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Counties with Higher Prescription Opioid Presence Have Slower Student Learning Rates

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KEY FINDINGS

- Students in counties with high levels of community opioid presence (as measured by annual number of prescription pills distributed per person) are learning more slowly over time than peers in counties with low levels of community opioid presence.
- These differences in learning rates are largest for Native American students. After controlling for community and school characteristics, the differences are largest for Black students.
- The relationship between opioid presence and student learning remains even when accounting for community and school differences.
- Community opioid presence is more strongly associated with math learning rates than with reading learning rates.

The adverse impacts of the U.S. opioid crisis have been documented in many domains, but surprisingly little attention has been directed to understanding how the opioid crisis has affected children's educational outcomes. Adverse childhood experiences, such as parental drug use, can negatively affect academic performance.[1] Children of individuals with opioid use disorders (OUD) have increased risk of emotional and behavioral problems and poor social skills, which contribute to poor academic performance.[2] In addition to this direct link between parents and children, drug use in the child's broader social environment outside the home is also linked to detrimental outcomes for children.[3] Understanding how student learning has been disrupted by the opioid epidemic is important for identifying interventions to reduce potentially negative lifelong impacts

This brief summarizes findings from our recent peer-reviewed study that investigated the link between the opioid crisis and student learning. Our opioid measure is the annual per-person rate of prescription pills distributed by pharmacies in a county, according to the U.S. Drug Enforcement Agency (the DEA). Throughout this brief, we will refer to this measure as community opioid presence because it reflects the number of prescription opioids physically distributed within a community. Our student learning

measure reflects the average annual improvement in standardized test scores between grades 3 and 8 for a county between academic years 2007-2008 and 2017-2018.

Learning Rates are Slower in Counties with High Community Opioid Presence

The average student in a county with high opioid presence (top 25th, 69 pills per person annually) learns at a rate 0.012 standard deviations (SD) slower than the average student in a county with low opioid presence (bottom 25th, 16 pills per person annually), amounting to a 0.06 SD difference in growth between third and eighth grade (Table 1). Put another way, when compared to the national average, students in high-pill counties are learning 4.96 grade levels of material over five years, whereas students in low-pill counties are learning 5.02 grade levels of material over five years. While this difference is statistically significant, it is also modest: average student achievement improves by 0.33 SD per year between grades 3 and 8, so the overall difference is about 4% of the average learning rate. However, differences in learning rates between high- and low-pill counties are vary across race, ethnicity, and socioeconomic status. For example, differences are most pronounced for Native American students.

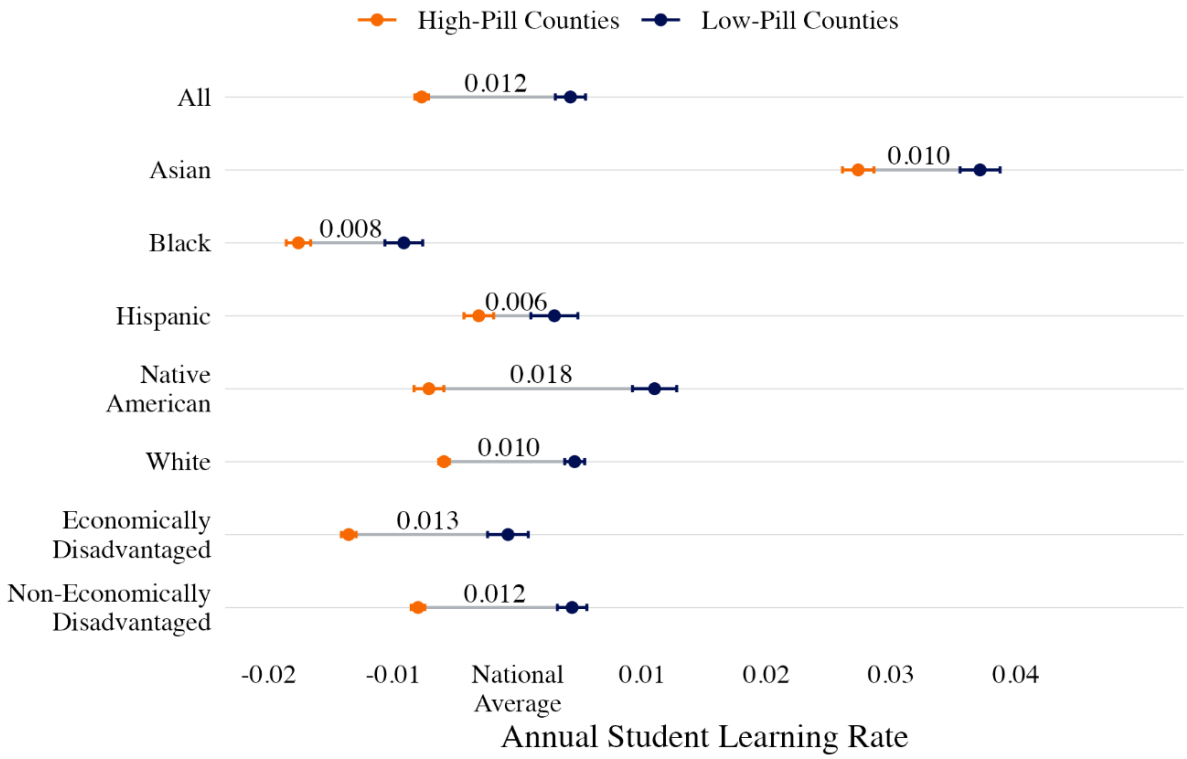

Figure 1. Annual Student Learning Rates by Student Demographic Group

Data Source: Stanford Education Data Archive (SEDA, version 4.1, academic years 2008-2009 through 2017-2018) and DEA ARCOS (years 2006-2014).

Notes: Learning rates are measured in standard deviations of the national student-level within-grade distribution of test scores and are weighted by enrollment. The bars represent the standard error of each learning rate estimate. All differences are statistically significant ($p<0.003$).

The Negative Link Between Community Opioid Presence and Learning Rates is Partially Accounted for by Differences in Community and School Characteristics

After observing these differences between counties with the highest and lowest levels of opioid community opioid presence, we created a regression model to account for differences in community and school characteristics. By doing so, we are able to include all counties in our analysis while also controlling for factors that are known to be associated with test scores.

In our simplest model, a 23 pill-per-person (or 1 SD) annual increase in community opioid presence is associated with a 0.0025 SD slower annual learning rate, or 0.0125 SD lower total growth over five years. This relationship attenuates slightly (by 8%) when we add county socioeconomic status and racial/ethnic composition to our model, suggesting that differences in community demographics are playing just a small part in the learning differences we observe. While the overall effect is small, there is tremendous variation across communities, with some facing a much larger burden than others.

We find more compelling evidence that the relationship between opioid presence and learning rates may be partially operating through in-school pathways. When we add various school factors to our model, such as student-teacher ratio and per pupil expenditure, the relationship between opioid presence and learning rates attenuates by an additional 26% (to 0.0017 SD). Potential in-school pathways include instability in the classroom wrought by hungry, tired students and stressed, overextended teachers.[4,5] This may also reflect increased pressure on school budgets in direct response to the opioid crisis, including increased needs for special education services and mental health services, diverting funds from enrichment activities or classroom assistants.[6,7] Our models also suggest that community opioid presence is more strongly associated with learning rates in math than reading. Prior work has suggested that math skills are more influenced by in-school factors than reading skills, so this finding further suggests that the association between opioid presence and learning rates is partially operating through in-school factors.[8]

How Can Policymakers Address the Troubling Relationship between the Opioid Crisis and Student Learning?

Because student growth is generally believed to more accurately reflect student learning in schools than achievement levels, we hope this research can provide more insight into how the opioid crisis may be affecting student learning in the classroom. We expect that the small negative relationship we observe nationally might vary significantly across communities that have experienced the epidemic to differing degrees of severity, particularly in hard-hit states like West Virginia. West Virginia University's Project TRAIN has surveyed teachers throughout the state, finding that teachers feel underprepared for students arriving at school more worried about "survival" than learning.[9] Their work indicates that there are several school-based needs that can be addressed through policy and everyday practice, including increased staff support via counselors and social workers and access to trainings on topics such as the effects of addiction on families and classroom strategies for engaging with affected children. State policymakers and district-level school officials should work together to address these needs.

In addition, current and upcoming litigation brought against pharmaceutical and marketing companies by school districts are important tools for addressing the epidemic's effect on U.S. public schools. Such litigation is relying on research linking in utero opioid exposure to increased rates of students who need costly special education services. Future causal research may enable districts to seek compensation for children not only exposed to opioids in utero, but also those exposed to community opioid presence throughout childhood.

In addition to these in-school pathways, learning rates—like achievement levels—are also influenced by students' social conditions. Policies and other actions that address the underlying social conditions are likely as important as school-based responses. This could be tackled through federal, state, and local prevention efforts to reduce prescription opioid misuse and subsequent community-level child harm. For example, the federal government could vastly expand access to the most effective forms of substance use disorder treatments through care providers employed by the Veterans Health Administration (VA), Military Health System (DoD), Indian Health Service (IHS), and Community Health Centers (HHS).

Data and Methods

To generate the estimates presented in Table 1, we weighted SEDA's pooled learning rate estimates by the per-grade enrollment of each group. These estimates reflect the average learning rates of students who live in high-pill counties vs. low-pill counties. For our national model, we fit a precision-weighted regression model to estimate the conditional associations between average learning rates and community opioid presence, controlling for outlying counties in the top one percent of opioid presence, county covariates, and state fixed effects. See the full paper for details.

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