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# Before and after out-of-home placement: Child health, education and crime

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**Abstract**

We investigate the short-term impact of the first placement in out-of-home care on child health, schooling and crime. Using administrative data and an event study, we document the development in outcomes for the average child in care. We find that primary health care utilization rises temporarily when entering care before returning to pre-intervention levels. School absenteeism and criminal charges decline markedly after placement and remain lower than pre-placement levels within two years of placement. Using monthly data, we infer that the decision to place a child in care may be triggered by acute events such as hospitalization or criminality.

Key words: Child protection, health, schooling, crime, event study

JEL codes: H75,I14,I21,I38,J12,J13

# 1 Introduction

Family dysfunction, child neglect and maltreatment can have devastating consequences for child cognitive and noncognitive development, health and well-being (Doyle 2007; Doyle 2008, 2013; Paxson and Waldfogel 2002; Currie and Tekin 2012). Recent research suggests that these effects carry over to negative long-run impact on education, employment, and risky behaviors when children reach adulthood (Almond, Currie, and Duque 2018; Currie and Widom 2010; Widom 1989).

Most Western countries have established child protection programs to improve equity in conditions and secure basic rights and safety for at-risk children. The number of children placed in out-of-home care is non-negligible: In many Western countries, including both the US and a Nordic welfare state such as Denmark, an average of around 1 percent of a child cohort is at any time placed in care, and 5-6 percent of children will experience some type of out-of-home placement before they turn 18 (Bald et al. 2022b; Ejrnæs and Gørtz 2017a; Turney and Wildeman 2016); rates are similar for other countries (Rouland and Vaithianathan 2018; Yi, Edwards, and Wildeman 2020).[1]

Children who receive child protective services are more likely to experience homelessness, delinquency, unemployment and chronic health conditions than other children later in life, and they have poorer educational outcomes (Doyle and Aizer 2018; Lindquist and Santavirta 2014; Vinnerljung et al. 2006). In order for society to make the correct decisions on whom to place in foster care and whom to offer preventive family-oriented measures, a better understanding of the causal effects of out-of-home care is essential. However, as a consequence of non-random selection into treatment and the challenges of defining a relevant control group for children placed in care, evidence on the causal effects of out-of-home care is sparse. Given the obvious ethical concerns related to randomizing treatments to at-risk children, studies evaluating the effects of foster care instead rely on

1. On top of the obvious welfare consequences for individuals involved, out-of-home placement is also a very costly intervention. Cavalca, Ejrnæs, and Gørtz 2022 find that the average public cost for a child in institutional care amounted to more than 150,000 Euro annually in 2016, while the cost of a foster family was around 68,000 Euro annually. By comparison, the average annual public expenditure per pupil in municipality-driven public schools was around 11,000 in the same year.

observational data.[2]

Our paper provides important contributions to the literature on the consequences of out-of-home placements on several dimensions. *First*, we contribute to the literature by using an event study approach to estimate the effects for the *average* child of the first placement in out-of-home care on a wide range of outcomes covering health care use, schooling outcomes, and criminal behavior of children in a period preceding (two years before) and following (two years after) their first out-of-home care placement. *Second*, our rich data allows us to construct a control group of children that were placed in care for the first time three years after the treatment group and thus share very similar (unobserved) background characteristics. This allows us to estimate implications of foster care that can, under strong assumptions about parallel pre-trends, be given a causal interpretation. *Third*, exploiting an extraordinarily rich population-wide longitudinal data with monthly observations from the Danish administrative registers, we trace out the dynamic trajectories of outcomes for all children placed for the first time in out-of-home care when they were between 4 and 17 years old at the time of placement in the years between 2013-2016 in Denmark (around 20,000 children). This allows us to look at the development leading up to the placement, and thereby shed light on which events are likely to trigger a placement. *Fourth*, we compare the development around the first out-of-home placement with less invasive preventive interventions to investigate if preventive action can lead to improved health, schooling and crime outcomes. *Finally*, our rich administrative data allows us to dive deeper into the mechanisms driving the observed patterns. For example, inspecting the changes in health care at a very detailed diagnosis level, we can pinpoint the roots of health changes. Moreover, we can follow schooling not only on the extensive margin (enrolled or not), but also on the intensive margin (absenteeism). And we are able to zoom in on risk-seeking behavior in terms of criminal activity, hospitalizations due to poisoning etc.[3]

2. Note that we use the terms foster children and children in out-of-home care interchangeably throughout the paper.

3. We observe number of visits to the general practitioner (GP), share of children using prescription drugs (at detailed ATC code level), the share of children hospitalized to either a somatic or psychiatric hospital (using detailed ICD10 diagnosis codes), share of children enrolled in primary school, the rate of school absenteeism for enrolled children, and juvenile delinquency measured by criminal charges (for the

Our event study yields several noteworthy insights. We find that primary health care utilization (GP visits) rises temporarily for the average child entering care before steadily returning to pre-intervention levels. The share of children receiving prescription drugs follows a similar pattern but remains significantly higher two years after placement than before, suggesting a sustained improvement in access to treatment. Detailed health records indicate that this increase primarily reflects better engagement with health services, such as vaccinations, rather than deteriorating health. In parallel, school absenteeism declines markedly immediately after the first placement and remains about 15 percentage points lower than pre-placement levels after two years. We also observe that criminal charges decrease steadily by roughly 6 percentage points within two years of the initial placement. Importantly, hospitalizations exhibit a distinct pattern: a sharp spike occurs around the time of placement. Although less pronounced, there is also a clear increase in criminal charges shortly before placement. These patterns suggest that, in some cases, the decision to place a child into care may be triggered by acute events such as hospitalization or involvement with the criminal justice system.

Causal identification in an event study relies on the assumption that the exact timing of the treatment is independent of child outcomes. Our event study demonstrates that this assumption does not always hold when observing the entire group of children in out-of-home care. For example, we observe non-parallel pre-trends between treatment and control group for hospitalizations and schooling outcomes. While a small group of children (around 10%) carry a high risk of mental disease already before being placed, the majority, however, do not suffer from such extraordinarily heightened risk levels. When focusing on the large subsample (around 90%) of children with no prior mental health condition, we are able to obtain a better match of the treatment and control groups. In this case, most outcomes exhibit as good as parallel pre-trends, implying that the event study design becomes more useful in documenting effects of placement that may be given a causal interpretation. We confirm that this (majority) group of children had more GP visits and prescription purchases after their first placement, indicating better

older children).

care. Although we observe a temporary decline in school enrollment up to 12 months after placement, there is an immediate reduction in absenteeism (conditional on enrollment) after placement.

Our results further display substantial heterogeneity in the effects of being placed in out-of-home care, suggesting that the implications of treatments are complex and depend on the individual child's age, gender, and care type (foster family or institution). Generally, we find that girls experience stronger consequences for health care use than boys, while boys experience stronger effects on criminal charges.

Our event study results concern the *average* implications of out-of-home care for a large group of children, including both children facing severe family-related risks and children from whom a less drastic intervention, such as preventive action, might have been an alternative. However, a relevant policy question is whether out-of-home care produces positive outcomes for the *marginal* child. Our event study does not provide an answer to this question. In order to shed some light on the trajectories for children for whom less invasive alternatives may be relevant, we instead estimate the effects of the first preventive action initiated for a child using again the event study approach. The estimated results for the effects of preventive action point in the same direction as the effects of out-of-home care for most outcomes, except GP visits, but the effect sizes are in most cases considerably smaller. While GP visits go down in the first and second year after receiving preventive care (i.e. the opposite effect of out-of-home placement), preventive care is associated with more use of prescription medicine in the first year, a reduction in hospital visits (both somatic and psychiatric), a reduction in school enrollment but also in absenteeism, and a reduction in criminal charges. For somatic hospitalizations, the change is in fact stronger for preventive actions than for out-of-home placements.

Our paper contributes to a small but growing literature on the effects of out-of-home placements. Several studies, starting with Doyle (2007), have relied on the quasi-random assignment of cases to child protection investigators and judges with differential propensities to placement to identify the causal effects for the *marginal* child in foster care. These studies point to mixed evidence on the effect of the marginal out-of-home placement, de-

pending on data and institutional context. Doyle finds an increase in juvenile as well as adult delinquency, and no effect on health outcomes (Doyle 2007; Doyle 2008, 2013) using data for Illinois. A few recent studies, on the contrary, find positive effects of foster care on schooling (Baron and Gross 2022; Bald et al. 2022a; Roberts 2019). For criminality, Baron and Gross (2025) find a reduction in juvenile petitions using data for Michigan, whereas Helénsdotter (2024) finds an increase in convictions for young people in Sweden. Warburton et al. (2014), on the other hand, finds no effects on criminal behavior, but a reduction in graduation rates and an increase in welfare receipts for Canadian boys in foster care. A few studies looking at the *average* treatment effect of placement rather than the local average treatment effect point to zero results of foster care placement on outcomes such as cognitive skills, behavior problems, and criminality (Berger et al. 2015; Lindquist and Santavirta 2014). Our analysis provides important new evidence on a relatively high-quality type of out-of-home placement, which may differ in scope in comparison to some of the treatments evaluated in the previous literature.

The paper is organized as follows. Section 2 explains the institutional setting around child protection in Denmark. Section 4 describes the data, and section 3 discusses our methodological approach. Section 5 presents the results of our empirical analyses, and section 6 concludes.

# 2 Institutional setting

The overall goal of Danish child protection laws is to support at-risk children in attaining "the same opportunity for personal development, health and an independent adult life as their peers".[4] The child protection responsibility lies with the municipalities, which can draw on a range of interventions from various preventive measures to placement in out-of-home care as the most drastic intervention. In principle, out-of-home care is intended to be a temporary arrangement, implying that reunification with the child's parents should be sought when possible. In practice, less than one third of children in out-of-home care return to their biological parents before age 18, and the rest "age out" of care at age 18 or

4. Law on Social Services, Ch. 11, Paragraph 46

over. Out-of-home placements are primarily for the 0-17 year-olds, but in some cases, the municipality extends the placement up to the age of 22. Around two thirds of children are placed in a foster family, while a third live in institutional care.[5] Note that in this paper we use the term foster children to refer to children in all types of out-of-home care. Many children transition from one type of care into another; on average, children experience 1.4 placements.

A report from daycare workers, school teachers, nurses, doctors, or a neighbor will instigate a municipal investigation into potential child neglect or abuse. Such an investigation takes a general view on the child's situation, investigating the child's behavior, development, health, school and family situation. The investigation draws on the assessment by relevant experts and professionals, and the parents and children aged 15 and above are also heard during the process. An investigation should be concluded within four months of being opened. As a result of the investigation, municipalities can either conclude that there is no reason for intervention, or it can initiate preventive care measures or a placement. Survey evidence from Copenhagen (Ejrnæs and Gørtz 2017a) suggests that the most common reasons for placing a child in out-of-home care are parental neglect (50 percent) and child externalizing behavior and social adjustment issues (33 percent). Less frequent reasons are violence or threats of violence (10 percent) or sexual abuse (2 percent). The municipal council (which consists of elected local politicians) is responsible for the decision to place a child in out-of-home care and parents can appeal such decisions to the National Social Appeals Board (Svendsen 2017). In grave child abuse cases where a decision is made to acutely place a child into care (without parental consent), a child welfare investigation must be completed within two months of the placement.

An out-of-home placement can also be initiated following various preventive measures. On average, around 55 percent of all children in our register data sample are placed in out-of-home care without any previous preventive measures. Conditional on having received preventive measures before a placement in out-of-home care, the average duration from the first month of a preventive measure to the first placement is around two years.

5. Own calculations on register data, see Data section for details.

Children in care are expected to be enrolled in primary school. Children enroll in school year they turn 6. Primary school extends until age 15 (i.e. no "tracking" and no middle school).

# 3 Empirical strategy

To structure our discussion of the impact of the first placement, we use the framework of Freyaldenhoven, Hansen, and Shapiro (2019). Let $z_{is}$ be an indicator for the first placement of child $i$ in out-of-home care in period $s$. We assume that the decision about placement of a child is initiated if the risk of the child's safety and health exceeds a threshold. Let $\eta_{is}$ be a measure of the child's general risk and $\eta^*$ the threshold. The indicator for placement is given by $z_{is} = 1(\exists s^* \geq s : \eta_{is} \geq \eta^*)$, such that the child $i$ is in out-of-home care in period $s$ if $z_{is} = 1$. We now consider the outcome $Y_{is}$, e.g., the health or school outcome for the child, and assume that it is affected not only by the placement decision but also by the underlying risk to the child:

$$Y_{is} = \beta z_{is} + \lambda \eta_{is} + \epsilon_{is}. \tag{1}$$

We assume strict exogeneity of the placement with respect to $\epsilon_{is}$. In this model $z_{is}$ is endogenous if $\lambda \neq 0$ and $\eta_{is}$ is unobserved. If $\eta_{is}$ is observed, we can solve the endogeneity problem by controlling for $\eta_{is}$.

In the event study framework, we introduce an additional time variable: the event time $t$, which is defined as the time to placement such that $t = 0$ in the first period that the child is placed in out-of-home care. We index all periods relative to that period such that e.g. $t = -1$ corresponds to one month prior to placement. In the baseline specification, we consider the development for children placed in care from 24 months prior to their first out-of-home placement to 24 months after. We study the evolution of a set of child health and schooling outcomes across event time, focusing on high-frequency outcomes that are available on a monthly basis.

If $\eta_{is}$ is unobserved, we would expect to see a trend in the outcome variable prior to

the first placement (see Freyaldenhoven, Hansen, and Shapiro (2019)). A large spike or dip in the outcome variable around the time of the first placement may also suggest that the outcome in itself can trigger a placement, e.g., charges of crime or hospitalization. Therefore, it is also important to consider the dynamics of the outcome leading up to the placement. More information about this process may also allow us to determine which outcomes could potentially impact the decision about a placement.

To account for the potential trend in the outcome variable we introduce a control group. Following Fadlon and Nielsen (2019), we use as a control group children that are placed in out-of-home care 36 months later.[6]

We estimate the level change in the average outcome for foster children relative to the month before placement, controlling for age, year and month fixed effects. We model the outcome of interest, $Y_{iymt}$, for individual $i$, in year $y$, in month $m$, at event time $t$ in a non-parametric event study as follows:

$$Y_{iymt} = \sum_{s \neq -1} \alpha_s \cdot \mathbf{I}[s = t] + \sum_{s \neq -1} \beta_s \cdot \mathbf{I}[s = t] \cdot D_i + \kappa D_i + \delta_{age} + \tau_y + \gamma_m + \lambda \eta_{imt} + \epsilon_{imt}. \quad (2)$$

The first term on the right hand side reflects the full set of event time dummies, where $t = -1$ is left out such that the remaining event time coefficients represent the difference in outcomes with respect to the month prior to placement. The second term contains event dummies interacted with a dummy for the treatment group $D_i$. Our main parameter of interest, $\beta$, measures the effect of the placement relative to the control group for each time period $s$. The model further includes age dummies ($\delta$), year dummies ($\tau$) and month dummies ($\gamma$) to control for underlying age and time effects. The three sets of dummies are all identified in the model due to variation in the age and the calendar time at which children experience their first placement. $\lambda \eta_{imt} + \epsilon_{imt}$ reflects the combined error term, following the general framework presented in Equation 1.

6. We compare the dynamic trajectory of child outcomes 24 months before and 24 months after placement. By explicitly using a control group that is placed later, we avoid using already treated units as a control, which has been mentioned as a problem in the recent discussion about staggered Difference-in-Difference. See Callaway and Sant'Anna (2021), and Goodman-Bacon (2021).

In order to measure the average effects over the 24 months following placement, we conducted a staggered Difference-in-Differences analysis comparing the pre-treatment period to the first and the second year after treatment. The estimation equation is given by:

$$\begin{aligned} Y_{imt} = \beta_0 &+ \alpha_1 \cdot treat_i + \alpha_2 \cdot post_{0-12} + \alpha_3 \cdot post_{13-24} + \alpha_4 \cdot post_{25-35} \\ &+ \beta_1 \cdot post_{0-12} \cdot treat_i + \beta_2 \cdot post_{13-24} \cdot treat_i + \beta_3 \cdot post_{25-35} \cdot treat_i \\ &+ \delta_{age} + \tau_y + \gamma_m + \lambda \eta_{imt} + \epsilon_{imt}, \end{aligned} \tag{3}$$

where $post_{0-12}$, $post_{13-24}$ and $post_{25-35}$ are dummy variables for one, two and three years after treatment.[7]

To circumvent the concern about staggered Difference-in-Differences raised in Goodman-Bacon (2021), the estimates are obtained by only comparing the outcome of treated individuals with not yet treated individuals (treated three years later). The fundamental identification assumption behind this method is the parallel trends assumption, which entails that, in the absence of treatment, the two groups would have followed similar (i.e., parallel) trends in the outcome (Kahn-Lang and Lang 2020). For a causal interpretation of the estimates from the non-parametric event study or the staggered Difference-in-Differences estimation, the exact timing of first placement in out-of-home care should thus be uncorrelated with the outcome conditional on being placed in care, and on time and age effects. We are aware that this is a very restrictive assumption and will only make causal interpretations when we can justify that the assumption is fulfilled.

In the main graphs we present the non-parametric event time coefficients as estimated in model 2. To test the robustness of the main results from the event study, we estimate the impact of foster care on child outcomes using an alternative approach where we estimate model (2) without a control group and with individual fixed effects, following Bindler and Ketel (2022), Borusyak, Hull, and Jaravel (2024) and Miller (2023). The robustness analysis is presented in Appendix C.

7. In the empirical analyses we focus on the estimates of the two first years as the control group of the not yet treated individuals potentially could started to be affected one year before their placement.

# 4 Data

The analyses presented in the following sections are based on a main sample consisting of monthly Danish administrative register data containing linked information on children's personal characteristics, child protective services, health care utilization, educational outcomes and criminal charges for the full population of children in Denmark. The data was available in anonymized form through Statistics Denmark's secure servers for researchers.

## 4.1 Main outcomes

We look at seven main outcomes related to the child's health, education and criminal behavior: 1) number of visits to general practitioner, 2) share of children with a prescription drug purchase, hospitalizations for 3) somatic conditions and 4) psychiatric conditions, 5) enrollment in primary school, 6) absenteeism from school, and 7) criminal charges.

We measure the *number of visits to general practitioner* as the sum of reported health services a child received in the given month. The number of visits is reported on a weekly basis and we cap the number of weekly services to +/- 5 visits (following Sundhedsdatastyrelsen (2019)). The *share of children with a prescription drug purchase* is calculated by identifying children for whom at least one prescription drug was purchased in a given month. This includes all prescription medication sold at a pharmacy or other drug store, but does not include over-the-counter medication or medication given to the patient at the hospital. We do not measure the quantity of drugs purchased since this can be hard to compare across drug types. We measure *hospitalizations* as the child having at least one inpatient or outpatient admission to a hospital. We count the hospitalization in the month that the hospitalization was initiated, independent of the duration of the stay. The ICD-10 diagnosis codes distinguish between psychiatric and somatic hospitalizations.

We measure *enrollment* in primary school for children between and including ages 7 and 15, using information for all public and private elementary schools in Denmark.[8]

8. In Denmark, there is an obligation for parents to secure that their children are taught a curriculum similar to what is taught in primary and lower secondary school, but it is not mandatory to go to school, and some parents choose home schooling. Other explanations for not being enrolled in school may be that children temporarily dropped out of school after a period of sickness, while waiting for a special school offer, after a geographical move, or as a result of institutionalization that offers alternative types

*Absenteeism* is measured conditional on enrollment as the percentage of total time the student has been absent from school as reported by the school, regardless of the reason for the absence.

*Criminal charges* are measured for children aged 15 years or older who are charged with a crime. A charge is counted in the month that the crime was committed as recorded in the criminal register.

One concern about the health variables relating to GP visits and prescription drug purchase is that for children and youth in hospitals or in prisons these measures would underestimate the health utilization. To check if this is a problem, we have for our sample of children in care (described below) calculated the average days as in hospital and prisons. Children in care are on average 0.06 days in somatic hospital and 0.02 days in psychiatric hospital per month. If we calculated the average days in prison for our sample of youth in care the number is 0.05 days per month. Given the very small number of days we do not consider the underestimation of health care utilization as a threat to our results.

## 4.2 Sample selection

Our main sample consists of all people in Denmark aged 0-24 years old in the period 2010-2018 who experienced their first placement in out-of-home care between ages 4 and 17 in the years 2013-2016.[9] We observe children 24 months before their first out-of-home care placement and 36 months after. For enrollment in elementary school, we restrict the sample to school-aged children (ages 7-15 throughout the period), and for absenteeism, the sample is restricted to the group of children who were enrolled in school throughout the period. For criminal charges, we restrict the sample to children above the age of criminal responsibility (ages 15 and above).[10] See Table 1 for descriptive statistics on the samples.

of teaching outside the normal school system. Importantly, around one in ten children do not pass the exit exams after 9th grade in Danish and math and thus leave school without having passed the final tests.

9. Out-of-home care includes foster families, institutional care but also kinship care

10. For criminal charges, we follow only 12 months before as criminal charges are only relevant for the group of children aged 15+.

Table 1: Summary Statistics - Foster children at time of placement, unbalanced samples

| | Health sample | | Enrollment sample | | Absenteeism sample | | Crime sample | |
|---|---|---|---|---|---|---|---|---|
| | mean | (sd) | mean | (sd) | mean | (sd) | mean | (sd) |
| Age | 11.21 | (5.5) | 12.25 | (2.5) | 11.99 | (2.6) | 16.04 | (0.8) |
| Girl | 0.46 | (0.5) | 0.47 | (0.5) | 0.49 | (0.5) | 0.45 | (0.5) |
| Placed in FC, no prior preventive care | 0.64 | (0.5) | 0.59 | (0.5) | 0.58 | (0.5) | 0.58 | (0.5) |
| Months from preventive care to placement | 22.68 | (20.2) | 24.44 | (21.3) | 24.53 | (21.3) | 21.64 | (19.8) |
| Placement ongoing | 0.35 | (0.5) | 0.37 | (0.5) | 0.39 | (0.5) | 0.11 | (0.3) |
| **Legal action** | | | | | | | | |
| Placement with consent | 0.82 | (0.4) | 0.86 | (0.3) | 0.84 | (0.4) | 0.90 | (0.3) |
| Placement without consent | 0.11 | (0.3) | 0.10 | (0.3) | 0.11 | (0.3) | 0.03 | (0.2) |
| Urgent placement | 0.04 | (0.2) | 0.03 | (0.2) | 0.03 | (0.2) | 0.01 | (0.1) |
| Other | 0.03 | (0.2) | 0.02 | (0.1) | 0.02 | (0.1) | 0.06 | (0.2) |
| **Placement Type** | | | | | | | | |
| Foster family care | 0.34 | (0.5) | 0.31 | (0.5) | 0.38 | (0.5) | 0.11 | (0.3) |
| Kinship care | 0.07 | (0.3) | 0.08 | (0.3) | 0.10 | (0.3) | 0.05 | (0.2) |
| Group home | 0.17 | (0.4) | 0.20 | (0.4) | 0.16 | (0.4) | 0.25 | (0.4) |
| Institutional care | 0.28 | (0.5) | 0.32 | (0.5) | 0.31 | (0.5) | 0.31 | (0.5) |
| Independent living | 0.13 | (0.3) | 0.08 | (0.3) | 0.05 | (0.2) | 0.29 | (0.5) |
| **Length of placement** | | | | | | | | |
| Duration, years | 1.47 | (1.5) | 1.93 | (1.7) | 1.92 | (1.7) | 1.03 | (0.8) |
| Spell duration, years | 1.87 | (1.6) | 2.66 | (1.8) | 2.62 | (1.8) | 1.23 | (0.8) |
| **Reason for placement** | | | | | | | | |
| Child risk/externalizing behavior | 0.74 | (0.4) | 0.79 | (0.4) | 0.76 | (0.4) | 0.84 | (0.4) |
| Child health concerns | 0.32 | (0.5) | 0.35 | (0.5) | 0.33 | (0.5) | 0.33 | (0.5) |
| Abuse/neglect of child | 0.59 | (0.5) | 0.61 | (0.5) | 0.65 | (0.5) | 0.42 | (0.5) |
| Adult risk/externalizing behavior | 0.53 | (0.5) | 0.53 | (0.5) | 0.55 | (0.5) | 0.44 | (0.5) |
| Other | 0.32 | (0.5) | 0.26 | (0.4) | 0.26 | (0.4) | 0.33 | (0.5) |
| Share of reasons due to child | 0.48 | (0.3) | 0.50 | (0.3) | 0.46 | (0.3) | 0.61 | (0.3) |
| Share of reason due to parents | 0.52 | (0.3) | 0.50 | (0.3) | 0.54 | (0.3) | 0.39 | (0.3) |
| **At end of first placement** | | | | | | | | |
| Exit before age 18 | 0.37 | (0.5) | 0.48 | (0.5) | 0.48 | (0.5) | 0.23 | (0.4) |
| New placement | 0.16 | (0.4) | 0.19 | (0.4) | 0.19 | (0.4) | 0.08 | (0.3) |
| Continued care after age 18 | 0.00 | (0.1) | 0.01 | (0.1) | 0.00 | (0.1) | 0.00 | (0.1) |
| Age out | 0.46 | (0.5) | 0.32 | (0.5) | 0.32 | (0.5) | 0.68 | (0.5) |
| N | 21,394 | | 10,749 | | 6,413 | | 8,366 | |

*Notes:* Key variables for different (unbalanced) samples, measured one year before placement. Columns (1)-(2) – health outcomes sample (children aged 4-17), columns (3)-(4) – enrollment sample (aged 6-17), columns (5)-(6) – absenteeism sample (aged 6-17), columns (7)-(8) – criminal charges sample (aged 14-17). Standard deviations in brackets.

## 4.3 Descriptive evidence

Figure 1 shows descriptive evidence on the seven outcomes: the monthly number of visits to a general practitioner, share of children with prescription drug purchase, share of children with a somatic or psychiatric hospital admission, respectively, share of children enrolled in primary school, absenteeism from primary school (conditional on enrollment) and criminal charges (for relevant age group). The figure shows the average outcomes for our foster care sample and for the control of children who were not placed in foster care in the months leading up to month 36, but who were then placed in foster care for the first time in month 36.[11] Figure 1a shows that foster children have on average 0.4 visits per month to their general practitioner 24 months prior to their first out-of-home care placement, which is close to the average of the control group. From month -24 to month -1, we see an opening of a gap between the treatment and control group, followed by a sharp increase in the average number of GP visits at the time of entry into out-of-home care, with a subsequent drop in the number of visits, but the average remains somewhat higher than before the placement in out-of-home care. When we look at prescription drug purchases, figure 1b shows a similar pattern. Prescription drugs are purchased for around 16 percent of children in each month 24 months prior to the event. A sharp increase in prescription drug purchases is observed for foster children at the time of their first placement, followed by a stabilization at around 22 percent. The two panels below show the monthly share of children who experience somatic or psychiatric hospitalization. Figure 1c shows a steady increase in somatic hospitalizations in the 24 months leading up the first placement and a distinct additional increase at the time of entry into out-of-home care. We see the same pattern, but much more pronounced, in the share with a psychiatric hospital contact shown in figure 1d. More than 3 percent of foster children have a psychiatric hospital visit around the month they are placed in out-of-home care, and the percentage stabilizes at around 2 percent following placement. While somatic

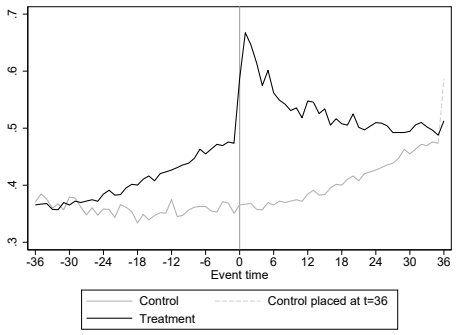
11. The dashed line indicating the change in outcomes for the control group in month 36 reflects the construction of the control group. As the control group consists of individuals placed three years after the treatment group, the trajectory of outcomes for the control group mimics the changes in outcomes for the treatment group measured exactly three years earlier. Importantly, month 36 is not included in the estimations presented in Section 5.

hospitalizations show almost parallel pre-trends leading up to a placement in out-of-home care, psychiatric hospitalizations do not exhibit parallel pre-trends for the treatment and control group.

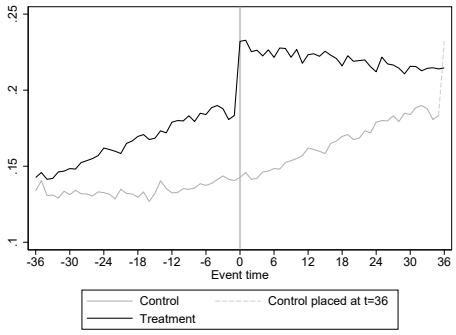
Figure 1e shows a significant decrease in the share of foster children who are enrolled in school from more than 93 percent six months before placement in out-of-home care to 90 percent six months after. As suggested by Figure 1f, there is a high rate of absenteeism among foster children at around 10-15 percent absence on average in the years leading up to placement in care. This is followed by a clear drop in absence at the time of placement to an average of around 5 percent for those enrolled throughout the period. Finally, Figure 1g shows an increasing share of children with a criminal charge among foster children in the time before the event. After placement there is a small drop, and the share remains relatively stable at around 3-4 %.

The descriptive evidence clearly documents that foster children experience large changes in most outcomes shortly before out-of-home care placement, which could mistakenly be attributed to the placement itself if only less granular data were available. Most importantly, it underlines that foster care children experienced a deterioration in most outcomes almost a year preceding their placement, especially when it comes to mental illness. In the estimations presented in 5, we compare the changes over time to the control group of children placed later in time (at month 24), as explained in 3.

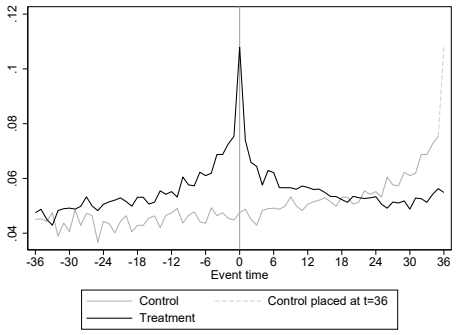
Figure 1: Descriptive graphs, monthly average



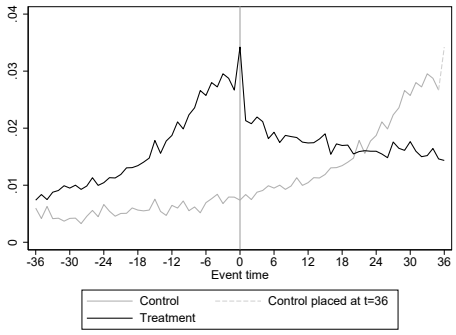

(a) Number of GP visits



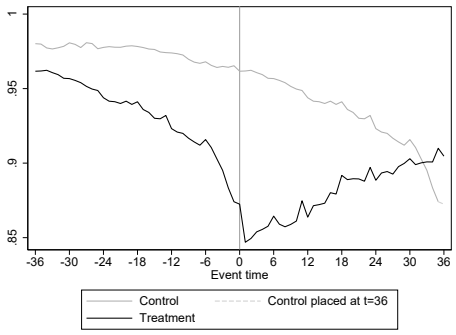

(b) Prescription drug purchase



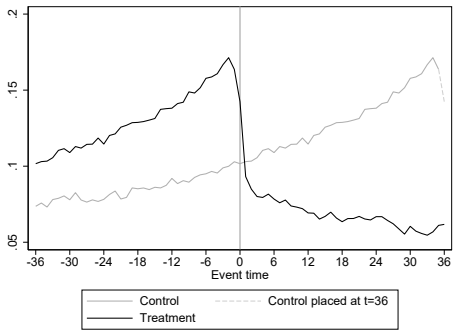

(c) Somatic hospitalization



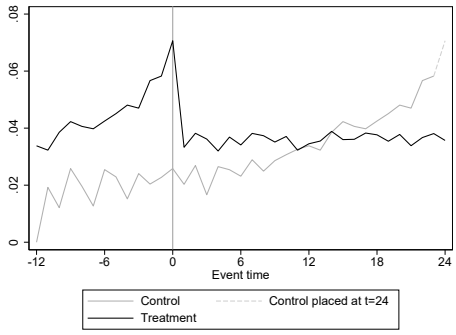

(d) Psychiatric hospitalization




(e) Enrollment




(f) Absenteeism




(g) Criminal charges

*Note:* The figures show average outcomes separately for children in the treatment and control group (see also Table 1 for sample definitions). The dashed line indicating the change in outcomes for the control group in month 36 reflects the construction of the control group. As the control group consists of individuals placed three years after the treatment group, the trajectory of outcomes for the control group mimics that of the treatment group measured exactly three years earlier.

# 5 Results

In this section, we examine the evolution of child outcomes in the years around the first out-of-home care placement in an event study. These results shed light on the average effect of the first placement in out-of-home care on child outcomes. The event study coefficients measure the level change in outcomes for children relative to the month before placement ($t = -1$), when controlling for time and age fixed effects. Figure 2 shows the estimated changes ($\beta$) in outcomes using the event study model (2) and monthly observations of outcomes for the four subsamples shown in Table 1. The advantage of having monthly event data is that we are able to zoom in on the dynamics in outcomes very close to the placement. Confidence intervals are based on robust standard errors clustered at the individual level. In order to measure the average effects over the 24 months following the first placement, we also conducted a staggered Difference-in-Differences analysis comparing the pre-treatment period to the first and second year after placement, as shown by equation (3). The results of the staggered Difference-in-Differences estimation are shown in Table 2, which quantifies the average changes in the first year (months 0-12) and second year (months 13-24) after placement compared to prior to placement.

Figure 2 shows that pre-trends are parallel for Number of GP visits (Figure 2a, Share with prescription drugs (Figure 2b), and Criminal charges (Figure 2g), but not for hospitalizations and schooling outcomes. The estimated impact in Figure 2a shows a large and statistically significant upward jump in number of visits to the general practitioner at the time of entry into out-of-home care. The increase seems to be only temporary; a year after the placement began, the number of visits to a general practitioner, conditional on age and calendar time effects, has fallen again to the pre-treatment level. Part of this temporary increase in GP visits is expected as children may be taken for a routine health visit at the time of placement. The Difference-in-Differences estimates in Table 2, column (1), indicate that general practitioner visits increase significantly in the first year after placement with 0.10 visits per month, which is equivalent to about a 20 percent increase.

A similar change is also reflected in Figure 2b, which shows a significant increase in prescription drug purchases for children at the time of placement, followed by a drop in

the years following placement in care, but to a higher level than before the placement was initiated. Two years after placement, the prescription drug purchases are 2 percentage points higher than pre-placement. According to the Difference-in-Differences estimates in Table 2, column (2), the use of prescription medicine increases by about 18 percent. For both measures (GP visits and prescription drugs) the second year effect is smaller (around 4-8 percent) but still positive and significant.

Figure 2c shows a gradual but moderate increase in somatic hospitalizations in the last 6-12 months before placement, a sharp spike at $t$=0 followed by a reduction to a level that is 4 percentage points below pre-treatment levels. When we turn to psychiatric hospitalizations, we see a strong increase in the two years leading up to a placement in out-of-home care, a spike at $t = 0$, followed by a large and continued decrease in psychiatric hospitalizations after placement in foster care, see Figure 2d. Pre-trends are not parallel for somatic and psychiatric hospitalizations; indeed the strong pre-trends and the spikes at $t = 0$ for both 2c and 2d indicate that somatic and psychiatric hospitalization may in itself be a decisive factor in initiating an out-of-home placement.[12] We are therefore cautious with any causal interpretation of the subsequent drop in hospitalizations. For hospitalizations, both somatic and psychiatric, we find small average changes in the first year according to the Difference-in-Differences estimates presented in Table 2, columns (3)-(4). In the second year, there is a significant decrease in hospitalization of between 10-30 percent compared to prior placement.

When looking at the pattern of the changes around placement for these four health outcomes taken together, it appears that the decline in health illustrated by the upward trend in hospitalizations before and at the time of placement is circumvented in the first 1-2 years after placement, where primary care services, i.e. health care provided in primary health care in combination with medicine prescribed by the GP or specialists in private practice and picked up at pharmacies, take over. It is important to note that medicine dispensed while in hospital is not reflected in the registers for prescription drugs sold at

12. In Denmark, health service staff have an obligation to report to child protection authorities on suspicion of child maltreatment. In our data, we see that among those children who are hospitalized up to 2 months before placement, 30 percent of those cases were reported to the child protection authorities.

pharmacies. Part of the increase in prescription drug purchase for e.g. mental conditions may therefore reflect a substitution from drugs given at hospitals to drugs prescribed by the GP or a specialist and picked up at the pharmacy.[13] Section 5.2 provides a more detailed look at changes in health care use by condition.

For schooling outcomes, Figure 2e shows that the share of children enrolled in primary school starts to decrease around 6 months before the time of placement; it reverts to the immediate pre-placement level within 12 months after the time of the first placement, but does not achieve the enrollment level observed 12 months before placement within the 24-month post-period. Absenteeism conditional on enrollment (see figure 2f), on the other hand, decreases sharply at the time of placement and remains low throughout the observation period. We interpret the changes in schooling outcomes as reflecting a generally positive impact of a placement in out-of-home care. Absenteeism is about 15 percent points lower 2 years after placement.[14] The estimates for schooling outcomes (columns (5) and (6) of Table 2) suggest that enrollment decreases with 8 percent in the first year and 5 percent in the second year, while we see the opposite pattern for absenteeism as the effect becomes stronger the second year. Given the absence of parallel pre-trends for schooling outcomes, one should be cautious giving the estimates a causal interpretation.

Criminal charges display a steep, but insignificant, increase up to placement and then a decline in criminal charges, see Figure 2g. The estimation of criminal charges only estimate the effects 12 months prior to placement, because this sample is restricted to children above 15. Two years after placement, the likelihood of being charged is reduced by 6 percentage points. The average effects using the Difference-in-Differences approach shows that criminal charges fall by about one percentage points the first year after placement

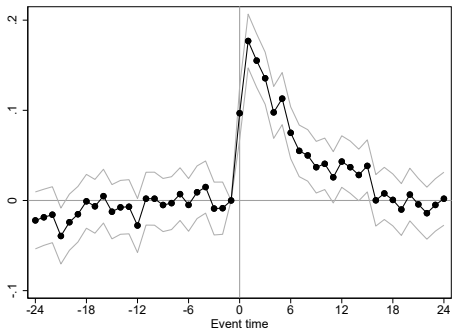
13. Generally, one should note that changes in these four health outcomes may reflect either changes in health care utilization or changes in the true underlying health of the child.

14. As absenteeism is conditional on enrollment, one may worry that the drop in absenteeism is due to selection effects. To examine this concern, we performed a robustness check exploiting the panel data dimension of data in an estimation using individual fixed-effects, as discussed below. Furthermore, in order to circumvent this concern, we combined the two measures (enrollment and absenteeism) by hypothesizing that not being enrolled in school corresponds to 100 percent absenteeism in that month. This exercise shows that absenteeism is almost flat up to the first placement and starts to decline 6 months after placement. See the IZA Discussion Paper version of this paper.

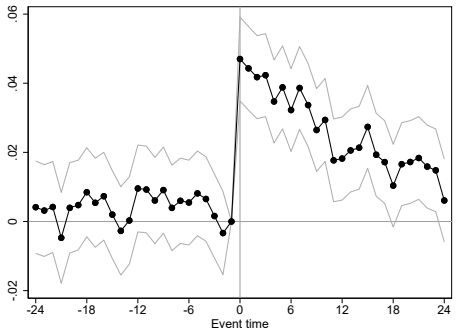
and 3 percentage points in the second year (Table 2, column (7)).

For comparison, Helénsdotter (2024) finds a large increase in suicide risk, being hospitalized with mental illness, and committing crimes. These results are somewhat in contrast to our results, which find a reduced risk of being hospitalized and criminal activities. One reason could be that we look at the average effect of all children in care, whereas Helénsdotter 2024 looks at the marginal child. Another difference is that Helénsdotter 2024 examines court-ordered removal of children whereas in our data only 11 percent are court-ordered removals.

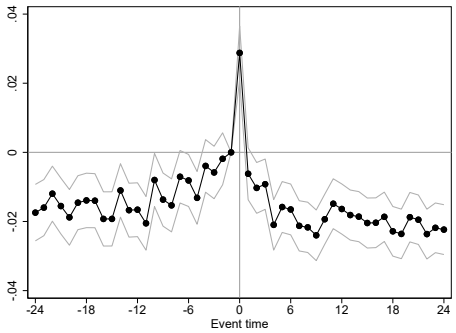
Figure 2: Baseline results for main child outcomes



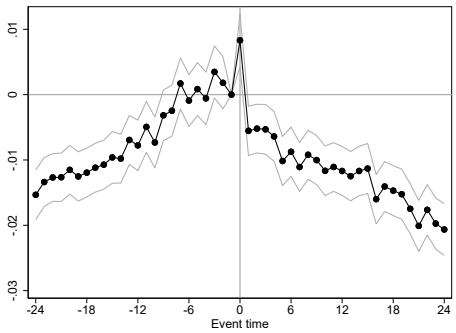

(a) Number of GP visits



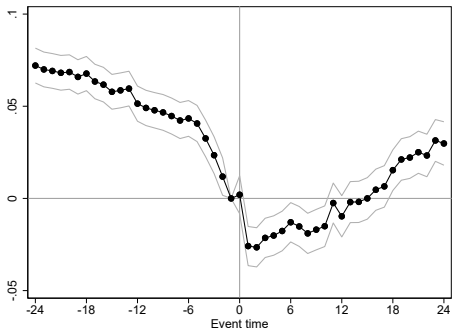

(b) Share with prescription drugs



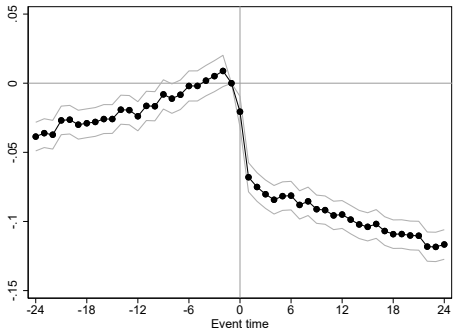

(c) Somatic hospitalization



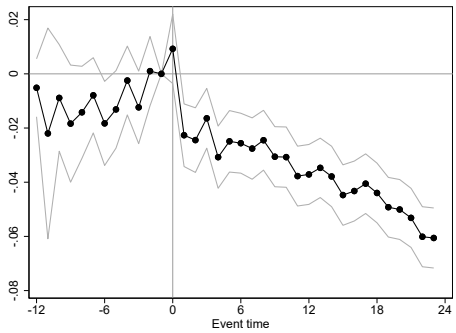

(d) Psychiatric hospitalization




(e) Enrollment




(f) Absenteeism




(g) Criminal charges

*Note:* The figures show estimated event study coefficients (see equation (2)). The solid black line indicates estimates and the grey lines the 95 percent confidence intervals (based on robust and clustered standard errors). Estimates are obtained from the main sample (Section 4 and Table 1).

Table 2: Estimated changes of main outcomes

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | GP visits | Prescr. med. | Somatic hosp. | Psych. hosp. | Enrollment | Absenteeism | Crime |
| ***Panel A: Main specification, full sample*** | | | | | | | |
| First year | 0.0990*** | 0.0323*** | 0.000599 | 0.000188 | -0.0723*** | -0.0540*** | -0.00891*** |
| | (0.00364) | (0.00151) | (0.000905) | (0.000445) | (0.00129) | (0.00112) | (0.00197) |
| Second year | 0.0219*** | 0.0155*** | -0.00700*** | -0.00801*** | -0.0429*** | -0.0834*** | -0.0300*** |
| | (0.00378) | (0.00157) | (0.000914) | (0.000470) | (0.00143) | (0.00115) | (0.00200) |
| N | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 | 1,203,182 | 726,341 | 447,378 |
| Mean of dep. var at $t = -1$ | 0.474 | 0.183 | 0.075 | 0.027 | 0.874 | 0.164 | 0.058 |
| ***Panel B: Robustness - Fixed effects specification*** | | | | | | | |
| First year | 0.101*** | 0.0369*** | -0.000380 | -0.00230*** | -0.0380*** | -0.0540*** | -0.00385*** |
| | (0.00313) | (0.00112) | (0.000746) | (0.000439) | (0.00113) | (0.00113) | (0.00103) |
| Second year | 0.0236*** | 0.0183*** | -0.00858*** | -0.0105*** | -0.0101*** | -0.0780*** | -0.00969*** |
| | (0.00406) | (0.00148) | (0.000953) | (0.000551) | (0.00144) | (0.00141) | (0.00136) |
| N | 1,201,695 | 1,201,695 | 1,201,695 | 1,201,695 | 675,848 | 372,081 | 344,805 |
| Mean of dep. var at $t = -1$ | 0.474 | 0.183 | 0.075 | 0.027 | 0.883 | 0.164 | 0.074 |
| ***Panel C: Sample - No prior psychiatric diagnosis*** | | | | | | | |
| First year | 0.0938*** | 0.0281*** | 0.00149 | 0.00791*** | -0.0528*** | -0.0511*** | -0.0116*** |
| | (0.00415) | (0.00163) | (0.00104) | (0.000234) | (0.00147) | (0.00127) | (0.00302) |
| Second year | 0.0332*** | 0.0268*** | -0.00300** | 0.00724*** | -0.0310*** | -0.0764*** | -0.0348*** |
| | (0.00419) | (0.00168) | (0.00103) | (0.000266) | (0.00158) | (0.00129) | (0.00304) |
| N | 1,391,916 | 1,391,916 | 1,391,916 | 1,391,916 | 786,841 | 485,710 | 284,134 |
| Mean of dep. var at $t = -1$ | 0.423 | 0.136 | 0.067 | 0.002 | 0.885 | 0.151 | 0.064 |
| ***Panel D: Sample - No preventive care prior to placement*** | | | | | | | |
| First year | 0.100*** | 0.0397*** | 0.00159 | 0.00138** | -0.0789*** | -0.0434*** | -0.00626** |
| | (0.00478) | (0.00187) | (0.00119) | (0.000536) | (0.00170) | (0.00150) | (0.00220) |
| Second year | 0.0227*** | 0.0242*** | -0.00464*** | -0.00676*** | -0.0517*** | -0.0787*** | -0.0262*** |
| | (0.00489) | (0.00194) | (0.00118) | (0.000575) | (0.00188) | (0.00154) | (0.00225) |
| N | 1,167,466 | 1,167,466 | 1,167,466 | 1,167,466 | 645,719 | 387,359 | 247,714 |
| Mean of dep. var at $t = -1$ | 0.469 | 0.158 | 0.082 | 0.026 | 0.869 | 0.166 | 0.050 |
| ***Panel E: Outcomes in reference to preventive care*** | | | | | | | |
| First year | -0.0232*** | 0.00805*** | -0.00404*** | -0.00136*** | -0.0263*** | -0.00664*** | -0.00314*** |
| | (0.00278) | (0.00119) | (0.000691) | (0.000312) | (0.000770) | (0.000867) | (0.000945) |
| Second year | -0.0490*** | -0.000420 | -0.00809*** | -0.00752*** | -0.0312*** | -0.0437*** | -0.0153*** |
| | (0.00285) | (0.00122) | (0.000694) | (0.000333) | (0.000875) | (0.000884) | (0.000969) |
| N | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 | 1,909,802 | 1,208,693 | 812,229 |
| Mean of dep. var at $t = -1$ | 0.449 | 0.200 | 0.051 | 0.020 | 0.947 | 0.152 | 0.036 |

*Notes:* Robust clustered standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table shows the estimates of changes in each outcome in the first and second year after out-of-home placement based on equation (3). The estimate of the first (second) year measures the average change in outcome from the two years leading up to the out-of-home placement to the 1-12 months (13-24 months) after placement. The data used for the estimation are described in section 4.

We test the robustness of the main specification of the event study results by using an alternative methodological approach with individual fixed effects, following recent advances on event studies discussed in e.g. Borusyak, Hull, and Jaravel (2024), Miller (2023), and Bindler and Ketel (2022).[15] Detailed event graphs can be found in Appendix C, Figure C.1. Generally, fixed effects estimates more often exhibit parallel pre-trends than for our main specification, partly by construction. Although the trends before and after treatment do not always exhibit similar dynamic trajectories across these two methodological approaches, the changes in outcomes following an out-of-home placement are overall within the same range, as shown in Panel B of Table 2. We furthermore show that there is a clear reduction in absenteeism in the fixed effects approach, which shows within-individual variation of individuals conditional on enrollment in all periods. This confirms that the reduction in absenteeism is not due to selection effects driven by the reduction in enrollment found in our main specification.[16] More discussion can be found in Appendix C.[17]

## 5.1 Analysis of two subsamples

As shown in the event study graphs in Figure 2 for our main specification, we find a strong pre-trend in especially psychiatric hospitalizations, suggesting that these may trigger a placement, and we therefore caution to not interpret event study estimates of our main specification causally. Around 10 percent of the children placed in out-of-home care had been admitted to psychiatric hospitals before placement, and strong pre-trends are common especially for this group of children, which could signal potential endogeneity. In the next step, we therefore deselect placements where the child had received psychiatric treatment prior to the first placement. When focusing on the subsample of children without prior admissions to psychiatric hospitals, i.e. around 9 in 10 children, we avoid the

15. Borusyak, Hull, and Jaravel (2024) and Miller (2023) suggest to tie two pre-treatment event dummies to zero to avoid multicollinearity in the fixed effects specification; this approach has the advantage that pre-trends appear flat.

16. This result is confirmed in a fixed effects estimation on a balanced sample. Results are available upon request.

17. Figure C.1 shows that enrollment increases two years after placement, backing up our finding that the reduction in absenteeism is not merely a consequence stronger students staying on in school.

problematic (non-flat) pre-trend in the main specification. We estimate the effects using equation (3) on this subsample and show the results in Table 2, panel C. Detailed event study results over time are shown in the Appendix in Figure D.1. A comparison of the estimates of the baseline sample (Panel A) and the sample of children without psychiatric diagnoses prior to placement (Panel C) shows only minor differences for the first year effects. The second year effects are in general larger for the sample with prior psychiatric diagnoses but not very different. One notable exception is for school enrollments – the drop in enrollment pre-placement occurs around the same time as the rise in hospitalizations. Thus, for the group without prior psychiatric diagnoses, we do not see a large drop in enrollment *after* placement. Another exception is for psychiatric hospitalization where the effects (perhaps somewhat mechanically) become positive and significant.

As an additional robustness check, we focus on a subsample of children who did not receive any measures of preventive care prior to their first placement. Since about 40 percent of the children receive some measures of preventive care before the placement, the sample is reduced substantially. We do this in order to check if our estimates are attenuated by the fact that many children already receive preventive measures. We present estimation results for this sample in Panel D in Table 2. The results are in line with what we saw in our baseline sample with one notable exception: psychiatric hospitalizations. For this sample there is a positive and significant increase in psychiatric hospitalizations the first year (followed by a negative effect the second year). A possible interpretation is that for children who are unknown (or less known) by the social authorities, an admission to a psychiatric ward in hospital is likely to trigger their first placement.

## 5.2 Supplementary health evidence

When analyzing changes in health care observed in the register data, it is important to reflect on the difficulties in interpreting results related to changes in health care – do they reflect better/worse care or a better/worse health condition? To shed more light on this question, we make use of our rich register data on health care use, which allows us to dig deeper into specific types of drugs and diagnoses that are prevalent for the group of

vulnerable children that are the centre of our analysis. We present supplementary evidence on health outcomes in Panel A of Table 3 for somatic health outcomes and Panel A of Table 4 for psychiatric health outcomes, respectively. In the Appendix, Figures E.1 and E.2 show the development in the detailed somatic and mental health outcomes over time using event graphs.

Table 3: Detailed somatic health outcomes

| | (1) Infections | (2) Resp. diseases | (3) Injuries | (4) Poisonings | (5) Antibiotics | (6) Asthma | (7) Vaccination |
|---|---|---|---|---|---|---|---|
| ***Panel A: Main specification*** | | | | | | | |
| First year | -0.000474** | -0.000662** | 0.00171** | 0.000114 | 0.00368*** | 0.00268*** | 0.00929*** |
| | (0.000145) | (0.000228) | (0.000546) | (0.0000833) | (0.000696) | (0.000515) | (0.000655) |
| Second year | -0.000227 | -0.000792*** | -0.00100 | 0.0000541 | 0.00195** | 0.00171** | 0.00566*** |
| | (0.000146) | (0.000231) | (0.000552) | (0.0000846) | (0.000720) | (0.000524) | (0.000613) |
| N | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 |
| Mean of dep. var at $t = -1$ | 0.001 | 0.004 | 0.024 | 0.001 | 0.029 | 0.014 | 0.019 |
| ***Panel B: Outcomes in reference to preventive care*** | | | | | | | |
| First year | -0.000250* | -0.000372* | -0.000522 | -0.0000943 | -0.00112* | -0.000416 | 0.00133** |
| | (0.000102) | (0.000167) | (0.000429) | (0.0000610) | (0.000564) | (0.000402) | (0.000466) |
| Second year | -0.000334** | -0.000892*** | -0.00152*** | -0.0000220 | -0.00189*** | -0.0000633 | 0.00190*** |
| | (0.000102) | (0.000167) | (0.000427) | (0.0000603) | (0.000569) | (0.000394) | (0.000435) |
| N | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 |
| Mean of dep. var at $t = -1$ | 0.001 | 0.003 | 0.018 | 0.000 | 0.033 | 0.015 | 0.014 |

*Notes:* Robust clustered standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
The table shows the estimates of changes in outcome in the first and second year after out-of-home placement based on equation (3). The estimate of the first (second) year measures the average change in outcome from the two years leading up to the out-of-home placement to the 1-12 months (13-24 months) after placement.
The data used for the estimation are described in section 4 and the detailed health outcomes are defined in Appendix A.

Table 4: Detailed mental health outcomes

| | (1) Severe stress | (2) Eating disorders | (3) ADHD diag. | (4) Any mental h. drug | (5) Anti-psychotic | (6) Anti-anxiety | (7) Anti-depressive | (8) Psychostimulants |
|---|---|---|---|---|---|---|---|---|
| ***Panel A: Main specification*** | | | | | | | | |
| First year | 0.000513* | -0.000195 | 0.000190 | 0.0127*** | 0.0118*** | 0.000762*** | 0.00148*** | -0.000701 |
| | (0.000212) | (0.000102) | (0.000205) | (0.000973) | (0.000488) | (0.000200) | (0.000311) | (0.000784) |
| Second year | -0.00198*** | -0.00126*** | -0.000398 | 0.00129 | 0.00455*** | -0.000238 | -0.00194*** | -0.00299*** |
| | (0.000216) | (0.000111) | (0.000215) | (0.00102) | (0.000527) | (0.000210) | (0.000346) | (0.000803) |
| N | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 | 1,987,717 |
| Mean of dep. var at $t = -1$ | 0.010 | 0.001 | 0.003 | 0.075 | 0.022 | 0.003 | 0.012 | 0.039 |
| ***Panel B: Outcomes in reference to preventive care*** | | | | | | | | |
| First year | -0.00000883 | -0.000332*** | -0.0000327 | 0.0114*** | 0.00307*** | 0.000393*** | 0.00140*** | 0.00623*** |
| | (0.000132) | (0.0000681) | (0.000152) | (0.000722) | (0.000273) | (0.000112) | (0.000294) | (0.000601) |
| Second year | -0.00144*** | -0.000810*** | -0.000981*** | 0.00308*** | 0.00292*** | 0.000417*** | -0.00249*** | 0.00195** |
| | (0.000141) | (0.0000706) | (0.000159) | (0.000764) | (0.000302) | (0.000121) | (0.000318) | (0.000625) |
| N | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 | 3,131,729 |
| Mean of dep. var at $t = -1$ | 0.005 | 0.001 | 0.003 | 0.080 | 0.014 | 0.002 | 0.018 | 0.046 |

*Notes:* Robust clustered standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
The table shows the estimates of changes in outcomes in the first and second year after out-of-home placement based on equation (3).
The estimate of the first (second) year measures the average change in outcome from the two years leading up to the out-of-home placement to the 1-12 months (13-24 months) after placement.
The data used for the estimation are described in section 4 and the detailed outcomes are defined in Appendix A.

Table 3, Panel A, shows results for seven detailed somatic health outcomes: the first four (Infections, Respiratory diseases, Injuries and Poisoning) based on major diagnosis groups (ICD10 codes) for somatic hospitalizations, two based on prescription drug purchases (ATC codes for Antibiotics and Asthma), and one based on primary health care register data (Vaccinations). The detailed health outcomes are defined in Appendix A. Event graphs for monthly detailed somatic health outcomes are shown in Figure E.1.

Based on Figure E.1, we note fairly flat and noisy developments in hospitalizations due to infections, respiratory disease, and poisoning. For hospitalizations due to these three (relatively infrequent) diagnoses, Table 3 reveals small but significant reductions for infections and respiratory disease, but no significant effects for poisonings. Panel A of Table 3, column (3), suggests a significant first-year increase in injuries (which constitute one and three hospitalizations before placement) of 0.17 percentage points (corresponding to 7 percent of the baseline mean). However, it is important to note from the monthly data in Figure E.1 that there is a steep positive pretrend in the last years before placement, consistent with (somatic) hospitalizations due to injuries potentially triggering a placement. For prescription drug purchases shown in columns (5)-(6) of Table 3, we find a significant increase in the purchase of antibiotics and asthma medication for children in the first two years after their first placement. This finding could be interpreted in two ways – it could either suggest better health care, or that children become more sick from infections or asthma after placement. For antibiotics, the latter explanation could potentially be due to the environment change, especially when placed in institutional care. For asthma, we believe that we can safely infer that an increase in medication is a signal of improved health care. Finally, column (7) of the table in combination with Figure E.1 shows a positive and significant effect on vaccination take-up in the two first years after placement, suggesting that vaccinations catch up with previous neglect to adhere with official guidelines in the child vaccination program.[18]

We now turn to investigate detailed mental health outcomes, combining insights from the Difference-in-Differences estimates Panel A of Table 4 with event study graphs of monthly effects shown in the Appendix, Figure E.2. For mental health hospitalizations, we focus on three of the largest ICD10 diagnosis groups: Severe stress, Eating disorders and ADHD (see Appendix A for the exact definitions of these conditions following ICD10 diagnosis codes). Figure E.2 reveals clear increasing pre-trends for these three diagnoses followed by a spike around the time of the time of placement. A similar picture is found

18. We look at vaccinations that are part of the universal child vaccination program, see A. These are recommended for all children (unless suffering from a chronic disease), the take-up is high, and there is a clear positive social gradient in take-up, as discussed in some of our previous work (Gørtz et al. 2020).

for the use of mental health drugs in subfigures (d)-(h) of E.2. For anti-psychotic and anti-depressive medicine, we observe increasing pre-trends before placement, while anti-anxiety medicine and psychostimulants show flat pre-trends. All detailed mental health outcomes show clear positive spikes (take-up of medication) around the time of the first placement, consistent with the notion that mental health contacts appear to trigger placement. For all detailed mental health outcomes, we observe a stabilization or even a reduction over time, especially in the second year after placement, which is consistent with the Difference-in-Differences estimates presented in Table 4.

## 5.3 Heterogeneous effects

To check for heterogeneous effects, we split the sample according to gender, age, and type of care. For all heterogeneity analyses, we define the treatment and control groups, respectively, within each subsample defined by gender, age, and type of care, respectively. The results are shown in Appendix section F. When comparing the effects across sex, see Figure F.1, we find that the health effects are stronger for girls, while the effects on juvenile crime are stronger for boys. When splitting the sample according to age in Figure F.2, we see that the effects on health are mainly driven by the oldest children (aged 13-16). For schooling outcomes, there are only minor differences across age.

Previous studies have shown that type of care, i.e. whether children are placed in foster families or in institutional care can have very different implications for the children (Humphreys et al. (2022)), and although allocation into care type may be suffering from selectivity, it is nevertheless interesting to study the effects across care type. When splitting the sample according to type of care, we see remarkable differences, as shown in Figure F.3. For children placed in foster families, we do not see the same deterioration in health and school outcomes prior to placement as observed for children placed in institutional care. Moreover, we see clear changes in health and schooling outcomes after the placement, since both the rate of hospitalization, the number of GP visits and absenteeism drop. Children in institutional care, however, follow the same development as shown in the main graphs, but with even larger changes. The drop in crime, e.g., seems

to be entirely driven by young people placed in institutional care, suggesting perhaps that this could be partly due to an effect from being in a more controlled environment. Although it is tempting to try to draw causal inference on the effect of foster families versus institutional care from the comparison of the outcomes of the two types of care, it is important to bear in mind that children placed in institutional care are different from children placed in family foster care, being older and often having more complex needs.

## 5.4 Implications of preventive care

Our event study results concern the *average* effects of out-of-home care for a large group of children with very different needs and circumstances. A relevant policy question is however whether out-of-home care produces positive outcomes for the *marginal* child. Our event study does not provide an answer to this question. While a non-negligible proportion of the children face severe risks related to their family environment, other children may be less at risk. As part of this project, we collected a survey among case workers in Copenhagen, who were asked about their assessment of risk factors for children in all child cases over an 18-month period. The results from this survey suggest that the group of children faced a very broad range of risks, leading to different decisions regarding placement in care at the time of the assessment (Ejrnæs and Gørtz 2017b). For some children in the group characterized by lower risks, a less drastic intervention, such as preventive action, might in some cases have been an adequate alternative and is indeed often tried out as a first solution. In order to shed some light on the trajectories for children for whom less invasive alternatives may be relevant, we estimate the effects of the first preventive action initiated for a child.[19] We document the monthly development in the main outcomes following the first preventive action graphically in Figure G.1 and summarize the Difference-in-Differences effects in panel E of Table 2.

Importantly, for GP visits and somatic hospitalizations, we observe flat pre-trends in G.1a and G.1c followed by a significant reduction after the initiation of preventive

19. A small proportion, around 8%, of the children in the sample receiving preventive measures for the first time ended up being placed in out-of-home care within the 24 months after initiating preventive action.

action. For prescription drug purchase and psychiatric hospitalization, there are clear pre-trends, suggesting that mental health problems may also trigger initiation of preventive action. Difference-in-Differences estimates of the effects on specific diagnoses for psychiatric hospitalizations shown in Table 4 suggest that psychiatric hospitalizations decrease or stabilize follow the onset of preventive measures. We also find a positive effect on vaccine take-up after preventive care is initiated (Table 3). Thus we generally find that the use of health services and purchases of prescription drugs decrease after preventive care has been initiated. In contrast to out-of-home placement, we do not see a temporary spikes in health outcomes around the time when the intervention is initiated. A possible explanation is that a serious health shock may often cause an out-of-home placement rather than preventive action.

For schooling outcomes, we observe a declining pre-trend in enrollment followed by a stabilization after initiating preventive measures (Figure G.1e), and an upward pre-trend in absenteeism that is circumvented by a sharp drop around the time of starting preventive measures (G.1f). For juvenile crime, the pre-trend is almost flat, with a slightly increasing trend, followed by a drop/stabilization after starting preventive action.

To sum up, preventive care seems to have somewhat similar effects as out-of-home placement, although slightly smaller, on crime, school attendance, vaccine take-up, and medication use than the more pervasive intervention of placement. This suggests that part of the positive changes around placement might be caused by doing some sort of intervention, with the following focus on the families and children. Smaller effect sizes may also be related to lower pre-treatment risks.

# 6 Conclusion

This paper examines the development of a broad set of outcomes covering health, schooling, and criminal behavior around the time of the first placement of a child in out-of-home care. Using an event study framework, the paper traces out the dynamic trajectories of health, schooling and crime *before* as well as *after* a placement in out-of-home care. Owing to a large longitudinal data set with monthly administrative register data for all children

experiencing a placement in the period 2013 to 2016 in Denmark, our analysis leads to a number of important new insights. Our results underline that the impact of out-of-home placement is complex and that there are positive as well as negative consequences of placement. Some positive effects occur shortly after the placement, such as adherence with the vaccination program, absenteeism in school and criminal behavior, while others, e.g. a reduction in hospitalizations, show up about a year after the placement. Furthermore, some outcomes do not improve within the 2-year post-treatment period when compared to the baseline level seen one year before the first placement; this is the case for e.g. enrollment in schools. While boys and girls seem to experience the same development over time across most outcomes, girls experience larger variation over time in psychiatric hospitalizations (both before and after out-of-home placement), whereas boys are driving the observed reduction in criminal charges after placement.

When analyzing the impact of out-of-home placement on health care usage, an interesting pattern emerges. It appears that the upward trend in hospitalizations seen before and at the time of placement is circumvented in the first 1-2 years after placement, where primary care services, i.e. health care visits and prescription drugs provided by GPs, take over. Here, we find that medical treatment for e.g. asthma, stress, depression, anxiety and ADHD increases after placement, possibly preventing admissions to hospitals. Although we cannot directly assess if the changes in health care services are due to better underlying health, some evidence points in the direction of improved health, e.g. less hospitalizations due to infections and respiratory diseases.

Our paper makes several important contributions. *First*, while a number of recent papers (Doyle 2007; Doyle 2008; Doyle 2013; Doyle and Aizer 2018; Warburton et al. 2014; Baron and Gross 2022; Bald et al. 2022a; Helénsdotter 2024) identify the causal effects of placing the *marginal* child in foster care, the results of our event study relate to placement of the *average* child. As the *average* child in the out-of-home placement is likely to have a very different background and face different problems and risks than the *marginal* child, the effect can also vary. We add to a small literature on the *average* effect for children in care (Berger et al. 2015; Lindquist and Santavirta 2014).

*Second*, our rich and very detailed administrative data allows us to compare our treatment group of children in out-of-home care care to a control group of children who were placed 36 months, but otherwise share a similar socio-economic background, following the Fadlon and Nielsen (2019) approach.

*Third*, by using longitudinal data, we can document the dynamic trajectories of key outcomes month by month. The complex process leading up to placement, as well as the course of events after placement, clearly illustrates that the group of children in out-of-home care (primarily those with psychiatric diagnoses prior to placement) experienced a deterioration in their situation over several years before the decision to place them in care. Methodologically, non-parallel pre-trends represent a challenge to our empirical design. Thus, despite being able to compare treated children to a very similar control group, the development in outcomes after a placement cannot always be given a causal interpretation. In our main specification, we observe parallel pre-trends for GP visits, use of prescription drugs and criminal charges, implying that the post-treatment development may be given a causal interpretation for these outcomes. When zooming in on a large sub-population of children without psychiatric diagnoses prior to treatment (90% of the full sample), we observe that pre-trends are closer to being parallel for our seven outcomes compared to the main specification.

We furthermore observe that hospitalizations and criminal charges increase sharply at the time of placement, indicating that the intervention may in some cases be triggered by such events. In combination with non-flat pre-trends in several outcomes over the last 1-2 years before placement, this raises the policy concern if interventions are initiated at the right time, or whether interventions for some children are implemented too late. Although our study cannot directly assess this concern, it highlights the importance of the timing of interventions, especially for the most vulnerable group of at-risk children.

*Fourth*, a relevant policy question is whether out-of-home care produces positive outcomes for the marginal child, or whether some children on the margin could have benefited from a less drastic intervention, such as preventive action. To shed light on the consequences of choosing less invasive interventions, we compare the effects of out-of-home care

with the effects of preventive action. This may be relevant, as recent research by Helénsdotter (2024) shows that there may be negative consequences of foster care placements for mental health, risky behaviors and crime, possible due to low quality of some out-of-home placements in the past. Generally, we find similar effects of preventive treatment as for out-of-home care, but the effects are somewhat smaller. While it is clear that children for whom a preventive care action was chosen as a relevant treatment may differ from children placed in out-of-home care, this analysis provides suggestive evidence on the potential advantages of choosing a less invasive action in the first place.

*Finally*, we analyze the effects of care arrangements for children using a wide set of health outcomes, education, and criminal records allowing us to paint a comprehensive picture of trends in well-being following placement in out-of-home care. Our results indicate that out-of-home placements, and to a lesser degree preventive measures, reduce hospitalizations, criminal behavior and absenteeism, but neither of the two interventions improve enrollment in schools. Our results suggest that policy makers and child protection authorities should increase their focus on enhancing school enrollment of children in out-of-home care. Our findings confirm previous studies that have shown that children in care face a higher risk of not obtaining education (Almond, Currie, and Duque 2018; Currie and Widom 2010 and Widom 1989).

Our results paint a far more complex picture of the effects of placement than the previous literature has uncovered and highlight that the effects of a placement often depend on the particular circumstances. This may explain the mixed evidence found in the literature.

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# For Online Publication

# Appendix

## A Health outcomes – sources and definitions

Table A.1 lists the standardized ICD-10, ATC and activity codes used in the paper to classify detailed health outcomes. This includes vaccinations, which are given at general practitioners as part of the child vaccination program.

Table A.1: Health outcome classifications

| **Code** | **Description** |
|---|---|
| *Panel A: ICD-10 codes* | |
| A00-B99 | Infections (and parasites) |
| J00-J99 | Respiratory diseases |
| S00-T14 | Injuries |
| T15-T98 | Poisonings |
| F43 | Severe stress |
| F50 | Eating disorders |
| F90 | ADHD diagnoses |
| *Panel B: ATC codes* | |
| J01 | Antibiotics |
| R03 | Asthma |
| N05 & N06 | Any mental drug |
| N05A | Anti-psychotic |
| N05B | Anti-anxiety |
| N06A | Anti-depressive |
| N06B | Psychostimulants |
| *Panel C: Child vaccinations* | |
| 8083 & 8085 | Haemophilus influenzae type b (Hib), Difteritis, Tetanus, Whopping cough and Polio (Di-Te-Ki-Pol) |
| 8086 | Measles, Mumbles and Rubella (MMR). |

# B Children in care versus not in care

Table B.1 shows descriptive statistics for the sample of foster children in the treatment group compared to children in the control group of children who were placed in foster care three years later.

Table B.1: Foster children, treatment vs control group, one month before placement

| | Foster children (treatment) | Foster children (control) | Difference | |
|---|---|---|---|---|
| | mean | mean | mean diff | t-value |
| Age | 11.25 | 9.55 | 1.70*** | (28.6) |
| Girl | 0.46 | 0.48 | -0.02** | (-3.2) |
| **Mother's characteristics** | | | | |
| Age | 27.08 | 27.55 | -0.46*** | (-6.2) |
| Married | 0.28 | 0.33 | -0.04*** | (-7.9) |
| Completed elementary school | 0.17 | 0.12 | 0.05*** | (11.7) |
| Completed secondary education | 0.76 | 0.79 | -0.03*** | (-5.9) |
| Completed tertiary education | 0.07 | 0.09 | -0.02*** | (-6.4) |
| Employed | 0.24 | 0.30 | -0.06*** | (-11.6) |
| Self-employed | 0.01 | 0.01 | -0.00 | (-1.2) |
| Unemployment benefits | 0.05 | 0.05 | 0.01* | (2.2) |
| Education or health benefits | 0.14 | 0.16 | -0.01** | (-2.9) |
| Early retirement benefits | 0.03 | 0.03 | 0.01*** | (3.8) |
| Retirement benefits | 0.00 | 0.00 | -0.00 | (-0.5) |
| On cash benefits | 0.36 | 0.35 | 0.01 | (1.4) |
| Other | 0.04 | 0.03 | 0.00 | (0.8) |
| Criminal charge | 0.27 | 0.25 | 0.01* | (2.5) |
| Psychiatric hospital contact | 0.15 | 0.14 | 0.02*** | (3.7) |
| N | 20,805 | 10,492 | 31,297 | |

*Notes:* Key variables for the treatment and control group. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

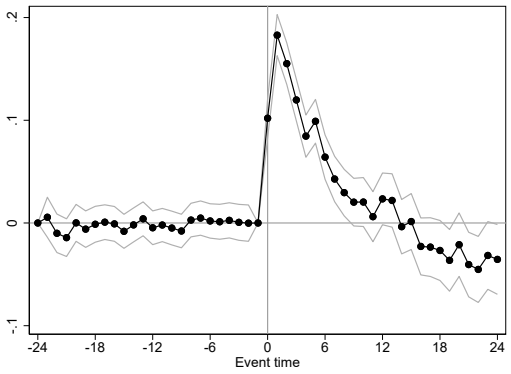
# C Robustness: Alternative estimation method

This section presents the detailed results of a robustness check using an estimation of the event model where we follow the methodology used in Bindler and Ketel (2022). See also Borusyak, Hull, and Jaravel (2024) and Miller (2023) for a discussion of the advantages of this approach in a situation where pre-trends are not necessarily parallel. Following Borusyak, Hull, and Jaravel 2024 and Miller 2023, we omit the event times $t = -24$ and $t = -1$ so that the estimated event time coefficients $\alpha_s$ refer to the trend between the 24 months and one month before the placement. By using a sample of children who are all placed in foster care, we estimate the following equation, where we control for individual fixed effects as well as age and time effects.

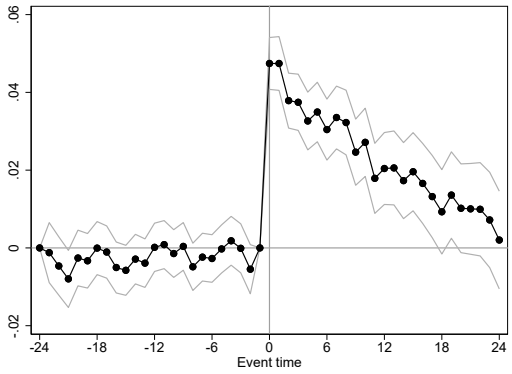
$$Y_{iymt} = \sum_{s \neq -1} \alpha_s \cdot \mathbf{I}[s = t] + \theta_i + \delta_{age} + \tau_y + \gamma_m + \epsilon_{imt}. \tag{4}$$

The robustness check yields results that are generally similar to the main results.

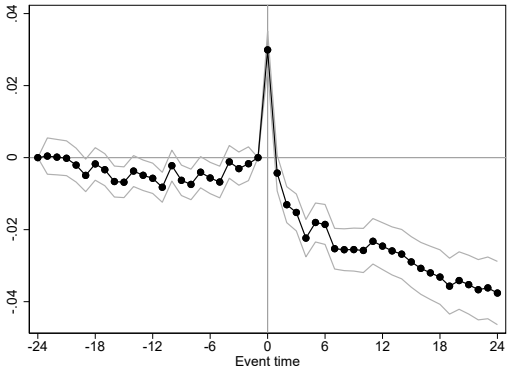
Figure C.1: Event coefficients, Individual fixed effects estimation



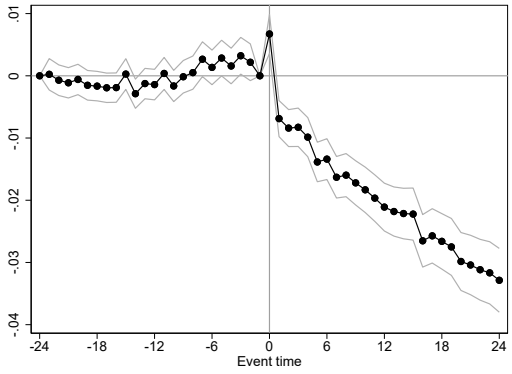

(a) Number of GP visits



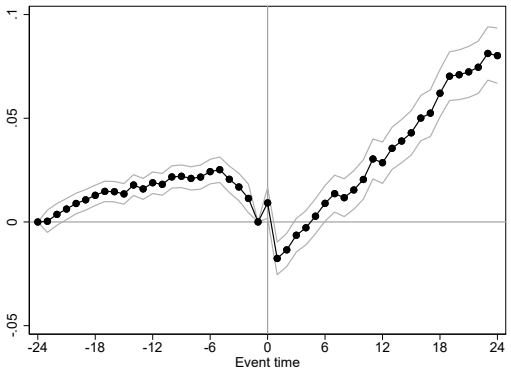

(b) Share with prescription drugs



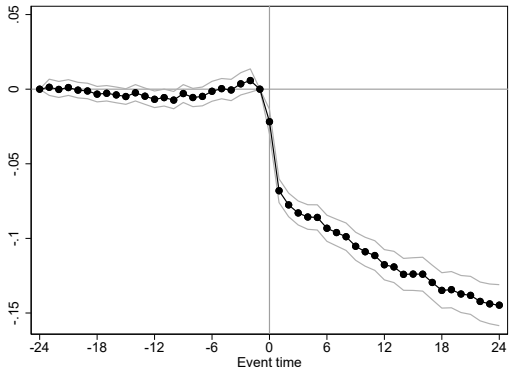

(c) Somatic hospitalization share



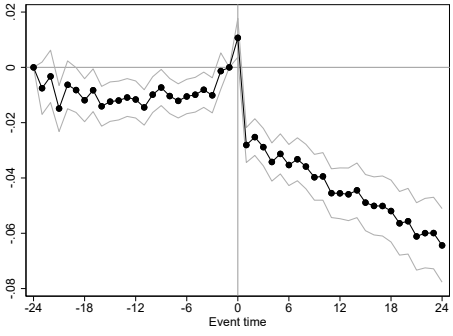

(d) Psychiatric hospitalization share




(e) Enrollment




(f) Absenteeism




(g) Criminal charges

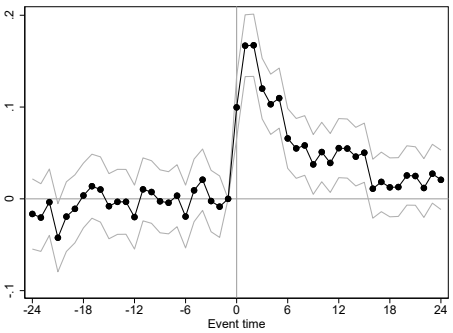
*Note:* The figures show the estimated coefficients of the event study, see equation (4). The solid black line is the estimates and grey lines indicate the 95 percent confidence intervals. The estimates are obtained from the main sample, see section 4 and Table 1.

# D Children without prior psychiatric diagnoses

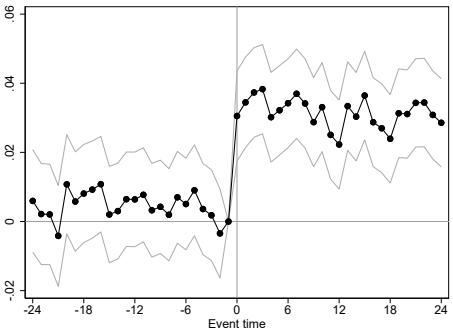
In this section we repeat our analyses on a subsample of children without psychiatric diagnoses prior to placement. The sample consists of about 90 percent of the baseline sample. We confirm our baseline result that children had more GP visits and prescription purchases, see Figure D.1a and D.1b, while reducing school enrollment but also absenteeism (conditional on enrollment), as witnessed by Figure D.1e and D.1f. Moreover, we observe an increase in psychiatric hospitalizations, which is almost mechanic as psychiatric hospitalizations were bound to zero immediately before placement (see Figure D.1d).[20]

20. The pre-trend for Figure D.1d can deviate from zero due to estimated age and time effects.

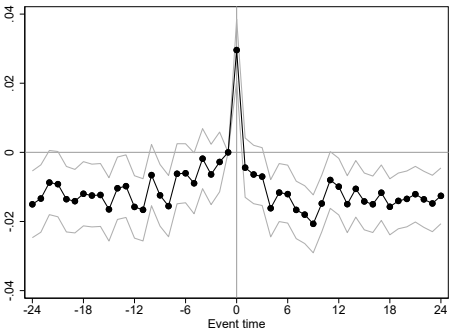
Figure D.1: Changes in outcomes for children without previous psychiatric diagnoses



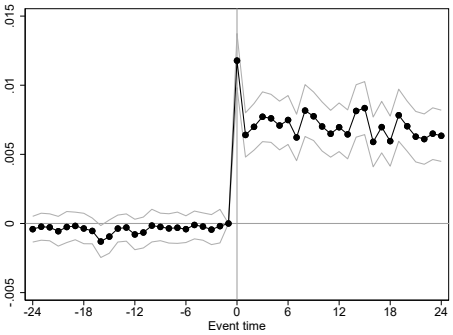

(a) Number of GP visits



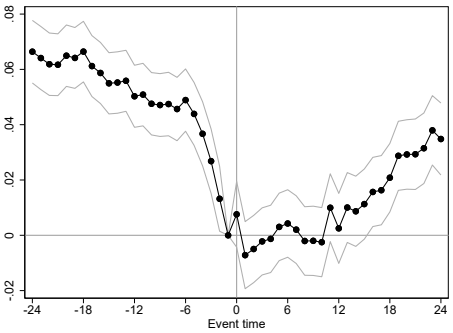

(b) Prescription drug purchases



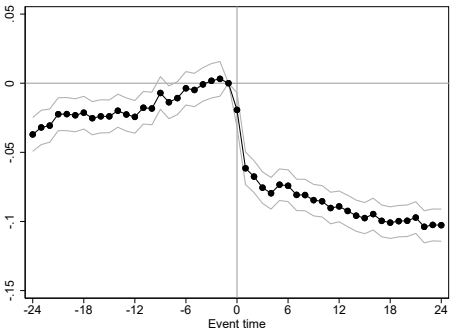

(c) Somatic hospitalizations



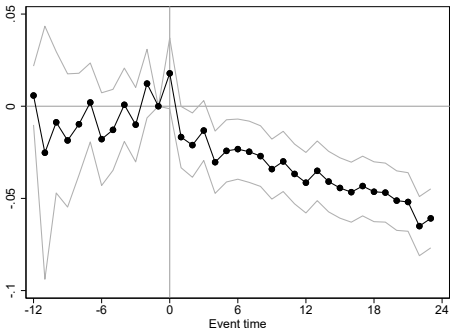

(d) Psychiatric hospitalizations




(e) Enrollment




(f) Absenteeism

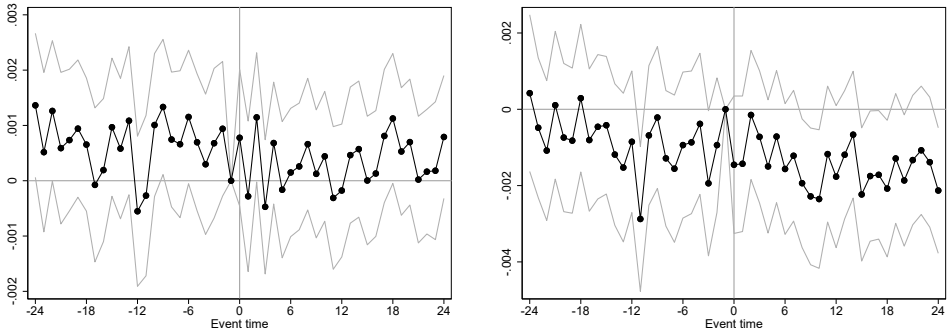



(g) Criminal charges

*Note:* The figures show the estimated coefficients of the event study, see equation (2). The solid black line is the estimates and grey lines indicate the 95 percent confidence intervals (based on robust and clustered standard error). The estimates are obtained from a sample of children without previous psychiatric diagnoses.

# E Detailed health outcomes

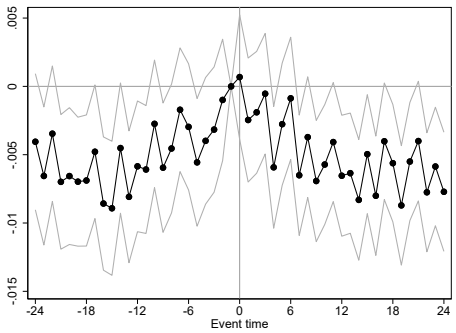
Figure E.1: Somatic health outcomes



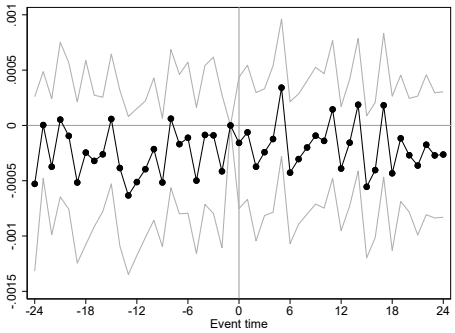

(a) Infection



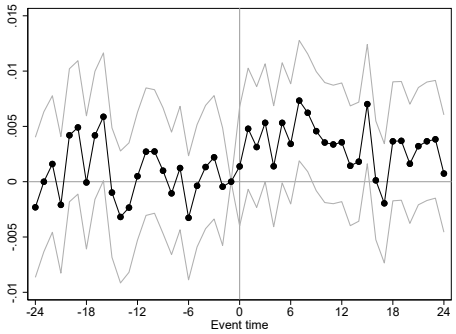

(b) Respiratory disease



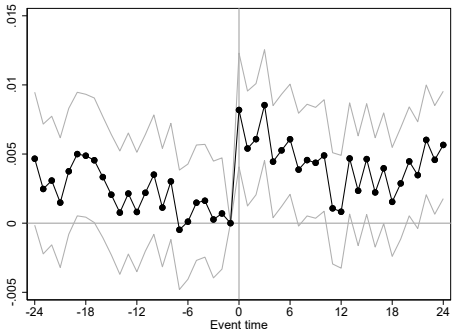

(c) Injury



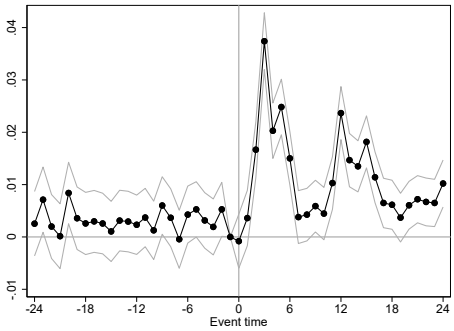

(d) Poisoning




(e) Antibiotics



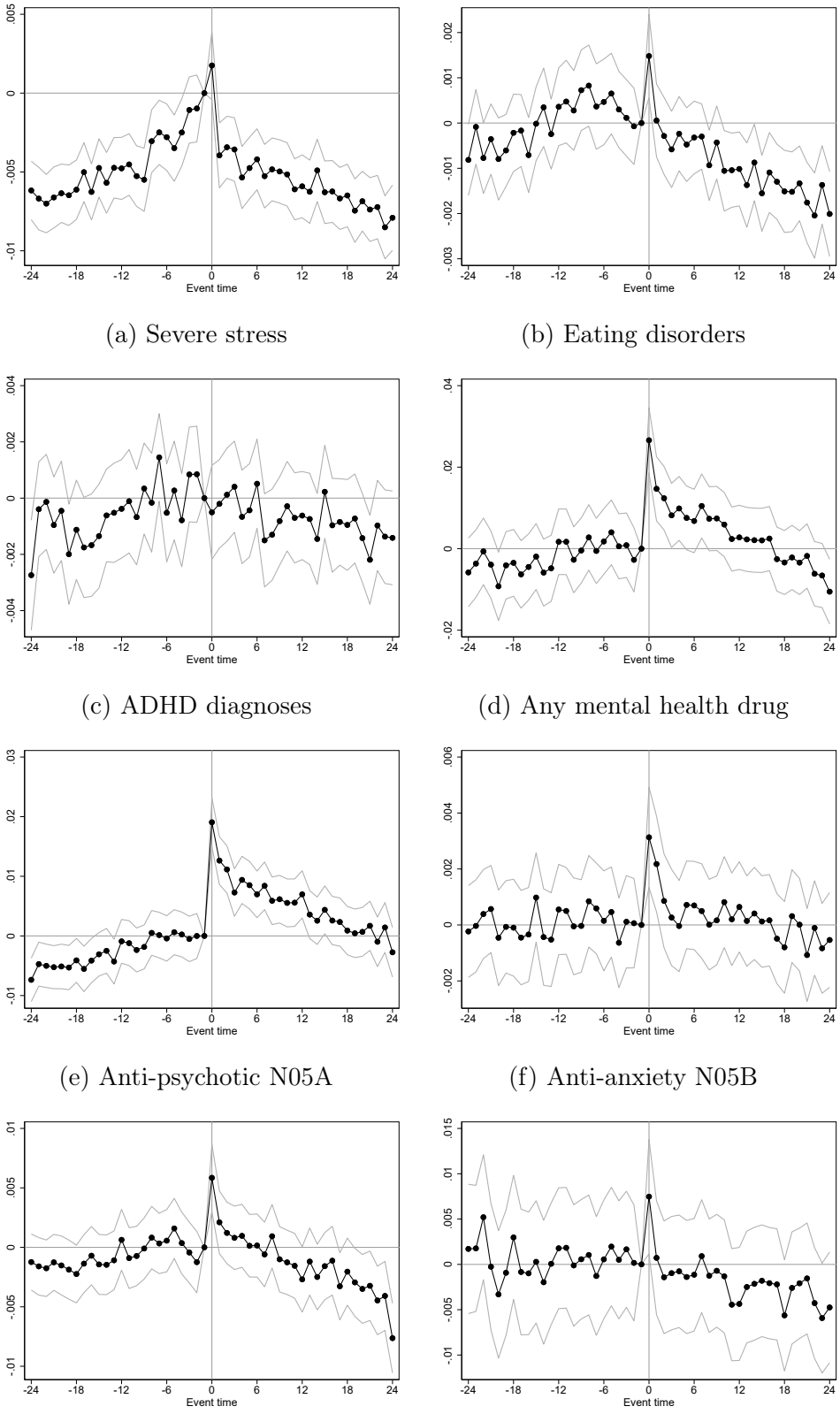

(f) Asthma




(g) Vaccinations

*Note:* The figures show the estimated coefficients of the event study, see equation (2). The solid black line is the estimates and grey lines indicate the 95 percent confidence intervals (based on robust and clustered standard error). The estimates are obtained from the main sample, see section 4 and Table 1.

Figure E.2: Mental health outcomes




(a) Severe stress

(b) Eating disorders

(c) ADHD diagnoses

(d) Any mental health drug

(e) Anti-psychotic N05A

(f) Anti-anxiety N05B

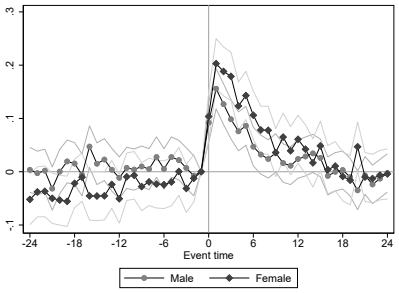
(g) Anti-depressants N06A

(h) Psychostimulants N06B

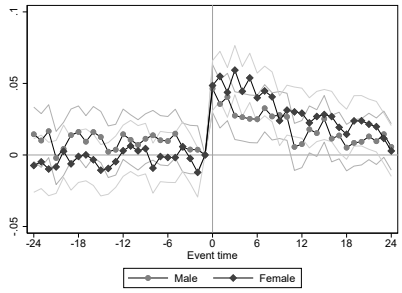
*Note:* The figures show the estimated coefficients of the event study, see equation (2). The solid black line is the estimates and grey lines indicate the 95 percent confidence intervals (based on robust and clustered standard error). The estimates are obtained from the main sample, see section 4 and Table 1.

# F Heterogeneity by sex, age, and type of care

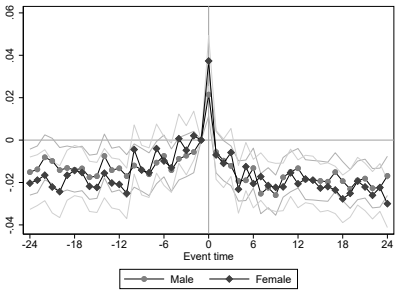
Figure F.1: Heterogeneity by sex



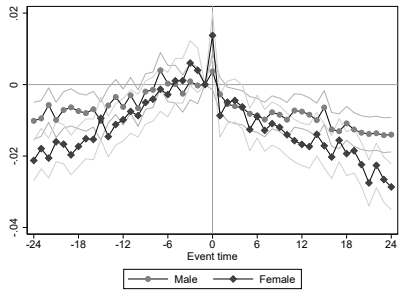

(a) GP visits



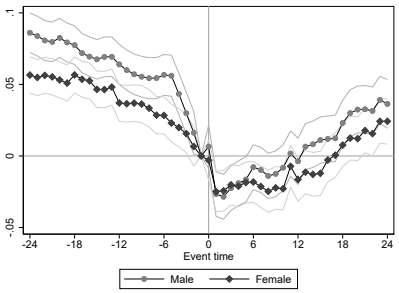

(b) Prescription drug purchase



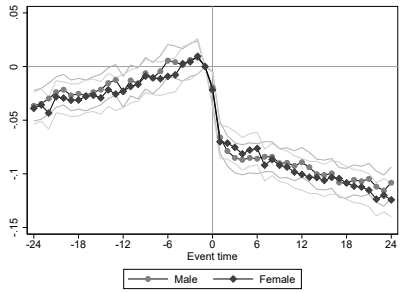

(c) Somatic hospitalization



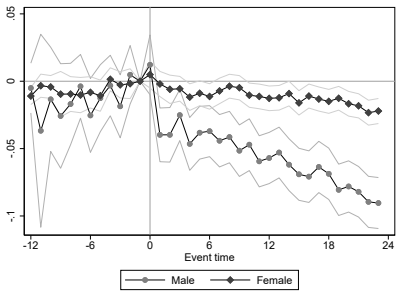

(d) Psychiatric hospitalization




(e) Enrollment



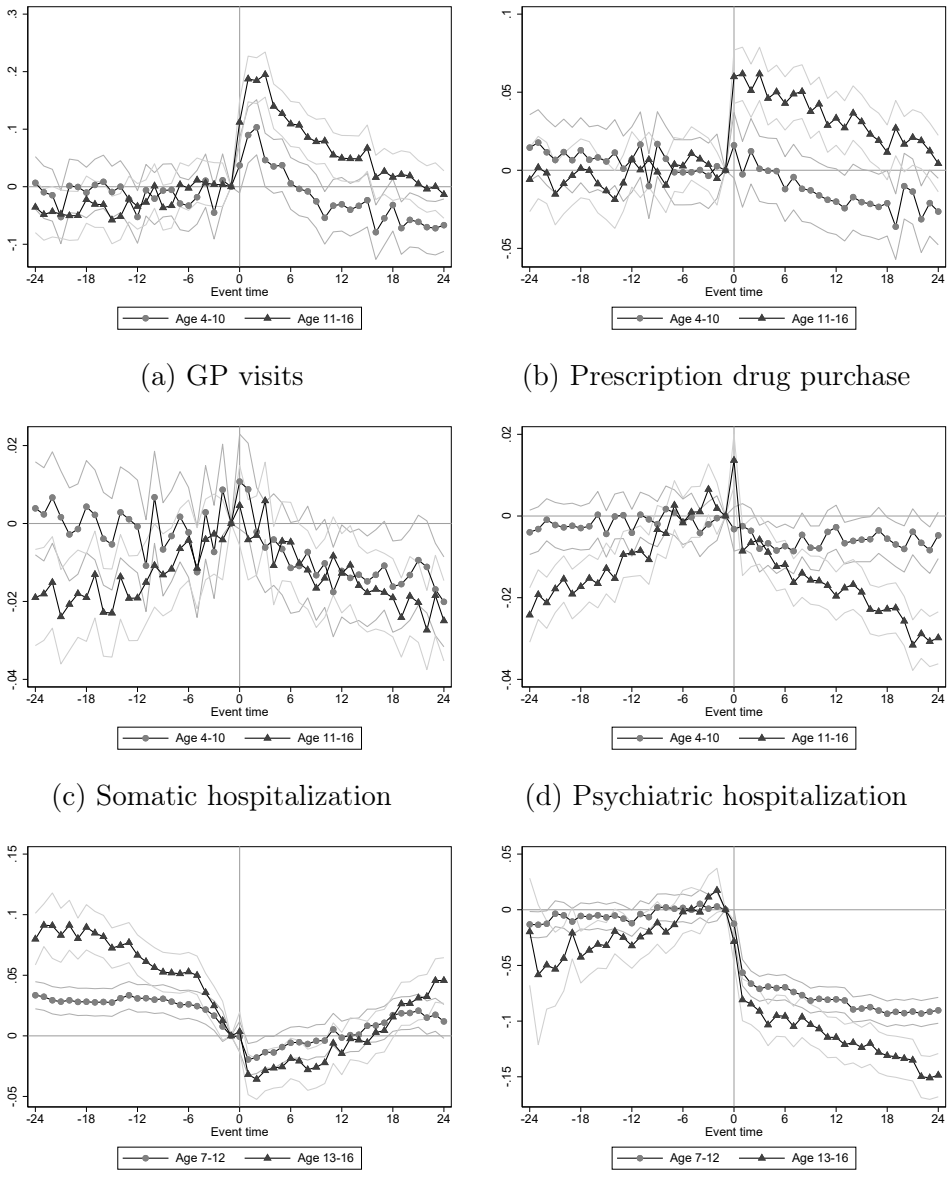

(f) Absenteeism




(g) Criminal charges

*Note:* The figures show the estimated coefficients of the event study, see equation (2). The solid black line is the estimates and grey lines indicate the 95 percent confidence intervals (based on robust and clustered standard error). The estimates are obtained from the main sample split by sex.

Figure F.2: Heterogeneity by age




(a) GP visits

(b) Prescription drug purchase

(c) Somatic hospitalization

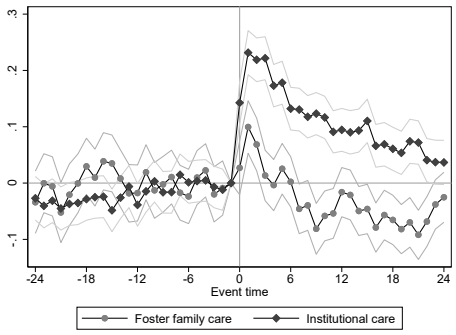
(d) Psychiatric hospitalization

(e) Enrollment

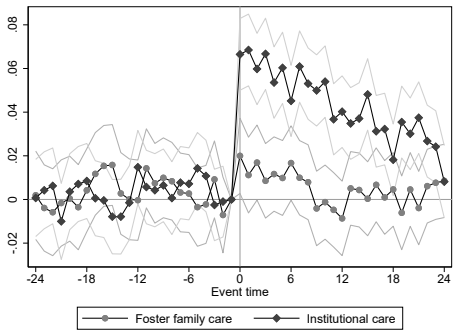
(f) Absenteeism

*Note:* The figures show the estimated coefficients of the event study, see equation (2). The solid black line is the estimates and grey lines indicate the 95 percent confidence intervals (based on robust and clustered standard error). The estimates are obtained from the main sample split by age group.

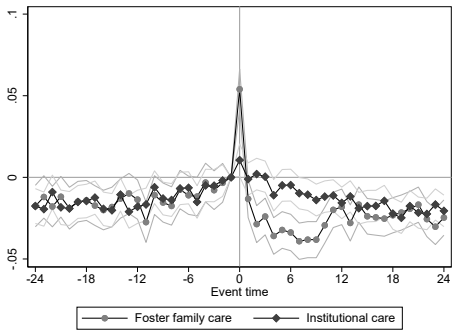
Figure F.3: Heterogeneity by type of care



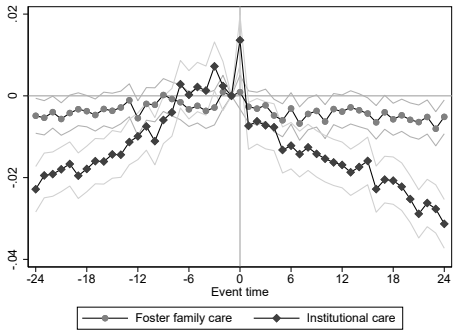

(a) GP visits



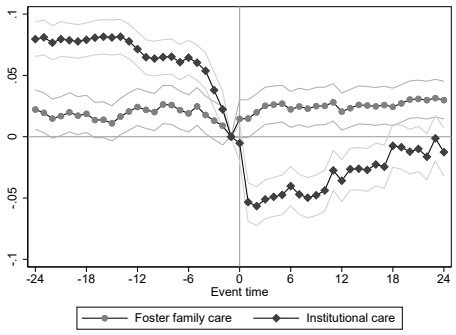

(b) Prescription drug purchase



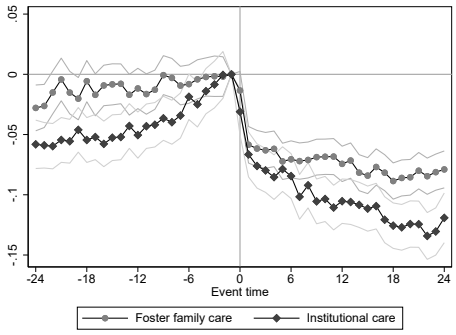

(c) Somatic hospitalization



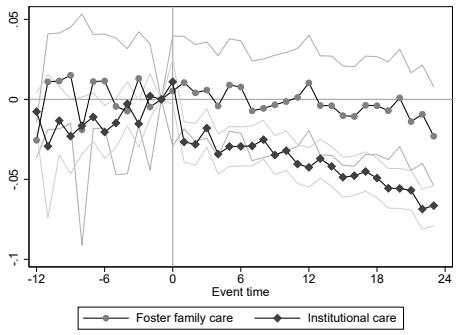

(d) Psychiatric hospitalization




(e) Enrollment




(f) Absenteeism




(g) Criminal charges

*Note:* The figures show the estimated coefficients of the event study, see equation (2). The solid black line is the estimates and grey lines indicate the 95 percent confidence intervals (based on robust and clustered standard error). The estimates are obtained from the main sample split by type of care.

# G First preventive care measure

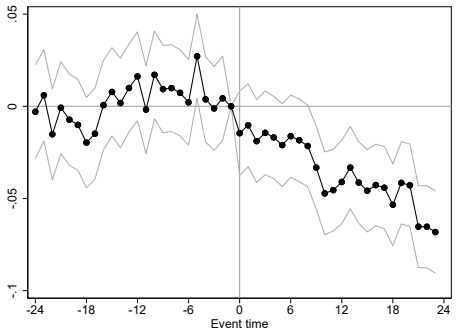
This section presents results in the same way as the main results in the paper, but the event analyzed is defined as the first preventive care measure, rather than the first out-of-home care placement. For some children, this event coincides with their first out-of-home care placement, but other children are never placed in out-of-home care and only ever receive preventive care measures.

Table G.1: Children in preventive care, treatment vs control group, one month before prevention

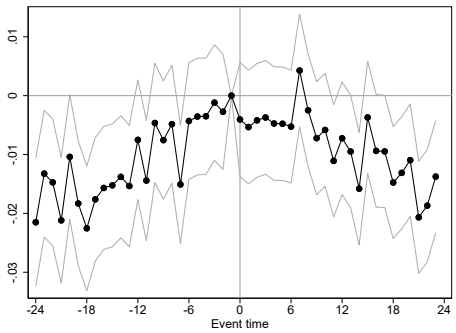
| | Preventive care (treatment) | Preventive care (control) | Difference | |
|---|---|---|---|---|
| | mean | mean | b | t |
| Age | 12.59 | 10.23 | 2.36*** | (54.8) |
| Girl | 0.43 | 0.44 | -0.01 | (-1.9) |
| **Mother's characteristics** | | | | |
| Age | 27.77 | 28.16 | -0.40*** | (-6.9) |
| Married | 0.36 | 0.39 | -0.03*** | (-6.6) |
| Completed elementary school | 0.14 | 0.10 | 0.04*** | (11.6) |
| Completed secondary education | 0.75 | 0.76 | -0.01* | (-2.3) |
| Completed tertiary education | 0.11 | 0.14 | -0.03*** | (-8.8) |
| Employed | 0.34 | 0.39 | -0.05*** | (-11.5) |
| Self-employed | 0.01 | 0.02 | -0.00 | (-1.7) |
| Unemployment benefits | 0.05 | 0.04 | 0.01*** | (5.1) |
| Education or health benefits | 0.17 | 0.18 | -0.00 | (-0.9) |
| Early retirement benefits | 0.02 | 0.02 | 0.00* | (2.3) |
| Retirement benefits | 0.00 | 0.00 | 0.00 | (.) |
| On cash benefits | 0.26 | 0.26 | 0.00 | (0.7) |
| Other | 0.03 | 0.03 | 0.00 | (0.5) |
| Criminal charge | 0.21 | 0.20 | 0.01* | (2.0) |
| Psychiatric hospital contact | 0.09 | 0.10 | -0.01** | (-3.0) |
| N | 32,066 | 15,235 | 47,301 | |

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

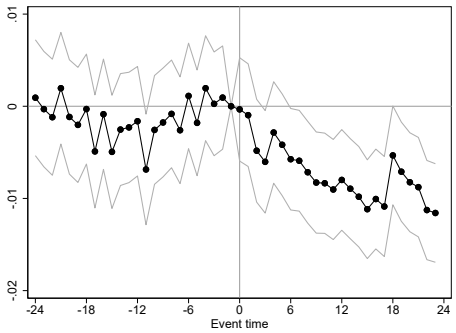
Figure G.1: Event study estimates, first preventive care measure



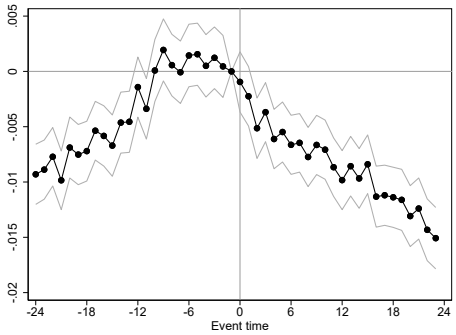

(a) Number of GP visits



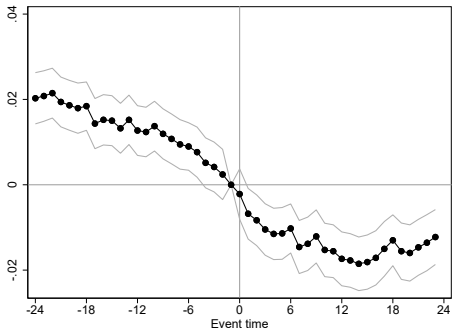

(b) Prescription drug purchase



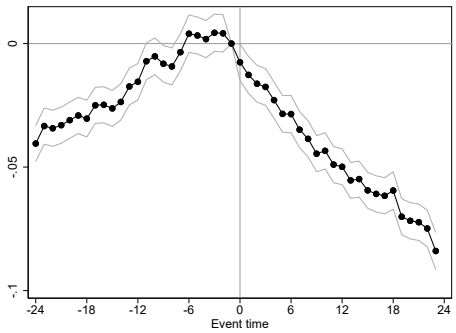

(c) Somatic hospitalization share



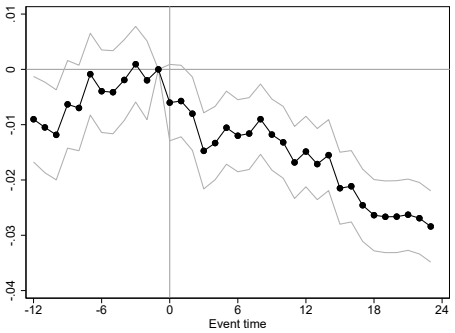

(d) Psychiatric hospitalization




(e) Enrollment




(f) Absenteeism




(g) Juvenile crime

*Note:* The figures show the estimated coefficients of the event study, see equation (2). The solid black line is the estimates and grey lines indicate the 95 percent confidence intervals (based on robust and clustered standard error). The estimates are obtained a sample of first preventive care (see Table G.1).