researchers but also among policy activists about the factors that appear to make conditions in states ripe for passage. With this knowledge, they will be able to better recognize the settings and circumstances that make windows of opportunity likely to open and passage of a state-funded pre-K program possible. Beyond the five states, our study has value for advocates looking to scale other promising programs and interventions in early childhood education; policy entrepreneurs looking for state action to enhance pre-K quality, pre-K to third-grade alignment, and/or access to childcare, for example, might start first with states where conditions are similar to the conditions that predict pre-K program adoption.

In the next section of the article, we describe the pre-K sector in the United States and highlight evidence about its short- and longer-term impacts, evidence that state policy makers have cited in their discussions

about whether to invest public dollars in pre-K programming. We then describe the policy innovation diffusion framework and what's known from previous empirical work on the factors that condition policy adoption in education among the American states (e.g., Box-Steffensmeier & Jones, 2004; McLendon et al., 2014). Next, we move on to our research questions and set of hypotheses. After detailing our data sources, we describe our analytical approach: event history analysis (EHA). An "event history" is simply a longitudinal record of when an event has occurred for an individual, unit, or group. In political science and policy studies, that event is often policy adoption. Specifically, EHA models the probability that a government (e.g., state) adopts a specified policy in each year across a continuum of years. Once a state experiences the event (i.e., adopts a public pre-K program), it is excluded from the dataset and probabilities are calculated for each state that remains. Similar to logistic regression, EHA allows researchers to interpret the predictors that influenced states to adopt (e.g., Allison, 1982). Next, we present findings from our analyses, and conclude by discussing our findings in light of the existing research, the study's limitations, and implications for policy and practice.

Public Pre-K Programs in the American States

What Do We Mean by Public pre-K?

In the United States, public pre-kindergarten is part of the broader early childhood education (ECE) system. That system generally refers to all forms of organized and sustained activities designed to foster learning and social-emotional development in children from birth through age 8, including preschools, kindergartens, and child-care centers. By *pre-K*, we are referring to the specific category of the ECE system that serves children the year prior to the start of kindergarten and aims to ensure kids are ready for school. The term *public pre-K* refers here to pre-K programs funded by state governments. For our purposes, it does not include Project Head Start, a federally funded program that provides educational, health, disability, mental health, nutrition and social services to children 3 to 5 years old; Head Start is reserved for a community's most vulnerable children based on family income (at or below 100 percent of the poverty level), homelessness, or assignment to foster care (Kalifeh et al., 2011; U.S. Department of Health and Human Services, n.d.). As such, Head Start served only about 35% of children living in poverty in 2017 (Child Trends, 2019). With demand unmet, most states fund their own public pre-K programs. Most are means-tested, with enrollment restricted to children from low-income families; a smaller

subset of states, however, provide "universal" pre-K, meaning that the only eligibility restriction is age. Put differently, universal programs are open to any child in a state, regardless of the child's family income, even if the state does not fund the program for all who wish to enroll (Barnett, 2010). In fact, only two states and the District of Columbia have a fully universal program, wherein all 4 year olds are eligible and those who wish to enroll are actually served. As we are focused here on the factors that predict state legislative activity, we include both types of public pre-K—means-tested and universal—in our definition. During the 2017 to 2018 school year, 1.3 million children were enrolled in state-funded pre-K, representing one-third of all four-year olds in the U.S. (Friedman-Krauss et al., 2019). States account for the largest share of educational spending in the nation. On average, states provide 47% of the costs of public education, though per pupil expenditures vary widely. For pre-K alone, states provide 32% of the costs, with local governments contributing 13%, on average; the remaining 55% comes from the federal government in the form of Head Start and Preschool Development Grants[1] to states totaling over $210 million (Friedman-Krauss et al., 2019; Parker et al., 2018).

What Does the Evidence Say?

Elsewhere, others have published comprehensive reviews of the empirical evidence regarding both the magnitude and persistence of the effects that quality pre-K programming has on a host of child outcomes (e.g., Camilli et al., 2010; DeAngelis et al., 2017; Phillips et al., 2017; Valentino, 2017). Here, we summarize the relatively consistent story that research tells about the positive impacts of both early model programs as well as later, scale-up versions; doing so helps situate our study, signifying just how critical the stakes are for policymakers considering whether to adopt a public pre-K program and/or expand the reach and quality of an existing one.

Evaluations of early model preschool programs demonstrate substantial academic, socioemotional, health, and societal benefits in both the short-and long-term (e.g., Yoshikawa et al., 2013). The Perry Preschool Program (Schweinhart et al., 2005), the Carolina Abecedarian Project (Campbell & Ramey, 1994), and the Chicago Parent-Child Centers (Temple & Reynolds, 2007), for example, have been shown to boost children's school readiness (Barnett, 2011), benefit later-life health outcomes (Campbell et al., 2014), and pay dividends to society writ large through high benefit-to-cost ratios (Duncan & Magnuson, 2013; Heckman et al., 2010).

These model programs were quite small and provided a robust, expensive set of services to children and their families—program features that are

arguably difficult to emulate in large, public pre-K programs. Nevertheless, recent, rigorous evaluations of large, state-funded pre-K programs reveal generally positive benefits (e.g., Dodge et al., 2016). Indeed, evaluations of scaled-up programs show immediate positive effects on student outcomes. A recent study by Barnett et al. (2018), for example, used age-cutoff regression discontinuity methods to estimate the effects of eight different state pre-K programs on early learning skills at kindergarten entry. They found positive effects for language (0.24 SD), math (0.44 SD), and literacy (1.10 SD). Several experimental and quasi-experimental studies also point to persistence in these effects.[2] Evaluations of Georgia's pre-K program and the New Jersey Abbott pre-K program, for example, found positive effects on math and reading scores that persisted through late elementary school (Barnett et al., 2013; Fitzpatrick, 2008) (see also Schweinhart et al., 2012).

Policy Innovation and Diffusion Theory

Our study of public pre-K adoption among the American states is guided conceptually by policy innovation and diffusion (PID), a leading theoretical framework for studying policy change (Box-Steffensmeier & Jones, 2004; Gilardi, 2016). A policy innovation is a policy that is new to the jurisdiction adopting it, without regard to the number of other jurisdictions that may already have adopted (Berry & Berry, 1990; Gray, 1994; Walker, 1969). Diffusion is the process by which a policy innovation spreads among the members of a social system, frequently understood in political science circles in the U.S. to mean the 50 American states (McLendon, 2003) (See also Clarke et al., 1999; Dolowitz & Marsh, 1996).

The framework encompasses two principal explanations for whether and when states innovate (Berry & Berry, 1990; Clark, 1985; Cohen-Vogel & McLendon, 2009; McLendon et al., 2014). The "internal determinants" explanation argues that state governments innovate when conditions within their own political, economic, and social environments are favorable for doing so (Gray, 1994). An assumption of this explanation, then, is that states are influenced by conditions inside them and "do not influence one another to any meaningful extent" (McLendon, 2003, p.113).

In contrast, "diffusion" explanations suggest that "policy innovation is intrinsically intergovernmental in nature" and that "states emulate the policy adoption behavior of their peers" (McLendon 2003, p. 113). The diffusion model attributes a state's policy innovation to the policy behaviors of other governments (Walker, 1969); most studies using this approach treat geographically proximate neighbors, such as its border states or other states in its region, as likely to exert the strongest influence on adoption (Grattet et al,

1998). Various reasons have been suggested for why policy makers in a given state might emulate the policy choices of those in other states. Arguably, the most common are *economic competition* and *policy learning* (Boehmke & Witmer, 2004; Gilardi, 2016). Under competition explanations, state officials make choices in order to gain an economic advantage over other states or sidestep a disadvantage (Allard & Danziger, 2000; Saiz & Clarke, 2013); in short, policy makers may "feel pressure to enact a policy that exists elsewhere because it affects their state's relative [economic] attractiveness" (Karch, 2007, p. 55). Under policy learning explanations, state officials take cues from one another in an attempt to simplify the range of alternatives from which they can choose; such cue taking reduces political risk by turning to solutions that have proven successful somewhere else (Cohen-Vogel et al., 2008; Ingle et al., 2007; Cohen-Vogel & Ingle, 2007; Gilardi, 2010; Mooney & Lee, 1995).

Research has revealed that both internal determinants and diffusion influences can be important in predicting policy adoption across a host of issue areas, from tax policy to health policy. A handful of studies *in education* have found intrastate and diffusion effects (Cohen-Vogel & McLendon, 2009; Doyle, 2006; McLendon et al., 2006). With exceptions (e.g., Lavenia et al., 2015), much of this work in K-12 education examines the conditions associated with the enactment of school choice initiatives (e.g., Mintrom & Vergari, 1996; Renzulli & Roscigno, 2005; Wong & Langevin, 2006); in higher education, research has focused on state-funded merit aid, college savings bonds, and prepaid tuition plans (Doyle, 2006; Doyle et al., 2010; Hearn et al., 2013). There has been relatively little attention to the innovation diffusion of early childhood education programs despite their increasing popularity. Are the factors that condition states to enact K-12 and higher education policies the same as those influencing public pre-K adoption? What role, if any, does geographic proximity play? And, do the factors that influence adoption change over time? The next section set out our hypotheses.

Research Question and Hypotheses

We ask, what factors influence states to adopt public pre-K programs? Based on our review of the PID literature, we conceptualize states' adoption of public pre-K as resulting from conditions inside of states as well as interstate diffusion forces. As discussed below, our hypotheses reflect characteristics that prior studies have found to be associated with patterns of state adoption activity in policy arenas in and outside of education.

Internal Determinants

Political conditions hypotheses

(1) States with a higher percentage of Republican legislators will be less likely to adopt a pre-K program.
(2) States with a Republican governor will be less likely to adopt a pre-K program.
(3) States with upcoming gubernatorial elections will be more likely to adopt a pre-K program.
(4) States with a more professional legislature will be more likely to adopt a pre-K program.
(5) States with higher proportions of women legislators will be more likely to adopt a pre-K program.

Political conditions inside a state have been found to explain why a state adopts a policy when it does. Party dominance—of the legislative and executive branches—is one such condition; its directional significance (whether Republicans or Democrats control the legislature or occupy the governorship) varies depending upon policy type (e.g., regulatory, redistributive) (e.g., Alt & Lowry, 2000; Barrilleaux & Bernick, 2003). While these relationships are complex, Hearn et al. (2013) report that Democratic Party strength in state legislatures has been linked with higher levels of overall state spending, with higher levels of spending on education and welfare programs, and with passage of certain civil liberties and equal-protection laws, while Republican control has been associated with regulatory and tax policies often viewed as favorable to business interests (pp. 609–610). Here, informed by prior studies of early childhood education policy (Curran, 2015; Dawson, 2008), we expect a negative influence of Republican party dominance on states' decisions to adopt a public pre-K program since Republicans traditionally have argued for a conservative role for government in education and childcare.

Another political condition that may influence adoption is related to electoral timing; governors' motivation for policy successes and their abilities to strike deals with legislative leaders is connected to election proximity (Berry & Berry, 1990; Mintrom, 1997). We posit that timing of gubernatorial elections will likely shape public pre-K adoption; specifically, states with upcoming elections may have governors that are more motivated advocates for statewide pre-K programs that benefit large proportions of their constituents.

In terms of legislative professionalism, research suggests that states are more likely to adopt as professionalism increases (Squire, 1993; Squire & Hamm, 2005). In political science, legislative professionalism refers to

legislative member pay, session length, and staff capacity, with states that pay their legislators more, meet in longer sessions (e.g., year-round), and employ a larger share of staff relative to the number of elected members, for example, considered more "professionalized." Because professionalism provides state legislators with more resources (e.g., time; expertise) and, thus, greater capacity for informed deliberation, we expect higher levels of professionalism to influence states to enact pre-K programs.

Finally, following Dawson's (2008) suggestion that future studies of policy adoption in the early childhood education space consider the influence of female leadership, we posit that states with higher proportions of women legislators will be more likely to adopt a pre-K program because, as traditional care providers, women may be more likely than their male counterparts to appreciate its value for their professional lives and household income.

Economic conditions hypotheses.[3]

(6) States with higher unemployment rates will be less likely to adopt a pre-K program.
(7) States with lower median family incomes will be less likely to adopt a pre-K program.

Beyond the political factors, we hypothesize that certain internal economic conditions will influence state adoption of public pre-K programs. Dating from the middle of the last century, the classical PID literature generally finds that wealthier states and states with stronger economic climates are more likely than others to adopt new programs, particularly those that require substantial public investment (see, e.g., Plotnick & Winters, 1985).

As applied to states' propensity to adopt early childhood education policy, that literature suggests that states with more fiscal capacity will be more likely to adopt a public pre-K program, given the significant upfront and ongoing costs associated with a program's personnel, buildings, and instructional materials. We focus here on two conditions in particular: unemployment and median family income. We expect that states with higher rates of unemployment to have lower tax bases and thus be less likely to invest in new pre-K programs; similarly, we expect states with lower median incomes to be less economically sound and therefore less likely than other states to adopt.

Educational conditions hypotheses

(8) States with higher levels of public expenditures per pupil on education will be more likely to adopt a pre-K program.

(9) States that were early adopters of universal kindergarten will be more likely to adopt a pre-K program.
(10) States with larger Head Start expenditures relative to their age 4 populations will be more likely to adopt a pre-K program.

Apart from the possible effects of political and economic conditions on adoption decisions, we consider the historical patterns of public investment in K-12 education by states. States account for the largest share of educational spending in the United States. Nationally, an average of $11,762 is spent on public education per student annually. New York spends the most—more than $20,000 per student, while Utah and Idaho report spending only about a third of that amount (U.S. Census Bureau, 2018). Previous studies have shown associations between overall education spending and state policy outcomes, including certain types of educational programming. We think the relationship would extend to states' enactment of pre-K programs.

With respect to that relationship, two arguments seem plausible. First, it is likely that states that invest more in their systems of primary and secondary education have an ethos, a culture that values public education and, consequently, will support programming that extends that system to four-year-olds. Second, it may be that leaders and residents of states that have invested heavily in their K-12 systems would want to secure their investments by funding complementary programming to ensure the readiness of children entering the system. Similarly, we think it is likely that states with prior records as educational innovators may want to uphold their reputations when it comes to enacting pre-K programs; specifically, we believe that to cement their reputations as trail blazers, states that adopted universal kindergarten earlier than other states will be more likely to adopt pre-K.

Similarly, the federally funded Head Start program, a targeted pre-K program for disadvantaged and disabled four-year olds, may have an effect on state funded pre-K. States that have higher Head Start expenditures may already see the benefits of early childhood education and may thus be more likely to contribute public funding towards a pre-K program. Having said this, we also see the potential for high enrollment in the Head Start program to act as a brake on policy change in some states; perhaps, for example, policymakers in states with relatively high enrollment rates feel that four-year-old children in their states are well-served, at least compared to other states. Our analysis will allow us to test for any directional relationship.

Demographic conditions hypotheses

(11) States with higher percentages of Black and Hispanic residents will be more likely to adopt a pre-K program.

Another factor that may shape patterns in state policy adoption of PreK programs is states' demographic characteristics. Much of the contemporary scholarship on early childhood education and other educational sectors conceptualizes and measures outcomes not only by average effects but also by effects on student subgroups (e.g., Jencks & Phillips, 1998; Morgan et al., 2012). Such scholarship followed in the footsteps of requirements enacted by a group of states beginning in the 1990s and scaled to all states through the *No Child Left Behind Act* of 2001 that required schools to ensure that students in all subgroups—racial and ethnic minorities, among them—make "adequate yearly progress" towards 100% proficiency on tests of math and reading. Under the new mandates, states were looking to invest in programming that showed effectiveness with various student subgroups. pre-K was one such program. Some high-profile evaluations of various pre-K programs, including Head Start and others that served disportionately high numbers of children of color, had shown large program effects, and especially large impacts for Hispanic and Black students (e.g., Gormley & Gaye, 2005). It is possible then that, beginning in the 1990s, states with larger Black and Hispanic populations were more likely to adopt public pre-K.

Geographic diffusion hypothesis

(12) States with a higher number of regional neighbors with state-funded pre-K will be more likely to adopt a pre-K program.

Evidence for the geographic diffusion of policies between states that share borders or within regions is mixed. Although studies have found significant, positive effects of interstate diffusion among contiguous or regional neighbors (e.g., Allen et al., 2004; Berry & Berry, 1990; Cohen-Vogel & Ingle, 2007; Volden et al., 2008), others have not (Doyle, 2006; Hearn et al., 2008). In this case, we expect to see a positive influence of states on their neighbors, as policy makers signal to corporations and others considering where to locate (and whether to stay) that they are investing in childcare options for at least a segment of the state's employees as well as educational programming that supports children's academic outcomes.

In the next section, we describe the research design and data sources leveraged to test these hypotheses.

Research Methods

Sample

Wisconsin was the first to adopt public pre-K. An extreme outlier, Wisconsin's provision for publicly-funded pre-K dates to the writing of that state's

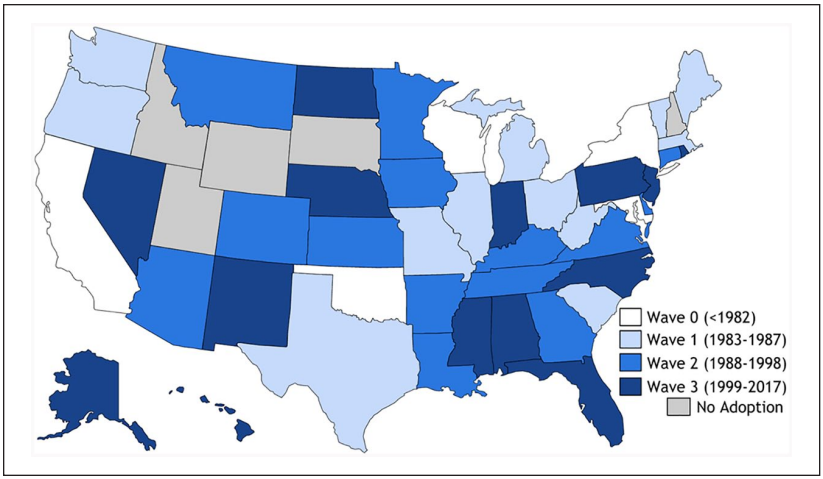

Figure 1. Public pre-K adoption among the American states, by Waves.

constitution in 1848.[4] Most recently, Montana (2017) and North Dakota (2017) have adopted a public pre-K program. Today, only five states have not yet adopted: Utah, Idaho, Wyoming, South Dakota, and New Hampshire (see Figure 1). Due to data availability,[5] our data set begins in 1983 and ends with the most recent pre-K adoptions in 2017. As our dataset only includes adoptions after 1983, Wisconsin (1848), California (1965), New York (1966), Maryland (1980), and Oklahoma (1980) are omitted from the analysis.[6]

Data

Dependent variable. The dependent variable in an event history analysis, like the one we evoke here, is the hazard rate—in our context, the annual probability that a state will adopt public pre-K. The NIEER 2019 *State of Preschool Yearbook* lists the year each state adopted a state pre-K program, defined as: (1) the program is funded, controlled, and directed by the state; (2) the program serves children of preschool age, usually 3- and/or 4-years old and the program must reach at least one percent of the 3- or 4-year-old population in the state; (3) early childhood education is the primary focus of the program; this does not exclude programs that offer parent education but does exclude programs that mainly focus on parent education; (4) the program offers a group learning experience to children at least 2 days per week; (5) the program is distinct from the state's system for subsidized child care, however, preschool programs may be coordinated and integrated with the

subsidy system for child care; and (6) the program is not primarily designed to serve children with disabilities, but services may be offered to children with disabilities. For states where adoption year was unclear in the *Preschool Yearbook*, we consulted government websites and contacted government officials. Consistent with previous analyses (e.g., Curran, 2015), we excluded Alaska and Hawaii due to their unique geographical proximity to the continental United States that makes estimating diffusion influences difficult as well as Nebraska due to its unique unicameral and nonpartisan legislature.

Independent variables. Our study analyzed the likelihood that a state will adopt a public pre-K program in a specific year based on five sets of independent variables conceptualized above: Political Conditions, Economic Conditions, Educational Conditions, Demographics and Geographic Diffusion. With data from a dozen sources, we constructed a dataset of these variable sets by state for each year between 1982 (event history analysis requires an observation of data before the first "event") and 2017, and all variables that involved currency were adjusted for inflation (see Table 1).

Political conditions. Five measures captured the political conditions inside each state. To measure party dominance, we used data from the National Conference of State Legislatures (NCSL) to construct a binary indicator of the party affiliation of the seated governor as well as the percentage of Republicans in the legislature in each state for all years in the data set. With data from NCSL, we included an indicator of the time to the next gubernatorial election, operationalized as the number of years prior to the next election, ranging from −3 to 0 in our data where −3 represents 3 years until the next election and 0 indicates an election year. Legislative professionalism was measured on an index created by Bowen and Greene (2014); it included state expenditures per legislator, session length, and salary data. The variable was coded so that a higher number indicates a more "professional" state legislature.[7] Using the same methods as Bowen and Greene (2014) whose published index stopped with the 2014 year, we expanded the existing dataset to create legislative professionalism variables for all states between 2014 and 2017. Specifically, we compiled data on session length and legislator compensation from the Book of the States and data on expenditures from the U.S. Census Bureau's Annual Survey of State Government Finances. We then followed Bowen and Greene's procedure to create multidimensional scaling predicted values that represent legislative professionalism (2014). Finally, annual data on the proportion of legislative members in each state who are women was obtained for all years from the Center for American Women and Politics.

Table 1. Summary Statistics.

		Min	Max	*M*	*SD*
Political conditions	Republicans in legislature (%)	1.90[a]	98.00[b]	47.53	17.21
	Republican governor (1 = yes, 0 = no)	0.00	1.00	0.52	0.50
	Proximity to gubernatorial election	−3.00	0.00	−1.44	1.12
	Women in legislature (%)	1.70[c]	42.00[d]	20.64	8.19
	Legislative professionalism	−1.87	4.65	−0.24	1.09
Educational context	Elementary and secondary expenditures per pupil	39.15	203.09	92.34	28.28
	Universal K adoption decade	1.00	4.00	1.93	1.01
	Head start expenditures per Age 4 population	0.27	5.34	1.45	0.77
Economic conditions	Unemployment rate	2.30	17.80	5.95	2.11
	Median income for a family of four (in thousands of dollars, 2017 dollars)	51.04	118.13	76.87	12.54
Demographic conditions	Black population concentration (%)	0.24	37.51	10.25	9.61
	Hispanic population concentration (%)	0.47	48.77	7.44	8.95
	Other population concentration (%)	0.41	14.72	3.58	2.69
Geographic diffusion	Census region states w/ Pre-K (#)	1.00	16.00	7.38	4.11

Note. Only data from states in model are reported. For the Universal K Adoption Decade variable, 1 = <1960, 2 = 60's, 3 = 70's, and 4 = 80's.
[a]Alabama, 1982.
[b]Washington, 1982.
[c]Mississippi, 1983.
[d]Colorado, 2015, 2016.

Economic conditions. From the Current Population Survey (CPS) administered by the U.S. Census Bureau, we obtained the annual median income of a family of four (in 2017 dollars) of state citizens for all years in our data set. We also collected the number of unemployed people as a percentage of the labor force for each year by state from the Local Area Unemployment Statistics program run by the Bureau of Labor Statistics (BLS).[8]

Educational context. We gathered variables that measured annual expenditures on elementary and secondary education (in 2017 dollars) relative to pre-K to 12th grade enrollment in each state from the National Center for Education Statistics. We used data from Cascio (2010) to code for whether a state has adopted a universal kindergarten policy in a particular decade (this metric was also used by Curran, 2015). By 2010, all states in the dataset had adopted universal kindergarten, a policy that provides publicly funded kindergarten education for all students in the state.

Data on Head Start expenditures came from two sources. Data from 1983 to 1991 was derived from the Consolidated Federal Funds Reports (CFFR), collected through datasets on Michigan State's Inter-university Consortium for Political and Social Research. These data revealed expenditures on the county-level for each school year, which we aggregated to the state level. Data from 1992 to 2014 were collected directly from the Department of Health and Human Service (DHHS, the agency that funds Head Start) website. Over the two available overlapping years (1992 and 1993), the two data sources did not align perfectly, likely due to different methods of allocating funds for migrant students (DHHS data does not count this money as state allocated, while CFFR data appears to). The correlation between the two datasets on existing overlapping years (1992–1993) is 0.98. We ran several different models as robustness checks: (1) models that used CFFR data during 1992–1993 instead of DHHS data, (2) models that excluded Head Start expenditures altogether, and (3) models that split the dataset into two, each using a different source of Head Start expenditure data. All of these models showed consistent results with our preferred model displayed below. We indexed Head Start expenditures by the Age 4 population in the state; age-based population data was gathered from the annual American Community Survey (ACS) administered by the US Census Bureau. We did so in order to examine relative rates of children served by the program.[9]

Demographic conditions. We sourced demographic information from the ACS by the US Census Bureau. Specifically, for each state, we obtained population data by race for each year as estimated by the ACS. In our final model, we used the following demographic group categories as independent variables: Black (non-Hispanic), Hispanic, and Other (including Asian, Pacific Islander, Native American, Alaskan Native, and Multiracial residents). Non-Hispanic Whites served as our reference demographic group.

Geographic proximity. To analyze geographic proximity, we used the Census Bureau's four-region classification.[10] For every year in our analysis, we calculated the number of states that have adopted a public pre-K program within a state's Census region.[11]

Analysis

Event history analysis (EHA) is an analytic technique used to explore the factors that influenced the timing of a state's adoption of a public pre-K program between 1983 and 2017. Originating from biological sciences, event history analysis and its variants (e.g., survival analysis in epidemiology and duration analysis in economics) examine the relationship between time-varying independent variables and a given event occurring (Allison, 1982; Lawless, 2003). The methods produce a hazard rate, or the "risk" (conditional probability) that an event of interest occurs at a particular time interval. Here, the hazard rate represents the risk that a state adopts public pre-K in a given year (Box-Steffensmeier & Jones, 2004; DesJardins, 2003). Once a state adopts a public pre-K program, it is excluded from the dataset for the remaining years and the hazard rate is calculated every year for states that remain in the dataset.[12]

Our model took the following general form:

$$h\left(t \mid \mathrm{x_j}\right) = h_0\left(\mathrm{t}\right)\exp\left(\mathrm{B_x x_j}\right)$$

where $h(t \mid \mathrm{xj})$ represents the hazard rate at a given year of a state adopting a public pre-K program, and $h_0(\mathrm{t})$ is the baseline hazard rate (an unspecified term that equals the hazard rate for states whose coefficients are equal to zero) (Buis, 2006). $\mathrm{X_j}$ is a vector of independent variables for state j in year t. In this model, we reported regression coefficients ($\mathrm{B_x}$)—which included the independent variables described above—that have been exponentiated. These exponentiated coefficients or hazard ratios were interpreted in reference to a value of one. Significant hazard ratios less than one indicate that for every one-unit increase in $\mathrm{X_j}$ the probability of adoption is reduced. Significant hazard ratios greater than one indicate that for every one-unit increase in $\mathrm{X_j}$ the probability of adoption is increased. For example, a hazard ratio of 1.2 implies that a one-unit increase of the variable in question corresponds to a 20% increase (1.2–1.0) in the conditional probability that the event will occur. A hazard ratio of 0.7 implies that a one-unit increase of the variable in question corresponds to a 30% decrease (0.7–1.0) in the risk that the event will occur. Our model was as follows:

$$\begin{array}{c}\text{Risk of Public}\\ \text{pre}-\text{K Adoption}\end{array} = \mathrm{h0}\left(\mathrm{t}\right)\exp\left(\begin{array}{l}\beta_1\left(\text{Regional Proximity}\right)\\ +\,\beta_2\left(\text{Political Conditions}\right)\\ +\,\beta_3\left(\text{Educational Context}\right)\\ +\,\beta_4\left(\text{Economic Conditions}\right)\\ +\,\beta_5\left(\text{Demographic Conditions}\right)\end{array}\right),$$

where β_n represents a vector of variables that correspond to each data set. As Public pre-K adoption occurred over several decades, we also divided our dataset into waves of adoption and ran models to examine whether factors influencing public pre-K adoption changed over time.

Results

Overall, 37 states adopted a publicly funded pre-K program between 1983 and 2017, starting with Maine and West Virginia in 1983 and ending with Montana and North Dakota in 2017 (see Table 2). As depicted in Table 3, the distribution of adoptions across this time period is not uniform, with the rate of adoption the fastest in the first decade beginning in 1983. Because Rogers (2003), Berry and Berry (2018) and others have also found that adoption proceeds at different rates across time, we wondered if the factors that predict adoption themselves differ. As such, we first present findings from our analysis of the full sample to understand if there are intra- and inter-state conditions that are consistently related to the probability that states will adopt a public pre-K program. We then present findings from a wave by wave supplemental analysis to understand if conditions related to adoption likelihood in one wave are the same conditions related to adoption likelihood in others.

The results of the event history analysis for adoption of publicly-funded pre-K across the full sample of years are presented in Table 4. In line with our hypotheses, two political conditions—the percentage of Republicans in the state legislature and legislative professionalism—are predictive of states' likelihood to adopt a pre-K program, other variables in the model being equal. We also find that the unemployment rate has a positive effect, with a higher rate associated with a state's likelihood of adoption. Finally, we find that geographic diffusion—the number of adopters in a state's census region—is also positively associated with the likelihood of adopting a public pre-K program. No other relationships with factors hypothesized to predict state public pre-K adoption are significant at $p < .05$ levels.

Political conditions. Two of the measures that are predictive of state pre-K adoption are political in nature. First, we find that the percentage of Republicans in the state legislature is negatively associated with adoption of pre-K. For every one percentage point increase in Republicans in the state legislature, the risk of a state adopting pre-K decreases by 3.1 percent ($p < .05$). This finding supports earlier work by Curran (2015), which found that Republican legislatures are associated with a decrease in the risk of Universal pre-K adoption. Second, we find that legislative professionalism is positively associated with adoption of pre-K ($p < .01$). The scale of the legislative

Table 2. Descriptive Statistics by State during Adoption Year.

State	Adoption year	% Rep. in Leg.	Rep. Governor	Years until election	% Women in Leg.	Leg. Prof.	Ed Spending per pupil	Universal K decade	HS Expend/ Age 4	Unemploy. Rate	Median family income	% Black	% Hisp	% Other	Census states with policy
Alabama	2000	34.3	0	−2	7.9	−1.36	77.2	1970's	1.98	4.6	74.7	26.1	1.7	1.3	13
Arizona	1991	49.2	0	−3	34.4	1.57	67.2	1970's	1.24	5.9	70.2	3.2	19.3	7.6	4
Arkansas	1991	10.2	0	−3	7.4	−1.22	60.2	1970's	1.27	7.4	57.7	16.0	0.9	1.1	7
Colorado	1988	67.3	0	−2	28.0	0.61	77.6	pre-1960s	0.50	6.5	78.6	4.1	12.6	2.6	3
Connecticut	1997	41.8	1	−1	28.9	0.24	126.1	pre-1960s	1.13	5.0	103.0	9.2	8.0	2.6	4
Delaware	1994	42.3	0	−2	16.1	−0.30	97.6	1960's	0.90	4.8	83.6	18.1	2.8	2.1	9
Florida	1999	61.7	1	−3	23.8	1.03	82.2	1960's	1.30	3.9	77.7	15.4	15.4	2.3	12
Georgia	1993	27.8	0	−1	17.4	−1.05	71.6	1970's	1.06	6.0	72.8	27.7	2.0	1.7	8
Illinois	1985	45.3	1	−1	16.9	1.03	67.9	pre-1960s	0.70	9.1	75.8	14.8	6.8	2.2	1
Indiana	2015	73.3	1	−1	20.7	−0.34	99.1	pre-1960s	1.51	4.8	73.9	9.3	6.7	4.1	8
Iowa	1989	39.5	1	−1	16.7	−0.26	76.9	pre-1960s	0.44	4.2	69.1	1.7	1.1	1.2	5
Kansas	1998	64.6	1	0	29.7	−0.95	83.0	pre-1960s	1.28	3.5	79.8	5.9	5.3	2.6	6
Kentucky	1990	24.5	0	−1	5.8	−1.10	61.2	1970's	1.11	6.0	64.7	7.2	0.6	0.7	6
Louisiana	1988	15.0	0	−3	2.8	0.31	57.7	pre-1960s	0.71	10.8	66.5	30.6	2.2	1.3	5
Maine	1983	34.7	0	−3	22.3	−0.81	54.4	pre-1960s	0.63	8.3	57.0	0.3	0.5	0.8	1
Massachusetts	1985	20.6	0	−1	16.5	2.77	80.4	pre-1960s	0.75	4.0	84.0	4.8	3.6	1.9	2
Michigan	1985	50.4	0	−1	10.8	4.09	78.4	pre-1960s	0.76	10.0	74.1	13.4	1.9	1.4	1

(continued)

Table 2. (continued)

State	Adoption year	% Rep. in Leg.	Rep. Governor	Years until election	% Women in Leg.	Leg. Prof.	Ed Spending per pupil	Universal K decade	HS Expend/ Age 4	Unemploy. Rate	Median family income	% Black	% Hisp	% Other	Census states with policy
Minnesota	1988	35.1	0	−2	15.4	0.13	82.6	pre-1960s	0.50	4.3	82.7	2.0	1.1	2.7	4
Mississippi	2014	55.7	1	−1	17.2	−0.93	82.6	1980's	4.83	7.6	64.9	37.5	3.0	1.7	15
Missouri	1998	45.4	0	−2	21.3	0.21	80.7	1960's	1.49	4.2	78.7	11.3	1.6	1.5	6
Montana	2017	60.7	0	−3	28.7	−1.26	113.6	1970's	2.48	3.9	71.5	0.5	3.8	9.5	7
Nevada	2001	46.4	1	−1	34.9	−0.67	77.8	pre-1960s	0.85	5.2	83.1	7.2	20.7	6.9	5
New Jersey	1999	60.0	1	−2	15.8	0.52	144.1	pre-1960s	1.25	4.5	104.8	14.7	12.6	6.0	5
New Mexico	2005	41.4	0	−1	31.3	−1.42	94.8	1970's	2.45	5.1	64.7	2.3	44.2	11.5	6
North Carolina	2001	39.2	0	−3	18.8	1.05	85.0	1970's	1.63	5.5	79.7	21.8	5.2	2.9	14
North Dakota	2017	84.4	1	−3	18.4	−1.32	139.9	1980's	2.11	2.7	88.6	3.0	3.7	8.7	9
Ohio	1986	47.5	0	0	9.1	0.94	70.5	pre-1960s	0.60	8.3	75.2	10.4	1.2	0.9	3
Oregon	1987	45.8	0	−3	17.8	−0.71	80.9	1970's	0.62	6.3	67.9	1.6	3.5	3.5	2
Pennsylvania	2002	54.6	1	0	13.8	2.15	112.7	pre-1960s	2.08	5.6	90.8	10.4	3.6	2.3	6
Rhode Island	2009	16.6	1	−1	22.1	−0.65	161.9	pre-1960s	2.22	11.0	99.5	7.1	12.1	4.0	7
South Carolina	1984	15.0	0	−2	7.1	1.06	49.6	1970's	0.68	6.9	61.1	30.1	1.0	0.7	3
Tennessee	1998	41.9	1	0	13.6	−0.69	71.6	1970's	1.57	4.3	72.8	16.6	1.1	1.2	11
Texas	1985	27.0	0	−1	8.8	−0.03	65.1	1970's	0.48	7.0	71.0	12.0	23.4	1.8	4
Vermont	1987	43.0	0	−3	24.4	−0.75	85.4	pre-1960s	0.60	3.6	70.3	0.3	0.6	0.8	3
Virginia	1995	46.0	1	−2	11.4	−0.64	84.0	1960's	0.83	4.5	79.7	19.7	3.2	3.5	10
Washington	1985	45.4	0	−3	23.8	−0.08	76.2	pre-1960s	0.54	8.4	72.3	2.9	3.6	5.2	1
West Virginia	1983	10.9	0	−1	12.7	−1.01	60.8	1970's	0.73	17.8	55.5	3.3	0.6	0.4	2

Table 3. Risk Sets, Hazard Rates, and States Adopting a Public Preschool Program.

Year	States adopting	Number of adoptions	Cumulative adoptions	Risk set	Hazard rate
1982	.	0	0	.	.
1983	ME, WV	2	2	42	0.05
1984	SC	1	3	40	0.07
1985	IL, MA, MI, TX, WA	5	8	39	0.2
1986	OH	1	9	34	0.23
1987	OR, VT	2	11	33	0.29
1988	CO, LA, MN	3	14	31	0.39
1989	IA	1	15	28	0.42
1990	KY	1	16	27	0.46
1991	AZ, AR	2	18	26	0.54
1992	.	0	18	.	0.54
1993	GA	1	19	24	0.58
1994	DE	1	20	23	0.62
1995	VA	1	21	22	0.67
1996	.	0	21	.	0.67
1997	CT	1	22	21	0.72
1998	KA, MO, TN	3	25	20	0.87
1999	FL, NJ	2	27	17	0.98
2000	AL	1	28	15	1.05
2001	NC, NV	2	30	14	1.19
2002	PA	1	31	12	1.28
2003	.	0	31	.	1.28
2004	.	0	31	.	1.28
2005	NM	1	32	11	1.37
2006	.	0	32	.	1.37
2007	.	0	32	.	1.37
2008	.	0	32	.	1.37
2009	RI	1	33	10	1.47
2010	.	0	33	.	1.47
2011	.	0	33	.	1.47
2012	.	0	33	.	1.47
2013	.	0	33	.	1.47
2014	MS	1	34	9	1.58
2015	IN	1	35	8	1.7
2016		0	35	.	1.7
2017	MT, ND	2	37	7	1.99

professionalism measure does not lend itself to easy interpretation, but the finding suggests that the more professional a legislature is, the more likely it is to adopt pre-K.

The three other measures of political conditions—proximity to a gubernatorial election, whether or not a state has a Republican governor, and the percentage of women in a state's legislature—are not significantly related to risk of pre-K adoption. However, the percentage of women in a state's legislature does approach significance. Specifically, we find that for every one percentage point increase in the percentage of women in a state's legislature, the risk of adopting a public pre-K program increases by 6.2 percent ($p < .10$).

Given that the percentage of Republicans in the state legislature is related to adoption, we expected the presence of a Republican governor also to be. However, our finding is consistent with Curran's (2015) analysis, which found that the proportion of Republicans in a legislature is negatively related to the risk a state would adopt a pre-K program for all four-year-olds but the presence of a Republican governor is not. In a sensitivity check, we ran models (not shown here)[13] that replaced the variable measuring Republican governor and percentage of Republicans in the legislature with variables that measured citizen and government ideology, as defined in Berry et al. (1998) (see also Karch, 2010). These models yielded consistent results with our main model.

Educational context. We include three measures of educational context in our analysis: total education expenditures divided by the number of pupils enrolled, the decade in which the state adopted universal kindergarten, and Head Start expenditures divided by the number of four year olds living in the state. We find no evidence that these measures are predictive of state adoption of pre-K. These findings are surprising because we hypothesized that more investment in P-12 education, early adoption of universal access to kindergarten, and a commitment to serve children through Head Start would indicate a state's proclivity for investing in education that would trickle down into public pre-K.

Economic and demographic conditions. We include a set of economic (unemployment rate; median income) and demographic measures (race; ethnicity) that we hypothesized may condition state adoption of pre-K. We expected that states with higher rates of unemployment would be in economic distress and thus less likely to invest in new pre-K programs. However, our results suggest the opposite: A one percentage point jump in the unemployment rate is associated with an increase in the likelihood of a state adopting a public pre-K program by 32.1% ($p < .05$). In terms of median income for a family of

four, we expected that states with higher median incomes would be more economically sound and thus more likely to adopt pre-K. However, median income is not predictive of pre-K adoption. Finally, we do not find that the racial/ethnic composition of a state predicts the adoption of public pre-K.

Geographic diffusion. As with some prior studies of state policy adoption, our findings provide at least some evidence of state-to-state emulation. We find a significant and positive relationship between the number of states within a census region that have previously adopted pre-K programs and the risk a state will adopt. Specifically, for every additional state within a state's census region that has previously adopted public pre-K, the adoption likelihood for a state that has yet to adopt increases by 32.1% ($p < .05$). We explored alternative specifications of diffusion because there are various ways to examine the influence of states on one another. Apart from testing for census-region, we also tested for an effect using three contiguous-states measures (one that measured if any neighboring state had a program, one that measured how many neighboring states had a program, and one that measured the proportion of neighboring states that had a program). In these alternative specifications, the diffusion effect remained positive but was no longer statistically significant. Other results in these models were consistent with those found in Table 4.

Wave by wave analysis. As public pre-K adoption spans multiple decades in our dataset, we also ran supplemental event history analyses with three different adoption waves to examine whether later-adopting states are influenced by different predictors than early adopters. The first wave includes the first 11 adoptions in our dataset (1983–1987), the second wave includes the middle 14 adoptions (1988–1998), and the third wave includes the latest 12 adoptions (1999–2017).[14] Waves were chosen to create roughly equal groups in terms of the number of adopters.

As shown in Table 5, the results differ somewhat depending on which wave is analyzed. We turn first to the political conditions. In Waves 1 and 2, the percentage of Republicans in a state's legislature is negatively associated with the likelihood of public pre-K adoption ($p < .05$), as it is for the main model. The relationship, however, is not significant in the most recent wave of adoptions. Similarly, the two other political predictors that are statistically significant (legislative professionalism) or approaching significance (percent of Women in legislature) in the main model are also positively associated with adoption at the ($p < .10$) in Waves 1 and 2, but not in Wave 3. Turning next to educational, economic and demographic conditions, no measure is statistically significant for Waves 1 to 3. And, in terms of

Table 4. Cox Regression Model with Hazard Ratios Predicting Public PreK Policy Adoption.

Political conditions	Republicans in legislature (%)	0.969* (0.01)
	Republican governor (1 = yes, 0 = no)	0.790 (0.32)
	Proximity to gubernatorial election	0.823 (0.16)
	Women in legislature (%)	1.062+ (0.04)
	Legislative Professionalism	1.739** (0.31)
Educational context	Elementary and secondary expenditures per pupil	0.992 (0.02)
	Universal K Adoption Decade	0.920 (0.24)
	Head Start Expenditures per Age 4 population	0.970 (0.37)
Economic conditions	Unemployment rate	1.321* (0.17)
	Median income for a family of four (in thousands of dollars, 2017 dollars)	1.023 (0.04)
Demographic conditions	Black population concentration (%)	0.961 (0.04)
	Hispanic population concentration (%)	1.004 (0.03)
	Other population concentration (%)	1.020 (0.12)
Geographic diffusion	Census region states w/ Pre-K (#)	1.321* (0.18)
	N	653
	# of Events	37

Note. + shows $p < .10$, * shows $p < .05$, ** shows $p < .01$; Hazard ratios and standard errors reported.

geographic diffusion, having more adopters in a Census region is positively associated with a state's likelihood to adopt ($p < .05$) in Wave 2 only.

These patterns, coupled with the finding that no variable significantly predicts the likelihood of public pre-K adoption in Wave 3, suggest that (1) the factors that condition policy adoption among states differ over time relative to the time elapsed since initial adoptions, and (2) conditions inside of states as well as the competitive pressures imposed on states from outside (i.e., other states' actions) may both be more likely to influence state policymakers during earlier stages of the adoption curve. We discuss these findings in more depth below.

Discussion

Summary

Public pre-K programs have become almost ubiquitous in the United States. Our findings shed light on the conditions that influence (and do not influence)

Table 5. Wave by Wave Analysis of Cox Regression Model.

	Full model	Wave 1	Wave 2	Wave 3
Republicans in legislature (%)	0.969* (0.01)	0.889* (0.04)	0.946* (0.03)	1.004 (0.05)
Republican governor (1 = yes, 0 = no)	0.79 (0.32)	0.127 (0.17)	0.905 (0.61)	0.398 (0.49)
Proximity to gubernatorial election	0.82 (0.16)	0.644 (0.35)	0.829 (0.27)	1.041 (0.51)
Women in legislature (%)	1.062+ (0.04)	1.182+ (0.11)	1.092 (0.08)	1.016(0.10)
Legislative Professionalism	1.739** (0.31)	2.172+ (0.88)	2.245+ (1.09)	2.687 (1.65)
Elementary and secondary expenditures per pupil	0.992 (0.02)	0.986 (0.05)	0.916+ (0.04)	1.018 (0.04)
Universal K adoption decade	0.920 (0.24)	1.477 (0.91)	0.633 (0.33)	1.448 (0.98)
Head start expenditures per Age 4 population	0.970 (0.37)	0.087 (0.29)	1.535 (1.39)	0.171 (0.23)
Unemployment rate	1.321* (0.17)	1.222 (0.18)	1.547 (0.46)	3.433 (3.06)
Median income for a family of four (in thousands of dollars, 2017 dollars)	1.023 (0.04)	0.941 (0.08)	1.172+ (0.10)	1.017 (0.13)
Black population concentration (%)	0.961 (0.04)	0.963 (0.07)	0.897+ (0.06)	1.254 (0.21)
Hispanic population concentration (%)	1.004 (0.03)	1.085 (0.09)	0.912 (0.09)	1.072 (0.08)
Other population concentration (%)	1.020 (0.12)	0.569 (0.23)	0.995 (0.25)	1.383 (0.34)
Census region states w/ Pre-K(#)	1.321* (0.18)	0.250 (0.21)	1.718* (0.47)	0.943 (0.36)
N	653	188	267	198
# of Events	37	11	14	12

Note: + shows $p < .10$, * shows $p < .05$, ** shows $p < .01$; Hazard ratios and standard errors reported.

states in their decisions to adopt publicly-funded pre-K and, arguably, their roles in early childhood education generally. In particular, party dominance and the professionalism of state legislatures appear to be significant and stable predictors of policy adoption, with greater representation by Republicans and lower legislative professionalism signaling a lower likelihood of pre-K passage. Unemployment, too, is a predictor, with states experiencing higher rates of unemployment more likely to adopt. Unlike Dawson (2008) and Curran (2015), we find some evidence suggesting that states are at least partly influenced by the actions of nearby states (states that *share a Census region*) as they vote to adopt pre-K programs. Specifically, we see evidence of regional diffusion in both our primary model and Wave 2 of our analysis disaggregated by time. We find no evidence, however, that pre-K policy actions of neighboring states (states that *share borders*) predict adoption (Dawson, 2008; Curran, 2015). Finally, our wave by wave analysis suggests that later-adopting states are influenced by different intra- and interstate conditions than early adopters.

Implications for State-Funded Pre-K Adoption Moving Forward

Despite the increasing ubiquity of state-funded pre-K programs, our results inform policymakers and advocates of early childhood education moving forward. States that have not adopted such a program remain targets for advocates who wish to see pre-K programs available across the entire nation. Additionally, state pre-K programs are often not one-off policy decisions. In many cases, they begin as small, targeted programs, serving a small proportion of age-eligible residents or children meeting restrictive eligibility guidelines. As of 2017, 16 state pre-K programs served less than 20 percent of four-year-olds residing in the state and only nine served more than 50 percent (Friedman-Krauss et al., 2018). This means that many state policymakers may be considering legislation to increase funding for, adjust eligibility criteria, or otherwise expand or change policies related to state-funded pre-K. While our results do not test the conditions that predict revisions to state-funded pre-K, they nevertheless suggest the importance of considering the political composition of state legislatures, legislative professionalism, and employment conditions when doing so.

Nuanced Geographic Policy Diffusion

Our findings also speak to the broader policy diffusion literature, expanding on prior work that has focused on K-12 and higher education to include the early childhood education sector. Prior work on policy diffusion in education has been mixed as to the predictive power of a regional effect (Hearn &

Griswold, 1994; Hearn et al., 2013; Mintrom, 1997; Wong & Langevin, 2006). While we do observe a regional diffusion effect for the adoption of publicly-funded pre-K programs among the American states, it does not appear to be particularly robust. Specifically, when we model adoption waves separately, the relationship is only significant during Wave 2 and does not hold when we look at states that share borders. There are a couple possible reasons for this. From a policy learning perspective, information about the impacts of high quality pre-K has been brought to policymakers' attention by *national*, in addition to regional, groups. The National Governors Association, Education Commission of the States, National Conference of State Legislatures, and the Council of Chief State School Officers, among others have taken increasingly active roles in facilitating dialogue about early childhood education among state leaders (Karch, 2013). In the 2000s, for example, the Pew Charitable Trust's *pre-K Now* initiative took a national approach to disseminating evidence and advocating for state adoption of public pre-K (Watson, 2010). These efforts and others like them may have increased policy learning across a large swath of states, thereby stamping out the regional diffusion relationship in Wave 3. As Mooney (2001) points out, "information available on some policies may be nationalized, making learning from neighbors no more common than learning from states elsewhere in the country" (p. 106).

Similarly, since the early 2000s when Mooney made his observation, technologies for information sharing have exploded. Traditionally, information among policymakers and lobbyists was disseminated through personal contacts and word of mouth, mechanisms that—prior to recent technological advancements—were at least somewhat geographically constrained (e.g., Nicholson-Crotty, 2009). In the last two decades, the explosion of internet and related virtual communication technologies has vastly enhanced the opportunity for policymakers to share and learn from geographically-dispersed peers and advocates during the time period of our study (particularly the period which aligns with the end of Adoption Wave 2), mitigating any earlier regional diffusion effect.

Implications for Future Research

As with the regional diffusion observed here, factors that condition policy adoption among states seem to differ over time relative to the time elapsed since initial adoptions. However, most studies of policy adoption using EHA with which we are familiar estimate effects for the entire set of potential adopters simultaneously. In modeling adoption waves separately, our study sets forth an approach from which future researchers and statisticians can begin to build. Modeling techniques and guidance need to be advanced to

allow scholars in the policy sciences to test whether different influencers play different roles over time. The S-shaped curve that commonly illustrates adoption rates in the policy space and beyond (e.g., among farmers, physicians)—whereby innovations are slow to diffuse early on, spread quickly in the midterm, and fall off again among a later set of adopters—provides a theoretical rationale for modeling adoption stages separately, when practicable.

Finally, as with most studies of its kind, ours examined only one stage in the policy making process: policy adoption. There has been considerably less attention in the literature given to other stages of the policy life cycle, such as agenda setting and implementation (McLendon et al., 2014). This is important given that at least one study suggests that the influence of regional neighbors is less pronounced during the policy adoption stage compared to the agenda setting and proposal formulation stages (Cohen-Vogel and Ingle, 2007). Future studies then should expand on our work to consider innovation and diffusion correlates at other stages of the policy life cycle. In particular, other studies might consider using policy consideration (i.e., bills introduced) rather than adoption as the outcome of interest. Case studies of states' paths to publicly-funded early childhood education are also warranted; of particular interest might be political histories of Wisconsin's adoption in the 1800s when pre-K was provided for in the state constitution and Oklahoma's adoption of the first universal program.

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ORCID iDs

James Sadler https://orcid.org/0000-0003-4550-7609

F. Chris Curran https://orcid.org/0000-0001-5680-1446

Notes

1. The federal Preschool Development Grant program, created under the Obama administration, funded much of the growth in state programs for 4-year-olds.

2. The immediate positive effect of scaled up Pre-K programs has been shown to persist in some but not all research studies; the persistence of Pre-K effects appears to vary by the quality of the Pre-K program and students' subsequent learning environment (Ansari & Pianta, 2018; Bailey et al., 2017).
3. We also expected women's participation in the labor market to influence state adoption. We were unable to assess this in full due to data availability issues, but when we ran analyses using an available subset of state-by-state data (1999–2014) we found no association between employment rates among women and adoption.
4. We encourage historians of education to investigate the state as a case to better understand what we might call in the policy studies space, extreme innovators.
5. Specifically, we were unable to locate state-level data related to many of our economic conditions and educational context variables before 1979.
6. We run an additional model as a robustness check with an expanded dataset that begins in 1979 and includes adoptions in Maryland and Oklahoma. This model, which does not, for data availability reasons, include Head Start expenditure data, shows results that are consistent with our post 1982 model. A findings table with data from this expanded dataset is available from the authors.
7. Because the index measures professionalism for each legislative session by biennium, we duplicate observations in order to have data on an annual basis. Bowen and Greene (2014) could not find reliable data for some states during the 1990s. For these missing observations, we use guidance from Bowen and Greene and impute data using previous bienniums. We also took the mean of available data before and after missing years as a sensitivity check and found no substantial changes in our results.
8. To calculate these estimates, BLS uses data from the CPS, the Current Employment Statistics survey, and state unemployment insurance systems.
9. Ideally, we would also construct a direct measure of the proportion of qualifying four year olds in the state who are served by Head Start. Unfortunately, data allowing us to do so is unavailable as we could not procure Head Start enrollment figures by state for the early decades of our analytic time frame. We are, however, able to calculate Head Start expenditures relative to the number of four year olds in the state, which can be interpreted as an approximation of the investment to Head Start made by states indexed by the Age 4 population.
10. To check for measure sensitivity, we also include a binary variable that determines whether or not a neighboring state has adopted a public Pre-K program as well as a continuous variable that counts how many neighboring states have a program. Results were consistent.
11. Census regions include Northeast (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, and Pennsylvania), Midwest (Indiana, Illinois, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota), South (Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, Texas), and West (Arizona, Colorado, Idaho, New Mexico, Montana, Utah, Nevada, Wyoming, Alaska, California, Hawaii, Oregon, and Washington).

12. Following standard practice, we use a Cox proportional hazards model. The Cox model is a semi-parametric model that does not pre-define a hazard rate curve but instead models how the independent variables shift the hazard rate up or down (Allison, 1982).
13. Findings tables can be requested from the authors.
14. Wave definitions were created based on the data available to us. A more balanced wave configuration (e.g., first 12, middle 12, and last 13 adoptions) was not possible based on the patterns of adoptions in our dataset (specifically, with multiple states adopting in the same year, more even splits were not possible). We also ran wave analyses on a different wave definition: Wave 1 (first 14 adoptions), Wave 2 (middle 11 adoptions) and Wave 3 (last 12 adoptions). The results for these definitions were consistent with results presented in Table 5.

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Author Biographies

Lora Cohen-Vogel, PhD, is the Frank A. Daniels Jr. Distinguished Professor of Public Policy and Education at the University of North Carolina at Chapel Hill, where she focuses on bringing to scale programs that raise outcomes for historically underserved students.

James Sadler is a Doctoral student at the University of North Carolina at Chapel Hill, where his research covers school discipline, restorative justice, and early childhood education.

Michael H. Little, PhD, is an Assistant Professor of Educational Evaluation and Policy Analysis at North Carolina State University, where he focuses on early childhood and early grade education policy.

Becca Merrill, PhD, is Researcher and Advisor at Education Northwest, which holds the Regional Education Lab Northwest. With an equity lens, Dr. Merrill focuses on how teacher labor markets and early learning systems affect student outcomes.

F. Chris Curran, PhD, is an Associate Professor of Educational Leadership and Policy and Director of the Education Policy Research Center at the University of Florida, where he conducts research with the goal of improving equity in education.