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PVI Draft

**State-Level Partisanship Strongly Correlates with Health Outcomes for US Children**

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1. **Introduction:**
   1. **Significance of Childhood Health**

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

Mental health and overall life satisfaction can also be impacted by childhood morbidities, often manifesting early in one’s life.7 Childhood obesity has been shown to shape the self-esteem and academic performance of an individual, thus affecting their overall emotional well-being.3 In fact, nearly half of all mental health issues manifest in children before the age of 14 and are often related to one’s physical health.7 Some of these health predictors can even occur at birth. 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.8 Thus, the psychological implications of poor childhood health can be just as impactful as the physical consequences.8

Childhood health outcomes have significant economic ramifications. Studies have shown that preventive interventions early in life can have a large economic impact on both individuals as well as on an entire healthcare system.9 Early tobacco screening has been shown to potentially save over two million lives and $3 billion annually in the US.9 Further preventative health screenings can also reduce an individual’s healthcare costs over time, especially in pregnant women.10

* 1. **Pediatric Health Disparities in the US and their Consequences**

Despite the importance of optimal childhood health, many disparities exist throughout the United States.11 Poor children have been shown to have higher rates of bronchiolitis, urinary tract infections, asthma, mood disorders, and accidents.11 In addition, multiple childhood health outcomes have been shown to be significantly better amongst white juveniles, when compared to their black or Hispanic counterparts.11,12 Geography can also impact one’s health through either physician shortages or the public policies adopted by a specific locale. Thus, children from many different marginalized populations face these inequalities and their resulting effects.13

Ultimately, these 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.13 This can further worsen their health and result in fewer educational opportunities, thereby adding to their economic hardship.13 Furthermore, the emotional stress created by these disparities can lead to mental health problems and further exacerbate physical conditions.13 Unfortunately, children facing these inequities commonly receive fewer interventions and less adequate healthcare.14

* 1. **Political Connectivity to Health Outcomes and the Cook Partisan Voting Index**

Many have argued that political leaders must intervene to address these disparities, both at a state and federal level.14 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.15 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.

Therefore, the intent of the present study was to assess how each state’s political climate influences the well-being its pediatric population. 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 ecological association between state-level political partisanship and multiple barometers of childhood health.16

1. **Methods**

PVI for all 50 states from the 2012 and 2016 US presidential elections was calculated via the method outlined by the Cook Political Report.17 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 in this case for 2012 and 2016.18,19 In this study, Democratic-leaning states were denoted by positive PVI values and Republican-leaning states were denoted negative PVI values. For example, Alabama voted 14% more Republican than the national popular vote over the 2012 and 2016 US presidential election cycles and, thus, was assigned a PVI of -14.

Additionally, data regarding multiple measures of childhood health were obtained from the CDC from 2012 to 2016 and the median value of each was calculated for all US states.20 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 and 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.21 The median percentage of nonwhite residents for each state from 2012 through 2016 was collected from the US Census Bureau.22

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.

Next, 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.23 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.”16 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.

1. **Results:**

Based on the calculated PVI, 28 states were designated as Republican-leaning, while 20 states were designated as Democratic-leaning (see table 1). Two states, New Hampshire and Wisconsin, were labeled as neutral. PVI ranged greatly between states, with the lowest value, and thus most Republic state, being Wyoming at -25 and the highest value, and thus most Democratic state, being Hawaii at 18. Many health outcomes also displayed wide ranges between states (see table 2).

In our unadjusted regression analysis, Democratic-leaning states (PVI > 0) displayed significantly better outcomes than Republican-leaning states (PVI < 0) for seven of the 16 childhood health measures assessed (all p<0.003, see figures 1a and 1b). These measures included 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, bivariate 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 3). These included 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.

Among only moderately-partisan states, 15 out of 16 measures were better among Democratic-leaning states. However, none of these measures met our threshold of statistical significance. However, 5 out of 16 measures were statistically superior among extremely-Democratic states (p<0.003, see table 4) when compared to extremely-Republican states. These included teenage birth rates, childhood death rates, life expectancy at birth, childhood suicide rates and teenage death rates. No health outcomes were statistically superior in moderately-Republican or extremely-Republican states when compared to Democratic-counterpart states.

**Discussion:**

In this study, multiple childhood health outcomes from 2012 through 2016 were superior in Democratic-leaning states, while no health outcome was statistically better among Republican-leaning states during this same time interval. While the data itself is notable in there being no exceptions, it also has wide-ranging implications. Multiple sources have shown disparities in healthcare outcomes based on geography20,24-27, but we believe the current analysis to be the first highlighting the association between U.S. childhood health outcomes and political partisanship at the state level. This link between politics and health outcomes has been previously demonstrated, albeit on a multi-national level. Navarro et al. found that political parties with egalitarian ideologies tended to institute policies that lead to improved health outcomes among their populations.28 Thus, it remains possible that our study could simply be bringing attention to the effects of 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.

It is important to consider that the current study does not argue causality between PVI and childhood health. In fact, our analysis was performed as an ecological study, which cannot definitively prove causation. However, the clear association between state-level political partisanship and multiple childhood health measures is novel and quite interesting. 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 lead to improved health outcomes compared to Republican-leaning states. In fact, Bhatt and colleagues were able to demonstrate that infant mortality rates declined significantly more in states who embraced Medicaid expansion than in those who did not.29 However, no specific policies, including Medicaid expansion, were specifically analyzed in our study and, thus, we cannot pinpoint which are most effective in improving childhood health.

This study does carry several limitations. First, we could only 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 a host of other factors, including type of health insurance, access to healthy food, quality of early childhood education and other similar variables.11 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, the current 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 focus on childhood health outcomes at the state level, but additional studies could be performed at the county or voting district level. This type of granular approach could potentially reveal which policies or regulations lead to improved health for children.

Despite these limitations, we feel that the current 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 traditional p-value of 0.05 to denote statistical significance, then our analysis would have revealed many more significant variables. For instance, we previously stated that bivariate regression analysis revealed 9 out of 14 health outcomes to be statistically superior in Democratic-leaning states, while the other five were not statistically different. But 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.

As one of the first studies to link childhood health to state-level political partisanship, our study highlights an important association that has previously gone unrecognized. Further research could attempt to pinpoint which specific 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.

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