Child Abuse & Neglect 86 (2018) 306–313

Contents lists available at ScienceDirect

Child Abuse & Neglect

journal homepage: www.elsevier.com/locate/chiabuneg

Research article

State-level variation in the relationship between child removals and opioid prescriptions☆

Troy Quast

Department of Health Policy and Management, College of Public Health, University of South Florida, 13201 Bruce B Downs Blvd MDC 56, Tampa, FL, 33612, United States

ARTICLE INFO

Keywords:
Opioids
Foster care
Child removal

ABSTRACT

Background: One of the most devastating impacts of the U.S. opioid crisis is the challenge it creates for dependent parents to care for their children, potentially leading to the child being removed from their home. However, existing studies of the link between child removals and opioid prescriptions have either focused on a single state or estimated a national average.

Objective: To estimate state-level associations between child removals and opioid prescriptions.

Participants and setting: U.S. counties from 2010 to 2015.

Methods: We performed longitudinal regression analysis in which the rates for all removals and removals associated with parental drug abuse were employed as dependent variables. In addition to the opioid prescription rate, additional explanatory variables included child removal risk factors, county fixed effects, year fixed effects, and state-specific time trends. Interaction variables were used to estimate state-specific relationships.

Results: We found substantial variation in the association between child removals and opioid prescriptions. Twenty-three states had a positive association, fifteen had a negative association, and twelve did not have a statistically significant association. A one-standard deviation increase in the prescription rate was associated with a 37% ($p < .001$) increase in the removal rate for parental drug abuse in Illinois, while in New Hampshire it was associated with a 28% ($p < .001$) decrease.

Conclusions: The substantial variation in state-level relationships between child removals and opioid prescriptions may reflect differences in the extent to which states have experienced the opioid crisis and indicate the need for interventions that account for those differences.

1. Introduction

The opioid epidemic is one of the most urgent problems facing the United States. While the value represents a slight decline over previous years, there was an annual average of approximately 70 prescriptions per 100 people during the 2012–2015 period (Schuckit, 2016). The prevalence of heroin use has increased nearly five-fold since the early 2000s (Martins et al., 2017). The U.S. Drug Enforcement Administration issued a national alert declaring that fentanyl and fentanyl analogues are a threat to public health (U.S. Drug Enforcement Administration, 2015). An estimated two million individuals suffer from opioid use disorder (Schuchat, Houry, & Guy, 2017). The national effects of the crisis are stark. Roughly 33,000 deaths were attributed to opioids in 2015 (Rudd,

☆ This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
E-mail address: troyquast@health.usf.edu.

https://doi.org/10.1016/j.chiabu.2018.10.001
Received 24 June 2018; Received in revised form 26 September 2018; Accepted 3 October 2018
Available online 06 November 2018

Seth, David, & Scholl, 2016). Opioids are believed to be largely responsible for the 0.28 decrease in years of life expectancy due to drug-poisoning deaths between 2000 and 2015 (Dowell et al., 2017). The economic costs of opioid abuse were estimated at $80b in 2015 (Florence, Luo, Xu, & Zhou, 2016).

These national estimates mask significant variation in the epidemic across the country. Some states have experienced large effects over a number of years, while the crisis is more limited elsewhere. Grouped in county-level quartiles, the 2015 prescribed morphine milligram equivalents (MMEs) per capita in the lowest quartile was 203 while in the highest it was 1319 (Guy et al., 2017). There are also substantial differences in trends. Over the 2010–2015 period, the average prescribed MMEs increased in 50% of counties, fell in 28%, and was stable in 22% (Guy et al., 2017). The prevalence of heroin use in the Midwest increased by a factor of seven from 2002 to 2013, whereas the rate of increase in the Northeast was over 40% less (Martins et al., 2017). While the use of fentanyl and fentanyl analogues is difficult to measure, an analysis of 27 states found that the number of fentanyl submissions (defined as the number of drug products obtained by law enforcement that tested positive for fentanyl) between 2013 and 2014 was relatively unchanged in half of the states analyzed while in others it increased by 900 or more (Gladden, 2016). There are also important regulatory differences across states. Some states mandate the use of prescription drug monitoring programs (PDMPs) by prescribers and/or providers. Legal requirements of pain clinics also vary across states.

Correspondingly, the effects of the opioid epidemic range considerably across the country. The proportion of national opioid-related inpatient discharges from 1997 to 2014 has increased in the South and West but fell in the Northeast and Midwest (Tedesco et al., 2017). While the national 2015 age-adjusted death rate per 100,000 residents for synthetic opioids other than methadone was 3.8, the state-level rates ranged from 0.8 in Minnesota and Washington to over 7 in Rhode Island and West Virginia and over 12 in New Hampshire (Rudd et al., 2016). These differences may be even larger when the rates are corrected for under-counting due to limited information reported on death certificates (Ruhm, 2017). The indirect effects of opioid dependence also exhibit substantial interstate variation. For instance, the rate of neonatal abstinence syndrome per 1000 live births was less than one in Hawaii and South Dakota and approximately 33 in West Virginia and Vermont (Ko, 2016).

Another important indirect effect of opioid dependence is the impact on children of affected parents, which in the extreme can result in the child being removed from the home. An analysis of recent child welfare cases in San Francisco found that in those cases that involved parental substance abuse and mental illness, over half cited one of the following determinations: failure to meet a child's immediate needs, presence of a drug-exposed infant, and caretaking impairment, and emotional stability/developmental status/cognitive deficiency (Roscoe, Lery, & Chambers, 2018). While precise estimates are not available due to the voluntary nature of states reporting the proportion of cases, published estimates of the national proportion of child welfare cases that involve parental substance abuse range from roughly 10% to 30% (Seay, 2015). Of those children with confirmed maltreatment allegations against their parents involving substance abuse, socioeconomic challenges faced by their parents are associated with a higher removal risk (Canfield, Radcliffe, Marlow, Boreham, & Gilchrist, 2017). Beyond the initial trauma of being removed their homes, children in foster care typically experience worse physical health, mental health, legal, and economic outcomes (Doyle, 2007; Turney & Wildeman, 2016; Zlotnick, Tam, & Soman, 2012). These negative effects can persist into adulthood (Lindquist & Santavirta, 2014).

There is a paucity of population-level research on the relationship between opioid dependency and child protective services contact in the U.S. Further, despite the variation in the opioid epidemic across the country, the exisiting studies have either investigated only a single state or estimated a national average. A regression analysis of 2006 births in California (Prindle, Hammond, & Putnam-Hornstein, 2018) found that, after controlling for maternal and infant characteristics, the probability of entering foster care was 28% greater for children with an exposure diagnosis of opioids. Ghertner, Waters, Radel, and Crouse (2018) employed county-level data and found a positive association between foster care entries and opioid utilization measures at the national level, while Quast, Storch, and Yampolskaya (2018) employed similar data for Florida and also observed a positive association.

Given the findings of previous studies and anecdotal reports of a linkage, this study explores the association between child removals and opioid use. We test the hypothesis that there is a relationship between child removal and opioid prescription rates, both for all removals and specifically for parental drug abuse. We estimate state-level relationships to account for the local environment and to potentially provide more nuanced information to policy makers. Our county-level analysis controls for factors previously shown to be associated with removal risk and is based on within-county variation in prescription and removal rates. The estimation also accounts for national and state trends in foster removals.

2. Methods

2.1. Data

The sample was based on county-years and included all U.S. counties during the 2010–2015 period. However, due to confidentiality concerns, the identities of counties with fewer than 1000 foster care records over the period were masked. (A record must be submitted for any child in foster care for 24 h or more. If a child is in foster care multiple times during the six-month reporting period, only the latest episode is reported as a record.) However, while the names of these counties were not reported, the rural-urban continuum codes (RUCC) were. These codes are assigned by U.S. Department of Agriculture (U.S. Department of Agriculture, 2016) and are based on the county's population and its relationship to metro areas (in, adjacent to, or not adjacent to). The codes range from one to nine and were used to aggregate unidentified counties in a state into "pseudo counties". Of the 3143 U.S. counties, 1950 were unidentified and aggregated into 290 pseudo counties. The total number of actual and pseudo counties was 1483. The Appendix reports the number of identified and unidentified counties by state. (Below the term counties is used to refer to both actual and pseudo counties.)

2.2. Outcomes

The outcomes of interest were child removal rates, which were calculated as the number of children removed divided by the population aged 0–19. The number of removals was based on data from the Adoption and Foster Care Analysis and Reporting System files, which contains foster care data that states are federally mandated to submit to the Children's Bureau. The data were obtained from the National Data Archive and Child Abuse and Neglect (National Data Archive on Child Abuse & Neglect, 2018). Population data were obtained from the U.S. Census Bureau (U.S. Census Bureau, 2018a). The rates were calculated both for all removals and those in which parental drug abuse was listed as a condition associated with the child's removal. (A removal can have multiple conditions, such as neglect and parental physical abuse, associated with it.)

2.3. Explanatory variables

The explanatory variable of interest was the opioid prescription rate, which was calculated as the number of prescriptions per 100 residents and obtained from the U.S. Centers for Disease Control (U.S. Centers for Disease Control [CDC], 2017). To calculate the rate the CDC used the number of prescriptions reported in the QuintilesIMS Transactional Data Warehouse (TDW), which is based on a sample of approximately 59,000 retail pharmacies. The population data was obtained from the U.S. Census Bureau.

Additional explanatory variables were employed to control for factors believed to be related to removal risk. Because of the study design, only variables that varied both across and within counties during the sample period could be included. Demographic characteristics (Bhatti-Sinclair & Sutcliffe, 2012; Knott & Donovan, 2010; Swann & Sylvester, 2006) were reflected in the proportion of residents by gender, age, race, and ethnicity (U.S. Census Bureau, 2018a). The poverty rate (U.S. Census Bureau, 2018b) and unemployment rate (U.S. Bureau of Labor Statistics (BLS), 2018) controlled for economic factors believed to be related to the removal rate (Barth, Wildfire, & Green, 2006; Bhatti-Sinclair & Sutcliffe, 2012; Carter, 2009; Knott & Donovan, 2010; Rivaux et al., 2008).

2.4. Analysis

The statistical analysis consisted of ordinary least squares regression in which either the overall or parental drug abuse removal rate was the dependent variable. County fixed effects were employed to control for county-level factors that were constant during the sample period. By including these fixed effects, the regression estimates measure the within-county association between the removal rates and the control variables. Thus, the estimates differ from a cross-sectional analysis which are based on differences across counties. While the within-county perspective arguably provides more insight into the relationship of interest, a cost of this approach is that only variables that vary within a county over time can be included as explanatory variables. The state-specific relationships were estimated by interacting the opioid prescription rate variable with state indicator variables.

Year fixed effects were included to control for any national influences on removal rates specific to a given year. State-specific linear time trends were also included to control for trends in the removal rate at the state level. To account for population differences, the observations were weighted by the 2013 county population. The observations were clustered at the state level to account for the potential correlation of errors within states over time.

The Appendix contains the results of robustness checks performed to assess the reliability of our results. We examined the stability of our estimates by varying the included explanatory variables. To ensure that the aggregation of unidentified counties did not drive our results, we estimated the regressions alternatively using only the identified and pseudo counties. We also repeated the analysis by using the overall removal rate. While the sign of the relationship changed for some states, the number of states with a positive association (twenty-three) was exactly equal to the number in the parental drug rate analysis. The magnitude of the changes was lower, but this was to be expected given the overall rate includes removals for reasons other than parental substance abuse. We also investigated an alternative to the approach of employing interactions by instead stratifying the sample by state.

As our analysis employed county-level data, IRB approval was not needed.

3. Results

3.1. State characteristics

The average removal rate for all causes was 5.8 children per 1000, while for parental drug abuse the average was 1.9 (Table 1). The mean annual county opioid prescription rate in our sample was 95.9 per 100 residents. This value is somewhat higher than the approximate national average of 80 during this period (Guy et al., 2017) due to the influence of high-prescription, low-population counties.

The state-level average removal and opioid prescription rates highlight significant variation across states. State average removal rates for parental substance abuse are displayed in Fig. 1. The map shows the significant variation in rates across states, with values ranging from 0.1 in Illinois and New Hampshire to 3.0 in West Virginia. There are no striking geographic patterns, except perhaps relatively low rates in the New England region. Likewise, Fig. 2 displays striking variation in opioid prescription rates. The lowest rates of roughly 49 were present in New York and Hawaii while the rates were approximately 137 in Alabama and West Virginia. However, unlike removal rates, there appears to be a geographic pattern with higher rates in the Southeast and lower rates in the Midwest.

Table 1
Child Removal Rates, Opioid Prescription Rates, and Other Independent Variables.

Variable	Mean	(SD)
Child removal rate (per 1000 residents aged 0-19)		
All causes	5.8	(13.4)
Parental drug abuse	1.9	(4.4)
Opioid prescriptions (per 100 residents per year)	95.9	(43.2)
Percentage of population by gender		
Female	50.3	(1.6)
Male	49.7	(1.6)
Percentage of population by race		
White	84.4	(14.3)
Black	9.1	(12.3)
Other	6.5	(8.7)
Percentage of population by ethnicity		
Not Hispanic	90.2	(13.1)
Hispanic	9.8	(13.1)
Percentage of population by age		
0–19	25.9	(3.2)
20–39	25.2	(4.2)
Percentage of population below federal poverty level	15.9	(5.3)
Unemployment rate	7.7	(2.7)

Note. SD = standard deviation. There were 8898 county-year observations, where county refers to both identified and pseudo counties.

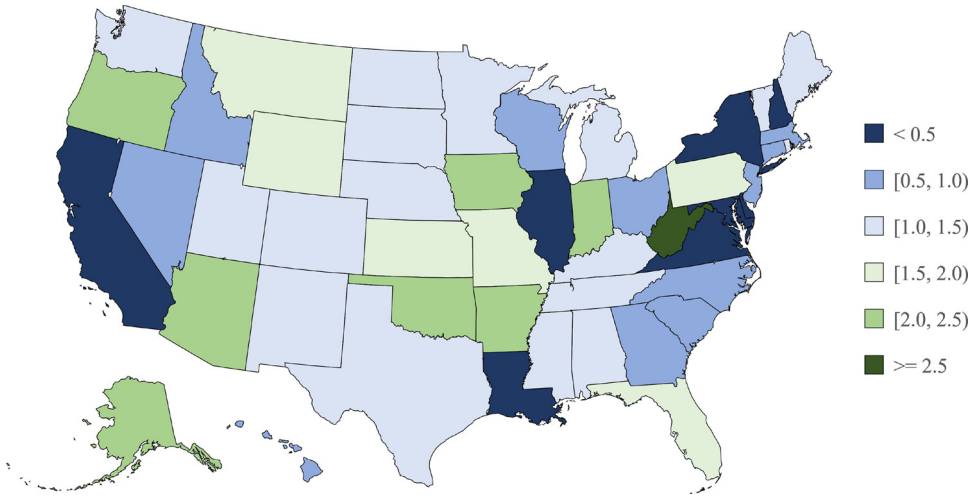

Fig. 1. State Rates of Child Removals Due to Parental Substance Abuse, 2010–2015. Removal rates are calculated per 1000 children (ages 0–19). The rates are based on the author's analysis of removal data from the Adoption and Foster Care Analysis and Reporting System and population data from the Census Bureau.

3.2. Regression analysis

Fig. 3 details the results from the state-level regression analysis. The values reflect the percent change in the state's removal rate (relative to the state's mean rate) associated with a one-standard deviation increase in the state's prescription rate. To correctly account for the within-county nature of the regression, the standard deviation for each state is estimated by the mean of the within-county standard deviations for that state. Blue shades correspond to decreases, green shades to increases, and white to no statistically significant association (defined as $P < 0.05$). The darker the shade, the greater the magnitude of the association.

A positive association exists in twenty-three states, a negative association in fifteen, and there is not a statistically significant association in twelve. The changes ranged from a decrease of 28% (95% CI = 15%, 40%; $p < 0.001$) in New Hampshire to an increase of 37% (95% CI = 25%, 48%; $p < 0.001$) in Illinois. Interesting contrasts emerged within geographic regions. There was a relatively strong positive association in several New England states, yet a strong negative association in New Hampshire, which has been hit especially hard by the opioid epidemic. Likewise, Illinois and Wisconsin exhibit strong positive associations but Indiana has strong negative association.

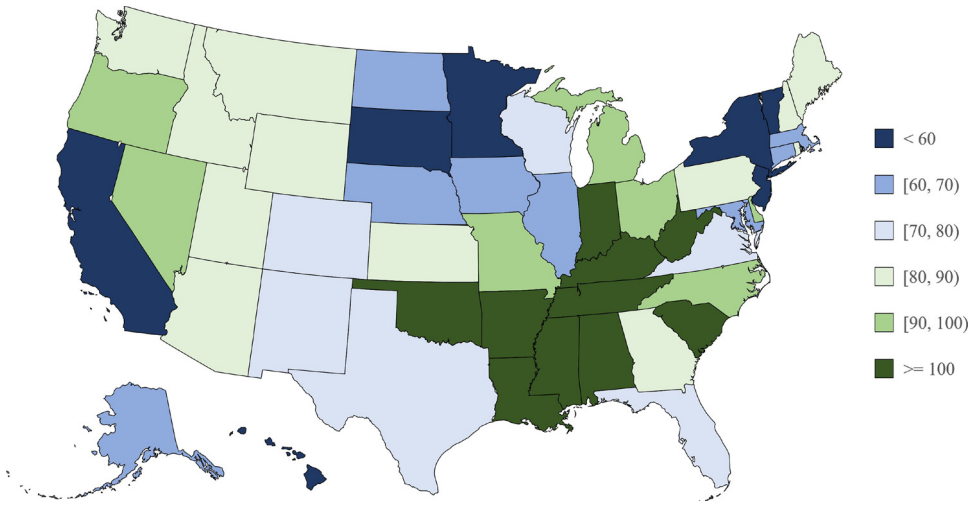

Fig. 2. State Opioid Prescription Rates, 2010–2015. The prescription rate is calculated per 100 residents (all ages). The rates are based on the author's analysis of prescription data from the Quintiles IMS Transactional Data Warehouse and obtained from the Centers for Disease Control.

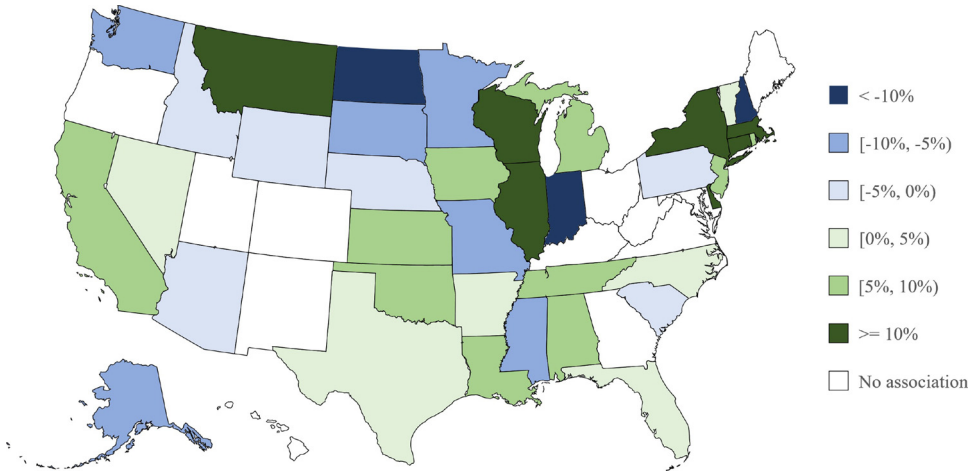

Fig. 3. Percent Change in the Rate of Child Removals Due to Parental Substance Abuse Associated with a One-Standard-Deviation Increase in the Opioid Prescription Rate, 2010–2015. The results are based on regression analysis. The dependent variable is the rate of child removals per 1000 children aged 0–19 in a county (where county includes both identified counties and aggregated de-identified counties). The prescription rate is calculated per 100 residents of all ages in a county. County and year fixed effects, county characteristics, and state time trends are included. The reported value is the ratio of: (a) the state standard deviation of the prescription rate multiplied by the sum of the prescription rate coefficient and the coefficient of the prescription rate interacted with the state indicator variable; and (b) the state average removal rate. To reflect within-county variation of the prescription rate, the standard deviation is proxied by the average of the within-county standard deviations in the state. There are 8898 observations and observations are clustered by state. Estimates with $p < .05$ were considered to have no association.

4. Discussion

Our exploratory analysis presents a nuanced view of the relationship between the rates of child removals and opioid prescriptions. We found an array of associations for the parental substance abuse removal rate, ranging from positive, negative, or none. The magnitude of these associations was considerable, with a standard deviation in the prescription rate associated with as much as a 30% change in the removal rate.

Our findings present an interesting contrast to the two known studies that investigate the relationship between foster care placements and opioid use. A national analysis (Ghertner et al., 2018) also employs county-level data covering roughly the same time period, but found a positive association between foster care entries and opioid utilization measures. However, the apparent discrepancy may be explained by several methodological differences. The study did not include county fixed effects, and thus did not control for all time-invariant county factors as our study did. It also employed relatively extreme measures of opioid use: hospitalizations and death rates. Finally, rather than aggregate counties with small foster care caseloads, it excluded roughly 30% of counties from the analysis. An analysis of Florida (Quast et al., 2018) also found a relatively robust positive relationship between child

removals and opioid use. The relationship was observed to be stronger in areas with higher proportions of white residents. The study employed a relatively similar analysis that used county fixed effects and the opioid prescription rate. However, the analysis was of only one state (Florida) and was based on prescription data from the state's PDMP.

Our findings do not provide an obvious narrative to describe the relationship between child removals and opioid use. Perhaps this is unsurprising giving the extensive disparities across states in the opioid epidemic and child welfare practices. Legal differences across states may play a role in the divergence of estimates. One potential factor is the state's legal criteria by which children may be removed from their homes due to parental substance abuse. These can include whether infant exposure to illegal substances is in the definition of child abuse or neglect; whether exposing children to the manufacture, possession, or distribution of illegal drugs is considered child endangerment; or whether using a controlled substance the impairs the caregiver's ability to adequately care of the child is considered child abuse or neglect. As of 2015 there were 26 states with at least one of these regulations (Children's Bureau, 2015). Of those states, sixteen had a positive association in our analysis, six had a negative association, and four had none. While circumstantial, our estimates provide potential evidence that child removal criteria may be pertinent to the association between removals and opioid use.

Another area of legal differences across states concerns PDMP and pill mill legislation. While these policies do not directly concern removals and opioid use, they may have indirect effects via their influence on the availability of prescription opioids. Of the eleven states with PDMP mandates as of 2017 (Mallatt, 2017), seven had a positive association in our analysis while the remaining four did not have a statistically significant association. Half of the eight states with pill mill legislation (Jones, Logan, Gladden, & Bohm, 2015) were shown in our analysis to have a positive association between the removal and opioid rates.

A very speculative interpretation of our results is that the divergent estimates across states could reflect the different stages in which they are in the opioid epidemic. For instance, the differences could be related to individuals substituting between prescription and illicit opioids. Prescription opioid dependence is associated with a risk of heroin dependence that is forty times greater than the risk of those without a history prescription opioid dependence (Jones et al., 2015). If a higher prescription rate reflects a higher rate of opioid dependence, one may expect a positive association between removal and prescription rates. However, if a higher prescription rate reflects substitution from (or avoidance of) illicit opioids, there may be a negative association between removals and prescriptions. This negative relationship could be driven by the especially debilitating and dangerous effects of illicit opioids. However, this explanation is especially speculative given doubts regarding a link between reduced opioid prescriptions and increased heroin use (Compton, Jones, & Baldwin, 2016).

Given our range of state-specific estimates, it is especially challenging to identify policy responses that are appropriate for all states. Policies intended to reduce opioid dependency would seemingly reduce child removals due to parental opioid misuse. For example, the set of policies adopted in Ohio that involve persuading physicians to avoid prescribing high doses of opioids, closing pill mills, and restricting opioid prescriptions reimbursed by its workers compensation agency (Penm et al., 2017) would appear to have the potential to reduce the number of child removals. However, while the negative associations that we observe for some states obviously do not imply benefits of increased opioid prescriptions, they do potentially create ambiguity regarding the most effective approach to reduce child removals due to opioid dependency. While sufficient resources need to be devoted to children removed from their homes, preventing parental opioid misuse should be a prime policy focus. The current rise of illicit opioid dependency suggests that a comprehensive approach that educates and equips parents to deal with all opioids, licit and illicit, may be appropriate.

4.1. Limitations

The analysis had several limitations. First, the masking of some county names reduced our sample size and made our estimates less precise if the aggregation obscured differences within pseudo counties. However, this concern was mitigated somewhat given the use of RUCCs aggregated somewhat similar counties and thus the relationship between removal rates and opioid use may be relatively consistent within the groupings. Further, the potential bias in our estimates from aggregation would likely be towards zero and thus suggest our results underestimate the relationship.

Second, the prescription rate we used to measure opioid use had several shortcomings. The rates did not measure dosage. Further, while the TDW data reflect roughly 88% of all retail pharmacies, the count is not a census of all opioid prescriptions. The prescription rates do not reflect illicit opioid use. While some studies have found prescription and illicit opioid use positively related (Schuckit, 2016), others observed a negative relationship between overdose deaths between prescription and illicit opioids (Dart et al., 2015). If there is substitution between prescription and illicit opioid use, our estimates may understate the relationship between child removals and opioid use.

Additionally, our prescription rate does not account for cross-county or cross-state movement of prescribed opioids. Such movement may reflect legal transportation of opioids across jurisdictions or the illegal diversion of opioids to illicit markets. In the fourth quarter of 2015, the number of diversion reports of immediate release and extended release opioids per 100,000 population were 0.709 and .116, respectively (Iwanicki et al., 2016). However, these reports include diversions to illicit markets within the same county.

Third, changes in how removals were recorded could partially account for increases in the rate of removals associated with parental drug abuse (Ghertner et al., 2018). Yet, while improved reporting by state agencies may have artificially increased the parental drug abuse removal rate, our use of state linear time trends may have mitigated this concern. Likewise, we were not able to control for localized changes in foster care resources or policies.

Fourth, the analysis does not completely control for state differences in how parental substance abuse is captured in the legal definitions of child abuse or neglect. For instance, three states (Arizona, Arkansas, and Washington) consider allowing a child to be in

the presence of chemicals used in the manufacture of controlled substances to be a form of abuse or neglect (Children's Bureau, 2016). Use of a controlled substance by a caregiver that impairs the caregiver's ability to adequately care for the child is considered abuse or neglect in eight states (California, Delaware, Kentucky, Minnesota, New York, Oklahoma, Rhode Island, and Texas) (Children's Bureau, 2016). While the state fixed effects control for any factors related to removals that do not vary in a state during the sample period, our state-specific estimates of the association between the removal and opioid prescription rates do not account for differences due to legal variation in the definitions of abuse or neglect. Thus, our estimates should be considered as the association inclusive of the effects of potential legal differences. For example, the positive associations estimated for some states could partly reflect the legal criteria for neglect in those states.

Fifth, given our use of aggregate data, our analysis was ecological and may not have accurately reflected individual-level behavior. Finally, while our use of county fixed effects provided insight into the within-county relationship between opioid prescriptions and child removals, our estimates only measured association and not causation. Unobserved factors may be related to both removal and prescription rates thus prevented us from estimating causal relationships.

5. Conclusions

Our results highlight another potentially devastating aspect of the opioid crisis. While the immediate deleterious effects on children from being placed in foster care are severe, the negative long-term outcomes can persist for decades. Unfortunately, our analysis does not point to obvious national policy solutions. However, our state-specific findings may provide insight to local officials attempting to mitigate this indirect effect of the opioid crisis through policy levers such as parental education and opioid dependency treatment.

The exploratory nature of our study may also provide context to future investigations of the relationship between foster care entries and opioid use. For instance, analyses of individual states may provide insight into our estimates. As previously noted, our findings do not explicitly account for differences in the criteria by which parental substance abuse is considered abuse or neglect. State-level changes in these policies may allow for an examination of how the criteria may influence the associations we observe. Analyses of individual or groups of states may also investigate other factors, such as PDPM laws and efforts to provide treatment to parents. Such studies may offer guidance to policy makers to combat this large and growing problem. Finally, investigations into the association between licit and illicit opioid use may provide insight into the relationship between child removals and all opioid use and offer a more complete picture of the opioid crisis.

Acknowledgements

The child removal data used in this publication were made available by the National Data Archive on Child Abuse and Neglect, Cornell University, Ithaca, NY, and have been used with permission. Data from the Adoption and Foster Care Analysis and Reporting System (AFCARS) were originally collected by the Children's Bureau. Funding for the project was provided by the Children's Bureau, Administration on Children, Youth and Families, Administration for Children and Families, U.S. Department of Health and Human Services. The collector of the original data, the funder, the Archive, Cornell University and their agents or employees bear no responsibility for the analyses or interpretations presented here.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.chiabu.2018.10.001.

References

Barth, R. P., Wildfire, J., & Green, R. L. (2006). Placement into foster care and the interplay of urbanicity, child behavior problems, and poverty. *American Journal of Orthopsychiatry, 76*(3), 358–366. https://doi.org/10.1037/0002-9432.76.3.358.

Bhatti-Sinclair, K., & Sutcliffe, C. (2012). What determines the out-of-home placement of children in the USA? *Children and Youth Services Review, 34*(9), 1749–1755. https://doi.org/10.1016/j.childyouth.2012.05.004.

Canfield, M., Radcliffe, P., Marlow, S., Boreham, M., & Gilchrist, G. (2017). Maternal substance use and child protection: A rapid evidence assessment of factors associated with loss of child care. *Child abuse & neglect, 70*, 11–27. https://doi.org/10.1016/j.chiabu.2017.05.005.

Carter, V. B. (2009). Prediction of placement into out-of-home care for American Indian/Alaskan Natives compared to non-Indians. *Children and Youth Services Review, 31*(8), 840–846. https://doi.org/10.1016/j.childyouth.2009.03.006.

Children's Bureau (2015). *Parental drug use as child abuse.* Retrieved fromhttps://www.childwelfare.gov/pubPDFs/drugexposed.pdf.

Children's Bureau (2016). *Definitions of child abuse and neglect.* Retrieved fromhttps://www.childwelfare.gov/pubPDFs/define.pdf.

Compton, W. M., Jones, C. M., & Baldwin, G. T. (2016). Relationship between nonmedical prescription-opioid use and heroin use. *New England Journal of Medicine, 374*(2), 154–163. https://doi.org/10.1056/NEJMra1508490.

Dart, R. C., Surratt, H. L., Cicero, T. J., Parrino, M. W., Severtson, S. G., Bucher-Bartelson, B., & Green, J. L. (2015). Trends in opioid analgesic abuse and mortality in the United States. *New England Journal of Medicine, 372*(3), 241–248. https://doi.org/10.1056/NEJMsa1406143.

Dowell, D., Arias, E., Kochanek, K., Anderson, R., Guy, G. P., Losby, J. L., & Baldwin, G. (2017). Contribution of opioid-involved poisoning to the change in life expectancy in the United States, 2000–2015. *JAMA, 318*(11), 1065–1067. https://doi.org/10.1001/jama.2017.9308.

Doyle, J. J., Jr. (2007). Child protection and child outcomes: Measuring the effects of foster care. *American Economic Review, 97*(5), 1583–1610. https://doi.org/10.1257/aer.97.5.1583.

Florence, C., Luo, F., Xu, L., & Zhou, C. (2016). The economic burden of prescription opioid overdose, abuse and dependence in the United States, 2013. *Medical care, 54*(10), 901. https://doi.org/10.1097/MLR.0000000000000625.

Ghertner, R., Waters, A., Radel, L., & Crouse, G. (2018). The role of substance use in child welfare caseloads. *Children and Youth Services Review, 90*, 83–93. https://doi.org/10.1016/j.childyouth.2018.05.015.

Gladden, R. M. (2016). Fentanyl law enforcement submissions and increases in synthetic opioid–involved overdose deaths—27 states, 2013–2014. *MMWR. Morbidity and Mortality Weekly Report, 65*. https://doi.org/10.15585/mmwr.mm6533a2.

Guy, J. G., Zhang, K., Bohm, M. K., Losby, J., Lewis, B., Young, R., … Dowell, D. (2017). Vital signs: Changes in opioid prescribing in the United States, 2006–2015. *MMWR. Morbidity and Mortality Weekly Report, 66*(26), 697–704. https://doi.org/10.15585/mmwr.mm6626a4.

Iwanicki, J. L., Severtson, S. G., McDaniel, H., Rosenblum, A., Fong, C., Cicero, T. J., … Dart, R. C. (2016). Abuse and diversion of immediate release opioid analgesics as compared to extended release formulations in the United States. *PLoS One, 11*(12), e0167499. https://doi.org/10.1371/journal.pone.0167499.

Jones, C. M., Logan, J., Gladden, R. M., & Bohm, M. K. (2015). Vital signs: Demographic and substance use trends among heroin users—United States, 2002–2013. *MMWR. Morbidity and Mortality Weekly Report, 64*(26), 719. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4584844/.

Knott, T., & Donovan, K. (2010). Disproportionate representation of African-American Children in foster care: Secondary analysis of the National Child Abuse and Neglect Data System, 2005. *Children and Youth Services Review, 32*(5), 679–684. https://doi.org/10.1016/j.childyouth.2010.01.003.

Ko, J. Y. (2016). Incidence of neonatal abstinence syndrome—28 states, 1999–2013. *MMWR. Morbidity and Mortality Weekly Report, 65*. https://doi.org/10.15585/mmwr.mm6531a2.

Lindquist, M. J., & Santavirta, T. (2014). Does placing children in foster care increase their adult criminality? *Labour Economics, 31*, 72–83. https://doi.org/10.1016/j.labeco.2014.10.001.

Mallatt, J. (2017). The effect of prescription drug monitoring programs on opioid prescriptions and heroin crime rates. Unpublished manuscript *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3050692.

Martins, S. S., Sarvet, A., Santaella-Tenorio, J., Saha, T., Grant, B. F., & Hasin, D. S. (2017). Changes in US lifetime heroin use and heroin use disorder: Prevalence from the 2001–2002 to 2012–2013 National Epidemiologic Survey on Alcohol and Related Conditions. *JAMA Psychiatry, 74*(5), 445–455. https://doi.org/10.1001/jamapsychiatry.2017.2725.

National Data Archive on Child Abuse and Neglect (2018). *Dataset number 207: AFCARS foster care file, 6-month periods (FY2010A - 2016B) [data file]*. Retrieved fromhttps://www.ndacan.cornell.edu/datasets/dataset-details.cfm?ID=207.

Penm, J., MacKinnon, N. J., Boone, J. M., Ciaccia, A., McNamee, C., & Winstanley, E. L. (2017). Strategies and policies to address the opioid epidemic: A case study of Ohio. *Journal of the American Pharmacists Association, 57*(2, Suppl), S148–S153.

Prindle, J. J., Hammond, I., & Putnam-Hornstein, E. (2018). Prenatal substance exposure diagnosed at birth and infant involvement with child protective services. *Child Abuse & Neglect, 76*, 75–83. https://doi.org/10.1016/j.chiabu.2017.10.002.

Quast, T., Storch, E. A., & Yampolskaya, S. (2018). Opioid prescription rates and child removals: Evidence from Florida. *Health Affairs, 37*(1), 134–139. https://doi.org/10.1377/hlthaff.2017.1023.

Rivaux, S. L., James, J., Wittenstrom, K., Baumann, D., Sheets, J., Henry, J., & Jeffries, V. (2008). The intersection of race, poverty, and risk: Understanding the decision to provide services to clients and to remove children. *Child Welfare, 87*(2).

Roscoe, J. N., Lery, B., & Chambers, J. E. (2018). Understanding child protection decisions involving parents with mental illness and substance abuse. *Child Abuse & Neglect, 81*. https://doi.org/10.1016/j.chiabu.2018.05.005.

Ruhm, C. J. (2017). Drug involvement in fatal overdoses. *SSM-Population Health, 3*, 219–226. https://doi.org/10.1016/j.ssmph.2017.01.009.

Rudd, R. A., Seth, P., David, F., & Scholl, L. (2016). Increases in drug and opioid-involved overdose deaths—United States, 2010–2015. *MMWR. Morbidity and Mortality Weekly Report, 65*. https://doi.org/10.15585/mmwr.mm655051e1.

Schuchat, A., Houry, D., & Guy, G. P. (2017). New data on opioid use and prescribing in the United States. *JAMA, 318*(5), 425–426. https://doi.org/10.1001/jama.2017.8913.

Schuckit, M. A. (2016). Treatment of opioid-use disorders. *New England Journal of Medicine, 375*(4), 357–368. https://doi.org/10.1056/NEJMra1604339.

Seay, K. (2015). How many families in child welfare services are affected by parental substance use disorders? A common question that remains unanswered. *Child Welfare, 94*(4), 19. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4894838/.

Swann, C. A., & Sylvester, M. S. (2006). The foster care crisis: What caused caseloads to grow. *Demography, 43*(2), 309–335. https://doi.org/10.1353/dem.2006.0019.

Tedesco, D., Asch, S. M., Curtin, C., Hah, J., McDonald, K. M., Fantini, M. P., & Hernandez-Boussard, T. (2017). Opioid abuse and poisoning: Trends in inpatient and emergency department discharges. *Health Affairs, 36*(10), 1748–1753. https://doi.org/10.1377/hlthaff.2017.0260.

Turney, K., & Wildeman, C. (2016). Mental and physical health of children in foster care. *Pediatrics*e20161118. https://doi.org/10.1542/peds.2016-1118.

U.S. Bureau of Labor Statistics (BLS) (2018). *Local area unemployment statistics [data file]*. Retrieved fromhttps://www.bls.gov/lau/#tables.

U.S. Census Bureau (2018a). *County population by characteristics tables: 2010–2016 [data file]*. Retrieved fromhttps://census.gov/data/tables/2016/demo/popest/counties-detail.html.

U.S. Census Bureau (2018b). *Small area income and poverty estimates (SAIPE) program [data file]*. Retrieved fromhttps://www.census.gov/programs-surveys/saipe.html.

U.S. Centers for Disease Control and Prevention (2017). *Opioid overdose U.S. prescribing maps [data file]*. Retrieved fromhttps://www.cdc.gov/drugoverdose/maps/rxrate-maps.html.

U.S. Department of Agriculture (2016). *Rural-urban continuum codes [data file]*. Retrieved fromhttps://www.ers.usda.gov/data-products/rural-urban-continuum-codes/.

U.S. Drug Enforcement Administration (2015). *DEA issues nationwide alert on fentanyl as threat to health and public safety*. Retrieved fromhttps://www.dea.gov/divisions/hq/2015/hq031815.shtml.

Zlotnick, C., Tam, T. W., & Soman, L. A. (2012). Life course outcomes on mental and physical health: The impact of foster care on adulthood. *American Journal of Public Health, 102*(3), 534–540. https://doi.org/10.2105/AJPH.2011.300285.