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Deviations in criminal filings of child abuse and neglect during COVID-19 from forecasted models: An analysis of the state of Oklahoma, USA

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ABSTRACT

Background: The COVID-19 pandemic has contributed to risk factors for child abuse and neglect and disrupted conventional abuse surveillance.

Objective: The goal of this study was to assess how counts of criminal charges have been affected by COVID-19 social distancing measures and related policy changes.

Participants and Setting: This study used publicly available court filings pertaining to child abuse and neglect from Jan 1, 2010 to June 30, 2020.

Methods: Autoregressive integrated moving average (ARIMA) algorithms were constructed with case data from January 2010 to January 2020 to forecast trends in criminal charges for February to June 2020. These forecasted values were then compared to actual charges filed for this time period.

Results: Criminal cases filed between February and June 2020, had an overall 25.7 percent lower average than forecasted. All individual months had progressively lower cases than forecasted with the exception of March. June had the largest deviation from forecasted with 60.1 percent fewer cases than predicted.

Conclusions: Although risk factors for child abuse have increased due to COVID-19, these findings demonstrate a declining trend in child abuse charges. Rather than a decreasing incidence of child abuse and neglect, it is more likely that less cases are being reported. The results warrant immediate action and further investigation in order to address the dangers this pandemic poses for children in abusive situations.

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1. Introduction

In the United States, Child Protective Services (CPS) departments investigated more than 3.5 million reports and identified over 678,000 victims of child abuse in 2018 alone (Children’s Bureau, 2018). The majority of cases were in the form of neglect (60.8 %), followed by physical abuse (10.7 %), and lastly, sexual abuse (7.0 %), with 15.5 % enduring 2 or more forms of abuse (Children’s Bureau, 2018). Additionally, exposure to intimate partner violence (IPV) is increasingly being recognized as a form of child abuse and similar adverse developmental and long-term health outcomes are being reported (McTavish et al., 2016).

Multiple factors place children at risk for child abuse and neglect and are due to a combination of interactions between the child, caregiver, and environment (Dubowitz & Lane, 2020; Mulder et al., 2018). Risk factors are often categorized into 4 different biopsychosocial levels (individual, familial, community, and societal) which all contribute to the development of child maltreatment (Dubowitz & Lane, 2020). Some of the strongest risk factors have been observed at the familial level which include low socioeconomic status, a history of psychiatric disorders, criminal behavior, and substance abuse (Mulder et al., 2018; Stith et al., 2009). Contributions from the other levels have also been observed to increase risk of child maltreatment and include stressful events in development (crying, enuresis, etc.) as well as community stressors such as living in dangerous neighborhoods and lack of access to recreational facilities (Dubowitz & Lane, 2020; Schilling & Christian, 2014).

The prevalence of these child abuse-related risk factors are high within the state of Oklahoma— a largely rural state with 2 major cities. Compared to the other 49 states, America’s Health Rankings (www.americahealthrankings.org) ranks Oklahoma 46th in overall health outcomes and in food insecurity — the latter of which is more prevalent within Native American lands within the state (Blue Bird Jernigan et al., 2017). In addition, Oklahoma ranks 43rd in poverty, 44th in median income, 49th in per-capita incarceration — and last among incarcerated women (Ann Carson, 2020; Benson, 2020). Further, Oklahoma also saw the rates of opioid misuse and methamphetamine use increase significantly from 2002 to 2017 (Bonk et al., 2020). The combination of these factors reflect the high rates of reported Adverse Childhood Events (ACE) among Oklahoma children — among whom 55 % are shown to have experienced at least 1 ACE, and 28.5 % experiencing 2 or more — higher than the national average (Child and Adolescent Health Measurement Initiative (CAHMI), 2018).

The severe acute respiratory syndrome coronavirus 2 (COVID-19) spread quickly through the US, with the first case occurring in Oklahoma on March 6th, 2020, with a Safer-at-Home (SAH) order issued on March 24th (Executive Order: Safer at Home, 2020). Following SAH orders issued in nearly all states, many working families lost jobs creating additional financial stress. Several studies have shown that natural disasters, such as Hurricane Katrina, and the COVID-19 pandemic are associated with an increased risk of parental substance misuse and higher stress levels, adding to the risk for abuse (Bradbury-Jones & Isham, 2020; Flory et al., 2009; Liu & Doan, 2020). During the COVID-19 crisis, there have been reports of abusers using misinformation and scare tactics as means of controlling victims and maintaining isolation (Bradbury-Jones & Isham, 2020; Usher et al., 2020). This financial burden is compounded by the increased mental distress surrounding the pandemic and increased parental duties, while school systems shut down. Furthermore, without social support, parents are at risk for parental burnout, a stress condition related to a mismatch in parental demands and resources, which has shown significant association with child abuse and neglect (Griffith, 2020).

In addition to increased household stress, professionals — those who interact with children as part of their job — are responsible for up to 67.3 % reports of alleged child abuse with the greatest contribution coming from educators (20.5 %) (Children’s Bureau, 2018). Without this added surveillance for abuse and neglect during the pandemic, as well as increased time spent isolated, conventional forms of protection and abuse recognition are impaired. Additionally, without access to school, public programs and other resources to mitigate abuse and domestic violence, reporting may be limited. Thus, our primary objective was to analyze the impact of COVID-19 and Stay-at-Home orders on child abuse, neglect and exposure to domestic violence filings using the Oklahoma State Court Network.

2. Methods

2.1. Data

Oklahoma State Court Network (OSCN; OSCN.net) is a publicly accessible database where filed court documents pertaining to all civil and criminal court filings within the state of Oklahoma are stored. We accessed this database through its application programming interface (API) and collected data for the following charges issued from 01/01/2010 through 06/30/2020: child abuse categorized as physical abuse including murder, sexual abuse including indecent or lewd acts, counts of enabling or permitting abuse (by type), neglect, solicitation of a minor, domestic violence in the presence of a minor, failure to report abuse or neglect of a minor, and failure to protect a minor.

2.2. Statistical analysis

To analyze the impact of the COVID-19 pandemic and statewide SAH impact on child abuse and neglect, autoregressive integrated moving average (ARIMA) algorithms (Hyndman & Khandakar, 2008) were constructed to forecast the predicted instances of criminal charges related to children as reported in the state of Oklahoma from February through June of 2020. ARIMA modeling is a tool used in economic forecasting using time-series data — accounting for annual and seasonal trends — to forecast future values. In this instance, we used it to compare actual data from the specified months to the forecasted data had the COVID-19 pandemic not occurred. ARIMA models were constructed in R (version 4.0.2) using the auto.arima function within the Forecast package to determine parameters (p, d, and q) of each model which are provided in Table 1.
We reported the total monthly frequency of criminal charges involving children and individual categories of physical abuse (including enabling or permitting), sexual abuse (including enabling or permitting), neglect, and domestic violence in the presence of a child. We estimated the forecasted values and their 95% confidence intervals (CI), the difference between actual and forecasted values and 95% CI, and the percent change among the total and each category of criminal charges. We then evaluated whether actual child-related crime charges were within the predictive values during the COVID-19 pandemic and associated stay-at-home order in the state. This study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines (Cuschieri, 2019) and received IRB determination that it did not meet human subjects research criteria.

3. Results

The criminal charges pertaining to neglect or abuse of a child, including acts of violence committed in the presence of a minor, during the months of February through June 2020 averaged 78.4 (SD = 19.4) monthly. This is lower than the same timeframe in 2019 in which the total charges averaged 98.0 (SD = 11.5). The average percent change over this time shows 25.7% fewer criminal filings than the forecasted values—a progressive trend each month further into the COVID-19 pandemic with May (-26.7%) and June (-60.1%). The exception was March and the actual number of cases (100) approximated the forecasted (99.7). For May, the actual number of cases was 80 while the forecasted was 109.2 (95% CI 80.6–137.7) and for June the actual number of cases was 42 while the forecasted was 105.2 (95% CI 76.1–134.3). Both May and June demonstrated statistically significant deviations between filings of criminal charges and forecasted values with the deviations in June being the most pronounced. The decline in overall crimes is largely due to the reduction in filings of sexual abuse and domestic violence in the presence of a minor which were 52.9% and 71.7% lower than forecasted, respectively. Sexual abuse and domestic violence in the presence of a minor were also the only individual categories with statistically significant differences, both for the month of June, with actual sexual abuse cases of 10 compared to 21 (95% CI 11.2–31.2) and actual domestic violence in the presence of a minor cases of 12 compared to 42 (95% CI 24.9–59.9). The total and categorized monthly counts and forecasted values are presented in Table 1 with longitudinal trends presented in Fig. 1a and b.

4. Discussion

Our findings indicate that fewer reports of abuse and neglect toward children have been made since the beginning of the COVID-19 pandemic and are trending downward. It is unlikely these findings represent falling cases of child abuse and neglect based on the

| Type | Total | Neglect |
|------|-------|---------|
| Month | Forecasted (95% CI) Actual (95% CI) Difference Percent Change | Forecasted (95% CI) Actual (95% CI) Difference Percent Change |
| February | 108.1 (81.3–134.9) 87 | -21.1 (-47.9–5.7) | -19.5 | 18.2 (6.6–29.7) 15 | -3.2 (-14.7–8.4) | -17.4 |
| March | 99.7 (72.4–127.1) 100 | 0.3 (-27.1–27.6) | 0.3 | 16.3 (4.3–28.4) 11 | -5.3 (17.4–6.7) | -32.7 |
| April | 106.6 (78.7–134.6) 83 | -23.6 (-51.6–4.3) | -22.2 | 18.9 (6.3–31.4) 11 | -7.9 (20.4–4.7) | -41.7 |
| May | 109.2 (80.6–137.7) 80 | -29.2 (-57.7–0.6) | -26.7 | 17.4 (4.4–30.4) 12 | -5.4 (-18.4–7.6) | -31 |
| June | 105.2 (76.1–134.3) 42 | -63.2 (-92.3–34.1) | -60.1 | 15 (1.5–28.4) 10 | -5 (-18.4–8.5) | -33.1 |

| Physical Abuse | ARIMA Parameters: (0,1,1) (1,0,1) |
| Month | Forecasted (95% CI) Actual (95% CI) Difference Percent Change |
| Febrary | 11.5 (5.4–17.6) 14 | 2.5 (3.6–8.6) | 22 |
| March | 15.1 (9.2–21.3) 17 | 1.9 (4.3–8) | 12.5 |
| April | 11.7 (5.4–18) 11 | -0.7 | 5.9 |
| May | 14.7 (8.3–21) 12 | -2.7 (-9.3–7) | -18.2 |
| June | 13.6 (5.5–19.5) 10 | -11.2 (-21.2–1.2) | -52.9 |

| Sexual Abuse | ARIMA Parameters: (1,1,1) (0,0,2) |
| Month | Forecasted (95% CI) Actual (95% CI) Difference Percent Change |
| February | 19.9 (10.4–29.4) 15 | -4.9 (14.4–6.4) | -24.6 |
| March | 19 (9.3–28.8) 20 | 1 (8.8–10.7) | 5.1 |
| April | 19.4 (9.6–29.3) 16 | -3.4 | -17.7 |
| May | 20.8 (10.9–30.8) 24 | 3.2 (6.8–13.1) | 15.2 |
| June | 21.2 (11.2–31.2) 20 | -11.2 (-21.2–1.2) | -52.9 |

| Domestic Violence in Presence of Minor |
| Month | Forecasted (95% CI) Actual (95% CI) Difference Percent Change |
| February | 42.6 (25.9–59.3) 37 | -5.6 (22.3–11.1) | -13.2 |
| March | 38.3 (21.3–55.3) 43 | 4.7 (12.3–21.7) | 12.2 |
| April | 40.9 (23.7–58.2) 44 | 3.1 (14.2–20.3) | 7.5 |
| May | 43.2 (25.8–60.6) 28 | -15.2 (-32.6–2.2) | -35.2 |
| June | 42.4 (24.9–59.9) 12 | -30.4 (-47.9–12.9) | -71.7 |

Table 1 Actual and Forecasted rates of crimes involving children in the state of Oklahoma from February-June 2020 during the COVID-19 pandemic.
projected models. Instead it raises concern that the effects of this pandemic may have disrupted conventional surveillance systems leaving more victims of abuse without the means for intervention.

The academic community has been quick to discuss the impact of COVID-19 regarding the increased risk for maltreatment of all kinds including child, domestic, and elder (Bradbury-Jones & Isham, 2020; Cluver et al., 2020; Han & Mosqueda, 2020). Some have recognized the lack of research and have called upon the need for studies concerning the influence of COVID-19 on household abuse (Bryant et al., 2020; Holmes et al., 2020). Furthermore, several articles discuss the potential influence of COVID-19 on abuse as well as suggesting strategies to minimize household violence but offer no primary research (Bradbury-Jones & Isham, 2020; Griffith, 2020; Liu & Doan, 2020). To our knowledge, this study is the first to analyze reported rates of child abuse and neglect as well as compare rates with those of years past and estimate the forecasted rates of these crimes. A study conducted in Dallas, TX analyzing rates of domestic violence reports received by the Dallas Police Department before and after the Dallas Stay-at-Home issue used data reported between Jan 1, 2020, and Apr 27, 2020 and was interested in quantifying the initial impact of the Dallas SAH order (Piquero et al., 2020). In comparison, our study took a longer term approach with a broader geographic distribution which aimed to analyze not only the initial impact of COVID-19, but also the pandemic’s effects throughout the subsequent months in both urban and rural environments.

Child abuse is not limited to or perpetrated by any one gender, age, or race nor is it limited to any geographic distribution or socioeconomic class. Child abuse includes neglect, physical abuse, sexual abuse, and exposure to intimate partner violence (IPV). Each of these are distinct entities with differing psychosocial impact. Furthermore, physical abuse, neglect, sexual abuse, and exposure to

Fig. 1. Forecasted and monthly criminal charges involving minors within the state of Oklahoma from January 2016 to June 2020.
Although the first three years of life are at higher risk, without intervention ACEs can have negative impacts throughout life despite the educational struggles, and relationship difficulties (InBrief: The Impact of Early Adversity on Children's Development, 2020). However, uncertainty due to the pandemic, job loss, evictions, and other contributing factors has heightened age that the event occurred (Hughes et al., 2017). 

Infant mortality is of the utmost concern and brain development is occurring faster than any other time of life (Bradley et al., 1989). These first years are also when children are most safety needs and social-emotional safety needs are at odds during this time of social isolation. Children in the first three years of life are of the most vulnerable population. Infant mortality is of the utmost concern and

4.2. Adverse child experiences and mental health therapy for children

The impact of COVID-19 has no doubt added to adverse childhood experiences (ACEs) that will have lifelong effects as medical safety needs and social-emotional safety needs are at odds during this time of social isolation. Children in the first three years of life are particularly vulnerable from both an environmental and developmental view as they rely on caregivers for all of their needs while brain development is occurring faster than any other time of life (Bradley et al., 1989). These first years are also when children are most at risk for abuse and neglect— nearly three times higher than older children (Children’s Bureau, 2018). Infants who suffer from abuse or neglect will subsequently strengthen the “survival” parts of the brain leading to physical problems, mental health psychopathology, educational struggles, and relationship difficulties (InBrief: The Impact of Early Adversity on Children’s Development, 2020). Although the first three years of life are at higher risk, without intervention ACEs can have negative impacts throughout life despite the age that the event occurred (Hughes et al., 2017). Early intervention is a key facet in the mitigation of long-term trauma from ACEs due to a dose-response relationship between trauma and outcomes. However, uncertainty due to the pandemic, job loss, evictions, and other contributing factors has heightened risk for additional ACEs and delayed timely intervention (Brown et al., 2020). Harm reduction models aimed at primary and secondary prevention are imperative in reducing maltreatment to our most vulnerable population. Infant mortality is of the utmost concern and
with the added stress on parents and barriers to basic needs and care, our communities must work collaboratively to ensure that the basic and mental health needs of parents of newborns are met. Early experiences matter and missed opportunities to support child and caregiver mental health could have lasting impacts on children, families, and communities. Notably, children with ACEs and complex trauma may struggle forming trusting relationships, regulating their emotions and functioning in daily life. As children return to school after experiencing significant trauma they can have deficits in receptive and expressive language, and as a result, are assigned to special education more frequently and suspended or expelled at higher rates (Cole et al., 2005). Children and adolescents who experience trauma and exhibit behavioral issues can fall into the school to prison pipeline which not only impacts students but the community as a whole (Stensrud et al., 2019). Untreated trauma in children and adolescents affects the child, family, and community with lasting effects at every level.

4.3. State policy needs and recommendations

To offset the short and long term effects of abuse, neglect, and trauma that children are experiencing during the COVID-19 pandemic, policymakers need to maintain budgets for agencies that provide health and social service support to families such as the State Department of Education, Department of Human Services, and Department of Mental Health, among others. While the economic downturn caused by the pandemic could impact state budgets for an indefinite amount of time, as children return in-person to classrooms, schools, teachers, and communities will need additional resources to provide supports to help students address the trauma, stress, and anxiety experienced during stay-at-home orders (Humphreys et al., 2020). Additionally, collaborative community responses will be needed to support families during this time (Sandifer & Walker, 2018). In order to reduce family stress, community efforts, including community gardens, increased distributions by food pantries, additional job fairs, and other social services, should be utilized to assist overburdened families (Kaukinen, 2020).

As each child is an individual with unique needs, communities also have individual needs that should be addressed in order to make progress in tipping the scales towards a more resilient community. Washington State exemplifies meeting a state’s needs by addressing the individual communities in the state. When Washington’s Adverse Childhood Experiences Public-Private Initiative gave communities more control over individual community needs, change happened (Verbiskiy-Savitz et al., 2016). This change included increased graduation rates, decreased smoking and alcohol use among pregnant women, and fewer low birth weight infants. At a time when a pandemic is layered onto already overburdened systems, communities can find solutions by coming together in innovative ways to prevent and protect all individuals from abuse and neglect.

4.4. Strengths, limitations, & future research

The study addresses an issue of growing public concern with significant lasting consequences, but has strengths and weaknesses. ARIMA forecast modeling is a well-established and widely accepted method of time series forecasting and our results demonstrate a potential trajectory for child abuse and neglect charges (De Gooijer & Hyndman, 2006). Furthermore, this report comes at a time when research within this topic is desperately needed and provides support for additional research. However, the SAH orders may not have immediately affected charges of abuse and neglect, and it is possible there may be some lag time before its effects will be fully realized, which we are unable to capture at this point—a limitation of our study. Additionally, as the focus on this study was limited to cases within Oklahoma, a larger dataset, such as the National Child Abuse and Neglect Data System (NCANDS) which collects CPS report data from all 50 states, would provide additional power for the statistical analysis. Further, the SAH order in Oklahoma was not as stringent as other states, and additional measures varied by city and town, which may have allowed some social surveillance systems to remain effective. Researchers should continue to evaluate these trends over the remainder of this 2020 and 2021 to fully elucidate the influence of COVID-19 on abuse and neglect reporting. Future research should expand these models to other states and reevaluate these trends once school has resumed onsite education.

5. Conclusions

The results of this study demonstrate a downward trend in cases of child abuse and neglect, confirming what many have suspected. Though cases of abuse are decreasing, evidence has shown that the risk factors for abuse have increased significantly. Rather than declining in incidence, it is more likely interruptions within conventional surveillance systems due to stay-at-home orders, social distancing, and mandated closures are causing cases of abuse and neglect to go unreported. Effects of the COVID-19 pandemic have increased risk factors and inhibited social surveillance creating a dangerous environment for the development of abuse, neglect, and intimate partner violence. Given the overwhelming consequences maltreatment can have on a child both in the immediate and long term, as well as society as a whole, it is imperative to further examine how the COVID-19 pandemic and state-at-home orders have impacted children in potentially abusive environments. As abusive situations develop and more cases are missed, the eventual results may be much more severe than if intervention had occurred earlier, even fatal. Although the systems of surveillance and intervention have been disrupted and fewer cases are being reported, there are still many forms of prevention and intervention that may yet be implemented. This pressing issue requires immediate action in order to lessen the damage already done and assist abused and neglected children in receiving the intervention and treatment they require.
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Declaration of Competing Interest

We declare no conflicts of interest.

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