State-Level Partisanship Strongly Correlates With Health Outcomes for Us Children

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Abstract

Introduction:

The Cook Partisan Voting Index (PVI) determines how strongly a state leans toward the Democratic or Republican Party in presidential elections compared to the nation. We set out to determine the correlation between childhood health outcomes and state-level partisanship using PVI.

Materials and Methods:

16 measures of childhood health were obtained from the CDC, U.S. Census Bureau, and U.S. Bureau of Labor Statistics for 2012-2016. PVI was averaged for every state for the same time period. Pearson's rho determined the correlation between PVI and each health outcome, using a Bonferroni adjustment of 0.003. Multiple regression was also conducted, adjusting for children without health insurance, primary care physicians, childhood poverty, and % non-white. We also compared childhood health in moderately Democratic and Republican states (5%-9.9% more Democratic/Republican than the national mean) and, similarly, for extremely Democratic and Republican states (10% or more Democratic/Republican than the national mean), using Kruskal-Wallis tests.

Results:

Democratic-leaning states had better outcomes for 7 of 16 health measures (all $p<0.003$, table 1). In the adjusted model, Democratic-leaning states had better outcomes for 9 of the 16 variables (all $p<0.003$, table 1). Among moderately-partisan states, no outcomes were statistically better in one group of states but extremely-Democratic states had superior outcomes for 5 variables (all $p<0.003$, table 2). No health outcomes were found to be significantly better in Republican-leaning states.

Conclusions:

Multiple childhood health measures were statistically better in Democratic-leaning states compared to Republican counterparts. Future research should identify which state-level policies have led to such disparate health outcomes.

What Is Known

- In the United States, many health disparities exist among children along racial, economic and geographic lines.
- Many US states lean strongly towards either the Democratic or Republican political parties in federal elections.

What is New:

- Trends for multiple measures of childhood health vary in association with the political partisanship of the state being examined.
- Multiple barometers of childhood health are superior in Democratic-leaning states, while no measures are better in Republican-leaning states.

Introduction

a. Significance of Childhood Health

Poor childhood health can lead to numerous adverse outcomes, both at an individual and societal level [1]. Several studies have demonstrated that the well-being of a child is strongly linked to subsequent adult health outcomes and that both childhood and adolescence are specifically critical periods [2, 3]. For example, childhood obesity can lead to poorer health in adulthood and the development of multiple medical co-morbidities [4]. Markers of poor neonatal health, such as low birthweight, have been associated with higher rates of asthma and developmental problems [5]. Similarly, preterm birth can affect the central nervous system, vision, hearing, respiratory development, and growth of a child [6]. Ultimately these physical consequences can reduce both the quality and duration of a child's life [3, 7].

The psychological implications of poor childhood health can be just as impactful as the physical consequences. The effects of childhood morbidities on mental health and overall life satisfaction often manifest early in one's life [8]. Childhood obesity has been shown to shape the self-esteem and academic performance of an individual, thus affecting their overall emotional well-being [4]. Nearly half of all mental health issues manifest in children before the age of 14 and are often related to one's physical health [8]. In fact, some outcomes are even influenced by birth-related factors. Very low birthweight survivors are at higher risk for hyperactivity, social difficulties, and autism during adolescence and demonstrate higher levels of depression and anxiety during adulthood [9].

Childhood health outcomes have significant economic ramifications, and preventive interventions early in life can have a large economic impact on both individuals as well as on an entire healthcare system [10]. Early tobacco screening has been shown to potentially save over two million lives and $3 billion annually in the US [10]. Further preventative health screenings can also reduce an individual's healthcare costs over time, especially in pregnant women [11].

b. Pediatric Health Disparities in the US and their Consequences

Despite the importance of optimal childhood well-being, health disparities exist throughout the United States [12]. Poor children have higher rates of bronchiolitis, urinary tract infections, asthma, mood disorders, and accidental injury [12]. In addition, childhood health outcomes have been shown to be significantly better amongst white juveniles, when compared to their black or Hispanic counterparts [12]. Geography can also impact one's health through either physician shortages or the public policies adopted by a specific locale. Affluent people, for example, report better outcomes from living in high inequality states whereas lower income groups within these same states present with more severe health issues [13]. Thus, children from many different marginalized populations face these inequalities and their resulting effects [14].

Ultimately, health disparities can have a substantial impact on the lives of children, often manifesting in further socioeconomic, psychological, and physical consequences. People with low socioeconomic means may be unable to afford health insurance and thus struggle for access to healthcare [14]. This can further worsen their health and result in fewer educational opportunities, thereby adding to their economic hardship [14]. Furthermore, the emotional stress created by these disparities can lead to mental health problems and further exacerbate physical conditions [14]. Unfortunately, children facing these inequities commonly receive fewer interventions and less adequate healthcare [15].

c. Political Connectivity to Health Outcomes

Some researchers have argued for changes in public policy to address these disparities, both at the state and federal levels [15]. While studies have shown that one's political orientation is associated with health behaviors, little research has been done to examine the impact of this phenomenon on children [16]. Given the long-term effects of

poor childhood health, it seems imperative to understand which states have satisfactory pediatric health outcomes, in hopes of identifying the policies that lead to such outcomes. For instance, the US life expectancy was once middle of the pack of its peer nations and now is significantly below average, with research indicating that state-level variation has led to this decline [17]. Over the last four decades, many major policy decisions have been made at the state, rather than federal, level. This has led to substantial differences with regard to policy adoption for a variety of issues [18]. Therefore, the intent of the present study was to assess how each state's political climate influences the well-being of its pediatric population.

Materials And Methods

Using the Cook Partisan Voter Index (PVI), a measurement of how strongly a state leans towards the Democratic or Republican party in US presidential elections compared to the nation as a whole, we set out to investigate the association between state-level political partisanship and multiple barometers of childhood health [19]. PVI for all 50 states from the 2012 and 2016 US presidential elections was calculated via the method outlined by the Cook Political Report [20]. Briefly, PVI is calculated by measuring how strongly each state leans toward the Democratic or Republican party in the past two US presidential elections, compared to the nation as a whole. State-level voting data was collected from the Federal Elections Commission for 2012 and 2016 [21, 22]. PVI's were denoted by a letter expressing the direction of their political partisanship (R for Republican, D for Democratic) and a number stating the relative strength of their voting preference compared to the nation as a whole. For instance, Alabama voted 14% more Republican than the nation as a whole during this time period and, thus, was assigned a PVI of R+14. For statistical analysis, all PVI's were converted to solely numerical values, with negative numbers being used for Democratic PVIs and positive numbers being used for Republican PVIs. The usage of negative numbers for Democratic PVIs was arbitrary and the same analysis could have been conducted with directionality being assigned in a reverse fashion.

Data regarding measures of childhood health were obtained from the Centers for Disease Control and Prevention from 2012 to 2016 and the median value of each was calculated for all US states [23]. Outcomes were selected for pediatric health variables that (1) were reported by each state in full between 2012-2016 and (2) were all available in publicly-searchable government-maintained databases. All healthcare variables were chosen prior to data analysis. The variables assessed were widely varied but encompassed statistics pertaining to neonatal/infant health (low birthweight rates, very low birthweight rates, preterm birth rates, neonatal mortality rates, infant mortality rates), childhood health (childhood death rates, rates of children without medical insurance, childhood suicide rates, rates of children who are overweight or obese, childhood poverty rates), teenage health (teenage death rates, teenage birth rates, teenage rates of tobacco and cigarette use) and long-term outcomes (life expectancy at birth). In addition to these values, the median number of primary care physicians per 100k people from 2012-2016 was obtained from the US Census Bureau website. This included family practice doctors and pediatricians [24]. The median percentage of nonwhite residents for each state from 2012 through 2016 was collected from the US Census Bureau [25].

Summary statistics of each of the variables of interest were generated, including mean and standard deviation. Bivariate regression analyses were performed to assess the relationship between PVI and each of the 16 childhood health outcome variables. Pearson's Rho was used to determine the statistical significance of these relationships, using a Bonferroni adjustment to the p value of 0.003 (derived from 0.05 divided by 16 for the number of variables of interest) to make the criteria more robust. The beta value (slope) was also calculated for each outcome to determine directionality of each relationship. Linear regression diagnostics were conducted for PVI versus each outcome variable.

An adjusted regression analysis was conducted to investigate the association between PVI and each of the health outcomes, while adjusting for state-level measures of children without health insurance, primary care physicians per 100,000 people, percentage of nonwhite residents and childhood poverty. Pearson's Rho, also using the Bonferroni adjustment of 0.003, and beta values were again obtained for PVI. Linear regression diagnostics were conducted for PVI versus each variable of interest after adjusting.

States were designated as "moderately" Republican or "moderately" Democratic if their PVI was 5%-9.9% more Republican or Democratic than the national popular vote [26]. This numerical designation was made based on the Cook Political Report's convention of defining states with a PVI of less than 5% as being "swing states"[19]. Childhood health measures were compared in these states and differences between mean values were evaluated using Kruskal-Wallis non-parametric tests. Again, the Bonferroni adjustment of 0.003 was applied to determine significance. Additionally, those states with a PVI ≥10% more Republican or Democratic than the national mean were designated as either "extremely" Republican or "extremely" Democratic. Similarly, the childhood health outcomes among these extremely partisan states were compared against one another. Kruskal Wallis non-parametric tests were used again to compare the childhood health measures between the two groups with a Bonferroni adjustment of 0.003.

Results

Based on the calculated PVI, 28 states were designated as Republican-leaning, while 20 states were designated as Democratic-leaning (Figure 1). Two states (New Hampshire and Wisconsin) were labeled as neutral. PVI ranged greatly between states, with the most Republican-leaning state being Wyoming at R+25 and the most Democratic-leaning state being Hawaii at D+18. Many health outcomes also displayed wide ranges between states, with 6 variables demonstrating statistically significant differences in Republican and Democratic states given the Bonferroni adjustment of $p<0.003$. These included childhood death rate, teenage death rate, life expectancy at birth, teen cigarette use rate, teen tobacco use rate, and teen birth rate. All 6 of these outcomes were better in Democratic states (Table 1 and Figure 2a).

In unadjusted regression analysis, Democratic-leaning states displayed significantly better outcomes than Republican-leaning states for seven of the 16 childhood health measures assessed (all $p<0.003$, see Figures 2a and 2b). These measures were teenage death rates, teen birth rates, life expectancy after birth, childhood death rates, infant mortality rates, teenage tobacco use rates and teenage cigarette use rates. No health outcomes were found to be superior in Republican-leaning states during the unadjusted analysis. After adjusting for children without health insurance, percentage of nonwhite residents, childhood poverty and primary care physician shortages, multivariable regression analysis revealed that Democratic-leaning states had statistically better outcomes for 9 out of 14 variable measures using the Bonferroni adjustment of $p<0.003$ (see Table 2). These were teenage death rates, life expectancy at birth, teenage birth rates, childhood death rates, teenage tobacco use rates, teenage cigarette use rates, infant mortality rates, neonatal mortality rates and preterm birth rates. No outcomes were significantly better in Republican-leaning states in the adjusted regression analysis. A threshold of 0.05 would have yielded statistically different results for 12 of the 14 childhood health measures. Similar to our prior findings, all 12 of these variables would have been superior in Democratic-leaning states, while Republican-leaning states would have had no superior outcomes.

Among moderately-partisan states, 15 out of 16 measures were better among Democratic-leaning states although none met statistical significance. This analysis included 6 moderately-Republican states and 6 moderately-Democratic states. Among 6 extremely-Democratic states, 5 out of 16 measures were statistically superior ($p<0.003$)

when compared to the 15 extremely-Republican states (Table 1). These 5 measures were teenage birth rates, childhood death rates, life expectancy at birth, childhood suicide rates and teenage death rates. No health outcomes were better in moderately-Republican or extremely-Republican states when compared to Democratic-counterpart states.

Discussion

In the present study, multiple childhood health outcomes were found to be superior in Democratic-leaning states compared to Republican-leaning states, while no outcomes were superior among Republican-leaning states. While other studies have highlighted disparities in healthcare outcomes based on geography,[23, 27-30] this study is the first to reveal an association between U.S. childhood health outcomes and political partisanship at the state level.

The link between political ideology and health outcomes has been previously demonstrated on a multi-national level. An international study examining the relationship between public policy and population-wide health outcomes found that political parties with egalitarian ideologies tended to institute policies that lead to improved health outcomes among their populations [31]. This study strongly suggests that there may be a similar phenomenon among US states. Many states take different approaches towards a host of public policies that can impact childhood health, such as Medicaid coverage, child welfare laws, tax policy, childhood education, childcare subsidies, food assistance programs and others. These policies, which can differ between states and regions of the country, can also significantly cause differences in health outcomes in children specifically.

With this, our study does not argue causality between PVI and childhood health. In fact, our analysis was performed as an ecological study which cannot prove causation. However, the association between state-level political partisanship and multiple childhood health measures is novel and warrants further investigation. For example, given that Democratic-leaning states were more likely to adopt the Medicaid expansion provision of the 2010 Patient Protection and Affordable Care Act, one might speculate that this led to improved health outcomes compared to Republican-leaning states. By the end of 2014, the earliest year states could expand Medicaid, 28 states accepted expansion while 22 did not [32, 33]. Of the 22 that did not, 19 were in Republican-leaning states, 2 were Democrat-leaning states (Virginia and Maine), and 1 was neutral (Wisconsin), according to this analysis. This number has since expanded to 38 states who have accepted Medicaid vs. 12 states that have not [32]. Of the 12 states that have still failed to adopt Medicaid expansion, 11 are Republican-leaning states while 1 is a neutral state (Wisconsin), and none are Democrat-leaning states. Additionally, one study exploring the effect of Medicaid expansion on US infant mortality rates demonstrated that rates declined significantly more in states who enacted Medicaid expansion than in those who did not [34]. However, given that our study assessed 16 different metrics of pediatric health, it remains challenging to pinpoint specifically how Medicaid expansion could have contributed to such discrepant outcomes between states.

Our study does have several limitations. First, we were able to control for 4 variables, which were the percentage of children without health insurance, percentage of children in poverty, percentage of nonwhite residents, and primary care physician shortages. However, when evaluating macro indicators of childhood health, one must consider that results could be impacted by other factors, including type of health insurance, access to healthy food, quality of early childhood education and other similar variables [12]. We also did not weight states based on their population. One could argue that this would allow states with small juvenile populations, such as Vermont and Wyoming, to have a disproportionate impact on the overall statistics of the groups of Democratic-leaning or Republican-leaning states, respectively.

Finally, this study analyzed data from 2012-2016. Inclusion of additional years could determine if our study's findings remain preserved over a longer time interval. Further, given that our study period overlapped only with the Obama administration, future research spanning multiple presidential administrations could determine whether the president's political affiliation plays a role in affecting measures of childhood health. We chose to conduct an analysis for all 50 states since PVI and pediatric health outcomes are reported at the state-level for the years spanning our study. While PVIs are also calculated at the congressional district level, health outcomes are unfortunately not reported among specific congressional districts. Although a more granular approach could potentially reveal which policies lead to improved health for children, this is not an analysis that can be performed using PVI.

Despite these limitations, we feel that this study can help further inform the discussion of what drives disparities of childhood health in the US. Furthermore, the Bonferroni adjustment of $p<0.003$ used in this study could be considered an extremely strict statistical threshold to some. Had we utilized a more traditional p-value of 0.05 to denote statistical significance, then our analysis would have revealed 12 significant variables rather than 7. While other studies have highlighted health disparities based on language, race, gender, economics, access to care, and even cultural norms, we felt it important to determine whether similar disparities exist based on state-level political partisanship. Recognition of such disparities is critical, as strategies aimed at attacking these inequities can only be developed after we are aware of their presence.

As one of the first studies to link childhood health to state-level political partisanship, our analysis highlights an important association that has previously gone unrecognized. Physicians, political stakeholders, and even parents may use this information to collaborate on approaches to improve childhood health. Further research should attempt to pinpoint which specific regulations and policies have led to these discrepant health outcomes and, thus, give US states conclusive information about how to improve the health of their juvenile populations.

List Of Abbreviations

PVI – Partisan voter index

US – United States

Declarations

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Ethics Approval: *This study was exempt from IRB approval given that it used publicly available data.*

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Consent for Publication: *All authors involved consent for the publication of this manuscript*

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Code Availability: *All code is available in R Studio.*

Author Contributions:

Megan Paul helped conceptualize and design the study, collected data, carried out the initial analyses, drafted the initial manuscript, and reviewed and revised the manuscript.

Dr. Brian Coakley conceptualized and designed the study, collected data, and reviewed and revised the manuscript.

Dr. Bian Liu and Ruya Zhang reviewed the initial analyses and critically reviewed the manuscript for important intellectual content.

Dr. Payam Saadai critically reviewed the manuscript for important intellectual content.

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Tables

Table 1: Summary Statistics: Outcomes, means, and standard deviations for each variable are listed above. **"Moderately Partisan Analysis:"** Republican and Democratic states (5%-9.9% more republican/democratic than the national PVI) were compared for 16 variables of interest. **"Extremely Partisan Analysis:"** Republican and Democratic states (10% or more republican / democratic than the national PVI) were compared for 16 variables of interest. P value is the result of Kruskal-Wallis testing comparing Republican and Democratic health outcomes, with, bolded being significant given the Bonferroni adjustment of $p<0.003$.

	Summary Statistics				"Moderately Partisan" Analysis			"Extremely Partisan" Analysis		
Outcome	**Mean (SD)**	**Mean R (SD)**	**Mean D (SD)**	**P Value**	**Mean R**	**Mean D**	**P Value**	**Mean R**	**Mean D**	**P Value**
PVI	3.44 (10.6)	-11.22 (7.29)	7.5 (5.19)	NA	8.7	-7.13	NA	15.96	-13.5	NA
Low Birthweight Rate (% total births)	7.96 (1.19)	8.15 (1.37)	7.75 (0.794)	0.20	8.57	7.75	0.30	8.04	7.61	0.59
Very Low Birthweight Rate (% total births)	1.36 (0.29)	1.41 (0.321)	1.32 (0.22)	0.37	1.5	1.43	0.93	1.35	1.27	0.75
Childhood Death Rate (Deaths age 1-14 per 100K children)	17.89 (4.25)	20.00 (4.04)	14.62 (2.27)	**<0.001**	21.33	13.75	0.006	21.0	13.5	**0.0019**
Teenager Death Rate (Deaths age 15-19 per 100K teenagers)	50.51 (11.88)	56.60 (10.5)	41.75 (8.8)	**<0.001**	59.92	39.25	0.0065	61.53	37.92	**<0.001**
% of Children in Poverty	19.82 (5.18)	20.99 (5.47)	18.49 (4.47)	0.66	21.99	17.85	0.20	20.84	17.49	0.28
% of Children Overweight	14.77 (2.75)	14.85 (2.91)	14.59 (2.52)	0.94	13.18	15.62	0.053	15.19	14.25	0.59
% of Children Obese	15.35 (3.54)	16.54 (3.65)	13.79 (2.79)	0.0043	18.93	14.63	0.11	16.01	14.27	0.21
% of Children Without Health Insurance	5.92 (2.13)	6.49 (2.29)	5.17 (1.58)	0.0110	7.67	4.75	0.025	6.28	4.12	0.018
Neonatal Mortality Rate (Deaths per 1000 live births)	3.95 (0.87)	4.19 (0.653)	3.82 (0.653)	0.0321	4.29	4.04	0.63	4.12	3.17	0.043
Infant Mortality	6.05	6.52	5.38 (0.962)	<0.001	6.86	5.58	0.078	6.54	5.03	0.0114

Rate (Deaths per 1000 live births)	(1.16)	(1.11)								
Childhood Suicide Rate (Rate per 100,000 juveniles)	3.00 (1.41)	3.21 (1.44)	2.56 (1.26)	0.24	2.94	2.54	0.41	3.76	1.51	**0.0029**
Life Expectancy at Birth	78.66 (1.66)	77.93 (1.68)	79.72 (0.953)	**<0.001**	77.32	79.72	0.0062	77.65	80.4	**0.0018**
Teen Cigarette Use Rate (% of all children)	5.97 (1.26)	6.36 (1.25)	5.18 (0.84)	**0.00103**	6.27	5.19	0.15	6.91	4.62	0.004
Teen Tobacco Use Rate (% of all children)	8.38 (1.69)	8.96 (1.65)	7.31 (1.16)	**<0.001**	8.86	7.32	0.11	9.65	6.42	0.0051
Preterm Birth Rate (% of all births)	9.59 (1.19)	9.99 (1.23)	9.03 (0.889)	0.0057	10.48	9.33	0.13	9.97	8.83	0.13
Teen Birth Rate (per 1000 of population 15-19)	24.44 (7.87)	28.19 (7.17)	19.30 (6.39)	**<0.001**	31.47	17.17	0.004	29.96	17.15	**0.0011**

Table 2: (Left) Results from linear regression analysis of 16 individual childhood health outcomes vs. PVI and associated Beta / p values are displayed. (Right): Results from the regression of each of the childhood health outcomes vs. PVI are displayed after adjusting for children without health insurance, primary care physicians, children in poverty, and % non-white population by state. For both analyses, bolded variables are significant given the Bonferroni adjustment of $p<0.003$ for Pearson's Rho

	Unadjusted Regression Analysis		Adjusted Regression Analysis	
Outcome	**β (Slope)**	**P-Value**	**β (Slope)**	**P-Value**
Teenage Death Rate (per 100k)	0.85	**<0.001**	0.91	**<0.001**
Teen Birth Rate (per 100k)	0.48	**<0.001**	0.47	**<0.001**
Life Expectancy at Birth	-0.092	**<0.001**	-0.10	**<0.001**
Childhood Death Rate (per 100k)	0.27	**<0.001**	0.31	**<0.001**
% Children without health insurance	0.087	0.0039		
Infant Mortality Rate (per 1000 births)	0.046	**0.0024**	0.66	**<0.001**
Teen Tobacco Use Rate (%)	0.098	**<0.001**	0.11	**<0.001**
Neonatal Mortality Rate (per 1000 births)	0.024	0.0378	0.39	**0.0026**
Childhood Suicide Rate (per 100k juveniles)	0.059	0.0062	0.37	0.11
Teen Cigarette Use Rate (%)	0.723	**<0.001**	0.74	**<0.001**
Preterm Birth Rate (% all births)	0.40	0.0105	0.73	**<0.001**
% Children in Poverty	0.095	0.18		
% Children Obese	0.095	0.0466	0.10	0.042
Low Birthweight Rate (% all births)	0.017	0.31	0.40	0.0069
Very Low Birthweight Rate (% all births)	0.0017	0.67	8.47E-03	0.015
% Children Overweight	0.0014	0.97	0.038	0.44

Figures

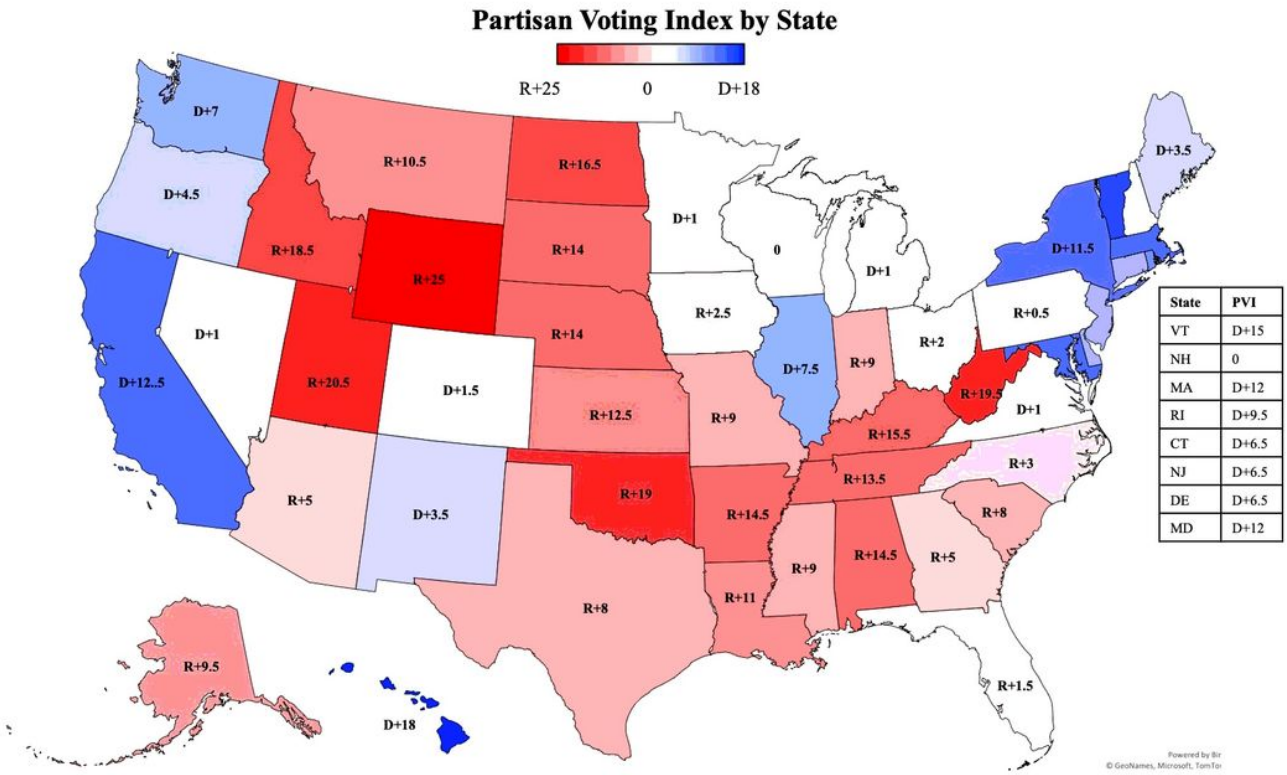

Figure 1

Republican vs. Democratic States According to PVI Value. Note that negative PVI values are associated with Democratic-leaning states whereas positive values are associated with Republican-leaning states but directionality could have reversed.

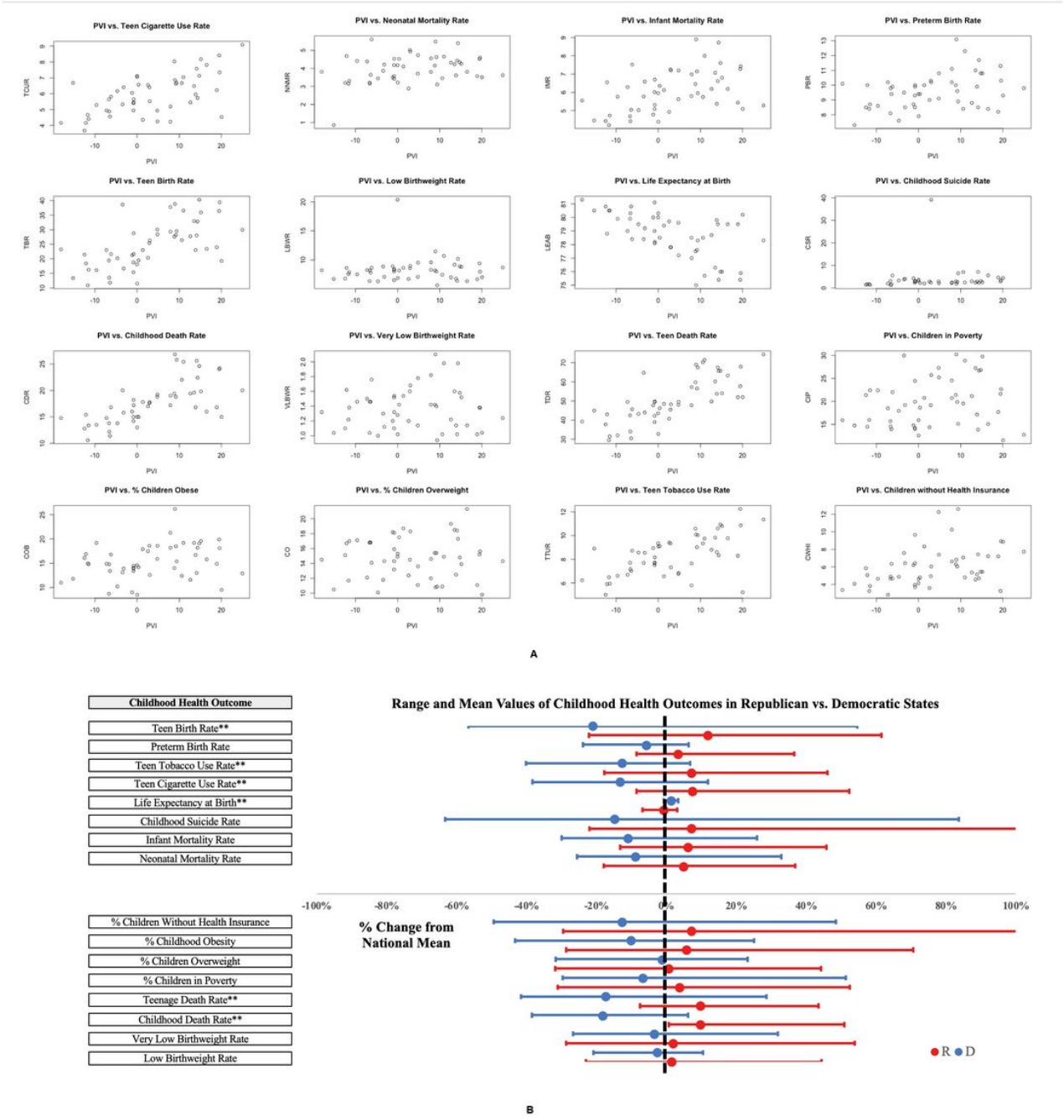

Figure 2

a Unadjusted Bivariate Regression of PVI vs. 16 Childhood Health Outcomes. The median PVI and variable of interest from 2012 to 2016 are displayed for each state in the scatterplots above b 16 childhood health outcomes are shown, with red and blue representing Republican and Democratic states, respectively. The dashed line (0%) represents the national mean. Bars are the range for each outcome. Variables with asterisks show significant differences using the Bonferroni adjustment of $p<0.003$