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LEGALIZING CANNABIS: IMPLICATIONS FOR CHILD MALTREATMENT

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ABSTRACT

Cannabis is the most used illicit drug in the United States. Though cannabis possession and consumption are prohibited federally, states are increasingly implementing laws that legalize this substance, initially for medical use and, more recently, for recreational use. We study the impact of recreational cannabis laws (RCLs) that allow all adults 21 years and older to legally consume and possess this substance on reports of child maltreatment and post-investigation service use. To do so, we combine difference-in-differences methods with administrative data on child maltreatment reports 2010-2022. Overall, we find no evidence that child maltreatment reports or service use are influenced by RCL adoption, though we find that physical abuse reports decline. Our findings indicate that recent efforts to legalize cannabis for recreational consumption have not led to an increase in child maltreatment reports.

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1. Introduction

Public attitudes toward cannabis use in the United States have grown increasingly favorable over time. In 1969, 12% of Americans agreed with the statement that cannabis should be legal, and this share increased to 70% in 2023 (Saad 2023). This shift in public perception has occurred as more states have legalized cannabis for medical use only or both medical and recreational purposes. California was the first state in the nation to legalize cannabis for medical purposes in 1996 and Colorado and Washington were the first to legalize cannabis for all adults 21 years and older in 2012 (NCSL 2025). As of 2025, 39 states have legalized cannabis for medical use and 25 have legalized this product for recreational consumption (NCSL 2025). Cannabis is most commonly used illicit substance in the U.S., with 21.8% of those 12 years and older reporting past-year use and 47.1% reporting lifetime use in 2023 (NSDUH 2025). Increases in cannabis use have risen across most demographic groups, including parents, and public acceptance of parental cannabis use has increased as well (Epstein et al., 2020). These upticks in public support, state legalization, and use of cannabis have occurred despite a federal prohibition on cannabis possession, consumption, distribution, and sales that has existed since the Marihuana Tax Act of 1937.

Understanding the welfare effects of RCLs requires an assessment of the general equilibrium effects of these policies, and indeed a robust economic literature has examined the impact of RCLs on a wide range of outcomes (Anderson and Rees 2023). Child maltreatment — a negative externality from parents (and other adults) to children — is arguably a critical outcome to study in the context of welfare effects, given the negative and long-lasting implications for children. Indeed, children who experience maltreatment are at elevated risk for numerous health and socioeconomic problems both in the short- and long-term, including

substance use, mental health conditions, poor employment outcomes, high-risk sexual behaviors, and chronic diseases (CDC 2013; Kisely et al. 2018; Mills et al. 2013). Moreover, negative intergenerational spillovers can occur whereby adults who experience maltreatment as children are, then later in life, more likely to mistreat their own children (Assink et al., 2018).

Child maltreatment is common in the U.S. In 2022, 4.3 million children were referred to Child Protective Services (CPS)[1] for maltreatment (Children's Bureau 2022)[2] and 37.4% of children experience a CPS investigation for suspected maltreatment by the time they are 18 years of age (Kim et al. 2017). The estimated annual burden of child maltreatment to the U.S. is $587 billion in 2025 dollars (Peterson, Florence, and Klevens 2018).[3] Given the high cost and prevalence, reducing child maltreatment is a national health objective (CDC 2020).

Despite various channels linking legalization of cannabis with child maltreatment (outlined in Section 2), there is very limited evidence on this relationship. While extensive research has examined the effects of cannabis laws on cannabis consumption, use of other substances, healthcare utilization, traffic and road safety, crime, and labor market outcomes (Anderson and Rees 2023; French et al. 2022), far less attention has been paid to parental cannabis use and potential consequences for child welfare. The present study aims to address this critical gap in the literature by providing evidence on whether child maltreatment reporting and post-investigation service use outcomes change following the legalization of recreational cannabis. By exploiting the staggered adoption of RCLs across states, we examine changes in

[1] CPS is the state agency tasked with responding to reports of child maltreatment. State CPS agencies are governed by state-specific laws and the 1974 federal Child Abuse Prevention and Treatment Act (CAPTA). Though there are differences across states, the duties and responsibilities of CPS include, among others, investigating reports of child maltreatment, assessing risks to children, providing services to children and families and, if needed, removing children from unsafe home environments.

[2] See Exhibit 2D number of referrals in that report.

[3] We inflate the number reported in the original study ($428 billion in 2015 dollars, see Table 2 in that paper) to 2025 dollars using the Consumer Price Index – Urban Consumers.

child maltreatment report rates by disposition level, reporting source, maltreatment type, and rates of services use with difference-in-differences (DiD) and event study approaches. Using 2010-2022 data from the National Child Abuse and Neglect Data System (NCANDS) for all 50 states and DC, we find no significant changes in child maltreatment reporting overall or service utilization following RCL adoption. Our (null) results are robust to alternative specifications and samples, and findings are relatively homogenous across different demographics groups as defined by child age, sex, and ethnicity. One exception to this pattern of null findings emerges – maltreatment rates decrease for substantiated physical abuse reports following adoption of a state RCL. This finding suggests that, for some children who are at risk of a particularly severe form of maltreatment, RCL adoption may offer some protection.

In our main analysis, we focus on reports of child maltreatment. RCLs could influence both the incidence of child maltreatment and the probability of reporting suspected maltreatment to CPS systems, which can complicate interpretation of our findings of maltreatment reports. Given these complexities, we also examine a measure of child maltreatment incidence that is not dependent on a CPS report — child injury-related deaths which are associated with maltreatment. Here, we find evidence that RCLs may reduce incidents of child maltreatment, regardless of whether there is a report to CPS, and this finding suggests that changes in the propensity of a maltreatment report cannot fully explain our finding, and instead suggest that RCL adoption reduces the risk that a child experiences physical maltreatment.

An analysis of mechanisms suggests that improvements in parental health, reductions in incarceration, and subsequential higher levels of financial resources within families counteract other channels through which legalized cannabis may be predicted to worsen maltreatment outcomes (e.g., problematic cannabis use by parents). Overall, however, our findings indicate

that recent state efforts to legalize cannabis for recreational purposes have not worsened child maltreatment outcomes.

Our work contributes to three strands of economics literature. First, our research is connected to the literature on the role of public policy in shaping child development. A large economics literature studies how insurance policies — for example, expansions of Medicaid coverage (McGinty et al. 2022; Meinhofer et al. 2025), public assistance programs — such as the Earned Income Tax Credit and the Supplemental Nutrition Assistance Program (Berger et al. 2017), paid leave (Bullinger et al. 2025; Deza, Maclean, and Ortega 2025), regulation of addictive substances — for example, "sin good" taxation (Markowitz and Grossman 2000), and opioid-related policies (Bullinger and Ward 2021; Evans, Harris, and Kessler 2022; Powell 2023) influence child outcomes. We study the impact of recent and ongoing efforts by states to legalize cannabis use for adults 21 years and older on children. Second, we contribute new information on the impacts of expanded cannabis legalization. Specifically, we provide up-to-date evidence of the effects of these state actions on a critical and policy relevant outcome for children — maltreatment reported to CPS systems. Third, we report new evidence on the link between cannabis use and child maltreatment. Much of the literature to date — described earlier in this section — has been correlational in nature and the extent to which these findings are causal is unclear. We build on this literature by exploiting quasi-experimental variation in cannabis use generated by state RCLs.

The paper is organized as follows. Section 2 provides a discussion of the possible links between state RCL adoption and child maltreatment reports, focusing on both changes in parental cannabis use and the complexities of CPS systems. Data and methods are outlined in

Section 3, while results and robustness checking are reported in Sections 4 and 5, respectively. Finally, Section 6 offers a discussion and conclusion.

2. Background on cannabis legalization and child maltreatment

Research demonstrates that parental substance use generally increases the likelihood of child welfare system involvement (Buckles, Evans, and Lieber 2023; Loch et al. 2021). Increases in cannabis use among parents of minor children can lead to concerns that such behavior may increase child maltreatment, leading to additional CPS reports. Indeed, in some states, parental substance use is considered a form of child abuse and neglect, and can lead to incarceration (Information Gateway 2020; Maclean et al. 2022).

However, a more nuanced consideration of the possible channels linking cannabis legalization to child maltreatment reports suggests that the true impact is uncertain. On one hand, cannabis is an intoxicating substance that has been shown to reduce motivation and cognition (Anderson and Rees 2023). Cannabis use may impair the judgment of parents who consume this product, leading to child endangerment or abuse, which could increase maltreatment reports. On the other hand, parental cannabis use for medical purposes — which can occur through legalization of both medical and recreational cannabis (Epstein et al. 2020; Goodwin et al. 2021; Rhee and Rosenheck 2023) — may improve parent health — for example, reductions in chronic pain or improvements in mental health (Borbely et al. 2022; Sabia, Swigert, and Young 2017), which could allow for more effective parenting, thereby reducing the prevalence of child maltreatment and, in turn, maltreatment reports. However, rigorous evidence on whether cannabis use affects parents' ability to supervise and care for their children remains limited (Berthelot, Morneau, and Lacharité 2021; Stott and Gustavsson 2016).

The legalization of cannabis effectively removes state-level criminal penalties associated with cannabis use, which can reduce incarceration rates. Incarceration of a parent(s) is a risk factor for child maltreatment, as those families have fewer adults available to supervise children. In addition, the household can experience a decline in earnings while the incarcerated parent is not working and, upon release, the parent may find that their labor market opportunities have declined due to the incarceration (Mueller-Smith 2015), which can further exacerbate child maltreatment (Lindo, Schaller, and Hansen 2013; Paxson and Waldfogel 2002). Moreover, many states terminate access to social assistance programs (e.g., Medicaid coverage and cash or in-kind assistance) for people who are incarcerated and re-enrollment in these programs post-release is complex — and for some programs not possible — leading to some individuals not re-gaining access to these benefits upon release (Packham and Slusky 2023; SSA 2025; Tuttle 2019), which could further strain households resources, leading to increased child maltreatment.

Even without changing parental use of cannabis or parenting practices, cannabis legalization may alter the likelihood that parents are reported to CPS for maltreatment and report determinations. Indeed, the complex interactions between parents, children, and CPS systems suggest that legalized cannabis could influence the reporting of child maltreatment. For example, many healthcare professionals, educators, childcare providers (e.g., daycares), and law enforcement officers are mandatory reports of child maltreatment. Following legalization, parental cannabis use may be less likely to trigger a child maltreatment report from these sources, as cannabis is no longer illegal within the state. Furthermore, CPS agencies face growing complexity in their decisions, as they must carefully assess parents' fitness and potential harm to children amid shifting legal and social norms (Gallagher 2020; Stott and Gustavsson 2016). Conditional on a maltreatment report, CPS caseworkers may be less inclined to view

parental cannabis use as maltreatment post-legalization, which could lead to fewer substantiated cases — i.e., a report for which a caseworker determines that child maltreatment has occurred. The types of services recommended to families can also be different when cannabis is legal. For example, caseworkers may be less likely to refer parents to substance use disorder (SUD) treatment for cannabis use once this product is legal within the state.

Other possible channels could link cannabis consumption to child maltreatment reports. For example, alcohol use and the use of illicit substances have been linked to child maltreatment (Ali et al. 2024; Donohue et al. 2019; Widom and Hiller-Sturmhöfel 2001), and if cannabis is a complement or substitute to these other substances (Chandra and Doshi 2025; Reiman 2009; Zhu, Trangenstein, and Kerr 2025), child maltreatment could change post-RCL. Given these competing possibilities, the overall impact of state cannabis legalization on child maltreatment reports to CPS remains unclear.

Only a few published studies have explored the impacts of state cannabis legalization on child outcomes. First, small-scale public health studies shows mixed relationships between cannabis use and access and child maltreatment (Freisthler, Gruenewald, and Wolf 2015; Freisthler and Kranich 2022), though the extent to which these correlations reflect causality is unclear. Second, a handful of economic studies has investigated the effect of MCLs and/or RCLs on children. A recent study finds that time parents spend with children increases following MCLs (Bansak and Kim 2024). One study examining both MCLs and RCLs finds no significant effect on newborn health outcomes (Meinhofer et al. 2021). Gardner and Osei (2022) examine the effect of RCL adoption on foster-care placements and find a 10% decrease in admissions to foster care following implementation of the law. Foster care placements — which entail the temporary or permanent removal of a child from their families — reflect a particularly severe

form of child maltreatment, with only 6% of children ever being placed in foster care (Yi, Edwards, and Wildeman 2020) vs. 37% of children experiencing a CPS investigation (Kim et al. 2017). In our analysis, we are able to examine a broader range of reported child maltreatment that impacts a greater number of children each year, and we can consider whether the bundle of post-investigation of services recommended to families undergoing a CPS investigation varies with the legal status of cannabis. Services are important to consider as services can offer parents additional supports that are designed to meet the needs of the family and to avoid subsequent maltreatment and a child removal from the home, but may be costly to the family and the state.

There are two working papers investigate the impact of cannabis legalization on child maltreatment reports. One paper uses earlier data from 1995 to 2014 and finds increases in reported child maltreatment following MCL adoption (Vijay 2018). MCLs impact an arguably select group of patients — those that meet qualifying health conditions — and thus findings from MCLs may not translate to broader access to cannabis as conferred by RCLs, which allow all adults 21 years and older to legally possess cannabis. The second study (Rashid and Waddell 2018) uses more recent data (2003-2016) to examine the effect of MCLs and RCLs on child maltreatment reports. The authors find reductions in physical abuse reporting and substantiated claims following implementation of these laws. The conflicting findings between the two papers may stem partly from differences in the time periods examined, diverse groups of people induced to use cannabis post-legalization, and heterogeneous effects across states. Moreover, the second study is only able to examine very short-run effects of RCLs — Oregon and Washington were the first states to adopt RCLs in December 2012 and four additional states implemented these policies in 2015 and 2016, thus the authors mainly identify effects based on the early experiences of six states. As the cannabis market evolves, the types of products available for purchase may

change (e.g., become more potent), social norms and acceptance may change — in particular among people involved with CPS systems either as caseworkers or prospective reporters of child maltreatment, and so forth. Thus, our ability to examine a longer post-RCL period (i.e., 2010-2022) allows us to examine both shorter- and longer-run dynamics in the cannabis market. In sum, our study focuses on RCLs and utilizes more recent data to re-assess the effects legalizing cannabis on child maltreatment reports and services received.

3. Data and methods

This section outlines our data, key variables, methods, and summary statistics.

3.1 Data

3.1.1 Outcome variables

The primary data source for the study is the National Child Abuse and Neglect Data System (NCANDS). The NCANDS is a federally maintained database that compiles case-level information on reports of child maltreatment from all U.S. state CPS agencies. These data were established under the Child Abuse Prevention and Treatment Act (CAPTA) of 1974 and are used to produce the official federal government statistics on child maltreatment. The NCANDS provide nationally representative data on the incidence, characteristics, and outcomes of child maltreatment investigations.

We use 2010-2023 NCANDS child files (NDACAN 2024), which report cases within the corresponding fiscal years. We then re-organize the data by calendar year and use reports over the period 2010-2022 for our analysis. We exclude reports initiated in 2023 from our analyses since we only have reports from January to September of the year. We then aggregate the child-reports and service use by state and year. Report rates are then calculated as the number of child-

reports in a state-year per 1000 population. State-year child population data are collected from the Centers for Disease Control and Prevention (CDC) WONDER online databases (CDC 2025).

When a maltreatment report includes multiple children, NCANDS administrators count each child included in the report as a separate child-report combination. When a child is involved in more than one report, administrators also count each incident as a separate child-report combination. Occasionally, a report may appear more than once in the child files if updates occur in the case (e.g., the initial report is followed by a subsequent CPS report). In these instances, we use information on the date the incident is reported to CPS from the first record and use information in the last record for all other information we use in our analysis.

Depending on maltreatment disposition level, we further calculate the number of substantiated and unsubstantiated child-reports. Substantiated reports occur when evidence reviewed by CPS caseworkers supports that child maltreatment has occurred. There is no federal definition of child maltreatment, thus CPS caseworkers follow state-specific definitions when making determinations. Some states have another disposition level — indicated or reason to suspect — when some evidence supports the claim, but this disposition level is not as strong as substantiated cases. NCANDS defines a child as a victim of maltreatment by considering both disposition levels — substantiated or indicated. Therefore, we also examine combined substantiated or indicated child-report rates. Notably, some states have a diversified response system, in which certain low-risk maltreatment reports can receive what are called “alternative responses” rather than a standard investigation. In such settings, a caseworker assesses the needs of the children and families and develops strategies to reduce risks to children and prevent subsequent family separations, such as the removal of a child from the family and placement in

foster care. Thus, we also include another measure that counts both unsubstantiated and alternative response reports (Ali et al. 2024; Deza, Maclean, and Ortega 2025).

Both substantiated and unsubstantiated maltreatment reports are costly for families (Merritt 2020). The experience of undergoing a CPS investigation can be stressful and financially burdensome for families. Moreover, research shows that outcomes for children with substantiated and unsubstantiated maltreatment reports are quite similar in terms of subsequent maltreatment reports, developmental outcomes, human capital accumulation, and risky behaviors such as substance use and high-risk sex (Hussey et al. 2005; Kohl, Jonson-Reid, and Drake 2009; Kugler et al. 2019; Leiter, Myers, and Zingraff 1994). For these reasons, we separately consider both types of maltreatment in our analysis. Additionally, we consider report counts by different reporting sources, including reports by education, law enforcement, social service, medical, and mental health personnel. All these individuals are mandatory reporters in most states.

Research is mixed on whether some types of maltreatment, such as physical abuse, are more affected by parental cannabis use than other types, such as neglect (Freisthler, Gruenewald, and Wolf 2015; Ng and Tung 2016; Wilson and Rhee 2022). We separately analyze report rates for these two maltreatment types (physical abuse and neglect), which are also the most prevalent types (24.4% and 60.6%, respectively, in our data).

Caseworkers often recommend post-response services to families to support parents and prevent subsequent risk to children and family separation. RCL adoption may alter the set of services recommended by caseworkers. NCANDS reports services directly related to the CPS response and delivered within 90 days after the disposition date. We count child reports that had any post-investigation services use, or some specific service use, including substance use, family preservation, foster care, and mental health services. Some service use variables have a

considerable number of missing values. When more than 25% of child reports in a state-year have missing values for a service use variable (Ali et al. 2024; Deza, Maclean, and Ortega 2025), we code that service use as missing for that state-year and do not include this observation.

In heterogeneity analysis, we examine maltreatment report rates by two age groups (0-4 years and 5-17 years), sex, race (White, Black, and other race) and ethnicity (Hispanic and non-Hispanic). We hypothesize that RCLs could have heterogeneous impacts across children in these groups. Theories of child development predict that shocks, such as experiencing maltreatment, can have differential effects on life course outcomes (Currie and Almond 2011), and younger and older children have different care needs — for instance, younger children require more primary care from parents, such as feeding and bathing, whereas older children are more likely to need supervision from their parents (Maclean and Pabilonia 2025). Parental cannabis use could have differential impacts across these age spectrums. Moreover, data show that children of different ages, races, and ethnicities experience differential risks for maltreatment reports (Children's Bureau 2022). All of these factors open the door to the possibility of heterogeneous effects associated with cannabis legalization and motivate our analysis by sub-group. The denominator of the report rates is the population of the corresponding demographic group, such as the population of children aged 0-4, 5-17, etc.

3.1.2 Policy variables

Our study focuses on the effect of RCLs rather than MCLs as the former are more likely to impact child maltreatment.[4] MCLs impact a much smaller share of the population than do

[4] Another technical reason for not focusing on MCLs is that only a limited number of states contributed to NCANDS child files in the 1990s – the period when states began adopting MCLs – and some early-adopters, such as California and Oregon, are not included in the dataset in these earlier years (NDACAN 2020). This omission constrains our ability to examine MCL effects using the NCANDS data.

RCLs and medical cannabis patients — Abouk et al. (2023) show that in 2019 2% of the residents in MCL states participated in the medical cannabis program.

In all states to date that have adopted a RCL, any adults aged 21 or above can access cannabis for recreational purposes. By January 2025, 25 states (including D.C. which we treat as a state in our analysis) have adopted a RCL (NCSL 2025). Figure 1 reports the temporal variation in RCLs between 2010 and 2022. As described earlier in this section, we aggregate the NCANDS data to the state-year level. Thus, we code the first partial year as the effective year of the RCL. Colorado and Washington were the first states to adopt a RCL in December 2012.

Additionally, we account for the opening dates of the first legal recreational dispensary in each state, recognizing that delays often occur between legalization and actual dispensary operations (Pacula et al. 2015). Most state RCLs allow two sources of legal supply — dispensaries and home cultivation, though not all states have legalized both supply sources.[5] Dispensaries are the most common source of recreational cannabis, as home cultivation is relatively resource intensive and time consuming. We collect effective dates and dispensary opening dates from the National Conference of State Legislatures report (NCSL 2025), existing literature (Wilk et al. 2024), and other relevant websites (full details available on request).

3.1.3 State characteristics

We account for several state-level variables in our regressions that could relate to child maltreatment reporting and service use. These state characteristics include sociodemographic variables: percentages of population age 18 to 24, 25 to 44, 45 to 64, 65 and above; male; Black; Hispanic; other race/ethnicity; and percentage of people with Bachelor's degree or above, all

[5] For example, Washington state does not allow home cultivation, but the state does permit dispensaries (though counties can prohibit these businesses from operating within the county), for recreational cannabis (Washington State Liquor and Cannabis Board 2025).

derived from the monthly Current Population Survey (Flood et al. 2024). We do not include some other state characteristics in our main analyses — such as unemployment rate, income and poverty rate — since these outcomes can be affected by cannabis use thereby leading to potential bias in the coefficient estimates (Chakraborty, Doremus, and Stith 2021; Dave et al. 2025; Sabia and Nguyen 2018). However, in robustness checking, we report results that include an extended set of state characteristics and policies in the regression, including Gross State Product; Democratic governor (University of Kentucky Center for Poverty Research 2025); state Affordable Care Act Medicaid expansion status (KFF 2025c); paid family and medical leave policy (National Partnership For Women & Families 2024); paid sick leave mandate; paid time off mandate (National Partnership for Women & Familiies 2023); prescription drug monitoring program (Ali et al. 2017); Aid to Families with Dependent Children (AFDC) or Temporary Aid for Needy Families (TANF) benefit for four-person family (University of Kentucky Center for Poverty Research 2025); Medicaid income threshold for children ages 6-18 (KFF 2025a); and Medicaid income threshold for parents (KFF 2025b). Reassuringly, our results remain stable when we include these covariates in the regression.

3.2 Identification and estimation

We use a DiD design to identify the effects of RCL adoption on child maltreatment reporting and services use. In particular, we use a two-stage imputation approach proposed by Gardner et al. (2024). This approach is robust to bias associated with a staggered treatment roll out when treatment effects display dynamics or when treatment effects may vary across treated units. In the first stage of this approach, outcomes are regressed on group and period fixed effects using untreated observations (both not yet treated and never treated). In the second stage, the

estimated group and period effects are subtracted from observed outcomes and the resulting residualized outcomes are then regressed on treatment status.

Conceptually, in the first stage of the procedure, we impute the untreated counterfactual for treated units. Then, in the second stage, we take the difference between the (realized) treated and (imputed) values to recover an estimate of the average treatment effect on the treated. Equations (1) and (2) outline the procedure:

$$M_{it}(0) = \gamma MCL_{it} + X_{it}\theta + \lambda_i + \eta_t + \varepsilon_{it} \ (1)$$

$$M_{it}(1) - \widehat{M_{it}(0)} = \delta RCL_{it} + \mu_{it} \ (2)$$

Where $M_{it}(0)$ and $M_{it}(1)$ are untreated and treated child maltreatment outcomes. In the first stage, we control for a vector of time-varying state-level policies and demographics, X_{it}, and state MCLs, denoted by MCL_{it}. λ_i and η_t are vectors of state and year fixed effects, respectively. In the second stage, the treatment variable is the state RCLs, captured by RCL_{it}. ε_{it} and μ_{it} are the error terms in the first and second stages. Most regressions are also weighted by state child population (or the population of the corresponding demographic group) though we will report unweighted regressions to ensure that the use of weights does not drive our findings. Standard errors are clustered at the state level. The Gardner procedure accounts for the imputation in the first stage in estimation of the standard errors. In heterogeneity analyses, we examine the effects of RCL adoption on report rates by demographic groups (including child age, sex, race, and ethnicity), reporting source, and maltreatment type.

We choose the Gardner approach as this procedure offers several attractive features for our study. First, like other modern DiD estimators, the Gardner approach is robust to bias that is associated with a staggered policy roll-out when treatment effects may be heterogeneous and/or dynamic, which we expect in our setting as RCL effects likely vary over time as the legal market

evolves and states differ in the details of their RCLs (e.g., taxation levels, supply architecture). Second, this approach can accommodate time-varying covariates, which we believe to be important in our setting (e.g., MCL). Third, Gardner et al. build their procedure based on regression, which is a familiar concept to many researchers. Fourth, the Gardner approach is robust to bias associated with treatment effect heterogeneity being correlated with included covariates (Powell 2022; Caetano et al. 2024). For example, we might expect differential effects of RCLs for states that have higher and lower shares of children. Fifth, relative to other modern DiD estimators, the Gardner approach preforms well in terms of inference (Mizushima and Powell 2025), thus by using this approach we are likely able to minimize concerns regarding over- or under-rejection of the null hypotheses. A limitation of using the Gardner procedure is that we could mis-specify the regression in the first stage, which could lead to poor estimates of counterfactual outcomes.

However, we recognize that different researchers will have heterogenous preferences towards application of DiD methods, thus in robustness checking we will show that results are qualitatively similar if we instead using other common methods utilized in the economic literature. We will also report results, using our preferred Gardner approach, based on different samples and specifications. In particular, we will show results using different sets of covariates, which addresses, to some extent, the above-noted concern about bias associated with a mis-specified regression in the first stage.

3.3 Trends and summary statistics

We depict trends in child maltreatment reporting rates during the study period (Figure 2). The average report rate in RCL states is higher than that in non-RCL states. Both trends largely move together, rising over the years and dipping in 2020. The dip in 2020 is likely attributable to

disruption during the pandemic period (Chen and Dube 2025; Huang et al. 2023). The overall common trends foreshadow our primarily null findings.

Table 1 presents descriptive statistics for the outcome and control variables in 2010 for states that implement a RCL later during the study period (21 states, including DC)[6] and states that do not (30 states). There is no statistical difference in mean maltreatment report rates between RCL and non-RCL states, though mean values vary across report categories and often greater in RCL than non-RCL states. The substantiated (or substantiated/indicated) child-reports account for about one fifth of all child-reports.

We also summarize the maltreatment report rates by most common reporting sources and by maltreatment types. The cases reported by education; law enforcement; and social service, medical, and mental health personnel are close to or above ten, respectively, per 1000 children in RCL states. The values are lower in non-RCL states (but none are statistically significant at 5% level). The substantiated neglect cases are over eight per 1000 children in RCL states and close to six in non-RCL states. Service use rates in RCL states are lower than those in non-RCL states, except that the substance abuse service use rate in RCL is higher. However, none of these differences in service use rates are statistically significant.

RCL states share a similar demographic composition as non-RCL states in 2010, with the exceptions that the percentage of Hispanic people in RCL states is almost twice of that in non-RCL states, and the percentage of people with bachelor's degree or above is also higher in RCL states than in non-RCL states. RCL states also have more generous AFDC/TANF benefit for four-person family and higher Medicaid income threshold for parents than non-RCL states.

[6] One of the RCL states – Oregon – did not submit data for FY2010, leaving 20 observations for RCL states in 2010.

4. Results

4.1 State RCL adoption and cannabis use

As a first-order outcome, we show the prevalence of parental cannabis use in relation to state RCL status (Table A1, Appendix). Using 2017-2022 data from the Behavioral Risk Factor Surveillance System (BRFSS), we include individuals aged 21 and older (namely, those above the minimum age for recreational purchases) who have children in the household (i.e. potential parents or caregivers) and who respond to the cannabis use questions in their surveys, if applicable. The BRFSS is a large-scale telephone survey that includes roughly 400,000 respondents who are asked a battery of questions related to health behaviors, demographics, and so forth. In 2017, cannabis questions were included in optional modules that states could choose to ask respondents within their jurisdiction. We consider the following past-30-day cannabis use outcomes: 1) any cannabis use, 2) days used cannabis (unconditional on any cannabis use), 3) use cannabis on 20 or more days, 4) use smoked cannabis, 5) use non-smoked cannabis (e.g., vaping or eating), 6) use cannabis for medical purposes, 7) use cannabis for medical and recreational purposes, and 8) use cannabis for recreational purposes. Table A2 (Appendix) reports the states with valid information on any cannabis use in each year. Due to differences in state participation, respondent reporting, and changes in question availability, sample sizes vary to some extent across cannabis measures.

We regress these cannabis metrics on RCL status using the two-stage DiD procedure, controlling for respondent- and state-level characteristics, and state and month-year fixed effects (Table A1, Appendix). These statistics show that most of the cannabis use measures increase following the implementation of RCLs. More specifically, the probability of any cannabis use increases by 2.0 percentage points (ppt) post-RCL, comparing this coefficient estimate to year

before the policy change implies a 17.2% increase (all relative effects are calculated in this manner). The number of days using cannabis increases by 0.4 (20.2%) and the probability of using cannabis 20 or more days rises by 1.1 ppt (19.3%).

In terms of mode of administration (i.e., how cannabis is consumed), post-RCL use of smoked cannabis declines by 3.1 ppts (35.2%) while the use of non-smoked cannabis increases by 1.3 ppts (65.0%). Non-smoked cannabis may be less likely to lead to children's exposure to secondhand smoke, which may reduce asthma episodes and, in turn, child maltreatment reports (healthcare professionals are generally mandatory reporters). Finally, we examine reasons for using cannabis and find that use of cannabis for medical and recreational purposes increases by 0.8 ppts (36.4%) and 1.1 ppts (25.0%), but there is no observable change in the probability of using cannabis for both medical and recreational purposes.

Another first-order outcome we examine is SUD treatment due to cannabis use, or problematic cannabis use, following RCLs. We estimate complementary regressions using state-level counts of SUD treatment episodes in the Treatment Episodes Database (TEDS) 2010-2022. TEDS is a national administrative dataset maintained by the Substance Abuse and Mental Health Services Administration (SAMHSA) that captures information on SUD treatment episodes. Each year roughly two million episodes are reported to TEDS. The data include client demographics, primary substance of use, route of administration, frequency, source of referral, and service setting for each treatment episode reported by state-licensed or certified providers. Data are submitted to SAMHSA annually by state agencies tasked with collecting SUD treatment data. The data reflect treatment episodes rather than unique individuals.

We focus on treatment episodes in which the patient is 21 years and older — those who are legally permitted to purchase cannabis in recreational states — with cannabis listed as the

primary substance endorsed at treatment intake (TEDS include up to three substances). In unreported analyses, we have examined episodes with any cannabis endorsed and results, available on request, are very similar to those reported here. We exclude detoxification only episodes and such episodes are not viewed as treatment per se by addiction medicine experts (SAMHSA 2006), and we examine total episodes, episodes refereed through the criminal legal system (given the possible link between cannabis legalization and risk of incarceration), and episodes not referred through the criminal legal system (e.g., self, healthcare provider, family member). We convert the episode counts to the rate per 1000 state residents 21+ years of age. We weight the TEDS data by the state population 21+ years of age. Results (Table A3, Appendix) suggest that, overall, treatment episodes per 1000 decline by 0.123 or 21.4% compared to the baseline mean, though the coefficient estimate is only marginally precise (10%). Separating treatment episodes by referral through the criminal legal system sheds light on the mechanisms behind this (potentially) surprising finding: post-RCL, episodes referred through the criminal legal system decline by 24.4% while there is no observable change in episodes referred through other sources. As we discuss in Section 2, state legalization effectively removes criminal penalties for simple cannabis possession and, in our data, 53.7% of (non-detoxification) cannabis treatment episodes are referred through the criminal legal system. Thus, our findings in Table A3 (Appendix) suggest that (as we will document later in the manuscript) we capture reduced crime related to cannabis sales post-RCL adoption.

Overall, our analyses of cannabis consumption, using both survey data and administrative data on SUD treatment, suggest that 1) cannabis use increases substantially (up to nearly 20%) and 2) particularly problematic cannabis use does not appear to increase post-RCL. These findings are informative for our study of child maltreatment reports as we do not observe that

particularly problematic cannabis use, which might be expected to increase child maltreatment, increases post-RCL, rather more "casual" use of non-smoked cannabis as measured in the BRFSS appears to rise. Moreover, fewer interactions with SUD treatment providers — who are generally mandatory child maltreatment reporters — may reduce the risk of a maltreatment report for some people who consume cannabis, i.e., those referred to treatment through the criminal legal system. With this information in hand, we turn to our primary research question, the impact of RCLs on child maltreatment reports.

4.2 The effect of state RCL adoption on child maltreatment reporting

Table 2 presents the estimated effect of RCL adoption on child maltreatment reporting. We start with a simple specification — state and year fixed effects only and no weighting (Specification [1]). We then conduct a weighted regression, with the state-specific child population serving as the weight (Specification [2]). Specification (3) adds time-varying state characteristics to the regression — including age composition, and percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree. In Specification (4), we also include a MCL as a covariate. Specification (5) lags the RCL by one year.

In panel A of Table 2, when treatment status is based on the RCL effective date, we observe no statistically significant evidence that RCL adoption leads to changes in child maltreatment reports. Moreover, the magnitudes are small compared to the mean report rates in RCL states during pre-treatment periods (last row of panel A). In our preferred specification — Specification (4) — the coefficient estimate suggests that maltreatment reports decrease by 2.64 reports per 1000 children or 5.0%. Thus, while coefficient estimates are somewhat noisy, if anything our results suggest that child maltreatment reports may decline post-RCL. Examination of the 95% confidence intervals suggest that we can rule out declines larger than 16.2% and

increases larger than 6.3%. In panel B of Table 2, we report results in which we use the opening dates of the first dispensary for recreational cannabis sales. Similarly, no significant effects are found for RCL dispensary openings on any of the report rates and the magnitudes remain small. In Specification (4), the (imprecise) coefficient estimate suggests that maltreatment reports increase by 0.7% following dispensary openings, however, the coefficient estimate sign changes across specifications — the coefficient estimate is negative (positive) in two (three) specifications.

In Table 3, we examine maltreatment report rates by substantiation status. We use our preferred specification (4) as reported in Table 2, which includes MCLs and all state characteristics as covariates, and state and year fixed effects in the regression, and data are weighted by the state-level child population. Again, we find no statistically significant effect of RCLs on substantiated, substantiated or indicated, unsubstantiated, and unsubstantiated or alternative report rates. The coefficient estimates remain non-significant regardless of whether RCL implementation dates (Panel A) or dispensary dates (Panel B) are used.

Figure 3 shows event study plots for report rates by substantiation status. No visible pre-trends are present in any of the report rates, regardless of whether the RCL implementation dates or dispensary dates are used to define the event. In addition, no significant effects are found on any of the report rates in the post-treatment period, except that the substantiated/indicated report rates showed significant reductions ($p \leq 0.05$) in Year 3. The reductions are 4.6% when RCL effective dates are used and 3.0% when dispensary operating dates are used.

4.3 The effect of state RCL adoption on post-disposition service use rates

After the determination of a child maltreatment allegation, a child or the family may also receive post-investigation services. These services are designed to support parents in their roles of caregivers and prevent future maltreatment reports or family separations. We examine

whether RCL adoption has any effect on services delivered after disposition, using RCL effective dates (Figure 4).[7] We measure the number of child-reports with any post-investigation services as well as four specific types of services — SUD treatment, mental healthcare, family preservation, and foster care. None of the estimated effects are statistically significant.

4.4 Heterogeneous effects of RCL on maltreatment report rates

While no significant effects of RCLs are found among reports involving all children under age 18, we further assess the disaggregated effects on all report rates by child age, sex, race, and ethnicity. In Figure 5, we report the two-stage DiD findings among these groups. RCL status is based on effective dates. Consistent with the core findings, none of the coefficient estimates are statistically significant.

We also examine whether reporting source varies with RCLs (Figure 6). Due to the complexities in CPS systems (see Section 2), legalization of cannabis through RCLs could lead to changes in who/when maltreatment is reported, leaving the total number of reports unchanged. Reports by law enforcement personnel, educators (and daycare providers), social services, medical, and mental health personnel, and parents tend to report less after RCL passage. However, none of these coefficient estimates rise to the level of statistical significance.

Parental cannabis use may differentially impact certain types of substantiated/indicated child maltreatment compared to others. We examine the effect of RCLs on the two most common child maltreatment cases — physical abuse and neglect (Figure 7). The substantiated physical abuse report-rate decline by 0.4 per 1000 children, or a 26.7% decrease compared to the average rate among RCL states one year before RCL. A negative effect on the substantiated neglect report rate is also present, but this coefficient estimate is not statistically significant.

[7] Notably, because we observe no significant change in maltreatment reports, our examination of "conditional" outcomes such as services received is not likely vulnerable to conditional-on-positive bias.

4.5 Separating maltreatment incidents from maltreatment reporting

Child maltreatment reports are determined by both the number of maltreatment incidents and the probability that suspected maltreatment is reported to CPS. As discussed earlier in the manuscript, RCL adoption can plausibly influence both child maltreatment incidence and reporting propensity. We next examine an outcome that is more likely to reflect underlying maltreatment incidence and is not conditioned on a CPS report —injury deaths among children 0-18 years of age from the CDC WONDER Underlying Cause of Death dataset. These forms of mortality are predicted by child maltreatment in earlier work (McCarroll et al. 2021; Palusci and Covington 2014; Jenny and Isaac 2006).[8] Reports are listed in Table 4. We observe an 4.3% reduction in child injury-related mortality following adoption of a state RCL. These findings offer additional evidence that maltreatment incidence may decline post-RCL and that other changes in contacts between families and the CPS system may attenuate this pattern of results in our main analyses of child maltreatment reports.

5. Robustness checks and mechanism analyses

In this section we conduct a number of sensitivity checks to assess the extent to which our findings remain robust to the use of alternative estimators, samples, and specifications. Reassuring, our findings are robust, which supports the credibility of our main results. We also explore potential mechanisms through which the legalization of recreational cannabis may impact child maltreatment reports as outlined in Section 2.

5.1 Alternative DiD estimators

[8] We rely on the public use WONDER data. There are no suppressed values in our extract.

We estimate the effects of RCLs on all report rates using alternative DiD estimators (Table 5), including conventional two-way fixed effects (TWFE), and alternative DiD estimators developed by Callaway and Sant'Anna (2021), DCDH (de Chaisemartin and D'Haultfœuille, 2020), Wooldridge (2025), BJS (Borusyak et al., 2024), and stacked DiD (Cengiz et al. 2019; Gormley and Matsa 2011). Despite differences in the estimation processes, none of the coefficient estimates are statistically distinguishable from zero at conventional levels. Similarly, when dispensary dates are used to determine RCL status (Panel B), none of the coefficient estimates rise to the level of statistical significance.

5.2 *Alternative samples*

Table 6 presents three additional robustness checks in comparison to the baseline results using the full sample. We first include a series of additional state policies and characteristics as controls (specification [2]). To isolate any potential cofounding due to the COVID-19 pandemic, we also estimate the effects using only pre-pandemic data (2010-2019) (specification [3]). Additionally, given the concern that child sexual abuse differs in nature from other types of maltreatment (Trask, Walsh, and DiLillo 2011), we exclude reports related to sexual abuse and sex trafficking and re-estimate the effects on child-report rates (specification [4]). Again, the estimated effects remain non-significant.

5.3 Leave-one-out analyses

To examine whether the results are sensitive to the inclusion or exclusion of some states or years, we repeat the estimation and exclude one RCL state or one year at a time. Results excluding each of the 21 RCL states (including D.C.) each time, in comparison with the baseline results (with all states in the sample) are presented in Figure 8. As before, no significant effects are found in this leave-one-out analysis, which is consistent with the baseline result. When

California is excluded, the estimated effect is positive (though not significant). The results are negative and non-significant when each of the other states are sequentially excluded. Similarly, when excluding one of the years between 2010 and 2022 sequentially (Figure 9), the coefficient estimates are all negative and non-significant.

4.4 *Potential mechanisms*

As discussed earlier, multiple channels could be in play through which RCLs can affect child maltreatment report rates. For example, the intoxicating effects of cannabis may impede effective parenting. One survey shows that parents who endorse cannabis use are more likely to engage in negative parenting practices than parents who do not (Wesemann, Wilson, and Riley 2022). Moreover, parental use of cannabis could raise the risk of children being inadvertently exposed to the substance (Myran et al. 2022; Tripathi et al. 2025; Tweet, Nemanich, and Wahl 2023). Conversely, other channels point toward a potential decrease in child maltreatment reporting. Parents may experience a medical benefit from cannabis as an alternative treatment for medical conditions, and improved health could enhance parenting capital (Bansak and Kim 2024). In addition, RCL passage may shift social norms, rendering cannabis use more acceptable by the public. This change could reduce reporting of child maltreatment related to cannabis use or lower the likelihood of substantiation in cannabis-related cases.

RCL adoption may lead to changes in non-health outcomes which could, indirectly, impact the probability of child maltreatment incidence or reports. For example, reductions in cannabis-related arrests could lessen family disruption, stress, and instability caused by involvement with the criminal legal system and possibly incarceration. To examine this mechanism, we use Kaplan's Concatenated Files of the Uniform Crime Reporting (UCR)

Program Data (2010-2020)[9] and estimate the effects of RCLs on cannabis-related arrests (sales and possession) per 1000 population using the two-stage DiD procedure (Table A4, Appendix). The UCR Program, administered by the Federal Bureau of Investigation (FBI), is a long-running national data collection system that compiles standardized information on crimes reported to law enforcement agencies across the U.S. Established in 1930, the UCR provides annual statistics on offenses such as homicide, assault, robbery, burglary, and motor vehicle theft, as well as arrests and law enforcement personnel counts. Data are voluntarily submitted by thousands of local, state, tribal, and federal agencies. We include policy agencies that reported every year between 2010 and 2020 and aggregate the monthly data to agency-year level. We find sizable and statistically significant reductions in cannabis sales arrests (50.3%) following RCL passage compared to average arrest rates among RCL states one year before the treatment. This large effect size is not surprising as RCLs effectively remove legal penalties associated with these activities. Processions arrest rates are also reduced, despite that the effect is not significant.

We next return to the BRFSS data and explore whether RCL adoption leads to changes in parental health, both mental and physical. To do so, and using data from 2010-2022, we consider the following self-reported health outcomes among parents: 1) fair or poor health, 2) the number of days in bad mental health in the past 30, and 3) the number of days in bad physical health in the past 30. The results (Table A5, Appendix) suggest that parental health improves post-RCL. More specifically, post-RCL, the probability that a parent reports their health as fair or poor declines by 1.5 ppts (10.9%), and the number of days parents report that their mental and physical health is poor falls by 0.36 days (8.8%) and 0.21 days (7.1%).

[9] As described in the data documentation, due to changes in the law enforcement agencies that contribute data to the UCR data, combining data pre- and post-2021 is not recommended. We follow this advice.

To examine whether RCLs lead to changes in family financial resources and structure, we turn to the American Community Survey (ACS) 2010-2022 (Ruggles et al. 2025). The ACS, conducted by the U.S. Census Bureau, is a nationally representative, continuous household survey that collects detailed demographic, social, economic, and housing information from approximately 3.5 million addresses annually. The ACS includes variables on income, employment, education, housing costs, migration, and household composition, among others. To focus on parents who gain access to cannabis in legalizing states, we include adults 21 years and older with minor children in the household. We use information on family income and personal income (inflated to 2023 dollars) to measure financial resources, and measures of labor market participation — an indicator for any employment (vs. unemployed) and the usual number of hours worked per week (unconditional on working). We also examine binary indicators for benefit receipt, focusing on benefits that people may lose when incarcerated: any 1) public assistance (Supplemental Security Income, TANF, and general assistance programs) and 2) Medicaid coverage. RCLs — by increasing substance use and financial strain within the family — could increase family disruption, which may elevate the risk of child maltreatment. To study this possible mechanism, we consider a measure of divorce in the past year. We also consider an overall measure of poverty: family income below the Federal Poverty Level. Our findings (Tables A6 and A7, Appendix) suggest that, following RCL adoption, income levels increase by 4.3% to 5.0%, there is no change in the probability of employment. The probability of receiving public assistance declines by 9.1% while the probability of reporting Medicaid coverage increases by 9.0% post-RCL. The increase in Medicaid coverage could stem the reductions in incarceration we document as many states terminate Medicaid upon incarceration. There is no

observable change in usual hours worked or the probability of divorce nor the probability that family income falls below the Federal Poverty level following RCL adoption.

These various channels likely occur simultaneously and there are possible mechanisms that we do not consider. Our results suggest that the collective effects largely offset one other, resulting in no overall change in child maltreatment reports, though our findings for declines in physical assault and injury- and homicide-related deaths suggest that RCL adoption may offer protection to children at risk of particularly severe forms of maltreatment.

6. Conclusion

This study examines the relationships between child maltreatment reports to CPS agencies and the legalization of recreational cannabis. The a priori impact of such policies on child maltreatment reports is ambiguous, with some potential mechanisms suggesting that child maltreatment will increase (for example, the intoxicating effects of cannabis impeding effective parenting), while others suggest that reports will decrease (such as lower incarceration rates among parents for simple cannabis possession). Our findings indicate that RCLs have no immediate significant effect on child maltreatment report rates by disposition level or report source, although we observe modest decreases in substantiated or indicated report rates three years after RCL. Moreover, the rate of substantiated physical abuse reports decreases by 22.5% following RCL passage and there is a 4.3% decline in injury-related deaths post-policy. The delivery of post-investigation services, as well as specific services (i.e., substance use, mental health, family preservation, and foster care services), do not change following RCL passage. We find no evidence of heterogeneous effects of RCLs on report rates across child age, gender, race, or ethnicity groups.

Ex ante, the impact of RCLs on child maltreatment reports is unclear. To shed some light on our (primarily) null findings, we conduct an extensive analysis of potential mechanisms. In our analyses of mechanisms, we show that post RCL cannabis use — but not misuse — increases, but we observe improvements in a range of outcomes that are predicted to minimize the risk of a child maltreatment report — improved parental health, earnings, and employment; and reduced arrest rates. Thus, our analysis suggests that on net, any negative impacts of RCLs on children (as measured by child maltreatment reports to CPS) are offset by benefits associated with this wider set of outcomes.

The declines in both physical abuse maltreatment reports and injury-related deaths following RCL adoption suggest that these state actions may provide protection to children at risk for particularly severe forms of maltreatment. While our reduced form methods do not allow us to fully isolate how RCL lead to these benefits, our analysis of mechanisms suggests that better physical and mental functioning of parents, and improved economic standing are important channels. Moreover, reduced incarceration among parents may allow for better family functioning and supervision of children. These mechanisms — and potentially others — may be more salient for physical abuse maltreatment reports than for other types of maltreatment, thus we observe declines for physical abuse only.

Our findings add to the literature that examines the social consequences of legalizing cannabis. In particular, we document no evidence that legalization of cannabis increases child maltreatment reports, thus our finding is in line with earlier work that shows no evidence that legalization harms infant health (Meinhofer et al. 2021) or increases child foster care placements (Gardner and Osei 2022). Cannabis can influence children's outcomes through a host of mechanisms, and our work suggests that on net these mechanisms do not lead worse outcomes

for children. An interesting avenue for future work is to explore other dimensions of child wellbeing — for example, measures of maltreatment incidence separate from those that are reported to CPS, meeting developmental milestones on time, human capital accumulation, delinquency, health, parenting practices, family structure, and child support payments. Moreover, as cannabis markets continue to evolve, additional monitoring of the impacts of legalization of cannabis on children seems prudent. Currently, longer term impacts of cannabis legalization are available for a small set of early adopting states, thus a re-examination of the impact of cannabis legalization on child maltreatment in the future could reveal differential findings that are relevant for policymakers, child advocates, and academics.

Our study has some limitations. First, under-reporting of child maltreatment cases is a distinct possibility. In particular, minor child abuse or neglect cases may never be reported to CPS. Child health or behavioral concerns due to parental cannabis use may develop slowly and are hard to discern by parents or professional personnel. Second, several of our null findings are somewhat imprecise. Third, given potential heterogeneous effects between early and late adopters, our results may not be generalizable to states that implement RCLs in the future.

In conclusion, our analyses reveal minimal to no detectable negative effects of RCLs on child maltreatment reporting or post-investigation services use, though we do find some evidence of modest reductions in substantiated/indicated report rates three years after RCL, a reduction in substantiated physical abuse report rates, and a decline in child deaths due to injuries. As national debates continue about cannabis legalization, our results suggest that state RCL adoption does not lead to increased child maltreatment. However, more research is needed to examine other potential RCL outcomes among children along with changes in parenting behaviors as a result of parental cannabis use.

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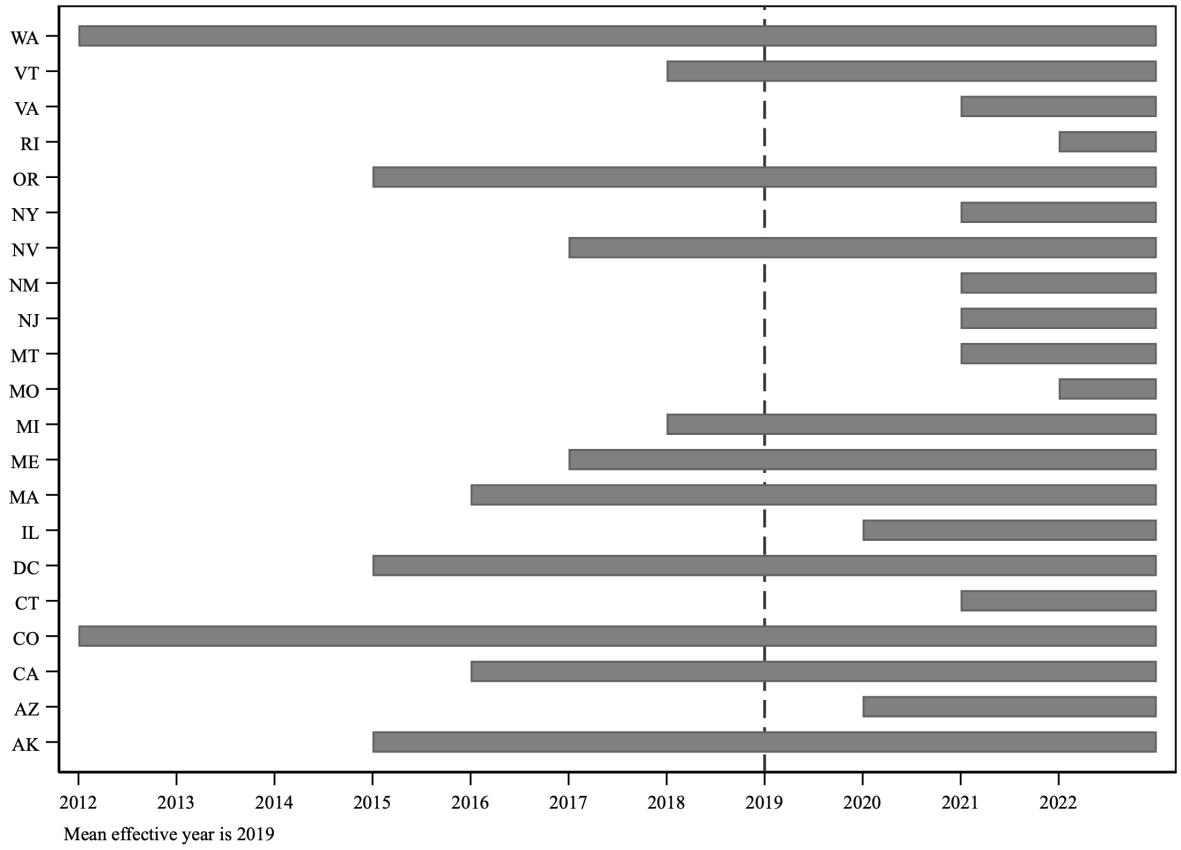
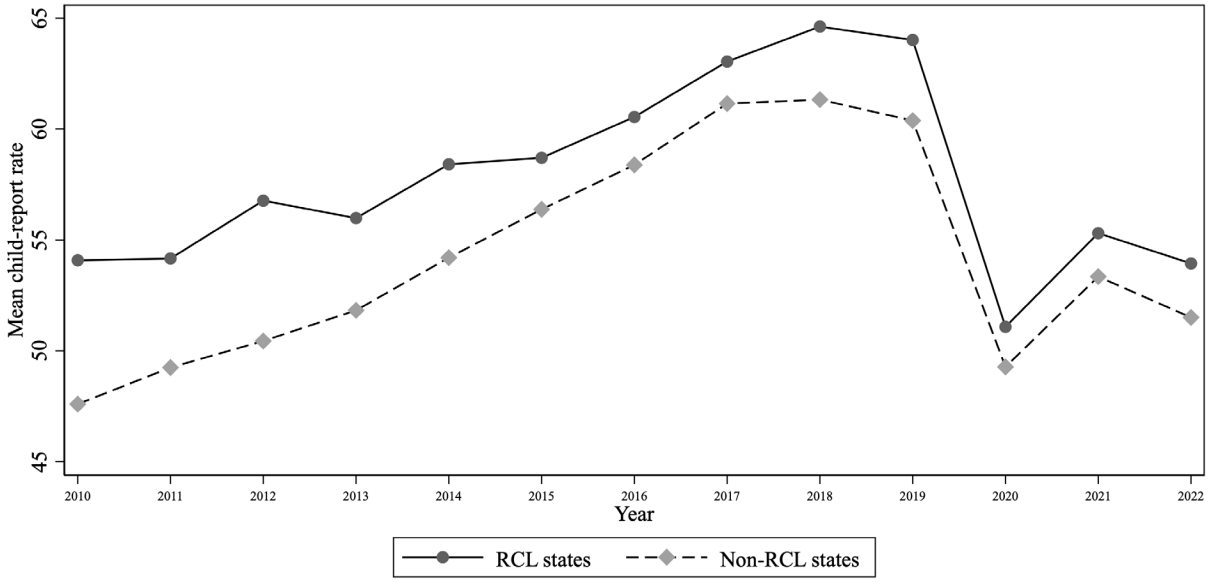
Figure 1. Temporal distribution of state recreational cannabis laws as of 2022



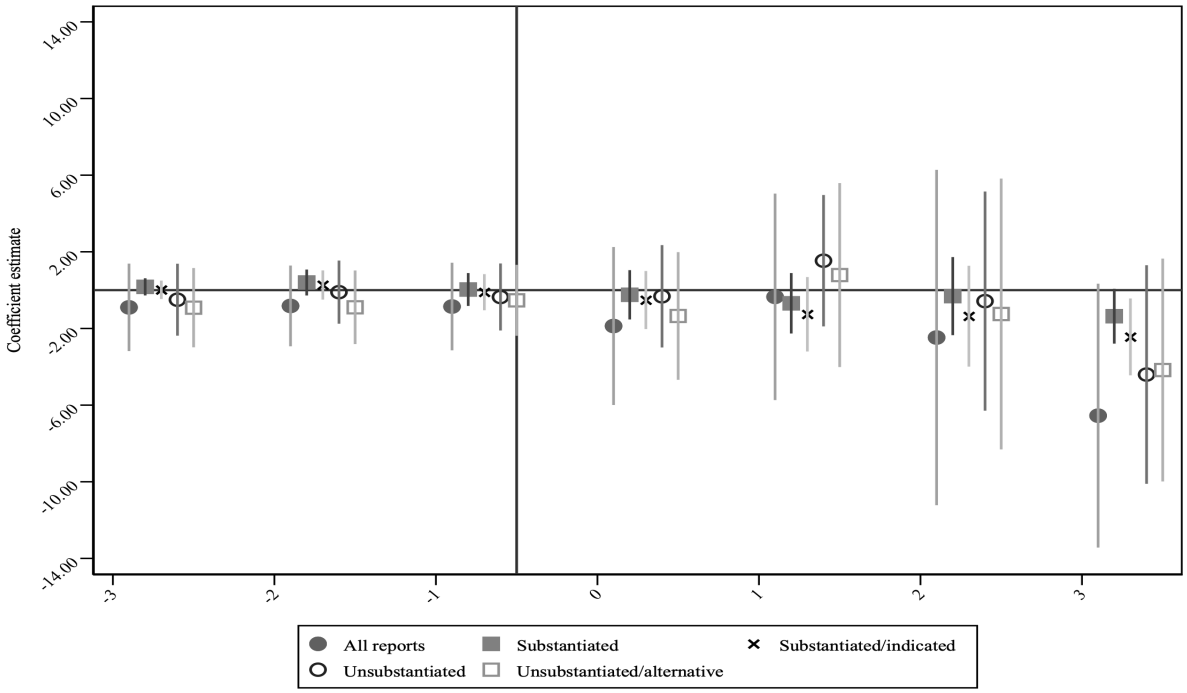
Note: This figure reports the temporal distribution of recreational cannabis laws across U.S. states as of 2022. The data source is the National Council of State Legislatures (2025).

Figure 2. Trends in child-report rates among states with and without recreational cannabis laws, 2010-2022

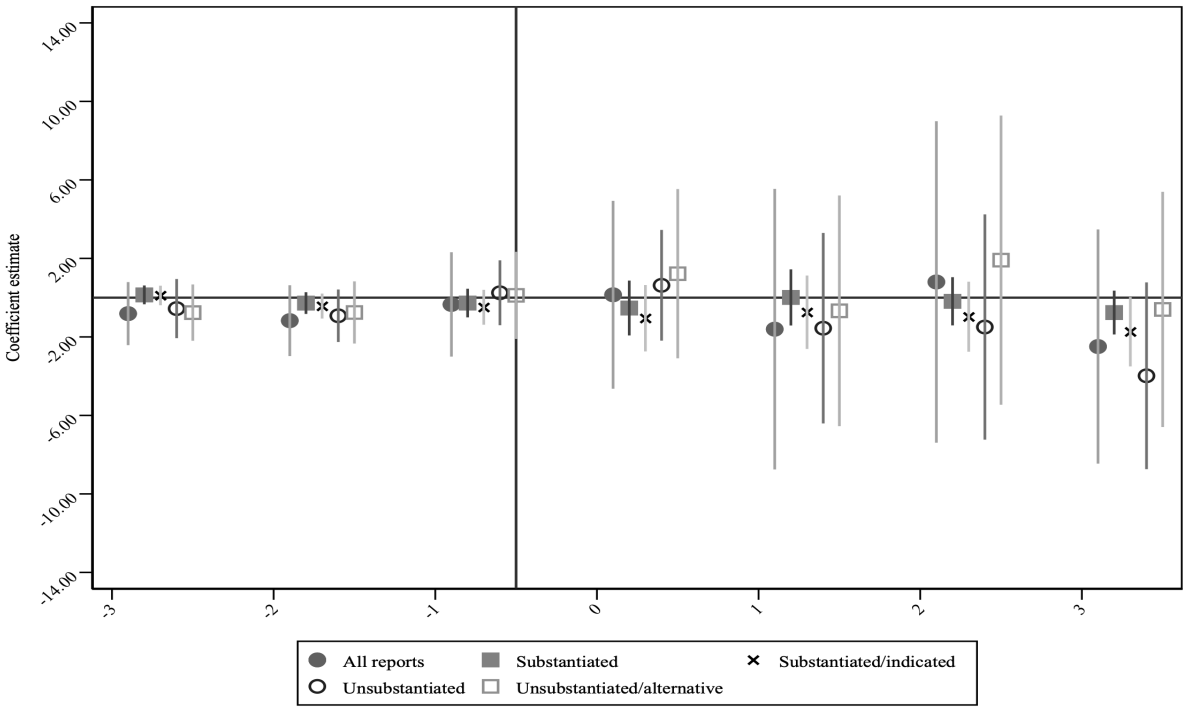


Note: Child-report rates refer to the number of child maltreatment reports per 1000 children. The data source is the National Child Abuse and Neglect Data System child files. RCL= recreational cannabis law.

Figure 3. The effect of state recreational cannabis laws on state annual child-maltreatment-reports per 1000 children using an event study, 2010-2022



A. Recreational cannabis law effective dates

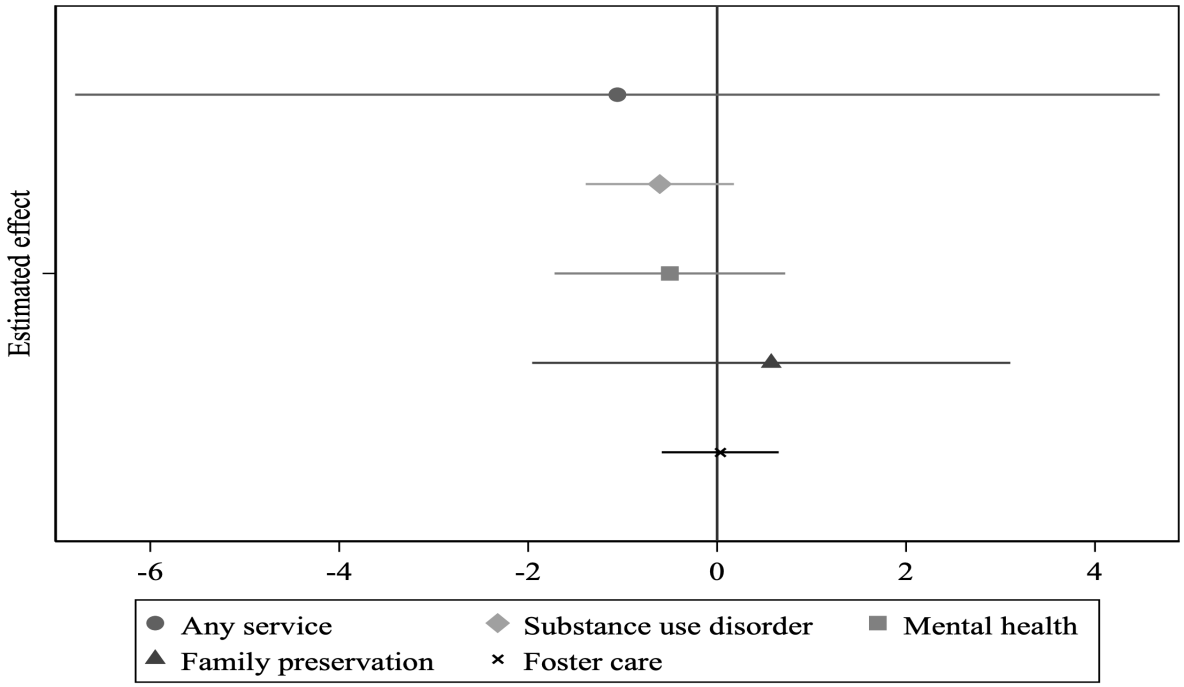


B. Recreational cannabis dispensary operating effective dates

Note: This figure shows event study coefficient estimates and 95% confidence intervals of the estimated effect of a recreational cannabis law adoption on state-level annual child maltreatment report rates between 2010 and 2022,

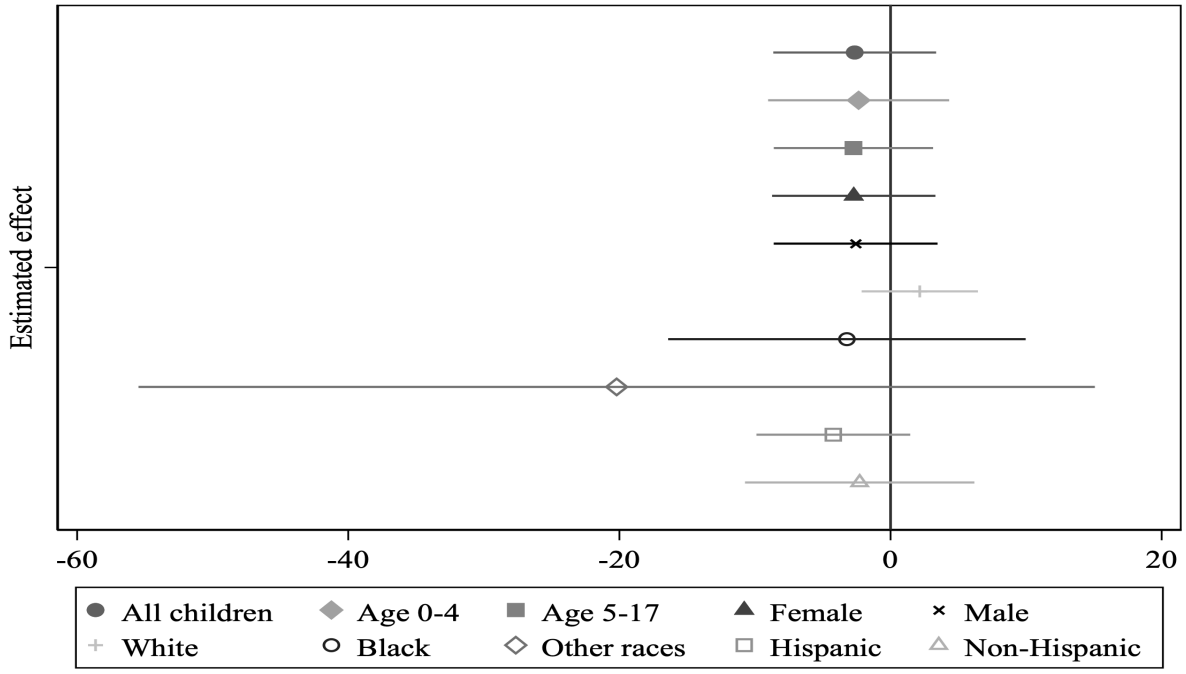
using a two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the National Child Abuse and Neglect Data System child files. Part A uses recreational cannabis law effective dates and Part B uses dispensary operating effective dates. The regressions include medical cannabis law, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. There is no omitted category in the Gardner et al (2024) event study. The regressions are weighted by state children population. 95% confidence intervals account for within-state clustering. All reports, substantiated, substantiated/indicated, unsubstantiated, and unsubstantiated/alternative are per 1000 children. Coefficient estimates are reported with symbols and 95% confidence intervals are reported with vertical lines.

Figure 4. Heterogeneity by post-disposition service type for the effect of state recreational cannabis laws on service use rates, 2010-2022



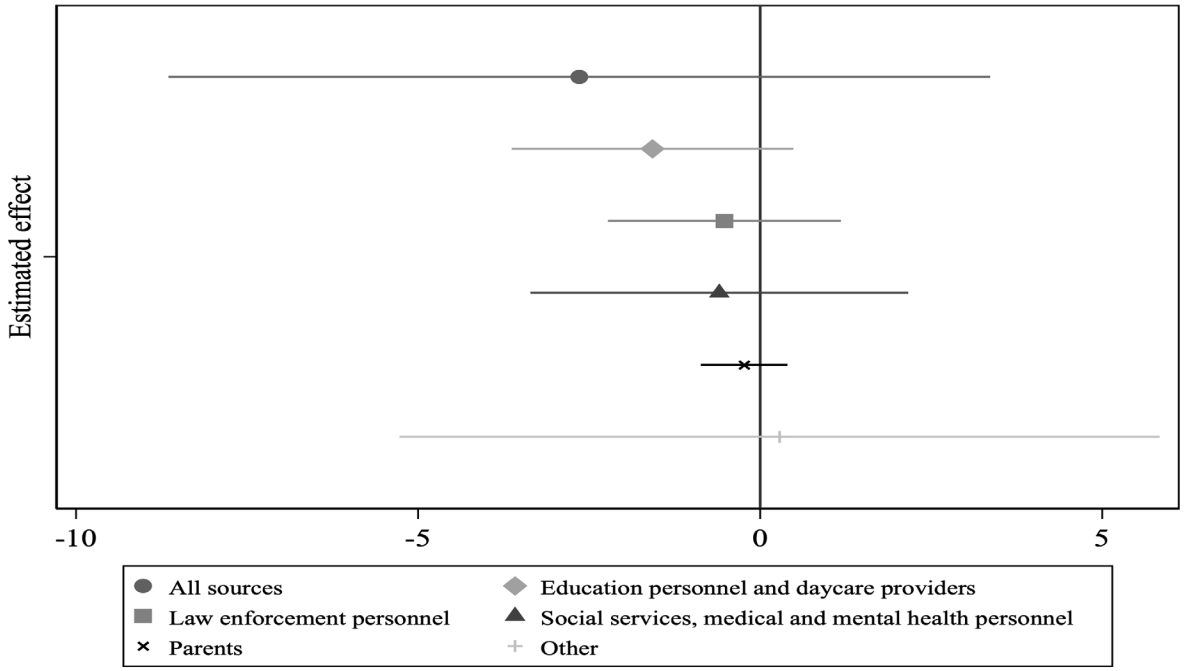
Note: This figure reports estimated effects of recreational cannabis laws on post-disposition service use rate along with 95% confidence intervals between 2010 and 2022 using a two-stage difference-in-differences procedure (Gardner et al. 2024). The data source is the National Child Abuse and Neglect Data System child files. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The regressions are weighted by state children population. 95% confidence intervals account for within-state clustering. The service use rate refers to the number of child-reports with any or a specific service delivered after disposition per 1000 children. Coefficient estimates are reported with symbols and 95% confidence intervals are reported with vertical lines.

Figure 5. Heterogeneity by gender, race, and ethnicity for the effect of state recreational cannabis laws on child maltreatment report rates, 2010-2022



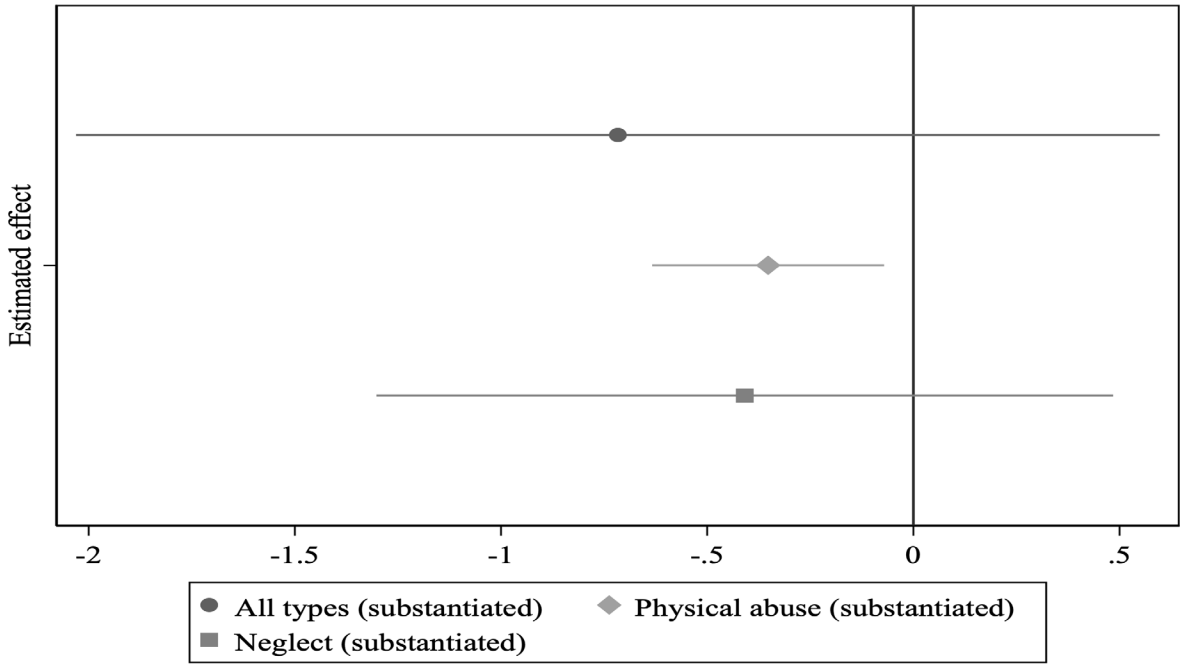
Note: This figure reports estimated effects of recreational cannabis laws on maltreatment report rates between 2010 and 2022 along with 95% confidence intervals using a two-stage difference-in-differences procedure (Gardner et al. 2024). The data source is the National Child Abuse and Neglect Data System child files. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The regressions are weighted by state children population and 95% confidence intervals account for within-state clustering. The service use rate refers to the number of child-reports with any or a specific service delivered after disposition per 1000 children. Coefficient estimates are reported with symbols and 95% confidence intervals are reported with vertical lines.

Figure 6. Heterogeneity by reporting source for the effect of state recreational cannabis laws on child maltreatment report rates, 2010-2022



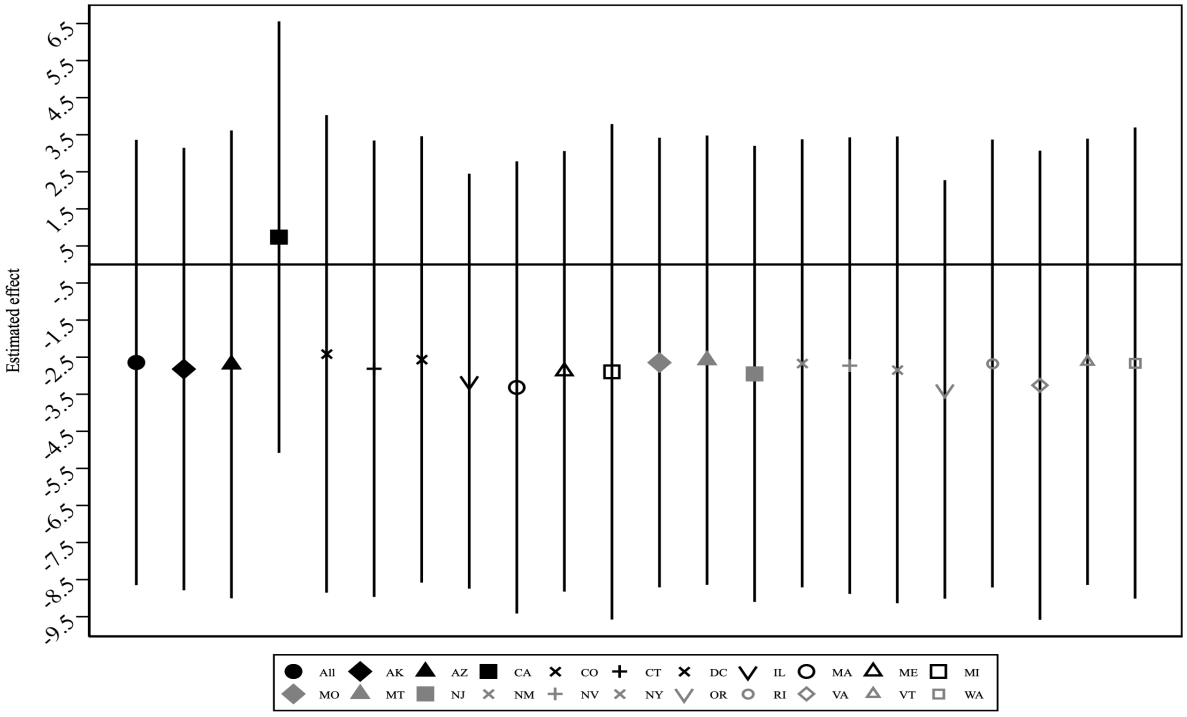
Note: This figure reports estimated effects of recreational cannabis laws on maltreatment report rates between 2010 and 2022 along with 95% confidence intervals using a two-stage difference-in-differences procedure (Gardner et al. 2024). The data source is the National Child Abuse and Neglect Data System child files. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The regressions are weighted by state children population and 95% confidence intervals account for within-state clustering. The service use rate refers to the number of child-reports with any or a specific service delivered after disposition per 1000 children. Coefficient estimates are reported with symbols and 95% confidence intervals are reported with vertical lines.

Figure 7. Heterogeneity by maltreatment type for the effect of state recreational cannabis laws on substantiated child maltreatment report rates, 2010-2022



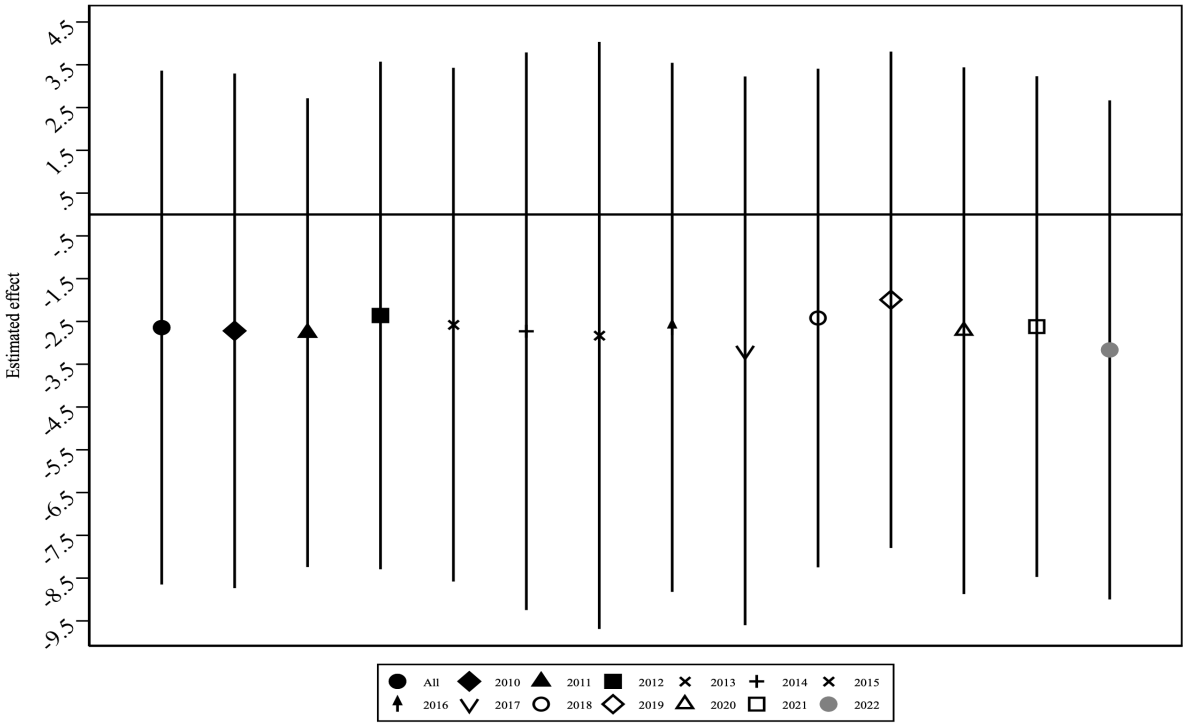
Note: This figure reports estimated effects of recreational cannabis laws on all substantiated, substantiated physical abuse, and substantiated neglect report rates between 2010 and 2022 along 95% confidence intervals using a two-stage difference-in-differences procedure (Gardner et al. 2024). The data source is the National Child Abuse and Neglect Data System child files. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The regressions are weighted by state children population and 95% confidence intervals account for within-state clustering. The service use rate refers to the number of child-reports with any or a specific service delivered after disposition per 1000 children. Coefficient estimates are reported with symbols and 95% confidence intervals are reported with vertical lines.

Figure 8. The effect of state recreational cannabis laws on child maltreatment-report rates after sequentially excluding each state that adopts a recreational cannabis law, 2010-2022



Note: This figure reports estimated effects of recreational cannabis laws on maltreatment report rates after sequentially excluding each state that adopts a recreational cannabis law (excluded state is reported in the legend) between 2010 and 2022 along with 95% confidence intervals using a two-stage difference-in-differences procedure (Gardner et al. 2024). The data source is the National Child Abuse and Neglect Data System child files. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The regressions are weighted by state children population and 95% confidence intervals account for within-state clustering. The maltreatment report rate refers to the number of child-reports. Coefficient estimates are reported with symbols and 95% confidence intervals are reported with vertical lines.

Figure 9. The effect of state recreational cannabis laws on child maltreatment-report rates after sequentially excluding each year, 2010-2022



Note: This figure reports estimated effects of recreational cannabis laws on maltreatment report rates after sequentially excluding each year between 2010 and 2022 along with 95% confidence intervals using a two-stage difference-in-differences procedure (Gardner et al. 2024). The data source is the National Child Abuse and Neglect Data System child files. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The regressions are weighted by state children population and 95% confidence intervals account for within-state clustering. The maltreatment report rate refers to the number of child-reports. Coefficient estimates are reported with symbols and 95% confidence intervals are reported with vertical lines.

Table 1. Descriptive statistics for child maltreatment report outcomes and state characteristics, 2010

	RCL states			Non-RCL states			
Variable	N	Mean	SD	N	Mean	SD	p-value
Report rate (per 1000 children)							
All reports	20	54.08	25.00	30	47.60	24.09	0.36
Substantiated report rate	20	10.67	6.89	30	8.48	4.63	0.18
Substantiated/Indicated report rate	20	11.00	6.92	30	8.76	4.59	0.17
Unsubstantiated report rate	20	33.54	16.02	30	28.15	16.77	0.26
Unsubstantiated/Alternative report rate	20	41.55	19.64	30	37.38	20.59	0.48
Report rate by source (per 1000 children)							
Education personnel	20	10.08	4.22	30	7.60	4.71	0.06
Law enforcement personnel	20	9.92	4.61	30	8.02	5.07	0.19
Social service, medical and mental health personnel	20	13.49	9.61	30	9.67	5.19	0.08
Parents	20	3.58	1.98	30	3.33	2.59	0.71
Other sources	20	17.00	8.10	30	18.97	13.85	0.57
Report by child maltreatment type (per 1000 children)							
Physical abuse (substantiated)	20	1.64	1.04	30	1.48	1.08	0.62
Neglect (substantiated)	20	8.24	5.76	30	5.50	3.89	0.05
Other maltreatment types (substantiated)	20	1.30	1.43	30	1.81	2.11	0.35
Service use rate (per 1000 children)							
Post-investigation services	13	8.99	7.13	21	12.52	9.87	0.27
Substance abuse services	9	1.61	1.89	14	1.04	1.13	0.38
Mental health services	10	1.23	1.58	14	2.53	3.81	0.32
Family preservation services	11	1.89	2.54	17	3.23	4.94	0.42
Foster care services	12	3.00	1.44	22	3.56	1.95	0.39
State characteristics							
Age 0-17	20	23.7%	2.12%	30	24.8%	2.07%	0.07
Age 18-24	20	9.7%	0.53%	30	9.5%	0.70%	0.41
Age 25-44	20	26.8%	2.59%	30	25.9%	1.08%	0.11
Age 45-64	20	27.1%	2.14%	30	26.5%	1.85%	0.34
Age 65+	20	12.8%	1.59%	30	13.2%	1.69%	0.35
Female	20	50.9%	0.88%	30	51.0%	0.71%	0.71
Male	20	49.1%	0.88%	30	49.0%	0.71%	0.71
White	20	81.0%	11.27%	30	80.1%	15.73%	0.84
Black	20	10.2%	11.45%	30	12.2%	10.87%	0.53
Hispanic	20	14.2%	12.18%	30	7.4%	7.41%	0.02
No Bachelor's degree	20	71.1%	6.73%	30	76.5%	4.12%	<0.01
Bachelor's degree or above	20	28.9%	6.73%	30	23.5%	4.12%	<0.01
Gross State Product (in 2023 $)	20	500725	630155	30	324905	344638	0.21

Democratic governor	20	50.0%		30	50.0%		1.00
Medicaid expansion	20	0.0%		30	0.0%		
Paid family and medical leave policies	20	10.0%		30	0.0%		0.08
Paid sick leave mandate	20	5.0%		30	0.0%		0.22
Paid time off mandate	20	0.0%		30	0.0%		
Prescription Drug Monitoring Program	20	80.0%		30	80.0%		1.00
AFDC/TANF benefit for 4-person family (in 2023 $)	20	810	241	30	593	214	<0.01
Medicaid income threshold for children 6-18 (relative to FPL)	20	1.6	0.6	30	1.5	0.7	0.58
Medicaid income threshold for parents (relative to FPL)	20	1.2	0.6	30	0.7	0.5	<0.01

Note: The statistics apply to state-level observations in 2010 for states that implemented a recreational cannabis law between 2010 and 2022 (21 RCL states) and states that did not (30 non-RCL states). One of the RCL states – Oregon – did not submit data for FY2010, leaving 20 observations for RCL states in 2010, including DC. The last column reports the p-values of t-tests for equal means between RCL and non-RCL states. The data sources are the National Child Abuse and Neglect Data System child files 2010 (for report and service rates) and Current Population Survey 2010 (state characteristics) for 50 states and DC. RCL=recreational cannabis law. SD=standard deviation. AFDC= Aid to Families with Dependent Children. TANF= Temporary Assistance for Needy Families. FPL= federal poverty line.

Table 2. The estimated effect of state recreational cannabis laws on child maltreatment-report rates, 2010-2022

Specifications:	(1)	(2)	(3)	(4)	(5)
Panel A					
Recreational cannabis law	-0.832	-2.939	-1.791	-2.644	-2.013
	(4.270)	(2.943)	(2.915)	(3.064)	(2.887)
N	662	662	660	660	660
Weights	No	Yes	Yes	Yes	Yes
Covariates	No	No	Yes	Yes	Yes
Medical cannabis law	No	No	No	Yes	Yes
One-year lag	No	No	No	No	Yes
Pre-treatment mean¥	53.246	53.246	53.246	53.246	56.068
Panel B					
Operating dispensary	-0.057	-1.235	0.386	0.399	0.850
	(5.167)	(3.134)	(2.751)	(2.877)	(2.702)
N	662	662	660	660	660
Weights	No	Yes	Yes	Yes	Yes
Covariates	No	No	Yes	Yes	Yes
Medical cannabis law	No	No	No	Yes	Yes
One-year lag	No	No	No	No	Yes
Pre-treatment mean¥	57.539	57.539	57.539	57.539	61.412

Note: The coefficient estimates, standard errors (in parentheses), and number of observations used (not adjusted by weights) arise from models estimating the effect of recreational cannabis laws on state-level annual child maltreatment reports between 2010 and 2022, based on a two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the National Child Abuse and Neglect Data System child files. Specification (1) includes state and year fixed effects. Specification (2) uses state children population as weights. Specification (3) adds state characteristics as covariates, including age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree. Specification (4) adds a medical cannabis law as a control. Specification (5) uses a one-year lag in the implementation of the recreational cannabis law. The standard errors are clustered at the state level.

¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.

Table 3. Heterogeneity by substantiation in the estimated effect of state recreational cannabis laws on child maltreatment report rates, 2010-2022

Outcomes:	All reports	Substantiated	Substantiated or indicated	Unsubstantiated	Unsubstantiated or alternative
Panel A					
Recreational	-2.644	-0.717	-1.496	-1.618	-1.301
cannabis law	(3.064)	(0.670)	(0.983)	(2.263)	(2.644)
N	660	660	660	660	660
Pre-treatment mean¥	53.246	9.815	10.373	29.976	41.264
Panel B					
Operating dispensary	0.399	-0.345	-1.036	-1.077	1.602
	(2.877)	(0.502)	(0.753)	(2.126)	(2.727)
N	660	660	660	660	660
Pre-treatment mean¥	57.539	10.525	11.027	34.113	44.884

Note: The coefficient estimates, standard errors (in parentheses), and number of observations used (not adjusted by weights) arise from models estimating the effect of recreational cannabis laws on state-level annual child maltreatment reports between 2010 and 2022, based on two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the National Child Abuse and Neglect Data System child files. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The standard errors are clustered at the state level. All reports, substantiated, substantiated/indicated, unsubstantiated, and unsubstantiated/alternative are per 1000 children.

¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.

Table 4. The estimated effect of state recreational cannabis laws on child injury--related death rates, 2010-2022

Outcome:	Deaths
Recreational cannabis law	-0.093***
	(0.030)
Observations	662
Pre-treatment mean¥	2.163

Note: The coefficient estimates, standard errors (in parentheses), and number of observations used (not adjusted by weights) arise from models estimating the effect of recreational cannabis laws on state-level annual child injury- and homicide-related deaths between 2010 and 2022, based on two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the Centers for Disease Control and Prevention WONDER data. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The standard errors are clustered at the state level. Deaths are per 1000 children.

***= statistically different from zero at the 1%.

¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption

Table 5. The effect of state recreational cannabis laws on child maltreatment-reports per 1000 children using alternative difference-in-differences estimators, 2010-2022

Estimator:	TWFE	Callaway & Sant'Anna	DCDH	Wooldridge	BJS	Stacked DID
Panel A						
Recreational cannabis law	-1.737	6.129	-0.667	-2.644	-2.644	-0.295
	(2.487)	(6.003)	(0.459)	(2.528)	(2.051)	(1.916)
N	660	538	340	660	660	1892
Pre-treatment mean¥	53.246	53.246	53.246	53.246	53.246	53.246
Panel B						
Operating dispensary	0.226	-4.827	0.006	0.399	0.399	0.097
	(2.799)	(4.421)	(0.571)	(2.203)	(1.510)	(1.813)
N	660	583	402	660	660	2276
Pre-treatment mean¥	57.539	57.539	57.539	57.539	57.539	57.539

Note: The estimated effect of recreational cannabis laws on child-report rate, standard errors (in parentheses), and number of observations used (not adjusted by weights) between 2010 and 2022 using two-way fixed effect (TWFE), Callaway & Sant'Anna, de Chaisemartin and D'Haultfoeuille (DCDH), Wooldridge, Borusyak et al (BJS), and stacked DID procedures. The data source is the National Child Abuse and Neglect Data System child files. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The stacked difference-in-differences specification includes state-by-cohort and year-by-cohort fixed effects. The standard errors are clustered at the state level.

¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.

Table 6. The effect of state recreational cannabis laws on total child maltreatment-reports per 1000 children using alternative samples and specifications

Specifications:	Full sample (1)	Additional controls (2)	Pre-pandemic years (3)	Excluding sexual abuse-related reports (4)
Panel A				
Recreational cannabis law	-2.644	1.670	-3.381	-2.512
	(3.064)	(2.485)	(3.220)	(2.961)
N	660	660	507	660
Pre-treatment mean¥	53.246	53.246	62.349	49.794
Panel B				
Operating dispensary	0.399	3.673	-0.308	0.401
	(2.877)	(3.025)	(3.294)	(2.796)
N	660	660	507	660
Pre-treatment mean¥	57.539	57.539	68.532	54.058

Note: The coefficient estimates, standard errors (in parentheses), and number of observations used (not adjusted by weights) arise from estimating the effect of recreational cannabis laws on child maltreatment reports, based on a two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the National Child Abuse and Neglect Data System child files. The regressions include medical cannabis laws, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and year fixed effects. The standard errors are clustered at the state level. Specification (1) is the baseline model using 2010-2022 observations. Specification (2) includes the following state characteristics and policy variables as additional controls — Gross State Product, Democratic governor, state Medicaid expansion status, paid family and medical leave policy, paid sick leave mandate, paid time off mandate, Prescription Drug Monitoring Program, AFDC/TANF benefit for 4-person family, Medicaid income threshold for children aged 6-18, and Medicaid income threshold for parents. Specification (3) uses 2010-2019 observations only. Specification (4) excludes sexual abuse and sex trafficking reports and the dependent variable is the non-sex-related report rates. AFDC= Aid to Families with Dependent Children. TANF= Temporary Assistance for Needy Families.

¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.

Appendix

Table A1. The effect of a state recreational cannabis law on cannabis use outcomes among adults 21 years and older with children in the household, Behavioral Risk Factor Surveillance Survey 2017-2022

	Any cannabis	Days of cannabis use	Use cannabis 20+ of the past 30 days	Smoke cannabis	Non-smoke cannabis	Medical	Medical & recreational	Recreational
Recreational cannabis law	0.020***	0.403***	0.011**	-0.031***	0.013*	0.008*	-0.001	0.011**
	(0.005)	(0.133)	(0.005)	(0.007)	(0.007)	(0.004)	(0.006)	(0.005)
N	122621	122621	122621	79390	79390	107312	107312	107312
Pre-treatment mean¥	0.116	1.999	0.057	0.088	0.020	0.022	0.046	0.044

Notes: This table reports coefficient estimates, standard errors (in parentheses), and number of observations used in estimating the effect of a recreational cannabis law on cannabis use, based on two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the Behavioral Risk Factor Surveillance Survey (BRFSS), 2017-2022. The regressions include medical cannabis law, individual characteristics (age, race, ethnicity, and education), state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), and state and month-year fixed effects. The regressions are weighted by BRFSS survey weights. The standard errors are clustered at the state level.

***; **; and * = statistically different from zero at the 1%, 5%, and 10% level, respectively.

¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.

Table A2. Years and states with valid past 30-day cannabis use measure information used in the analysis: Behavioral Health Risk Favor Surveillance Survey 2017-2022

Outcome variable	Years in which question is asked	States reporting information
Any cannabis use **Number of days used cannabis** **Use cannabis on 20 days**	2017-2022	Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Kentucky, Maryland, Minnesota, Mississippi, Montana, North Dakota, Nebraska, New Hampshire, New Mexico, Ohio, Rhode Island, South Carolina, Tennessee, Utah, Virginia, Wisconsin, West Virginia, and Wyoming
Smoked cannabis **Use cannabis in non-smoked form**	2017-2021	Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Kentucky, Maryland, Minnesota, Mississippi, Montana, North Dakota, New Hampshire, Ohio, Rhode Island, South Carolina, Tennessee, Utah, West Virginia, and Wyoming
Use cannabis for medical use **Use cannabis for recreational use** **Use cannabis for medical and recreational use**	2017-2020 & 2022	Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Kentucky, Maryland, Minnesota, Mississippi, Montana, North Dakota, New Hampshire, Ohio, Rhode Island, South Carolina, Tennessee, Utah, Vermont, West Virginia, and Wyoming

Notes: This table reports the years and states with cannabis use information used in the analysis. The data source is Behavioral Risk Factor Surveillance Survey. The following recreational cannabis law adopting states are always treated 2017-2022 and are thus excluded from the analysis: Alaska, California, DC, Maine, Massachusetts, Nevada, Oregon, and Washington.

Table A3. Effect of RCL on cannabis-related treatment episodes per 1000 population, Treatment Episode Dataset 2010-2022

Outcome:	All episodes	Criminal legal system referred episodes	Non-criminal legal system referred episodes
Recreational cannabis law	-0.123*	-0.075**	-0.048
	(0.065)	(0.031)	(0.044)
N	644	644	644
Pre-treatment mean¥	0.574	0.308	0.266

Note: Not all states report data in all years. This table reports coefficient estimates, standard errors (in parentheses), and number of observations used in estimating the effect of a recreational cannabis law on cannabis-related treatment episodes, based on two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the Treatment Episode Database, 2010-2022. The regressions include medical cannabis law, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), state and year fixed effects. The regressions are weighted by state population 21 years and older. The standard errors are clustered at the state level. The treatment episode rates are numbers of episodes per 1000 population. The cannabis-related treatment episode rate is the sum of residential, hospital, and outpatient rates.
**, * represent statistical significance levels of 5%,10% respectively.
¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.

Table A4. The effect of a state recreational cannabis law on cannabis-related arrests per 1000 population: Uniform Crime Reporting Program Data, 2010-2020

Outcome:	Cannabis sales	Cannabis possession	Cannabis-related (sales or possession)
Recreational cannabis law	-0.082**	-0.338	-0.420*
	(0.037)	(0.242)	(0.217)
N	155977	155977	155977
Pre-treatment mean¥	0.163	1.735	1.898

Note: This table reports coefficient estimates, standard errors (in parentheses), and number of observations used in estimating the effect of recreational cannabis laws on cannabis-related arrest rates at agency-year level, based on a two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the Jacob Kaplan's Concatenated Files of the Uniform Crime Reporting Program Data, 2010-2020. The regressions include medical cannabis law, state characteristics (age composition, percentages of males, black people, Hispanic people, people with a Bachelor's degree), state and year fixed effects. The regressions are weighted by agency population. The standard errors are clustered at the state level. The arrest rates are number of arrests per agency per 1000 population. The cannabis-related arrest rate is the sum of sales and possession arrest rates.
**, * represent statistical significance levels of 5%,10% respectively.
¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.

Table A5. The effect of a state recreational cannabis law on health outcomes among adults 21 years and older with children in the household, Behavioral Risk Factor Surveillance Survey 2010-2022

Outcome:	Fair or poor health	Days in bad mental health in the past 30 days	Days in bad physical health in the past 30 days
Recreational cannabis law	-0.015***	-0.362***	-0.211***
	(0.004)	(0.141)	(0.078)
N	1395183	1380605	1380037
Pre-treatment mean¥	0.138	4.125	3.010

Note: This table reports coefficient estimates, standard errors (in parentheses), and number of observations used in estimating the effect of a recreational cannabis law on health outcomes, based on two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the Behavioral Health Risk Surveillance Survey, 2010-2022. The regressions include medical cannabis law, individual characteristics, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), state and month-year fixed effects. The regressions are weighted by Behavioral Health Risk Surveillance Survey sample weights. The standard errors are clustered at the state level.
*** represents statistical significance levels of 1%.
¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.

Table A6. The effect of a state recreational cannabis law on economic outcomes among adults 21 years and older with children in the household, American Community Survey 2010-2022

Outcome:	Coefficient estimate (Standard error)
Total family income ($)	2676***
	(688)
N	11079740
Pre-treatment mean¥	62514
Personal income ($)	6930***
	(1822)
N	11079740
Pre-treatment mean¥	138595
Earnings from wages and salaries ($)	2484***
	(655)
N	11079740
Pre-treatment mean¥	52582
Employed (0/1)	0.001
	(0.001)
N	8202294
Pre-treatment mean¥	0.948
Usual hours worked (hours)	0.108
	(0.066)
N	11079740
Pre-treatment mean¥	29.740

Note: This table reports coefficient estimates, standard errors (in parentheses), and number of observations used in estimating the effect of a recreational cannabis law on social and economic outcomes, based on two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the American Community Survey, 2010-2022. The regressions include medical cannabis law, individual characteristics, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), state and year fixed effects. The regressions are weighted by American Community Survey sample weights. The standard errors are clustered at the state level.
*** represents statistical significance levels of 1%.
¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.

Table A7. The effect of a state recreational cannabis law on social outcomes among adults 21 years and older with children in the household, American Community Survey 2010-2022

Outcome:	Coefficient estimate (Standard error)
Public assistance (0/1)	-0.002**
	(0.001)
N	11079740
Pre-treatment mean¥	0.022
Medicaid coverage (0/1)	0.017**
	(0.007)
N	11079740
Pre-treatment mean¥	0.189
Divorced in the past year	-0.003
	(0.003)
N	10048951
Pre-treatment mean¥	0.010
Family income below the Federal Poverty Level (0/1)	-0.002
	(0.002)
N	11079740
Pre-treatment mean¥	0.091

Note: This table reports coefficient estimates, standard errors (in parentheses), and number of observations used in estimating the effect of a recreational cannabis law on social and economic outcomes, based on two-stage difference-in-differences procedure (Gardner et al., 2024). The data source is the American Community Survey, 2010-2022. The regressions include medical cannabis law, individual characteristics, state characteristics (age composition, percentages of males, people who are Black, people who are Hispanic, and people with a Bachelor's degree), state and year fixed effects. The regressions are weighted by American Community Survey sample weights. The standard errors are clustered at the state level.
** represents statistical significance levels of 5%.
¥Pre-treatment mean is measured over the year prior to recreational cannabis law adoption.