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BEFORE AND AFTER OUT-OF-HOME PLACEMENT: CHILD HEALTH, EDUCATION AND CRIME

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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 out-of-home care on child health, schooling and juvenile crime. Using an event study to examine the dynamics around the time of placement, we document a clear deterioration of mental health and increasing crime rates before placement. After placement, we find a decrease in hospitalizations and an improvement in schooling outcomes. For a sub-sample, we use caseworkers' risk-assessment to form a control group of children who were at risk of a placement. For the marginal child, we find little evidence of a causal effect of placement, as we also see improvements for the control group.

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

JEL code: 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 cohort of children 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., 2022; Ejrnæs and Gørtz, 2017a; Turney and Wildeman, 2016), and rates are similar for other countries (Rouland and Vaithianathan, 2018; Yi, 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 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 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 observational data.

Our paper provides important contributions to the literature on the causal effects of out-of-home placements on several dimensions. Combining two complementary empirical

[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).

approaches, we estimate both the *average* and the *marginal* effects of out-of-home care on child outcomes.

Our *first* contribution lies in being the first paper to use an event study approach to trace out the dynamic trajectories of a wide range of outcomes covering health care use, schooling outcomes, and criminal behavior of children in a period preceding (two to three years before) and following (two years after) their first out-of-home care placement. Exploiting extraordinarily rich population-wide longitudinal data with quarterly (and monthly) observations from the Danish administrative registers, we document the entire outcome history of all children placed for the first time in out-of-home care when they were between 4 and 18 years old at the time of placement in the years between 2013-2016 in Denmark (around 7,000 children). 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, hospitalization due to poisoning etc. [2]

Our event study leads to several interesting insights. Following the entire population of children in care, we document a substantial deterioration in health, schooling outcomes and juvenile crime in the last two years *leading up to* the first out-of-home placement, affecting around one in ten children. Immediately *after* the time of the first placement, however, primary health care utilization (GP visits and medication) increases temporarily, followed by a stabilization, and school absenteeism falls for the average child in care. Importantly, we also observe sharp increase followed by a reductions in hospitalization due to mental illness and in criminal charges around the time of first placement, indicating that the timing of placement could be endogenous and, for some, triggered by mental disease or criminal behavior. As 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

[2]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 as criminal charges (for the older children).

demonstrates that this assumption does not always hold when observing the entire group of children in out-of-home care. We therefore focus on two, quite large, subsamples for which the assumption of flat pre-trends does indeed hold. The largest of these subsamples consists of all children who had not previously received a diagnosis for a mental disorder and/or had not received a criminal charge prior to their first placement. While a small group of children (around 10 %) carry a high risk of mental disease and criminal behavior already before being placed, the majority do not suffer from such extraordinarily heightened risk levels. We furthermore zoom in on another subsample (around 12 %) of children for whom placement was solely decided based on reasons rooted in the parents. For both of these important subsamples, we find that the event study design is useful in documenting the causal effects of placement. For these two subsamples, we confirm that children had more GP visits and prescription purchases after their first placement. We also observe lower school enrollment up to eight quarters after placement and a reduction in absenteeism (conditional on enrollment).

Our results further show 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 problems, care type (foster family or institution), and alternatives at hand.

In our *second approach*, we zoom in on the "marginal child", using additional survey information that we collected on caseworker risk assessments for a sub-sample of at-risk children. We collected the caseworker survey for each individual child for whom the municipality of Copenhagen considered an out-of-home placement as part of a child case investigation over the period 2015-16. We document that the information on individual child risks, which is unobserved in the usual administrative data, is essential for forming a valid control group. Leveraging our register data with this unique measure of individual child risk considerably improves our match of children in out-of-home care to a control group of children who were not placed in care at this time, but shared similar risk scores as well as socioeconomic background. This allows us to estimate the causal effects of out-of-home care using the same set of outcomes as for the full-population analysis.

Interestingly, we find no indication of causal effects of the placement on neither hospitalizations nor absenteeism, but we find evidence of a small increase in GP visits. We thus provide evidence that, on the margin, the causal effects of a placement in out-of-home care, rather than a preventive action, are limited. Despite our somewhat imprecise estimates on this subset of the data, our results suggest a moderate potential for improving outcomes for the marginal child by increasing the number of placements in out-of-home care. Methodologically, our findings using the survey on caseworker risk assessments suggest that a more systematic data collection on risk factors in child cases would provide essential information that could not only improve the quality of decisions in child cases - potentially avoiding both type I and type II error in placement decisions - but also facilitate a better evaluation of the causal effects of interventions directed towards a very vulnerable group of young citizens. We furthermore infer that this could lead to considerable cost savings for society.

Our paper contributes to a small but growing literature on the causal effects of out-of-home placements. A number of studies, starting with Doyle, 2007, have relied on the quasi-random assignment of cases to child protection investigators and judges with differential propensities for placement to identify the causal effects for the marginal child in foster care. These studies point to mixed evidence of the effect of the marginal out-of-home placement, depending 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). A few recent studies on US data, on the contrary, find positive effects of foster care on schooling (Baron and Gross, 2020; Bald et al., 2019; Roberts, 2019) but also on crime (Baron and Gross, 2022). 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 fairly high-quality type of out-of-home placement, which

may differ in scope in comparison to some of the treatments that were evaluated in some of the previous literature. Moreover, we offer evidence on both average and marginal effects in this setting, evaluated on a rich set of objectively measured outcomes.

The paper is organized as follows. Section 2 explains the institutional setting around child protection in Denmark. Section 3 describes the data, and section 4 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".[3] 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 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.[4] 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 as-

[3]Law on Social Services, Ch. 11, Paragraph 46

[4]Own calculations on register data, see Data section for details.

sessment 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 quarter of a preventive measure to the first placement is 9 quarters (or around two years).

3 Data

The analyses presented in the following sections are based on a main sample consisting of quarterly Danish administrative data for the full population of children in Denmark and a subsample of children in the municipality of Copenhagen for whom we collected additional survey information. We link information from several registers using anonymized personal identification numbers to obtain information on children's personal characteristics, child protective services, health care utilization, educational outcomes and criminal charges.

3.1 Main outcomes

We look at seven main outcomes related to the child's health, education and criminal behavior.

We measure the *number of visits to general practitioner* as the sum of reported health services a child received in the given quarter. The number of visits is reported on a weekly basis and we cap the number of weekly services to +/- 5 visits (following Sundhedsdatastyrelsen, 2019). We measure the *share of children with a prescription drug purchase* by identifying children for whom at least one prescription drug was purchased in a given quarter. 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 quarter 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* for children between and including ages 7 and 15, using information for all public and private elementary schools in Denmark. *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 15 years or older who are charged with a crime. A charge is counted in the quarter 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 quarter. If we calculated the average days in prison for our sample of youth in care the number is 0.05 days per quarter. Given the very small number of days we do

not consider the underestimation of health care utilization as a threat to our results.

3.2 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 18 in the years 2013-2016. We observe children 12 quarters before their first out-of-home care placement and 8 quarters after, and the balanced sample consists of around 7,000 foster children. Note that we use the term foster children and children in out-of-home care interchangeably. 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). See table 1 for descriptive statistics on the samples.

Table 1: Foster children at time of first placement, balanced samples

	Health sample		Enrollment sample		Absenteeism sample		Crime sample	
	mean	(sd)	mean	(sd)	mean	(sd)	mean	(sd)
Age	12.62	(4.0)	11.45	(1.4)	11.16	(1.4)	16.99	(0.1)
Girl	0.48	(0.5)	0.45	(0.5)	0.49	(0.5)	0.48	(0.5)
Placed in OHC with no prior preventive care	0.56	(0.5)	0.54	(0.5)	0.52	(0.5)	0.51	(0.5)
Quarters from first preventive care to first OHC placement	8.28	(5.7)	7.92	(5.8)	8.99	(6.2)	7.46	(5.2)
Placement ongoing	0.29	(0.5)	0.45	(0.5)	0.55	(0.5)	0.00	(0.0)
Legal action								
Placement with consent	0.84	(0.4)	0.83	(0.4)	0.79	(0.4)	0.89	(0.3)
Placement without consent	0.10	(0.3)	0.12	(0.3)	0.15	(0.4)	0.04	(0.2)
Urgent placement	0.03	(0.2)	0.04	(0.2)	0.04	(0.2)	0.01	(0.1)
Other	0.02	(0.2)	0.01	(0.1)	0.02	(0.1)	0.06	(0.2)
Placement Type								
Foster family care	0.29	(0.5)	0.39	(0.5)	0.51	(0.5)	0.07	(0.3)
Kinship care	0.07	(0.3)	0.08	(0.3)	0.11	(0.3)	0.02	(0.1)
Group home	0.20	(0.4)	0.15	(0.4)	0.08	(0.3)	0.20	(0.4)
Institutional care	0.30	(0.5)	0.33	(0.5)	0.30	(0.5)	0.30	(0.5)
Independent living	0.14	(0.3)	0.04	(0.2)	0.01	(0.1)	0.41	(0.5)
Length of placement								
Duration, years	1.34	(1.1)	2.05	(1.8)	2.11	(1.8)	0.61	(0.3)
Spell duration, years	1.71	(1.2)	2.98	(1.9)	3.02	(1.9)	0.67	(0.3)
Reason for placement								
Child risk/externalizing behavior	0.80	(0.4)	0.78	(0.4)	0.71	(0.5)	0.85	(0.4)
Child health concerns	0.35	(0.5)	0.38	(0.5)	0.37	(0.5)	0.35	(0.5)
Abuse/neglect of child	0.60	(0.5)	0.68	(0.5)	0.72	(0.5)	0.44	(0.5)
Adult risk/externalizing behavior	0.50	(0.5)	0.58	(0.5)	0.61	(0.5)	0.45	(0.5)
Other	0.28	(0.4)	0.24	(0.4)	0.27	(0.4)	0.33	(0.5)
Share of reasons due to child	0.51	(0.3)	0.47	(0.3)	0.42	(0.3)	0.60	(0.3)
Share of reason due to parents	0.49	(0.3)	0.53	(0.3)	0.58	(0.3)	0.40	(0.3)
At end of first placement								
Exit before age 18	0.36	(0.5)	0.55	(0.5)	0.50	(0.5)	0.12	(0.3)
New placement	0.17	(0.4)	0.26	(0.4)	0.31	(0.5)	0.04	(0.2)
Continued care after age 18	0.00	(0.1)	0.00	(0.1)	0.00	(0.0)	0.00	(0.0)
Age out	0.46	(0.5)	0.18	(0.4)	0.20	(0.4)	0.83	(0.4)
N	7,000		2,470		762		1,314	

For comparison, we construct a matched control group consisting of children who were never placed in out-of-home care and is selected to match the foster care sample on age and gender, mother's characteristics and past outcomes measured in all quarters from 8 to 12 quarters prior to the event. The matching is done using propensity score matching (Leuven and Sianesi, 2003) on prior observable characteristics presented in table 2. The estimated propensity score is used to match non-foster children to foster children using the one-to-one nearest neighbor algorithm without replacement. The control group is assigned a random placebo event quarter. We match on the outcome trajectory in 8-12 quarters prior to the event since we observe a divergence in outcomes between children who are eventually placed in care and children never placed in care from 8 quarters prior to the placement (see appendix section A). Before 8 quarters the outcome levels between the two groups are different, but their trends are largely parallel. The matched control group is similar to the foster children on observable characteristics 8 quarters prior to the event. Since we still see differential pre-trends in the 8 quarters leading up to the event, we only use the matched control group for reference in the descriptive evidence, but they are not used to estimate the impact of placement in the main specification of the event study.

3.3 Descriptive evidence

Figure 1 shows descriptive evidence on the seven outcomes: the quarterly 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 outcome for foster children and the matched group of non-foster children separately. Figure 1a shows that foster children have an average of a little more than 1 visit per quarter to their general practitioner 12 quarters prior to their first out-of-home care placement. From 8 quarters prior to placement we see a clear divergence between foster and non-foster

Table 2: Treatment vs matched control children, quarter before first placement

	Treatment mean	Control mean	Difference b	t
Age	12.65	11.92	0.73***	(11.2)
Girl	0.49	0.48	0.01	(0.9)
Preventive care	0.31	0.00	0.31***	(55.4)
Number of GP visits, t-8 quarters	1.10	1.13	-0.03	(-1.0)
Somatic hospital contact, t-8 quarters	0.12	0.12	-0.00	(-0.3)
Psychiatric hospital contact, t-8 quarters	0.03	0.02	0.01*	(2.4)
Prescription drug purchase, t-8 quarters	0.31	0.32	-0.00	(-0.6)
Enrolled in elementary school, t-8 quarters	0.96	0.99	-0.03***	(-8.9)
Absenteeism, t-8 quarters	0.12	0.11	0.01***	(3.4)
Criminal charge, t-8 quarters	0.12	0.06	0.05***	(4.5)
Mother's characteristics, measured at year of birth of the child				
Age	27.44	27.34	0.10	(0.9)
Married/Registered partnership	0.33	0.32	0.01	(1.0)
Highest completed elementary school	0.11	0.12	-0.00	(-0.9)
Highest completed secondary education	0.81	0.81	-0.00	(-0.5)
Highest completed tertiary education	0.08	0.07	0.01	(1.8)
Unemployed	0.05	0.06	-0.01	(-1.3)
Disability pension	0.03	0.03	0.00	(0.4)
On cash benefits	0.35	0.17	0.18***	(24.0)
Criminal charge	0.24	0.26	-0.01	(-1.7)
Psychiatric hospital contact	0.11	0.12	-0.01	(-1.7)
N	6,781	6,781	13,562	

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

children in the time leading up to the event.[5] The figure also shows 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 much 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 30 percent of children in each quarter in both groups 8 quarters prior to the event. In the last 6 quarters prior to the event there is a clear divergence in the groups, and a sharp increase in prescription drug purchases for the foster children at the time of their first placement, followed by a stabilization at around 45 percent. The lower two panels show the quarterly share of children who experience somatic or psychiatric hospitalization. Figure 1c shows a divergence between the two groups in the 8 quarters leading up the first placement and a small additional increase in somatic hospitalizations 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 8 percent of foster children have a psychiatric hospital visit in the quarter they are placed in out-of-home care, and the percentage stabilizes at around 6 percent following placement. This should be viewed relative to the less than 1 percent in the matched control group.

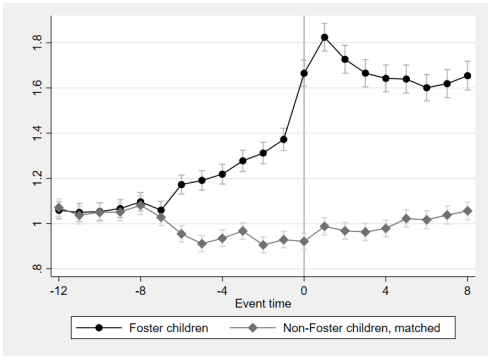
Figure 1e shows a significant decrease in the share of foster children who are enrolled in school from more than 95 percent two quarters before placement in out-of-home care to 90 percent two quarters after. The enrollment rate in the matched control group remains high at around 99 percent throughout the event period. As suggested by Figure 1f, there is a higher rate of absenteeism among foster children at around 10 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 10 percent.

The descriptive evidence clearly documents why a traditional matching approach is

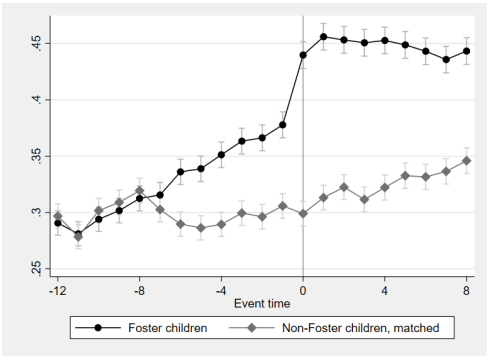
[5]The decline in the outcome variable for the control group is likely to be caused by convergence to the mean.

insufficient to account for differences between foster children and non-foster children even when very detailed administrative data is available. It also highlights the importance of timing when matching on observable characteristics, since large changes in most outcomes occur 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 the substantial pre-trends preceding the first placement, especially when it comes to psychiatric diseases. In the estimations presented in 5, we will focus on two groups of children where pre-trends are more "well-behaved": a subsample of children with no prior hospitalizations due to psychiatric diagnoses (around 90% of the main sample) and a subsample of children for whom the placement decision was reported to be due to problems of the parents, not the children (around 1 in 8 children). Moreover, we drop the control group (non-foster care children) and thus estimate the impact of an out-of-home care placement relative foster-care children observed in the quarter prior to placement. We explain the methodology used in 4.

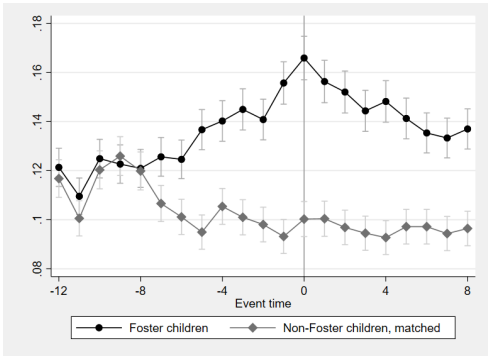
Figure 1: Descriptive graphs, quarterly average



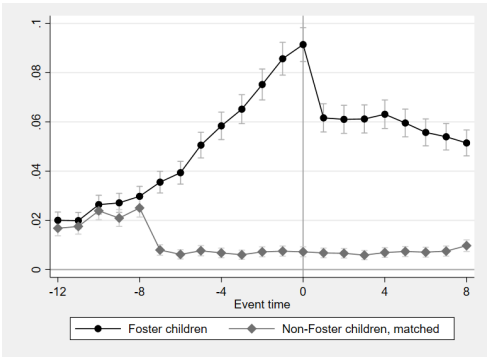
(a) Number of visits to general practitioner



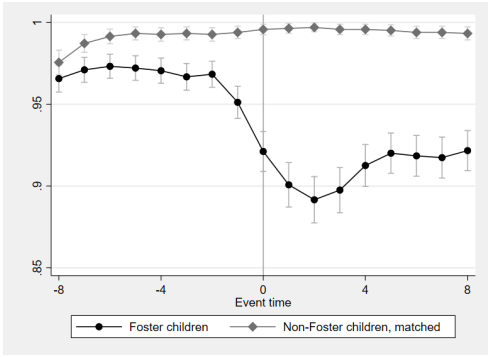
(b) Share with prescription drug purchase



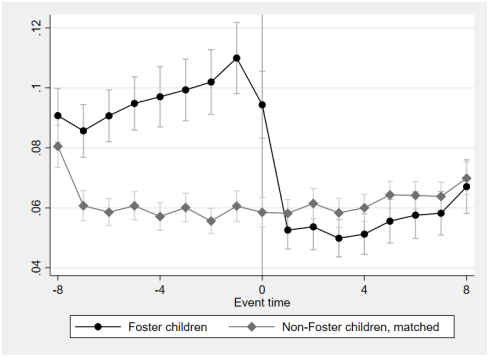
(c) Share with somatic hospitalization



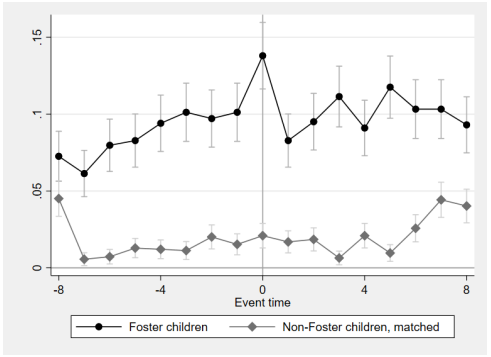
(d) Share with psychiatric hospitalization



(e) Enrollment



(f) Absenteeism



(g) Criminal charges

Note: The figure shows the average outcomes separately for foster children and the group of matched non-foster children in the balanced samples (see table 1). The two groups are matched on observable characteristics measured prior to the event, i.e., in quarters t-12 to t-8.

3.4 Survey among caseworkers

From January 2015 to June 2016, we conducted a survey of caseworkers in the municipality of Copenhagen. The survey was intended to provide insights into the "marginal child" by asking questions regarding the caseworkers' risk assessments for each individual child for each child protection decision.[6]

A municipal caseworker concerned about a child will open an investigation to determine whether there are grounds for intervention. Based on the investigation, the caseworker will present the case for the team of child protection caseworkers. At the meeting, the leader and the caseworkers discuss the case and decide whether to recommend an out-of-home placement. One exception for this procedure is if an acute out-of-home placement is needed. In this case, action is taken immediately.

The survey was designed to collect caseworker assessments of every case that was taken up at a meeting, irrespective of whether the child was placed in out-of-home care following the meeting or not. This means that by construction, the survey consists of children at the margin of a placement as all of the children in the survey sample were considered for placement.

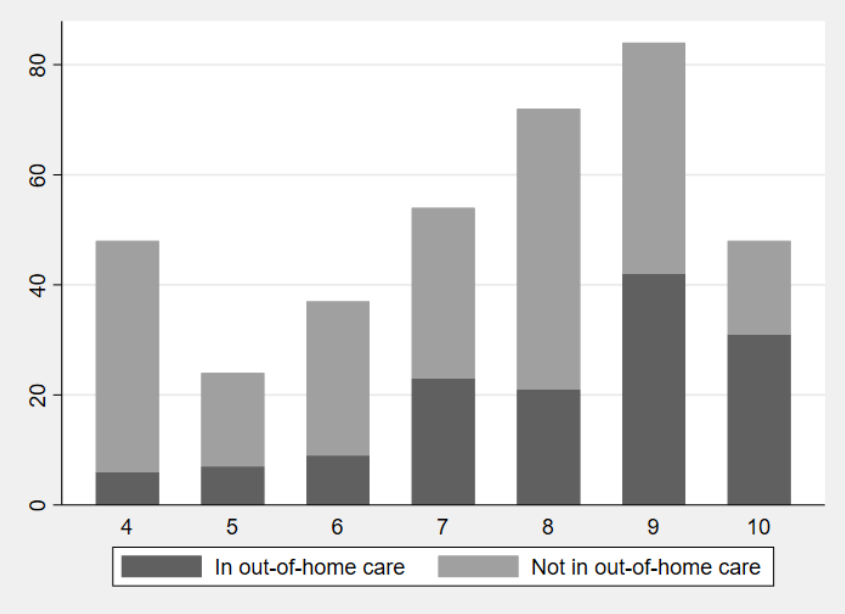
For every case in which placement in out-of-home care was considered for a child in the 18-month period in 2015 to 2016, caseworkers were asked to respond to ten short questions. The caseworkers responded to the questionnaire online. The response rate was 89 percent on the distributed survey. Specifically, the questionnaire asked caseworkers to assess the strength of causes for placement for each case, and whether there had been unanimity or disagreement among caseworkers about that assessment. They were asked to assess how concerned (on a scale from 1 to 10) they were for the child, what signs of threats to the child's well-being they saw, how they made their overall evaluation of the concerns and risk factors that were threatening the child, their assessment of resources surrounding the child, and if applicable, which type of placement (foster family versus institutional care) they found most suitable for the child in question. This is information that is not available in the registers or in municipal administrative data, but which may

[6]See Ejrnæs and Gørtz, 2017b for a description of the main results of the survey.

determine whether the child is placed or not.

We will primarily use the caseworker's risk assessments, in particular their answer to the question: "How do you assess the total burden of risk factors for the child on a scale from 1 to 10, where 1=high risk and 10=no risk?". We have reversed the scale to facilitate interpretation of the results. Figure 2 shows how the cases were distributed on the risk factor scale divided by those children who were subsequently placed in out-of-home care and those who were not. We have also experimented with using information from other questions, but as most of the questions are highly correlated it does not make a difference.

Figure 2: Distribution of risk assessment



Note: Due to the small number of observations at each risk assessment level, risk assessments of ≤ 4 *are grouped at risk level 4.*

.

The final survey dataset contains information on 350 children of which a placement of 139 children was initiated after the case meeting. For children who were not placed after the meeting about 86 percent were receiving support while they live with their parents.[7] The survey responses were subsequently anonymized and linked at the individual level to the same type of register information on socio-economic characteristics that was used in the first set of analyses on the full-population register data. We refer to the children

[7]This support could be having a mentor or that whole family is receiving support.

who are placed in care after the meeting as the treatment group and those who were not placed in care as the control group. Table 3, columns 1-2, shows descriptive statistics based on register data for all survey children. As shown in columns 3-4 in the table, there are still substantial differences between the two groups of children even when we only look at children who were considered for out-of-home placement. Importantly, children who were subsequently placed in care following the case meeting had a more severe risk assessment by the caseworkers on average than those who were not placed in care.

To improve the balance between the treatment and control group, we use propensity score matching to match the treatment and control groups on age, sex and the caseworkers' assessments. The matched survey sample consists of 262 children, of which 131 (50 percent) were placed in out-of-home care after the survey.[8]

Table 3, columns 5-8, shows that once we match on age, gender and caseworker risk assessment, the matched survey children that were not placed in care were very similar to the survey children who were placed in out-of-home care.[9] Outcomes at the time of the survey are not significantly different and we see only small differences in mother's characteristics. It is striking how similar these children are when comparing observable characteristics. Taking into account the caseworker risk assessment allows us to identify what looks like a valid control group compared to just matching on a large number of characteristics observed in the registers for the full-population sample. This suggests that the caseworker assessment likely holds important additional information that is not readily observable even in comprehensive and detailed administrative data.

[8] Among the matched children in the control group 89 percent receive support.

[9] The number of observations is lower, since not all observations could be matched satisfactorily in the propensity score matching procedure.

Table 3: Survey treatment vs control children, survey quarter

	Unmatched				Matched			
	Treatment mean	Control mean	Difference b	t	Treatment mean	Control mean	Difference b	t
Matching variables								
Age at time of survey	13.56	10.43	3.14***	(5.2)	13.37	13.05	0.31	(0.5)
Girl	0.55	0.48	0.07	(1.2)	0.52	0.51	0.01	(0.1)
Caseworker risk assessment	8.11	6.77	1.34***	(6.2)	7.99	7.60	0.39	(1.9)
Outcome variables								
Number of GP visits	1.24	1.38	-0.15	(-0.7)	1.21	1.31	-0.09	(-0.4)
Somatic hospital contact	0.17	0.17	0.01	(0.2)	0.17	0.18	-0.01	(-0.2)
Psychiatric hospital contact	0.10	0.02	0.08**	(3.1)	0.09	0.04	0.05	(1.8)
Prescription drug purchase	0.34	0.29	0.04	(0.9)	0.32	0.32	0.00	(0.0)
Enrolled in elementary school	0.81	0.80	0.01	(0.2)	0.81	0.76	0.04	(0.6)
Absenteeism	0.20	0.15	0.06	(1.1)	0.20	0.17	0.03	(0.6)
Criminal charge	0.11	0.11	-0.00	(-0.0)	0.11	0.13	-0.01	(-0.2)
Mother's characteristics								
Age	28.86	28.19	0.66	(1.1)	28.93	28.13	0.80	(1.2)
Married/Registered partnership	0.33	0.37	-0.04	(-0.7)	0.33	0.45	-0.12*	(-2.0)
Highest completed elementary school	0.03	0.07	-0.04	(-1.6)	0.03	0.10	-0.07*	(-2.3)
Highest completed secondary education	0.69	0.64	0.06	(1.1)	0.69	0.63	0.06	(1.0)
Highest completed tertiary education	0.08	0.16	-0.08*	(-2.3)	0.08	0.14	-0.06	(-1.6)
Unemployed	0.04	0.06	-0.01	(-0.6)	0.04	0.05	-0.02	(-0.6)
Disability pension	<0.03	<0.03	0.00	(0.2)	<0.03	<0.03	0.02	(1.0)
On cash benefits	0.39	0.38	0.00	(0.1)	0.40	0.42	-0.02	(-0.4)
Criminal charge	0.29	0.29	-0.00	(-0.0)	0.29	0.24	0.05	(0.8)
Psychiatric hospital contact	0.16	0.24	-0.08	(-1.8)	0.16	0.15	0.01	(0.2)
N	139	211	350		131	131	262	

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

4 Empirical strategy

To structure our discussion of the impact of a placement, we use the framework of Freyaldenhoven, Hansen, and Shapiro (2019). Let z_{is} be an indicator for the 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 η_{is} be a measure of the child's general risk and η^* 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:

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

We assume strict exogeneity of the placement with respect to ϵ_{is}. α_i is an individual fixed effect, which we can account for given the panel structure of our data. In this

model z_{is} is endogenous if $\lambda \neq 0$ and η is unobserved. If η_{is} is observed, we can solve the endogeneity problem by controlling for η_{is}.

4.1 Event study

In the event study framework, we introduce an additional time variable: the event time t, which is defined such that $t = 0$ in the first period that the child is placed in out-of-home care ($\min s : z_{is} = 1$). We index all periods relative to that period. In the baseline specification, we consider a balanced panel of children placed in care from 12 quarters prior to their first out-of-home placement to 8 quarters 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 quarterly basis.

If η_{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.

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

$$Y_{iqt} = \sum_{s \neq -1} \beta_s \cdot \mathbf{I}[s = t] + \delta_{iq} + \gamma_q + \alpha_i + \eta_{iqt} + \epsilon_{iqt}. \tag{2}$$

The first term on the right hand side is the full set of event time dummies, where $t = -1$ is left out so the remaining event time coefficients represent the difference in outcomes with respect to the quarter prior to placement. The model includes age dummies (δ) and quarter dummies (γ) to control for underlying age and time effects. Without controlling for age and time, the model would simply yield the level change in the mean outcome

for the group relative to $t-1$. The three sets of dummies are all identified in the model due to variation in the age and the calendar time at which a child experiences the first placement. In some of the specifications we allow for an individual fixed effect (α).

For a causal interpretation of the estimates from the non-parametric event study, the timing of first placement in out-of-home care should be uncorrelated with the outcome conditional on being placed in care, and on time and age effects. In addition to the non-parametric event-study, we estimate a parametric version of the model following Dobkin et al. (2018), where we allow for a linear pre-trend in event time t such that

$$Y_{iqt} = \sum_{s>-1} \beta'_s \cdot \mathbf{I}[s=t] + \theta t \cdot + \delta_{iq} + \gamma'_q + \alpha'_i + \eta_{iqt} + \epsilon'_{iqt}. \tag{3}$$

The event time coefficients (first term on the right hand side) now identify the post-event effect relative to the linear pre-trend. We assume that the pre-trend would have continued in the post-period in the absence of the event. In other words, if the children had not been placed in care, we assume outcomes would have evolved as predicted by the linear pre-trend. Although this is a strong simplification, it may be a relatively good short-run approximation and yield a conservative estimate of the effects of foster care on child outcomes. For a causal interpretation of the parametric event study coefficients, we need the timing of first placement to be uncorrelated with deviations from the linear trend conditional on being placed in care, and on time and age effects. We also have to assume that no third factor that is correlated with the outcome variable occurs at the same time as the event.

In the main graphs we will present the non-parametric event time coefficients as estimated in model 2 with the linear trend estimated from the parametric event model 3. This allows us to visually evaluate the fit of the linear pre-trend to the non-parametric changes in outcomes in the periods prior to the event and to evaluate the magnitude and statistical significance of the post-event coefficient estimates.

To test the robustness of the main results from the event study, we estimate the impact of foster care on child outcomes using three alternative approaches presented in detail in appendix B. First, we estimate model (2) with a control group and individual fixed effects,

where we use children that are placed in out-of-home care 8 quarters later as a control group for the treatment group following Fadlon and Nielsen (2019) (see appendix B.1). Second, we estimate model (2) with individual fixed effects, restricting two pre-periods to zero to identify all parameters (see appendix B.2). Third, we estimate model (2) with the matched control group and unit fixed effects (the matched control group is the one described in section 3, see also appendix B.3).

4.2 Survey matching

In the second empirical approach, we use children who were considered for out-of-home care and who had a similar caseworker risk assessment as a control group for the children placed in out-of-home care. The control group contains children who were considered for out-of-home care but where caseworkers decided not to place the child in care. This implies that we limit our attention to children with a high η, who are all on the margin to be placed. In addition, we have collected a new measure of child risk (η_{is}), which is usually unobserved. We use this variable to form a control group using propensity score matching. The idea behind our approach is to compare children who are placed in out-of-home care with children who are not but who have the same caseworker assessed propensity for a placement.

The survey data provides information on the caseworker risk assessment for children on the margin of placement. This allows us to identify the causal impact of an out-of-home care placement. With a slight modification of the notation, we consider the event time to be t time since caseworkers were considering a placement and the event time measures the quarters since the case meeting. The causal effect of placement measured 8 quarters after the caseworker meeting is identified by

$$E(Y^1_{iq8} - Y^0_{iq8} | p(\eta_{iq0}, x_{iq0})). \tag{4}$$

We construct the control group by propensity score matching with respect to sex, age (denoted by x) and case worker risk assessment (η), where p denotes the propensity score function. We use the estimated propensity score in a one-to-one nearest neighbor

matching algorithm to match children considered for, but not placed in care to children placed in out-of-home care after the case assessment meeting. The effect we identify is mainly determined from the children who are at the margin of being placed in out-of-home care, since both the treatment and the control children were considered for placement.

To account for the fixed individual effect, we also use an alternative estimation method where we measure the changes in outcome between period $t = 0$ and $t = 8$: $\Delta Y^z_{iq8} = Y^z_{iq8} - Y^z_{iq0}$ for $z_{iq0} = z$:

$$E(\Delta Y^1_{iq8} - \Delta Y^0_{iq0} | p(\eta_{iq0}, x_{iq0})). \tag{5}$$

5 Results

In this section, we present two sets of results corresponding to our two main empirical approaches. In the first set of results, we examine the evolution of child outcomes in the years around their first out-of-home care placement in an event study. The event study coefficients measure the level change in outcomes for children relative to the period before placement, when controlling for time and age fixed effects. This set of results sheds light on the average impact of placement in out-of-home care on child outcomes. In the second set of results, we apply the caseworkers' assessment to form a control group of children with similar risk levels, who are not placed in care. By comparing the children placed in out-of-home care with a control group of children with very similar risk assessment, we obtain an estimate of the causal impact of the placement.

5.1 Event Study

Figure 3 shows the estimated change in health outcomes relative to the quarter before placement for children. The point estimates are from the non-parametric model 2 and the linear pre-trend estimated from the parametric model 3. This allows us to graphically inspect the change in outcomes across event time relative to the linear pre-trend.

The estimated impact in 3a 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 decreased again to the pre-event level. We would expect to see a temporary increase if children are, e.g., taken for a routine health visit at the time of placement. A similar change is, however, also reflected in Figure 3b, 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. Changes in these health outcomes may reflect either changes in health care utilization behaviour or changes in the true underlying health of the child.

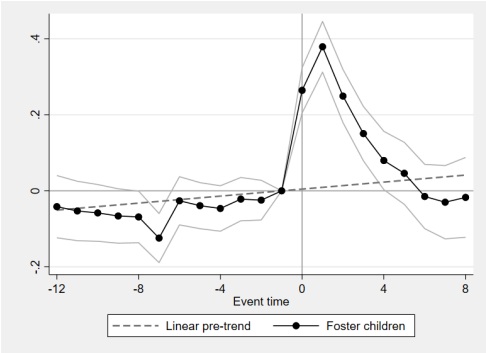
The rich register data on health care use allows us to dig deeper into specific types of drugs and diagnoses that are prevalent for this group of children. Details can be found in the Appendix section C. Prescription drug purchases by drug type are shown in figure C.4. On the one hand, the significant increase in the purchase of asthma medication indicates that the increase in drug purchases following placement in care is likely to, at least partly, be driven by utilization effects. On the other hand, the share of children using ADHD medication, benzodiazepines and related drugs gradually decreases in the years following out-of-home care placement. This development possibly reflects changes in underlying health.

Figure 3c shows a gradual decrease in somatic hospitalizations following placement in out-of-home care. When we turn to psychiatric hospitalizations, we see a strong increase in the two years leading up to placement in out-of-home care, followed by a large and continued decrease in psychiatric hospitalizations after placement in care, see Figure 3d. The strong pre-trend indicates that psychiatric hospitalization may in itself be a decisive factor in initiating an out-of-home placement, and we are therefore cautious with any causal interpretation of the subsequent drop in hospitalizations. Below, we further focus on two large subgroups of children: those without previous hospitalizations due to psychiatric diagnoses and those for whom their placement was solely initiated due to causes found in the parents.

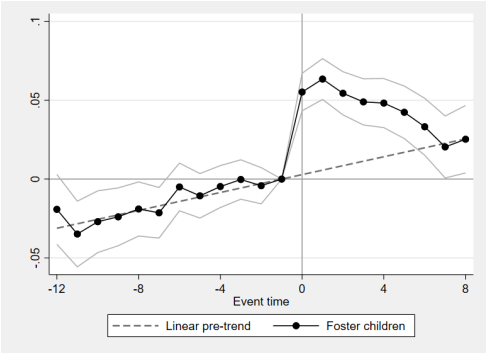
A closer look at hospitalizations by diagnosis groups suggests that the decrease after

placement is at least partly driven by a decrease in injury related hospitalizations (see Figure C.1). We interpret this as evidence that the decrease in somatic hospitalizations, at least to some degree, does reflect improvements in the underlying health of the children, perhaps mediated by a safer environment or potentially less risk-seeking behavior, although it is impossible to rule out that utilization effects may play a role.

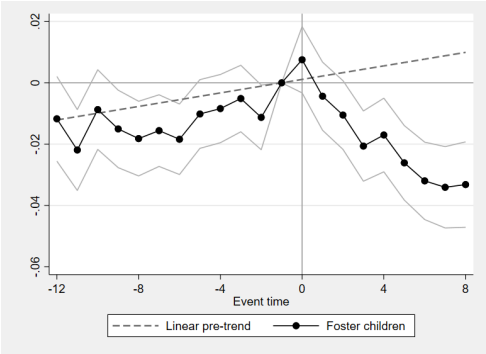
Figure 3: Event graphs for child outcomes



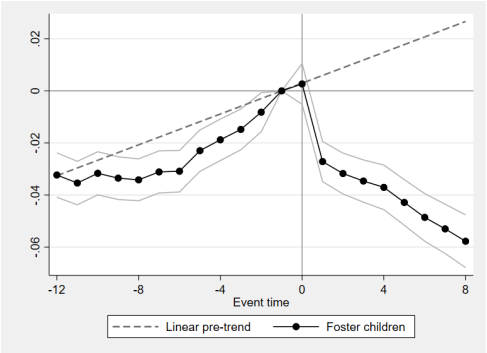
(a) Number of visits to general practitioner



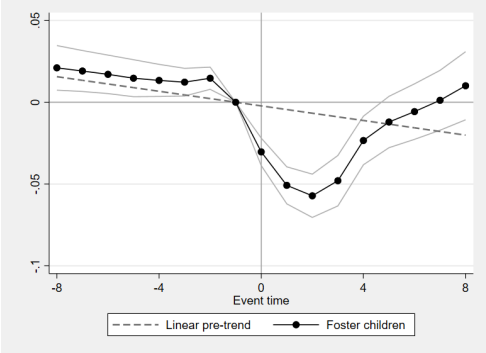
(b) Share with prescription drug purchase



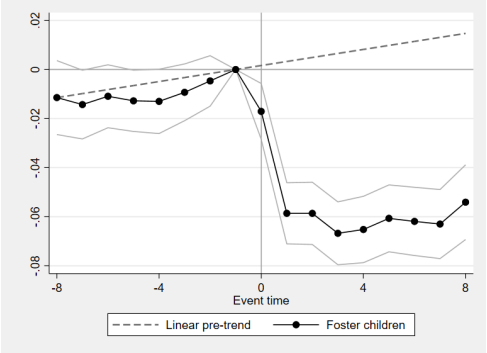
(c) Share with somatic hospitalization



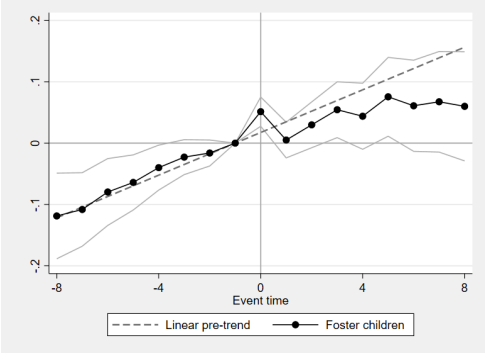
(d) Share with psychiatric hospitalization



(e) Enrollment



(f) Absenteeism



(g) Criminal charges

Note: The figure shows the estimated event coefficients from model 2 and the pre-trend from model 3, estimated for the balanced sample of children in care.

Figure 3e shows that the share of children who are enrolled in elementary school decreases around the time of placement, but recovers within a year from the time of first placement. Absenteeism conditional on enrollment (see figure 3f, on the other hand, decreases significantly 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 the placement in out-of-home care. If we combine the two measures by stating that not enrolled in school is the same as 100 percent absenteeism in the quarter, we find that absenteeism is increasing up to the first placement and then stabilizes (see Appendix figure D.1). For criminal charges we see a steep increase up to placement, a spike at the quarter where the placement is initiated and then a stabilization, see Figure 3g.

To further zoom in on what happens around the time of the placement, we have constructed the event graphs based on *monthly* observations in a window 12 months before the placement and 12 months after. These figures are shown in appendix E, see Figure E.1. The monthly event graphs highlight the previously reported sharp increase in GP visits and prescription drug purchase just after the placement. Similarly, we see a sharp decline in absenteeism after the placement. For hospitalization and criminal charges, the monthly data show a distinct spike in the month where the placement is initiated. This supports the interpretation that hospitalization and criminal charges may trigger a placement.

Analysis of two subsamples with flat pre-trends

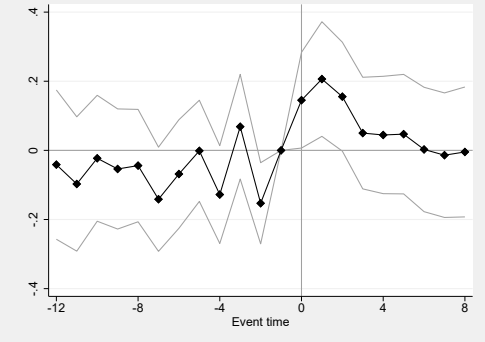
To overcome the potential endogeneity, we focus on two subsamples of children, where we do not observe problematic (non-flat) pre-trends. We estimate the effects using these two subsamples using equation 3, i.e. without explicitly modelling pre-trends.

The first subsample uses detailed information on the causes of placement given in the administrative registers. For each placement the caseworker has reported the (multiple) causes for the placement. The caseworker can choose between six causes relating to the child (e.g. risky behaviour, health concern, crime) and eight causes relating to the parents (e.g. adult risky behaviour). For most placements (77.7 percent), the placement is caused

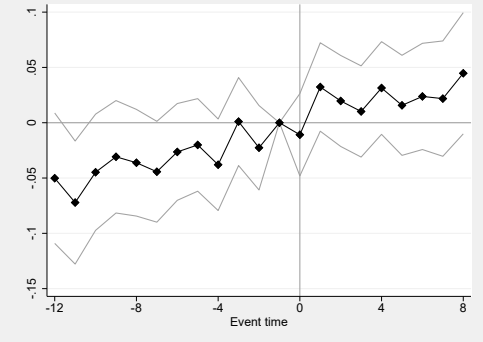
by issues relating to both parents and children. However, in 11.8 percent of the cases the placement is only caused by the parents' behaviour. In this subset of analyses we focus on the placements that were not caused by the child's behaviour. For these cases where it is solely the parents' behaviour that cause the placement, it is plausible to assume that the timing of placement is exogenous to child outcome. In figure 4 we show the event graphs for this sample. Given the somewhat smaller sample, the estimates are somewhat more noisy, but pre-trends are now flat, and we find some of the same patterns as for the main results shown in Figure 3. We thus confirm an increase in visits to GP in the first quarters after placement (4a), and we find equally substantial reductions in absenteeism from school as for the main sample (4f).

An alternative way of deselecting placements where the timing could be endogenous is to focus on children without psychiatric diagnoses or hospitalizations prior to first placement. 10 percent of the children who are placed have been admitted to psychiatric hospitals before the placement, and strong pre-trends are especially found among this group of children. Our second subsample thus focuses on the group of children without prior admissions to psychiatric hospitals, i.e. around 9 in 10 children. For this subsample we find flat pre-trends, see figure 5, and we confirm that children had more GP visits and prescription purchases (5b), while reducing school enrollment but also absenteeism (conditional on enrollment, 5f). Moreover, we observe an increase in psychiatric hospitalizations, which is almost mechanic as psychiatric hospitalizations were bound to zero immediately before placement (5d).

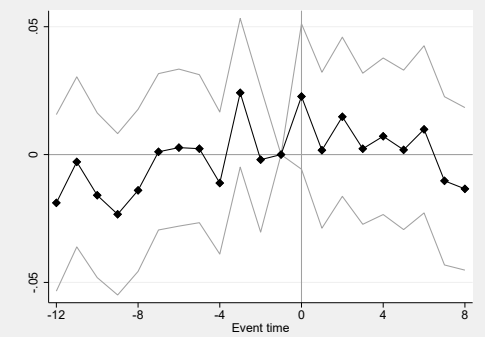
Figure 4: Event graphs only for children with parent related causes



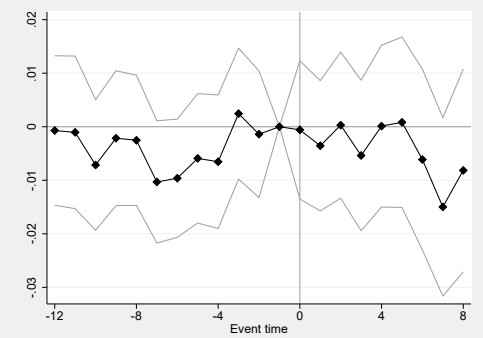
(a) Number of visits to general practitioner



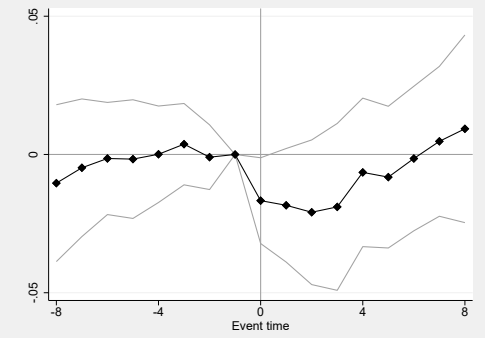
(b) Share with prescription drug purchase



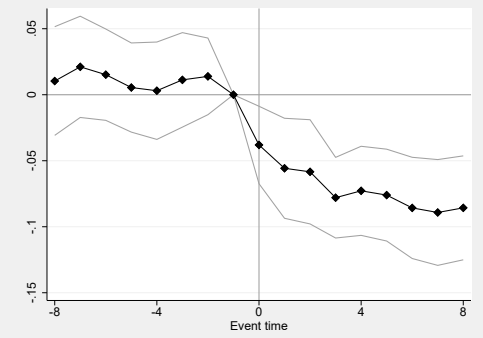
(c) Share with somatic hospitalization



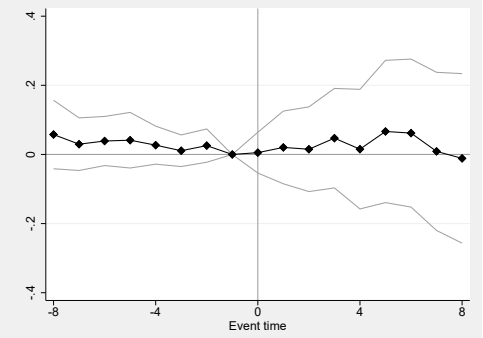
(d) Share with psychiatric hospitalization



(e) Enrollment



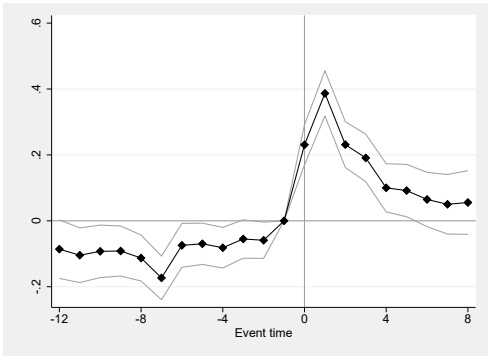
(f) Absenteeism



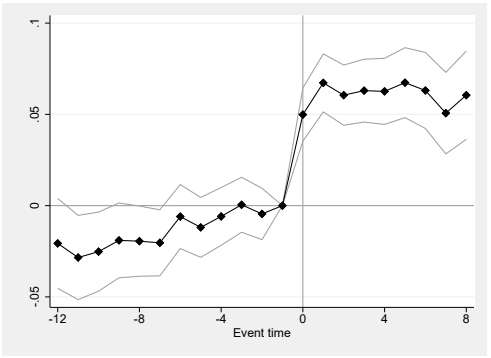
(g) Criminal charges

Note: The figure shows the estimated event coefficients from model 2, estimated for the balanced sample of children in care.

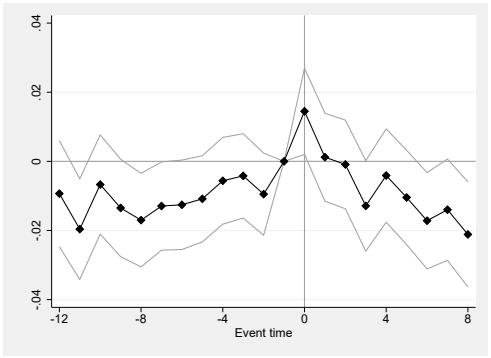
Figure 5: Changes in outcomes for children without previous psychiatric diagnoses



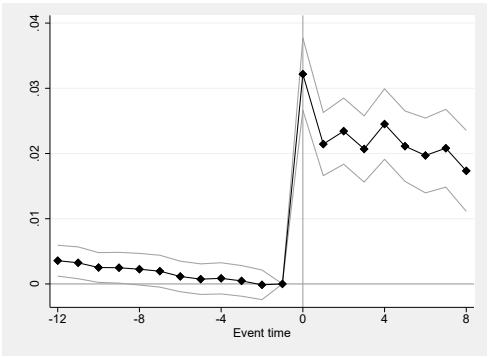
(a) Number of GP visits



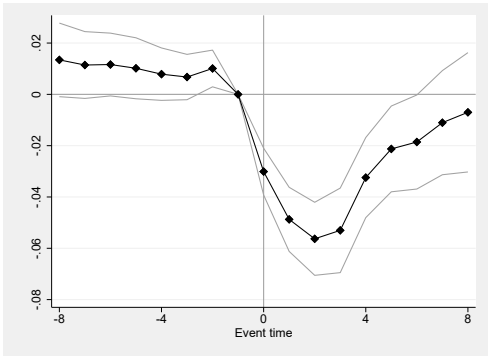
(b) Prescription drug purchases



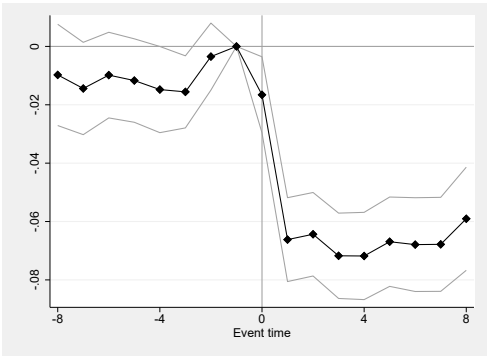
(c) Somatic hospitalizations



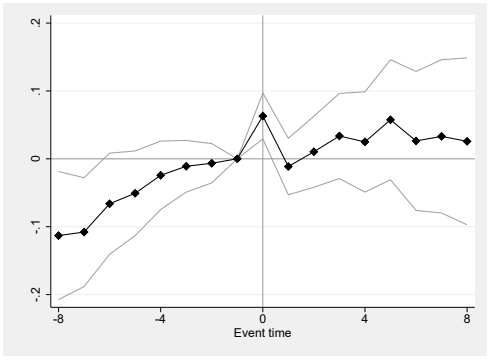
(d) Psychiatric hospitalizations



(e) Enrollment



(f) Absenteeism



(g) Criminal charges

Note: The figure shows the estimated event coefficients from model 2, estimated for the balanced sample of children in care.

Robustness of results

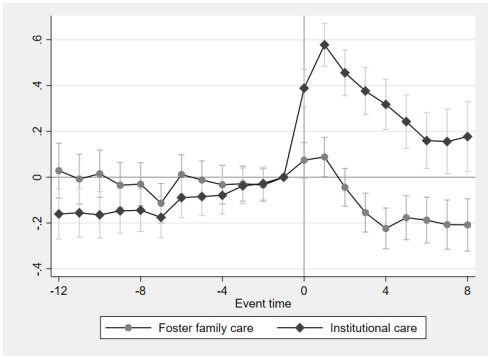
We perform three additional estimations to test the robustness of the event study results, see appendix B. The first robustness check uses later-placed children as the control group, following the design used in Fadlon and Nielsen (2019). The second robustness check uses an event study design, but with individual fixed effects instead of modelling a trend. And the third robustness check uses an event study design combined with propensity score matching. All three alternative estimation approaches yield results that are very similar to the main results. One exception is the estimates for schooling outcomes in the specification with unit fixed effects presented in B.2. The results from this specification show no temporary drop in enrollment in the year following placement in out-of-home care, but instead shows a gradual and sustained increase in enrollment following the event. The decrease in absenteeism following placement in out-of-home care is estimated to be larger at the time of placement compared with the main estimates, and to continue to decrease in the years following the event. In this sense, the main results represent conservative estimates of the positive impact of out-of-home care on schooling outcomes.

Heterogeneous effects

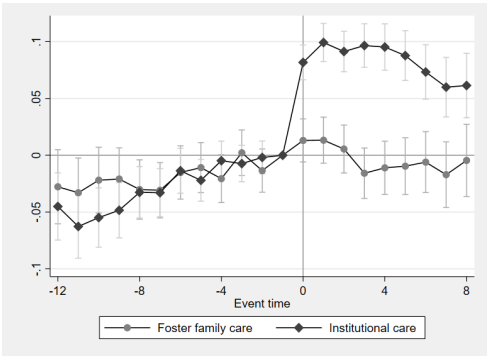
To check for heterogeneous effects, we split the sample according to type of care, gender and age. Previous studies have shown that type of care, i.e. whether children are placed in foster families or in institutional care can have very different implications for the children (Humphreys et al., 2022), 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 into type of care, we see remarkable differences, as shown in figure 6. For children in foster families, we do not see the same deterioration in health and school outcomes prior to placement. For most of the outcomes there are no pre-trends, with the exception of juvenile crime. Moreover, we see clear improvements in health and schooling outcomes after the placement, since both the rate of hospitalization, the number of GP visits and absenteeism fall. Children in institutional care, however, follow the same development as shown in the main graphs, but with even larger changes.

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.

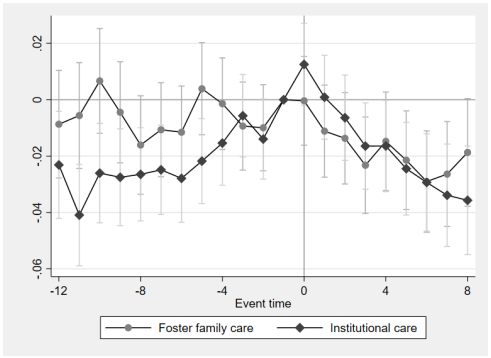
Figure 6: Heterogeneity by type of care



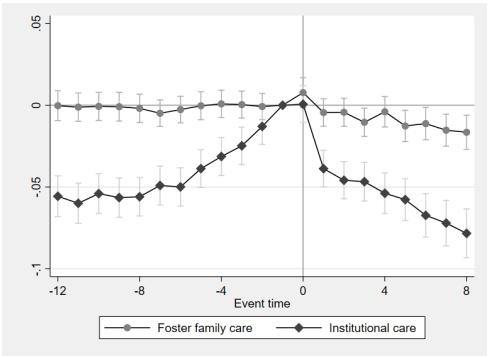
(a) GP visits



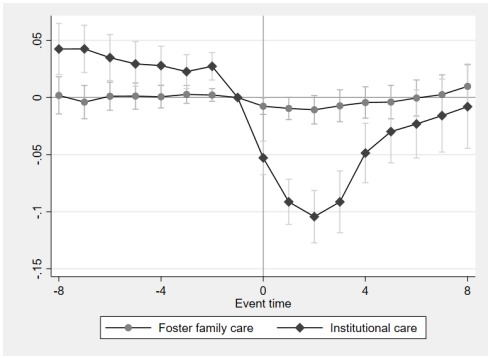
(b) Prescription drug purchase



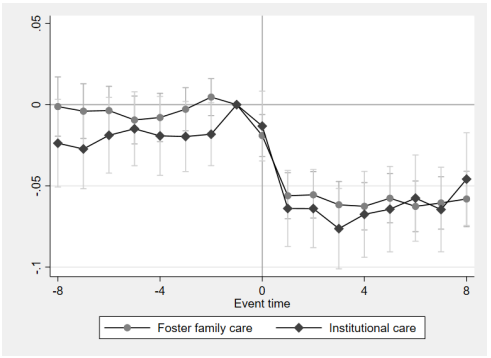
(c) Somatic hospitalization



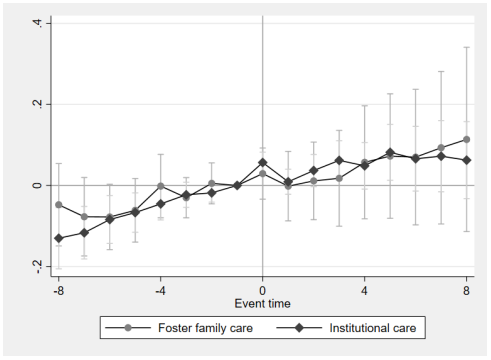
(d) Psychiatric hospitalization



(e) Enrollment



(f) Absenteeism



(g) Criminal charges

Note: The graphs show the level change in outcomes relative to period t=-1 separately for children placed in institutional care and family foster care.

Results by age and sex 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.

Finally, we have for a subsample of the children considered the long-term effects by extending the post-event time from 8 quarters to 16 quarters (see appendix G). For GP visits and drug purchases, there are no long-run effects, while for hospitalization and absenteeism, the effects persist. However, for school enrollment, the short-run negative effect is in the long run replaced by a positive but insignificant effect.

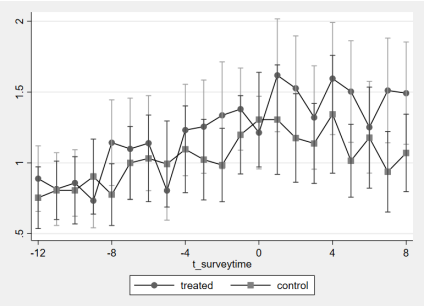
5.2 Survey matching

In this section, we present results for the local average treatment effect of placement using our matching strategy on the survey data collected for this project. We compare the outcomes of children who were placed in care with a matched control group of children who were not placed, but had similar risk levels as assessed by the caseworker. Most of the children in the control group receive preventive care.

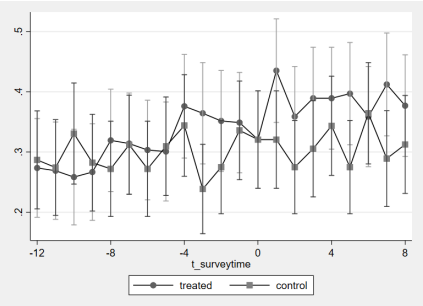
Figure 7 shows event graphs on health and schooling outcomes for the two groups. The event time $t = 0$ refers to the quarter in which the decision about placement was taken. All the event graphs show that the two groups are not significantly different neither before nor after the placement, partly due to small sample size.[10] When taking a closer look at the outcomes, we find a weak tendency for GP visits and drug purchases to increase after the placement relative to the control group, and we observe that the school enrollment rate is decreasing for children in care relative to the control group.

[10]The risk assessment seems to be key in order to construct a valid control group. We have experimented to see if it is possible to construct a predicted risk assessment based on the information solely found in the registers and use this to form the control group. Although the latter approach leads to the control group becoming more similar to the treatment group, we are still not able to ensure common pre-trends, see appendix H.

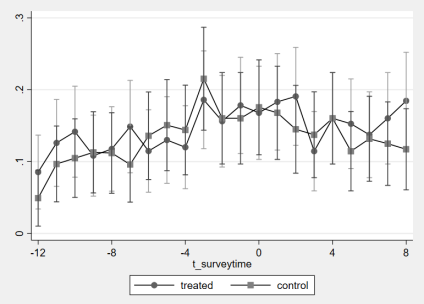
Figure 7: Event graphs for child outcome, survey population



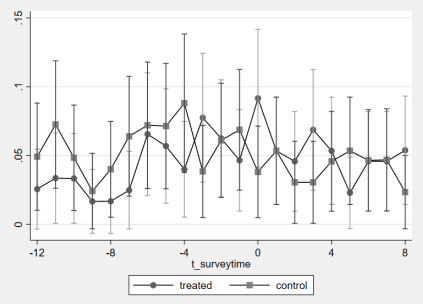
(a) Number of visits to general practitioner



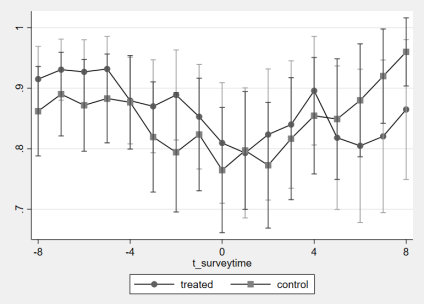
(b) Share with prescription drug purchase



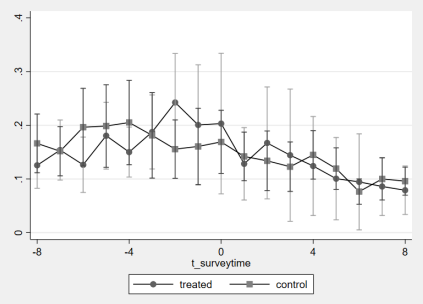
(c) Share with somatic hospitalization



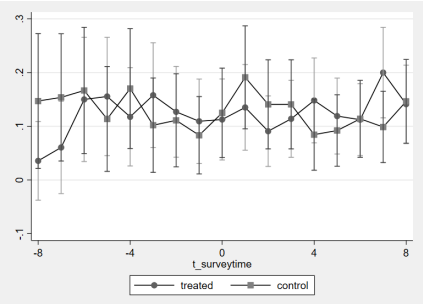
(d) Share with psychiatric hospitalization



(e) Enrollment



(f) Absenteeism



(g) Criminal charges

Note: The figure shows the average outcomes separately for children placed in care after the survey and children who were not placed in care after the survey. The two groups are matched on age, gender and caseworker risk assessment. The sample is unbalanced across event time.

To further investigate the effect of placement, we look at child outcomes 8 quarters after the placement decision was taken. The results are shown in the top part of table 4. We do not see any significant differences between the children placed in out-of-home care and those who are not placed in care. The point estimates indicate an increase in GP visits, hospital contacts and prescription drug purchases and a decrease in enrollment, absenteeism and criminal charges, but none of these differences are statistically significant.

In Appendix section I, we report additional regression analyses where we pooled all observations after the care decision is taken, controlling for background characteristics (see Table I.3). We find largely the same effects, and now the increase in GP visits is statistically significant.

Finally, we take individual fixed effects into account by looking at the average change in outcomes between periods t=0 and t=8 and compare the two groups, see table 4 bottom part. The last column shows the difference in differences between the two groups over time. We see largely similar results as in the top part of the table, with a few exceptions. The difference between the number of GP visits is a little larger than previously estimated and marginally statistically significant. The difference in psychiatric hospitalizations has switched sign from positive to negative, but remains insignificant. The difference in school enrollment and absenteeism between the treatment and control groups has increased, but it remains insignificant, and the same is true for the change in criminal charges. When repeating the exercise, but pooling all observations from $t = 1, .., 8$, we obtain the same results as before, confirming that the only significant effect of placement is for the number of GP visits (see Table I.4).

Generally, our results using survey data show no significant short-run effects of the placement compared to preventive actions. The only exception is a marginally significant effect on the number of GP visits which, on average, increase by around half a visit after a placement. While the results for GP visits and school enrollment are in line with the results of the event study, the results on hospitalization and absenteeism differ from the event study. However, the decline in hospitalization and absenteeism found in the event study is unlikely to be a causal effect of the out-of-home placement due to the lack of

common pre-trends.

Exploiting the caseworker risk assessments from the survey data, however, leads to an improved match between treatment and control groups and similar pre-trends. This gives us confidence that we can interpret our findings based on survey data as causal effects and suggests that, on average, the marginal child placed in out-of-home care do not experience an additional improvement compared to preventive care. This result is supported by the fact that we see similar improvements in health and schooling outcomes when preventive care is put in place, see figure J.1.

Table 4: Survey treatment vs control children, 8 quarters after survey

	Treatment mean	Control mean	Difference b	t
Average outcome in t=8				
Number of GP visits	1.49	1.07	0.42	(1.8)
Somatic hospital contact	0.18	0.12	0.07	(1.5)
Psychiatric hospital contact	<0.05	<0.03	0.03	(1.3)
Prescription drug purchase	0.38	0.31	0.06	(1.1)
Enrolled in elementary school	0.86	0.96	-0.10	(-1.6)
Absenteeism	0.08	0.10	-0.02	(-0.7)
Criminal charge	0.14	0.15	-0.01	(-0.1)
Average change in outcome from t=0 to t=8				
Δ Number of GP visits	0.28	-0.25	0.53*	(2.0)
Δ Somatic hospital contact	0.02	-0.06	0.08	(1.2)
Δ Psychiatric hospital contact	-0.04	-0.02	-0.02	(-0.6)
Δ Prescription drug purchase	0.06	-0.02	0.08	(1.2)
Δ Enrolled in elementary school	0.00	0.14	-0.14	(-1.4)
Δ Absenteeism	-0.04	0.02	-0.06	(-1.2)
Δ Criminal charge	-0.01	0.02	-0.03	(-0.4)
N	130	128	258	

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

Note: The top rows of the table show average outcomes 8 quarters after the survey for all survey children observed in that quarter. The bottom rows show the average change between the survey quarter and 8 quarters after the survey. For this reason, the bottom rows are conditional on observing an outcome for each child in both quarters and results may differ with respect to the unbalanced sample.

6 Conclusion

This paper examines the development of a broad set of child outcomes covering health, schooling, and criminal behavior around the time of a placement in out-of-home care.

The *first* part of the paper consists of an event study that traces out the dynamic trajectory 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 quarterly (and monthly) administrative register data for all children experiencing a placement in out-of-home care in the period 2013 to 2016 in Denmark, our analysis leads to a number of important new insights.

We initially provide a descriptive analysis that clearly pinpoints the severe problems experienced by a large part of the children placed in out-of-home care. We document that there are remarkable pre-trends preceding placement, especially for a minority of children with prior hospitalizations due to mental illness.

Estimation results indicate a deterioration in health and an increase in juvenile crime in the period leading up to the placement, while the effect is less clear for school outcomes. This suggests that health issues and juvenile crime can trigger a placement. Despite our rich administrative data, which allow us to match treated children to a control group of children with similar socio-economic background, the event study using our main sample does not present parallel pre-trends. This implies that the development in outcomes after placement in out-of-home care cannot be given a causal interpretation.

However, we are able to narrow our analysis down to two subsamples for which we do observe flat pre-trends, namely a subsample of children who were placed solely due to reasons rooted in the parents, and a subsample of children (90 % of all children in the main sample) who had no prior hospitalizations due to mental health issues. For these two (large) subsamples, we observe increases in GP visits and prescription drug purchases after placement, indicating that children receive better health care after placement. We also observe a reduction in school enrollment over the first 4-6 quarters after being placed, after which school enrollment bounces back to the initial level. Furthermore, we observe a large and permanent reduction in absence from school for those who are still enrolled.

A closer look at the children in out-of-home care reveals substantial heterogeneity. It turns out that children placed in institutional care have remarkably different outcomes than children placed in foster families even before the placement. Selection into foster care versus institutional care is, however, not random. Generally, children in institutional

care are older and more likely to have experienced psychiatric hospitalization prior to the placement. The deterioration in health and schooling outcomes before the placement and the adverse outcomes after placement are driven by children in institutional care. Children in foster families experience an improvement in both health and schooling outcome after the placement.

To improve our selection of a control group in the *second* part of the empirical analysis, we use a survey data set that we collected on caseworker assessments of risk levels for a small sample of children who were all considered for out-of-home placement in Copenhagen during 2015-16. The purpose of this survey was to collect information about a group of children that shared quite similar circumstances in the sense that they were all investigated with the purpose of deciding whether to place them in out-of-home care or not. Some were subsequently placed in out-of-home care, others were not, but all could be thought of as being a "marginal child" on the verge of a placement. Due to the limited sample size of the survey, the results are generally imprecisely estimated. However, the results point to important insights into the causal effects of out-of-home placement. We confirm an increase in GP visits after placement found in the event study which we, given parallel pre-trends, interpret as a causal effect. Likewise, our findings suggest that there is a fall in school enrolment as a result of placement in care, which could be driven by children in institutional care. When comparing children in the treatment and control groups, we observe similar trends in hospitalizations and absenteeism after placement. One explanation for the lack of causal effects on these outcomes is that once a child has been up for evaluation in a child case, the marginal child who ends up not being placed in out-of-home care will be subject to close attendance and support, leading to similar outcomes as for the child placed in out-of-home care.

Our paper makes several important contributions. *First*, while a number of recent papers (Doyle, 2007; Doyle, 2008, 2013; Doyle and Aizer, 2018; Warburton et al., 2014; Baron and Gross, 2020; Bald et al., 2019) were able to identify the causal effects of placing the *marginal* child in foster care, our event study results are related to placement of the *average* child. Our unique longitudinal data allows us to document the development in

key outcomes of the children quarter by quarter, and in some sub-analyses 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 had experienced a deterioration in their situation over several years before the decision to place them in care was taken. This underlines the difficulty of defining a relevant control group for this group of children and illustrates why ordinary propensity score matching on socioeconomic characteristics as well as previous child outcomes is generally not successful in identifying causal effects for placements in care. Our results show a far more complex picture of the placement than the previous literature has uncovered and highlight that the effect of a placement will depend on the particular circumstances. This may also explain the mixed evidence found in the literature.

Second, we contribute methodologically as well as empirically by leveraging our survey data with additional information, which is usually unobserved, on individual child risks. The survey was designed to identify crucial information on individual risk for the "marginal" child, for whom a placement is considered. Furthermore, when including such usually unobserved caseworker risk assessments as an additional variable in our propensity score matching, the treatment and control groups become much more similar in terms of socioeconomic characteristics and share similar pre-trends. Hence, including measures such as caseworker risk assessment improves the potential success of matching methods to identify causal effects by providing information that allows us to compare children who are similar on parameters that are essential in the placement decision.

Our analysis thus underlines that having better data on child characteristics, such as risk assessments, would improve policy makers options for evaluating public child protection programs. Our paper provides a proposal for a simple yet effective questionnaire that collects the essential information. This would furthermore contribute to improving the design of treatments for a very vulnerable group in society. Moreover, collecting such data systematically would assist caseworkers in finding the appropriate balance between out-of-home placement versus preventive measures for the individual child.

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For Online Publication

Appendix

A Children in care versus not in care

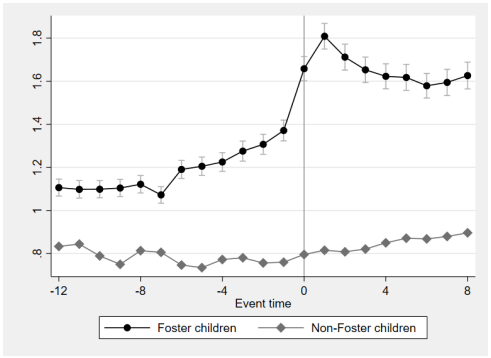
This section present graphs with descriptive differences between our sample of children in care as compared to a sample of all children who are not in care, matched only on gender and age. Graphs show the quarterly average of the two groups across event time. Children not in care are assigned a placebo event time.

Table A.1: Foster children vs non-foster children, quarter before first placement

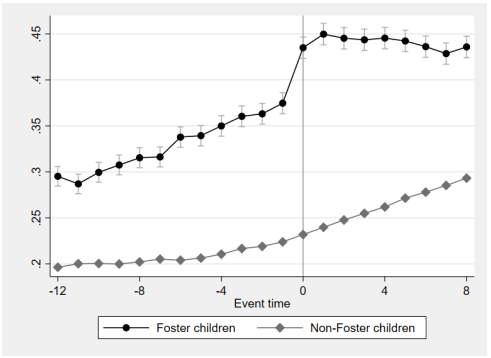
	Foster children	Non-foster children	Difference	
	mean	mean	b	t
Age	12.37	11.88	0.49***	(10.4)
Girl	0.48	0.49	-0.01	(-0.9)
Preventive care	0.31	0.00	0.31***	(302.4)
Number of GP visits	1.37	0.76	0.61***	(36.7)
Somatic hospital contact	0.15	0.07	0.08***	(24.6)
Psychiatric hospital contact	0.08	0.00	0.08***	(88.6)
Prescription drug purchase	0.37	0.22	0.15***	(29.6)
Criminal charge	0.14	0.01	0.14***	(67.1)
Enrolled in elementary school	0.92	0.99	-0.08***	(-55.6)
Absenteeism	0.17	0.05	0.12***	(75.5)
Mother's characteristics				
Age	27.40	29.39	-1.99***	(-33.3)
Married/Registered partnership	0.32	0.50	-0.17***	(-28.6)
Highest completed elementary school	0.11	0.06	0.05***	(16.5)
Highest completed secondary education	0.81	0.60	0.21***	(35.6)
Highest completed tertiary education	0.08	0.34	-0.26***	(-45.5)
Employed	0.29	0.65	-0.36***	(-61.5)
Self-employed	0.01	0.02	-0.01***	(-6.0)
Unemployment benefits	0.05	0.02	0.03***	(16.8)
Education or health benefits	0.16	0.17	-0.01	(-1.5)
Disability pension	0.03	0.00	0.03***	(33.7)
Retirement benefits	0.00	0.00	0.00**	(2.9)
On cash benefits	0.35	0.07	0.28***	(84.9)
Other	0.03	0.02	0.01***	(4.4)
On cash benefits	0.35	0.07	0.28***	(84.9)
Criminal charge	0.25	0.12	0.13***	(31.9)
Psychiatric hospital contact	0.12	0.03	0.09***	(42.2)
N	7,000	204,208	211,208	

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

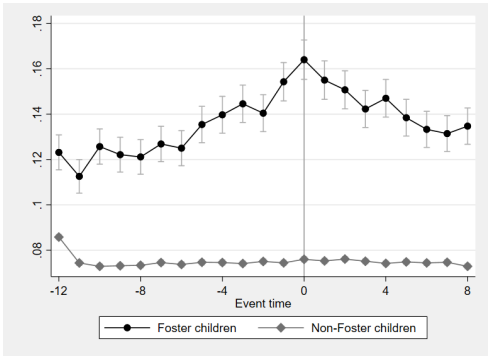
Figure A.1: Health, quarterly average



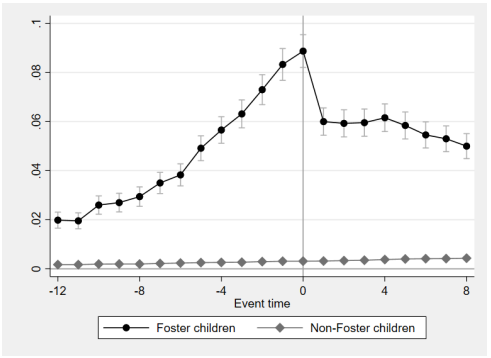
(a) Number of GP visits



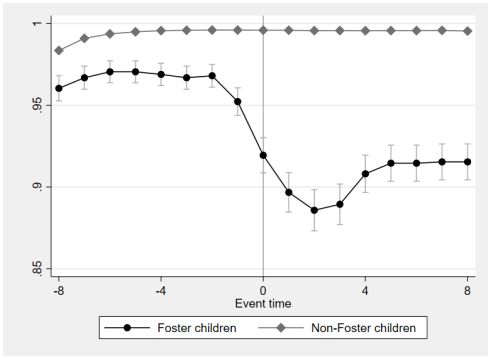
(b) Share with prescription drugs



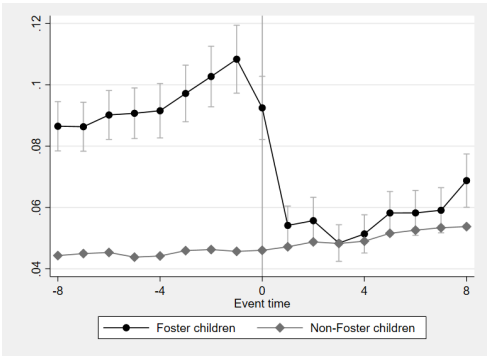
(c) Somatic hospitalization share



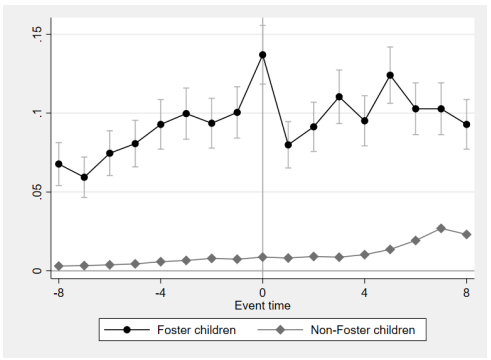
(d) Psychiatric hospitalization share



(e) Enrollment



(f) Absenteeism



(g) Criminal charges

Note: Average outcomes shown separately for foster children and non-foster children matched only on age and gender.

B Alternative estimation methods

This section presents three alternative event study estimation methods. The first alternative method is an estimation of the non-parametric event model using children placed in care at a later time as a control group. Adding the control group allows us to include unit fixed effects. The second alternative method is an estimation of the non-parametric event model on an unbalanced sample of children in care with unit fixed effects. In order to identify unit fixed effects without a control group, we must omit an additional pre-period dummy. The third alternative approach is an estimation of the non-parametric event model using the matched control group. Adding a control group to the estimation allows us to include unit fixed effects.

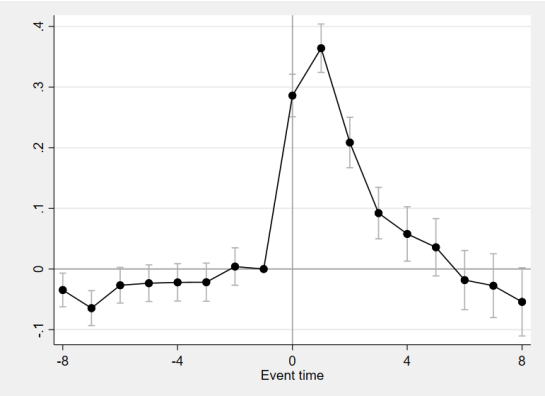
Table B.1: Foster children vs children placed in care 8 quarters later as control group, quarter before event

	Foster children	Non-foster children	Difference	
	mean	mean	b	t
Age	11.40	9.45	1.95***	(33.5)
Girl	0.47	0.48	-0.01	(-1.7)
Preventive care	0.29	0.13	0.15***	(29.7)
Number of GP visits	1.42	1.09	0.33***	(13.1)
Somatic hospital contact	0.17	0.12	0.05***	(11.2)
Psychiatric hospital contact	0.07	0.02	0.05***	(18.4)
Prescription drug purchase	0.36	0.28	0.07***	(12.4)
Criminal charge	0.14	1.00	-0.86***	(-18.1)
Enrolled in elementary school	0.91	0.96	-0.06***	(-15.3)
Absenteeism	0.16	0.10	0.07***	(19.2)
Mother's characteristics				
Age	27.17	27.59	-0.42***	(-5.4)
Married/Registered partnership	0.30	0.33	-0.03***	(-5.5)
Highest completed elementary school	0.15	0.12	0.03***	(7.4)
Highest completed secondary education	0.78	0.79	-0.02**	(-2.9)
Highest completed tertiary education	0.07	0.09	-0.02***	(-5.0)
Employed	0.25	0.30	-0.05***	(-8.9)
Self-employed	0.01	0.01	-0.00	(-0.7)
Unemployment benefits	0.05	0.05	0.01***	(3.3)
Education or health benefits	0.15	0.15	-0.01	(-1.3)
Disability benefits	0.03	0.03	0.00	(1.7)
Retirement benefits	0.00	0.00	-0.00	(-0.5)
On cash benefits	0.36	0.35	0.01	(1.5)
Other	0.04	0.03	0.00	(0.4)
On cash benefits	0.36	0.35	0.01	(1.5)
Criminal charge	0.27	0.26	0.01	(1.4)
Psychiatric hospital contact	0.14	0.14	0.01	(1.3)
N	18,589	9,888	28,477	

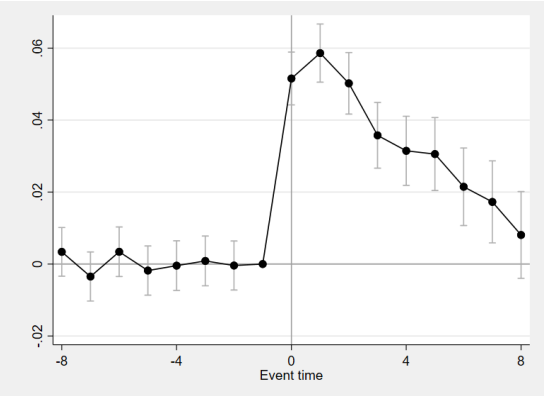
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

B.1 Event study, control group placed 8 quarters later

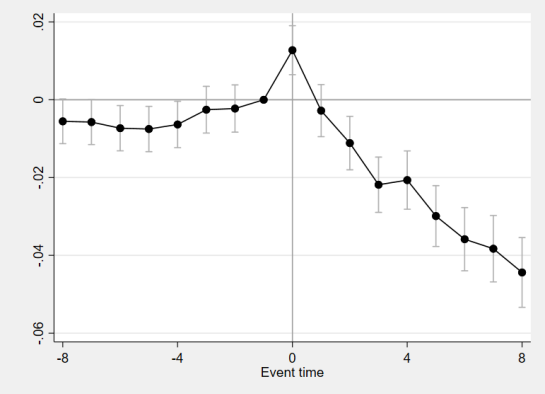
Figure B.1: Event coefficients, children placed in care 8 quarters later as control group



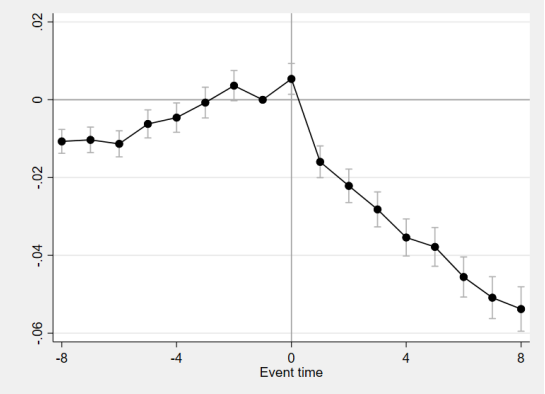
(a) Number of GP visits



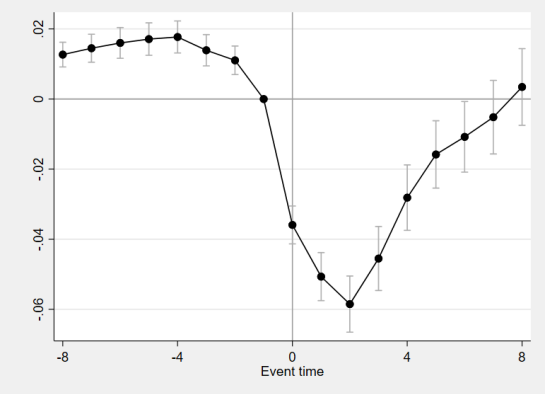
(b) Share with prescription drugs



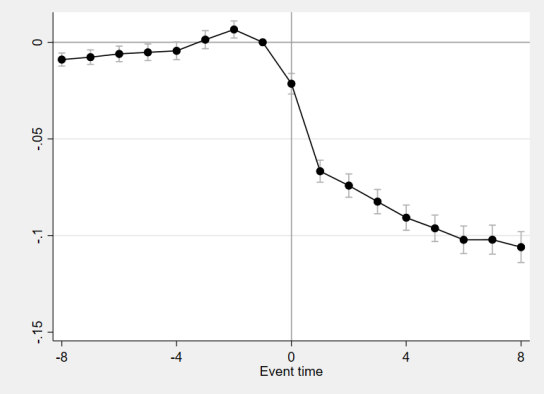
(c) Somatic hospitalization share



(d) Psychiatric hospitalization share



(e) Enrollment

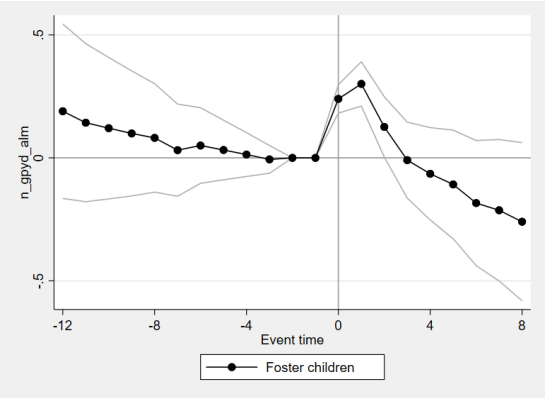


(f) Absenteeism

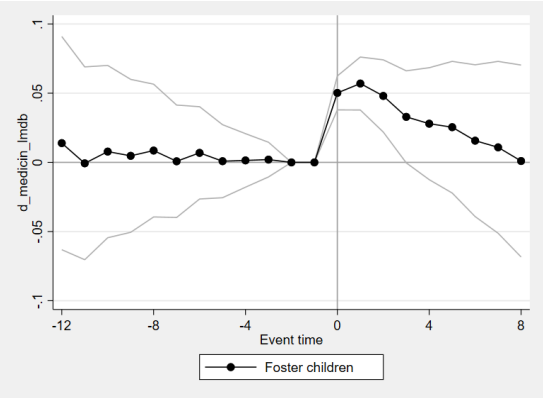
Note: Estimates of model 2. Control group is children placed in care at later (calendar) time. Unit fixed effects. Unbalanced sample.

B.2 Event study with unit fixed effects

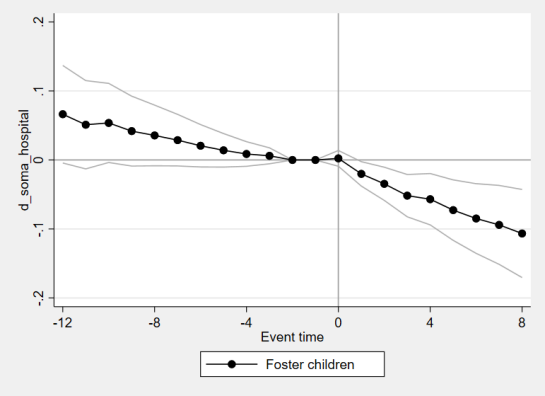
Figure B.2: Event coefficients, with unit fixed effects (no control group)



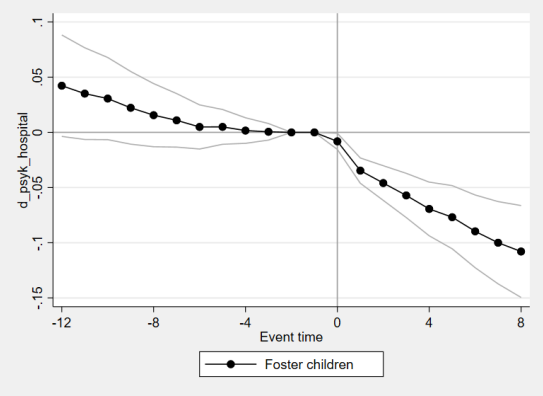
(a) Number of GP visits



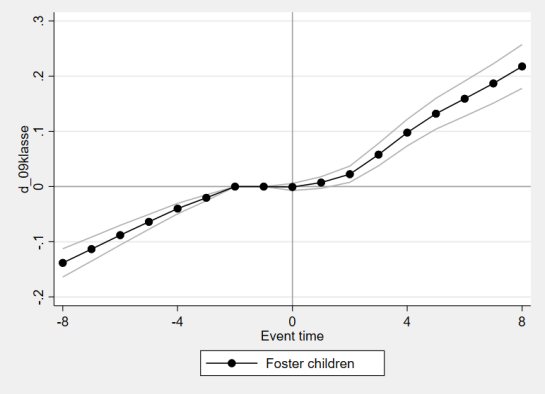
(b) Share with prescription drugs



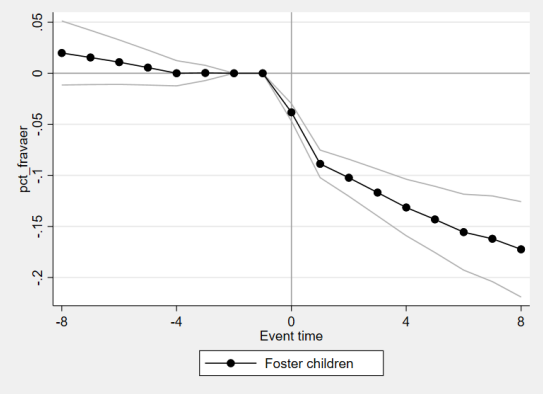
(c) Somatic hospitalization share



(d) Psychiatric hospitalization share



(e) Enrollment

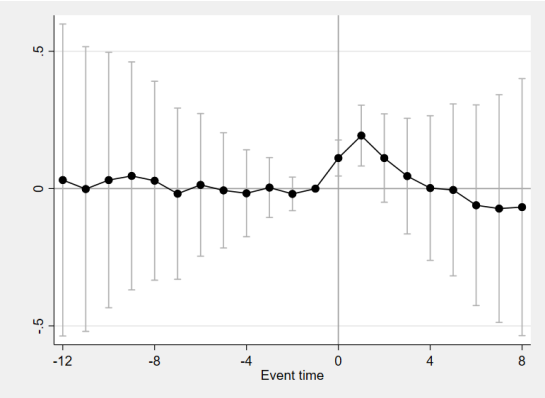


(f) Absenteeism

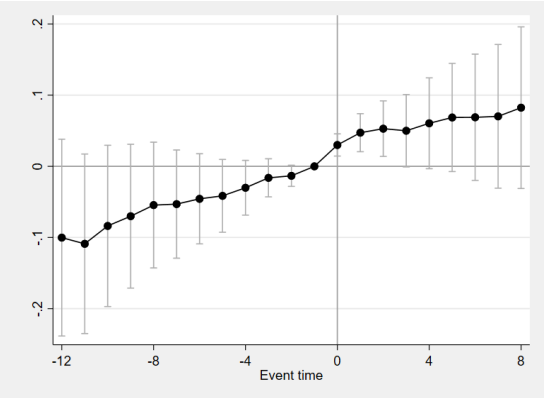
Note: The figure shows estimated event coefficients from model 2 with unit fixed effects and where pre-periods -1 and -2 are restricted to zero. The sample is unbalanced.

B.3 Event study with matched control group

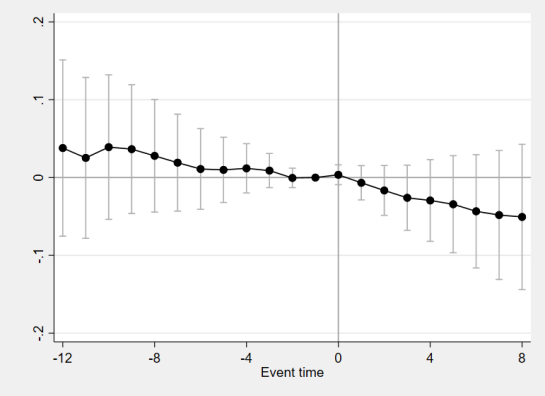
Figure B.3: Event coefficients, matched control group with unit fixed effects



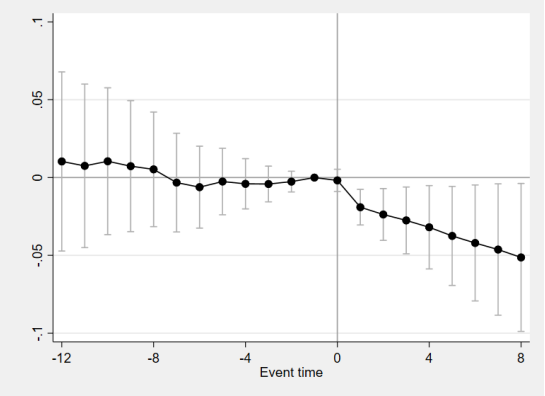
(a) Number of GP visits



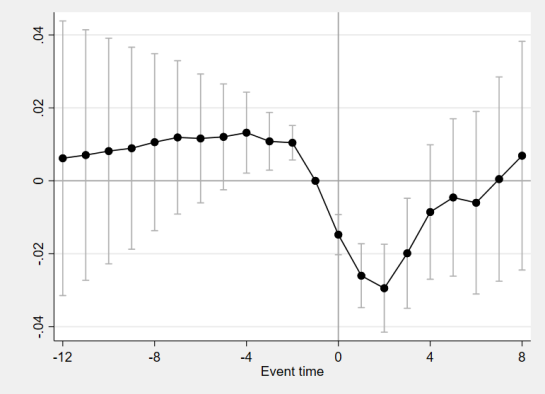
(b) Share with prescription drugs



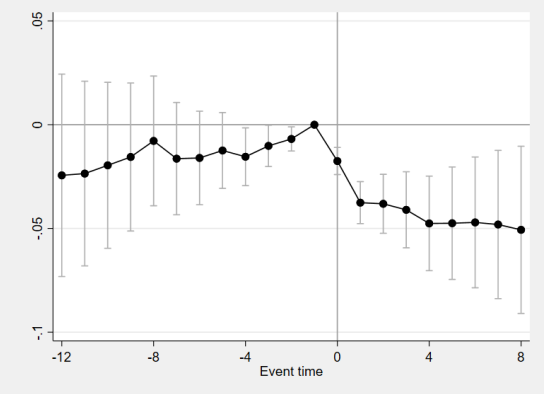
(c) Somatic hospitalization share



(d) Psychiatric hospitalization share



(e) Enrollment



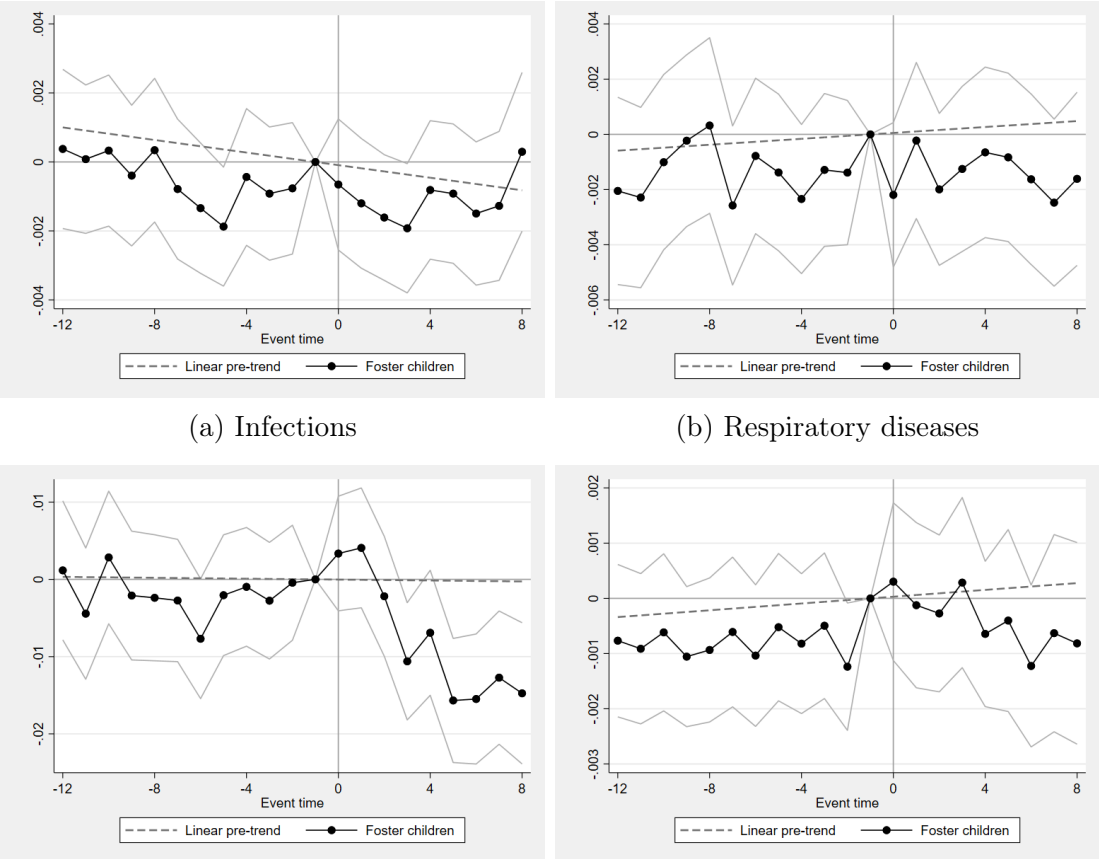
(f) Absenteeism

Note: The figure shows estimated event coefficients from model 2 with the matched children not in care as control group and unit fixed effects. The sample is unbalanced.

C Supplementary health evidence

Here we present supplementary evidence on health outcomes. For somatic hospitalizations we show results by 4 of the major diagnosis groups. The diagnosis groups are defined on the basis of the ICD10 diagnosis code and the specific ICD10 codes belonging to each group can be found in the notes to the figure. For psychiatric hospitalizations we show 3 of the largest diagnosis groups. For prescription drug purchases we show results for 4 of the largest drug groups.

Figure C.1: Somatic hospitalizations by diagnosis group



(a) Infections

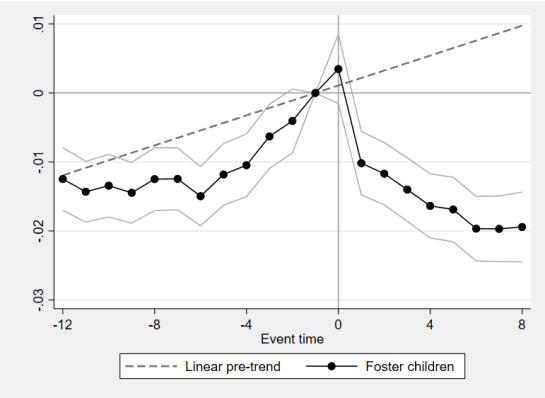
(b) Respiratory diseases

(c) Injury

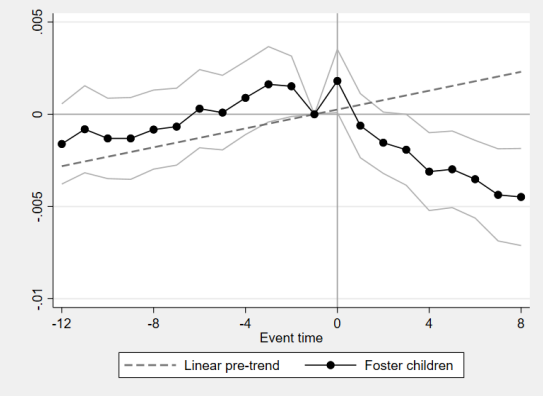
(d) Poisonings

Notes: ICD10 diagnosis codes in each of the diagnosis groups. Infections and parasites: A00-B99 , Respiratory diseases: J00-J99, Injuries: S00-T14, Poisonings: T15-T98.

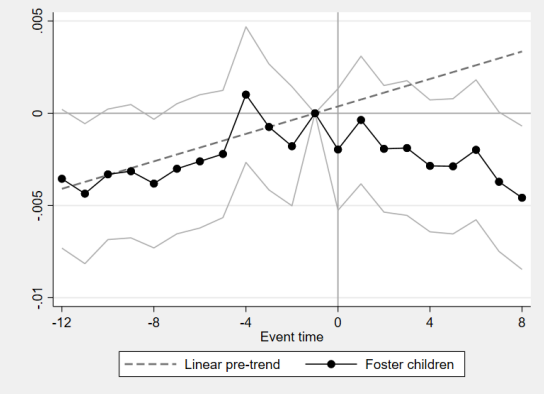
Figure C.2: Psychiatric hospitalizations by diagnosis group



(a) Reaction to severe stress, and adjustment disorders



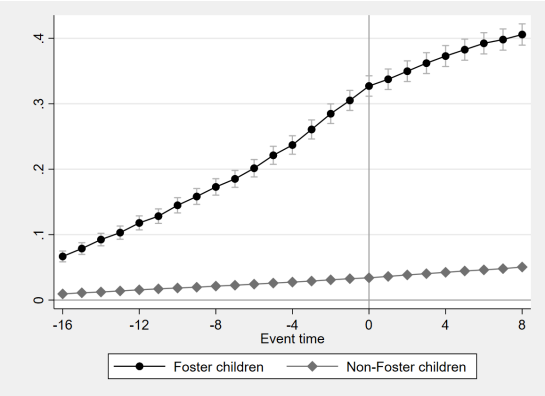
(b) Eating disorders



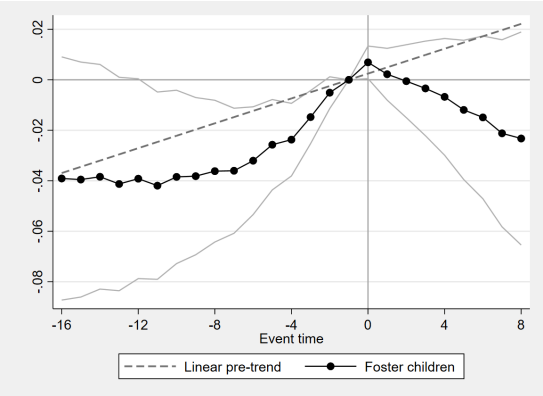
(c) Hyperkinetic disorders

Note: The diagnoses are categorized according to the ICD10 classification for mental and behavioral disorders. Here we show group F43 (Reaction to severe stress, and adjustment disorders), group F50 (Eating disorders) and group 90 (Hyperkinetic disorders).

Figure C.3: Cumulative psychiatric diagnoses



(a) Averages



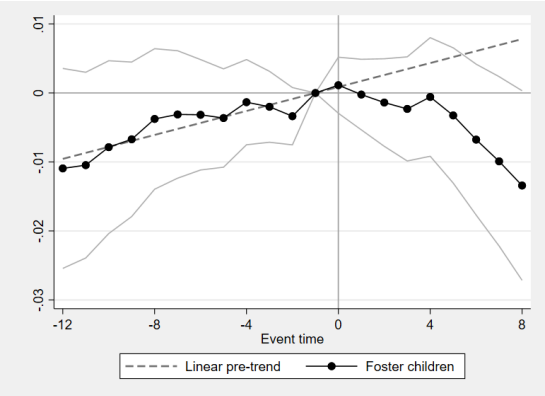
(b) Event coefficients

Table C.1: Survey treatment vs control children, no psychiatric hospitalization in t=0

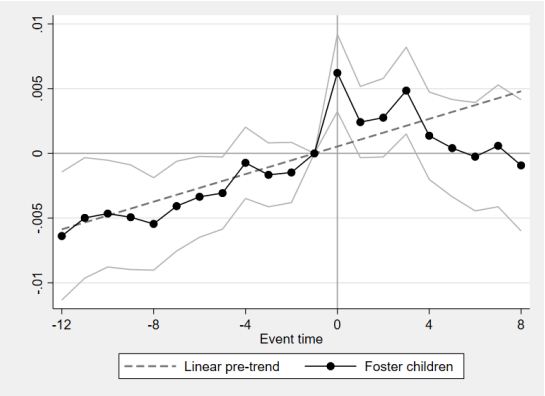
	Treatment mean	Control mean	Difference b	t
Average outcome in t=8				
Number of GP visits	1.33	1.01	0.32	(1.5)
Somatic hospital contact	0.17	0.12	0.05	(1.0)
Psychiatric hospital contact	<0.05	<0.05	0.02	(0.8)
Prescription drug purchase	0.35	0.30	0.05	(0.8)
Enrolled in elementary school	0.89	0.96	-0.07	(-1.2)
Absenteeism	0.08	0.10	-0.02	(-0.7)
Criminal charge	0.12	0.16	-0.03	(-0.6)
Average change in outcome from t=0 to t=8				
Δ Number of GP visits	0.23	-0.34	0.57*	(2.2)
Δ Somatic hospital contact	0.01	-0.06	0.07	(1.0)
Δ Psychiatric hospital contact	0.04	0.02	0.02	(0.8)
Δ Prescription drug purchase	0.07	-0.02	0.09	(1.4)
Δ Enrolled in elementary school	0.03	0.14	-0.11	(-1.2)
Δ Absenteeism	-0.04	0.02	-0.06	(-1.2)
Δ Criminal charge	-0.05	0.02	-0.07	(-0.9)
N	118	123	241	

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

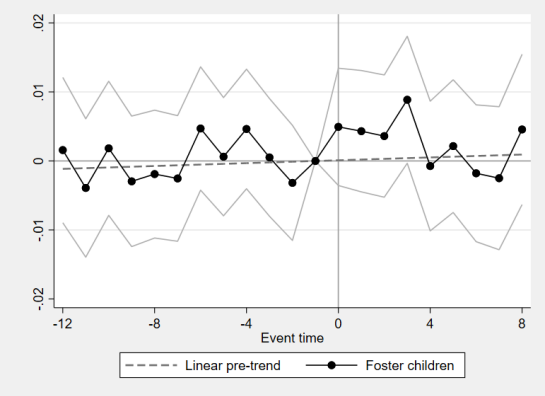
Figure C.4: Prescription drug purchases by drug group



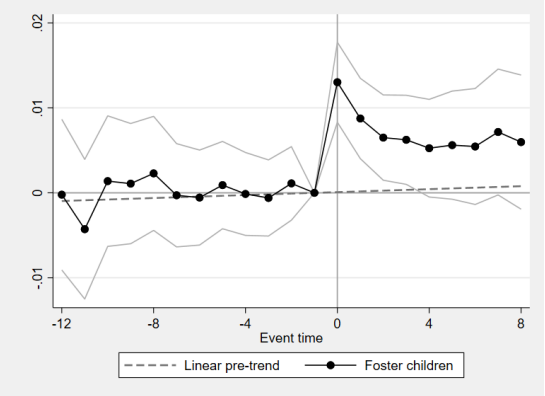
(a) ADHD treatment



(b) Benzodiazepines and related drugs



(c) Antibiotics



(d) Astma

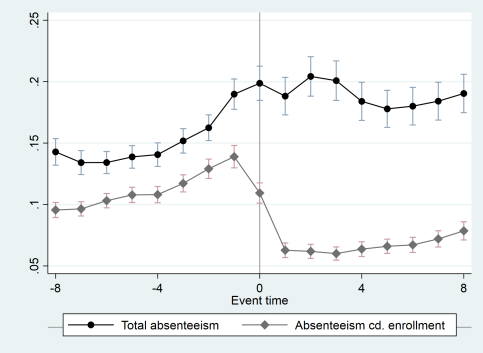
Notes: The drugs are categorized according to groups defined by the Danish Health Data Authorities (Sundhedsdatastyrelsen). The groups are defined based on the WHO ATC codes. The specific ATC codes can be found on medstat.dk. Asthma medication includes ATC codes R03. Antibiotics include ATC codes J01. ADHD medication includes ATC codes CO2AC01, N06BA01, N06BA04, N06BA09, N06BA12. Benzodiazepines and related drugs include ATC codes N05BA, N05CD, N03AE, N05CF.

D Extra Event graphs on absenteeism

We combine the two measures of absent from school: enrollment and absenteeism into one measure. If the child is not enroll in a particular quarter we state this as being 100 percent absent. In figure D.1, we have shown the total absenteeism and the absenteeism conditioned on being enrolled. The figure clearly show that the total absenteeism is

increasing up to the placement and then stabilizing.

Figure D.1: Absenteeism, quarterly average



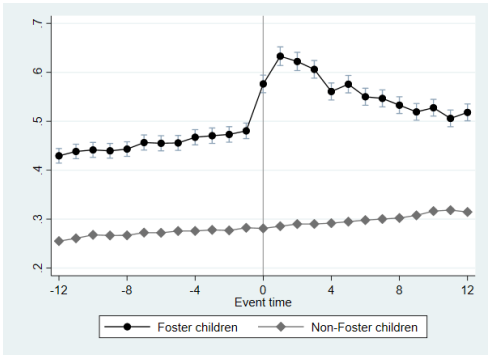
(a) Total absenteeism and conditional absenteeism

Note: The figure shows the average total absenteeism including children not enrolled and absenteeism conditioned on children been enrolled.

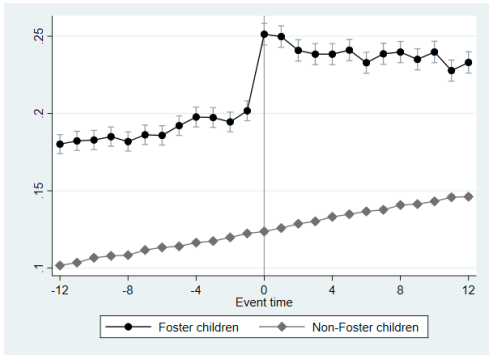
E Event graphs on monthly basis

To further investigate what happens around the time of the placement, we repeat our event graphs but now using a monthly frequency. We focus on a period of 12 month before and 12 month after the placement.

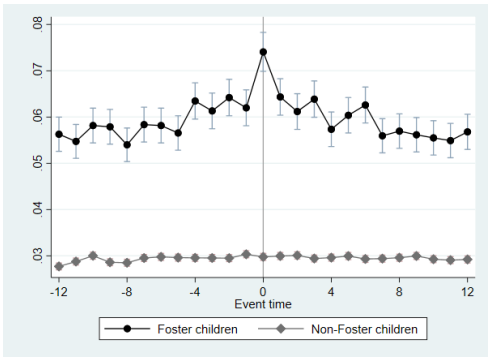
Figure E.1: Event graphs on monthly basis



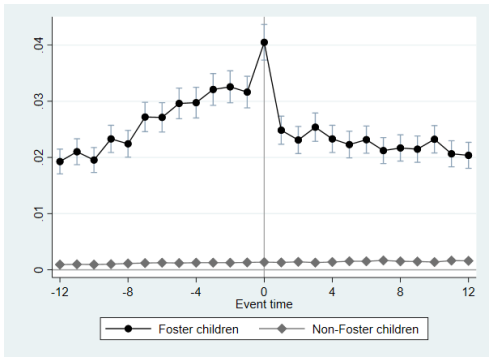
(a) GP visits



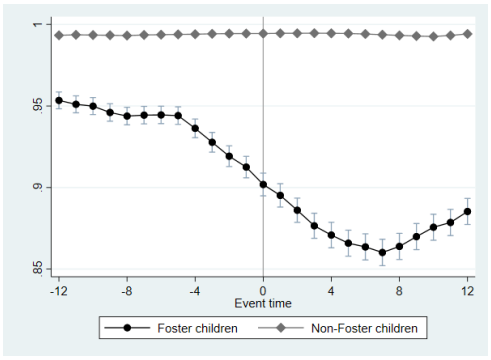
(b) Prescription drug purchase



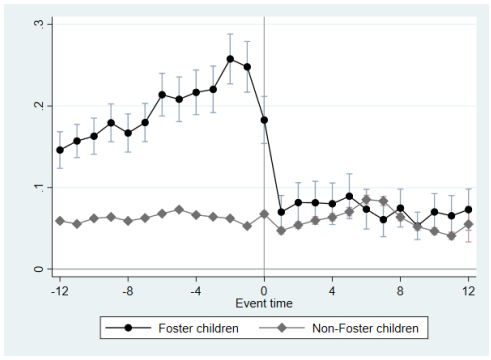
(c) Somatic hospitalization



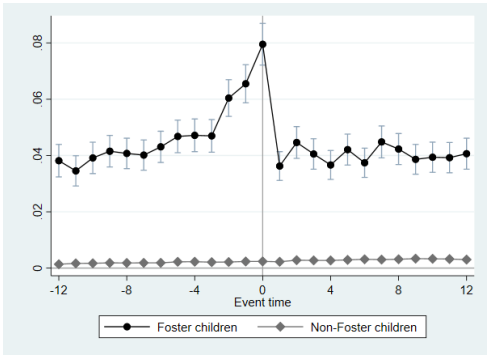
(d) Psychiatric hospitalization



(e) Enrollment



(f) Absenteeism

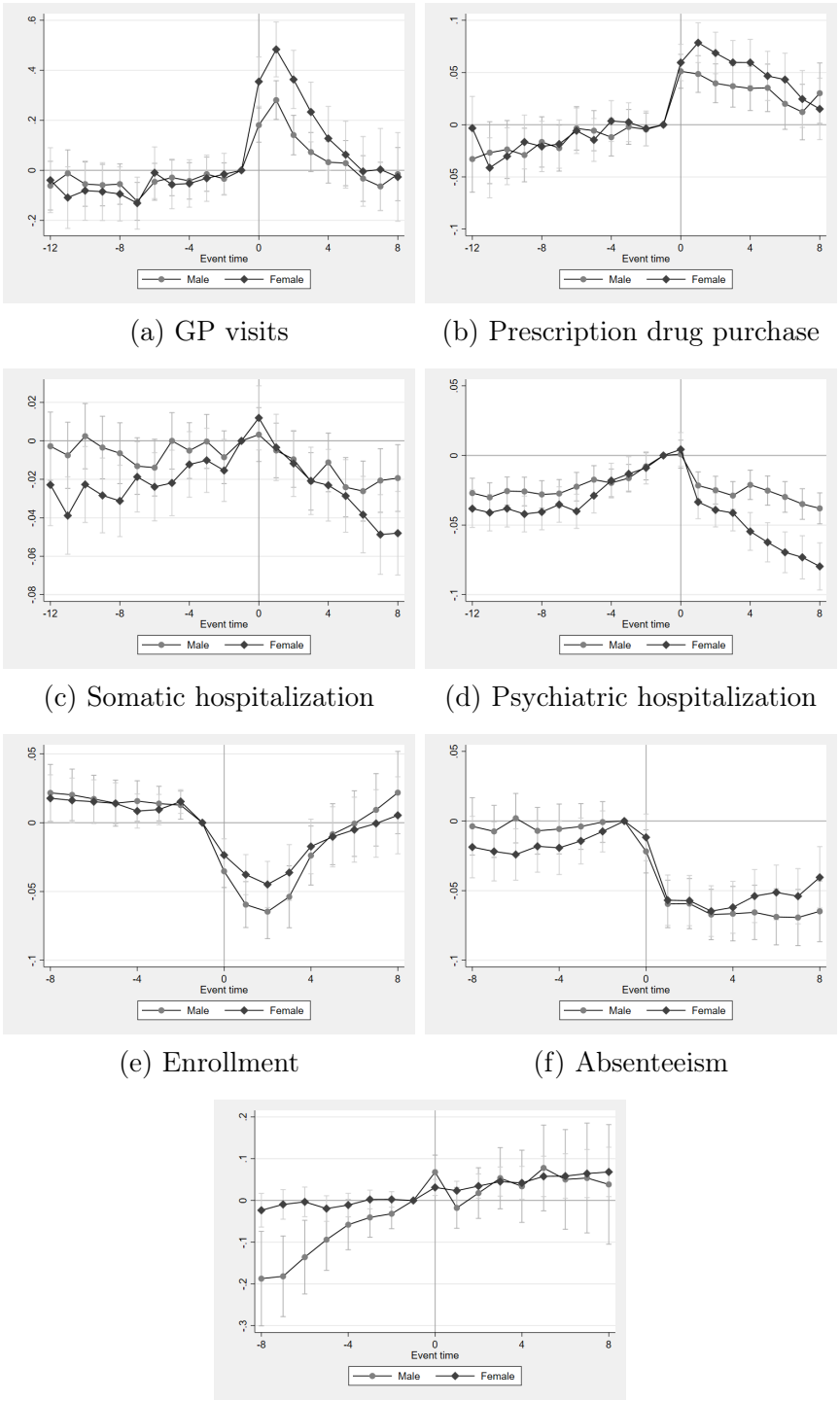


(g) Criminal charges

Note: The figures show the level changes in outcomes relative to period t=-1 12 months before and 12 month after the time of placement in out-of-home care.

F Heterogeneity by sex and age

Figure F.1: Heterogeneity by sex



(a) GP visits

(b) Prescription drug purchase

(c) Somatic hospitalization

(d) Psychiatric hospitalization

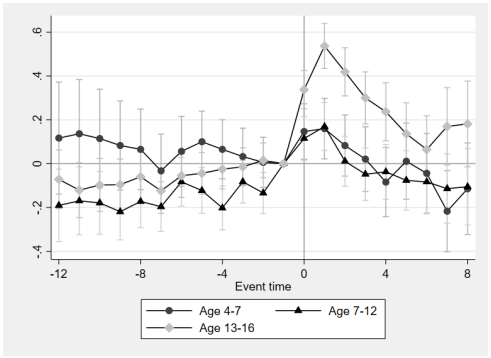
(e) Enrollment

(f) Absenteeism

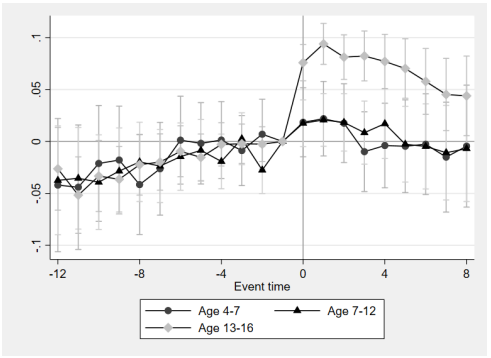
(g) Criminal charges

Note: The figures show the level changes in outcomes relative to period t=-1 separately for boys and girls.

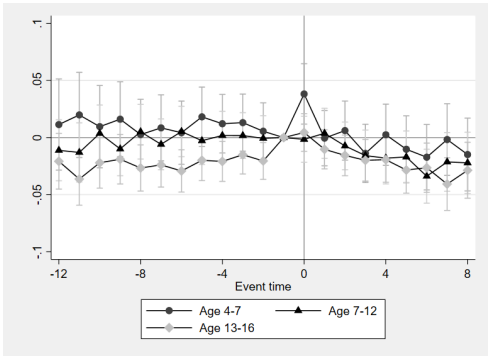
Figure F.2: Heterogeneity by age



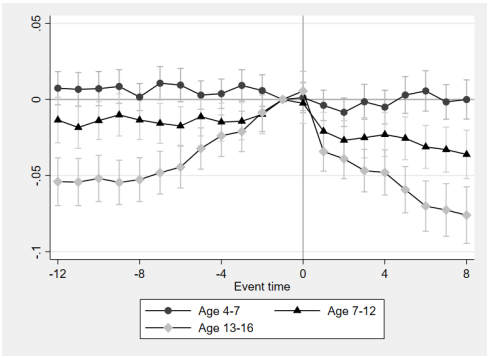
(a) GP visits



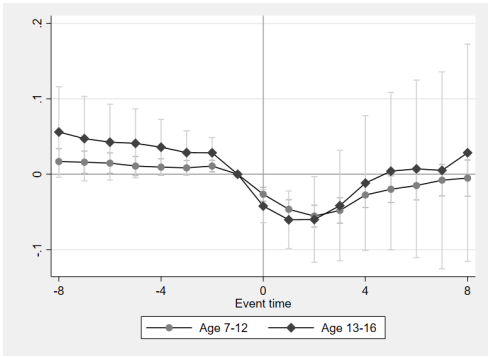
(b) Prescription drug purchase



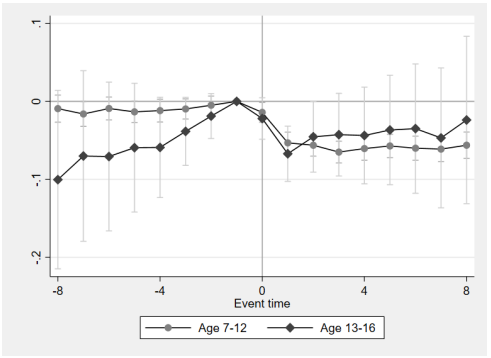
(c) Somatic hospitalization



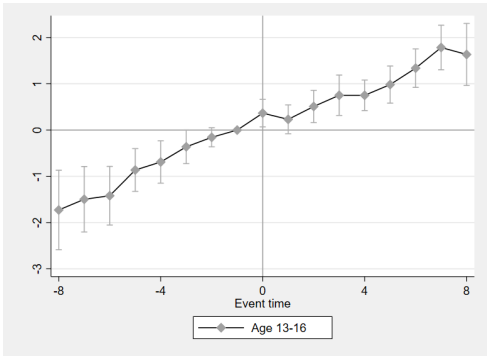
(d) Psychiatric hospitalization



(e) Enrollment



(f) Absenteeism



(g) Criminal charges

Note: The figures show the level changes in outcomes relative to period t=-1 separately by age group at the time of placement in out-of-home care.

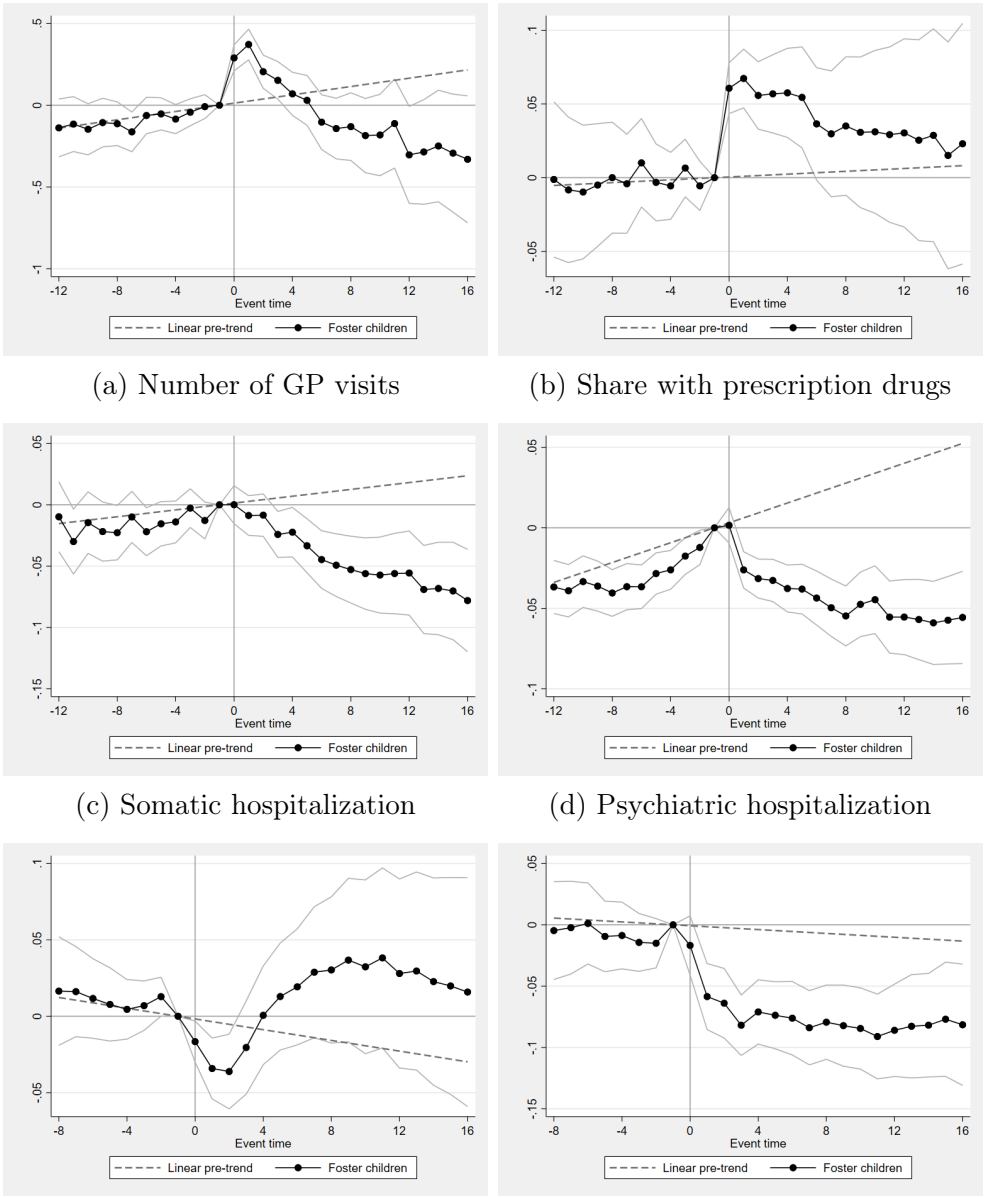
G Longer term effects - 16 quarters

Here we show results similar to the main results in the paper, but where we have extended the post-event period from 8 quarters to 16 quarters to look at the changes over the longer run at the cost of a reduced sample size.

Table G.1: Foster children at time of first placement, balanced samples

	Health sample		Enrolment sample		Absenteeism sample		Crime sample	
	mean	(sd)	mean	(sd)	mean	(sd)	mean	(sd)
Age	12.64	(4.0)	10.14	(0.8)	10.06	(0.8)	16.99	(0.1)
Girl	0.48	(0.5)	0.40	(0.5)	0.46	(0.5)	0.48	(0.5)
Placed in FC with no prior preventive care	0.56	(0.5)	0.54	(0.5)	0.50	(0.5)	0.53	(0.5)
Quarters from first preventive care to first out-of-home care placement	6.67	(4.4)	6.54	(4.2)	6.75	(4.2)	5.84	(3.8)
Placement ongoing	0.21	(0.4)	0.51	(0.5)	0.57	(0.5)	0.00	(0.0)
Legal action								
Placement with consent	0.85	(0.4)	0.78	(0.4)	0.73	(0.4)	0.90	(0.3)
Placement without consent	0.10	(0.3)	0.17	(0.4)	0.19	(0.4)	0.03	(0.2)
Urgent placement	0.03	(0.2)	0.05	(0.2)	0.07	(0.2)	0.01	(0.1)
Other	0.03	(0.2)	0.01	(0.1)	0.01	(0.1)	0.07	(0.3)
Placement Type								
Foster family care	0.28	(0.4)	0.46	(0.5)	0.53	(0.5)	0.06	(0.2)
Kinship care	0.07	(0.2)	0.07	(0.3)	0.09	(0.3)	0.02	(0.1)
Group home	0.20	(0.4)	0.12	(0.3)	0.06	(0.2)	0.19	(0.4)
Institutional care	0.31	(0.5)	0.34	(0.5)	0.32	(0.5)	0.29	(0.5)
Independent living	0.15	(0.4)	0.01	(0.1)	0.00	(0.0)	0.44	(0.5)
Length of placement								
Duration, years	1.56	(1.3)	2.30	(1.9)	1.79	(1.8)	0.61	(0.3)
Spell duration, years	1.96	(1.4)	2.94	(2.0)	2.54	(2.1)	0.67	(0.3)
Reason for placement								
Child risk/externalizing behavior	0.81	(0.4)	0.78	(0.4)	0.71	(0.5)	0.85	(0.4)
Child health concerns	0.37	(0.5)	0.43	(0.5)	0.38	(0.5)	0.37	(0.5)
Abuse/neglect of child	0.60	(0.5)	0.69	(0.5)	0.73	(0.4)	0.42	(0.5)
Adult risk/externalizing behavior	0.53	(0.5)	0.62	(0.5)	0.62	(0.5)	0.48	(0.5)
Other	0.27	(0.4)	0.25	(0.4)	0.28	(0.5)	0.32	(0.5)
Share of reasons due to child	0.51	(0.3)	0.46	(0.3)	0.42	(0.3)	0.60	(0.3)
Share of reason due to parents	0.49	(0.3)	0.54	(0.3)	0.58	(0.3)	0.40	(0.3)
At end of first placement								
Exit before age 18	0.36	(0.5)	0.66	(0.5)	0.58	(0.5)	0.13	(0.3)
New placement	0.15	(0.4)	0.30	(0.5)	0.40	(0.5)	0.03	(0.2)
Continued care after age 18	0.00	(0.1)	0.00	(0.0)	0.00	(0.0)	0.00	(0.0)
Age out	0.48	(0.5)	0.05	(0.2)	0.01	(0.1)	0.84	(0.4)
N	3,553		730		195		803	

Figure G.1: Health



(a) Number of GP visits

(b) Share with prescription drugs

(c) Somatic hospitalization

(d) Psychiatric hospitalization

(e) Enrollment

(f) Absenteeism

Note: The figure shows the estimated event coefficients from model 2 and the pre-trend from model 3, estimated for the balanced sample of foster children who are observed in a post-period of 16 quarters following their first out-of-home care placement.

H Control group based on predicted risk

In the following, we use information from the survey to predict a risk assessment. We estimate linear regression model with the risk assessment as the dependent variable and

Table H.1: Regression model of risk assessment

	(1) Risk factor
Child characteristics	
Age at survey	0.0285
	(1.21)
Girl	0.120
	(0.54)
Mother characteristics	
Immigrant	-0.362
	(-1.29)
Partner	0.520*
	(2.07)
Primary education	0.713
	(1.18)
Secondary education	0.0311
	(0.08)
Tertiary education	-0.894
	(-1.88)
Unemployed	0.500
	(0.96)
Disability pensioner	0.368
	(0.46)
Cash benefit	0.352
	(1.32)
Psychiatric hospitalization	-0.320
	(-0.97)
Age	0.0390
	(1.77)
Crime	-0.0441
	(-0.77)
Constant	5.751***
	(7.37)
Observations	350
R^2	0.0709

t statistics in parentheses

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

the explanatory variables containing register information on child and mother characteristics. The estimation results are shown in table H . The estimation shows that we are only able to explain 7 percent of the variation in the risk assessment with register information. Based on these estimation results, we calculate the predicted risk assessment on the entire sample. To form a control group, we limit the sample to only consists of children who receive preventive actions, as our survey data indicated that 89 percent of children in the survey that were not placed in out-of-home care received a preventive measure. We then use matching to construct the control group based on the predicted risk assessment, sex, age, calendar year and whether the child receives prevent action. Table H shows the descriptive statistics of the treatment and control group.

Table H.2: Treatment vs matched control children, quarter before first placement

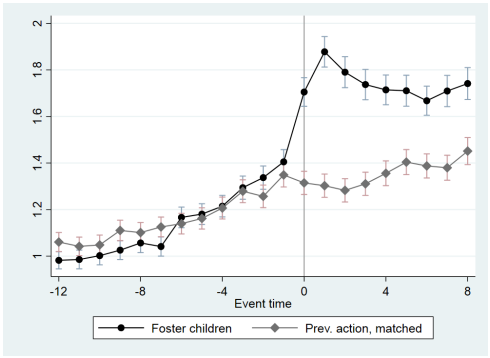
	Treatment	Control	Difference	
	mean	mean	b	t
Age	13.40	13.74	-0.34***	(-6.0)
Girl	0.49	0.51	-0.02**	(-2.7)
Preventive care	0.32	0.27	0.05***	(6.3)
Predicted risk assessment	7.45	7.49	-0.03***	(-4.2)
Mother's characteristics, measured at birth of child				
Age	13.40	13.79	-0.39***	(-7.0)
Girl	0.49	0.51	-0.02*	(-2.3)
Preventive care	0.32	0.27	0.05***	(6.5)
Predicted risk assessment	7.52	7.56	-0.04***	(-4.5)
Mother's characteristics, measured at year of birth of the child				
Age	27.49	27.91	-0.42***	(-3.9)
Married/Registered partnership	0.34	0.39	-0.05***	(-5.9)
Highest completed elementary school	0.11	0.12	-0.01	(-1.7)
Highest completed secondary education	0.80	0.77	0.03***	(3.9)
Highest completed tertiary education	0.09	0.10	-0.02***	(-3.5)
Unemployed	0.05	0.05	0.00	(0.3)
On diability pension	0.02	0.02	0.01***	(3.3)
On cash benefits	0.33	0.28	0.06***	(6.9)
Criminal charge	0.23	0.18	0.05***	(7.1)
Psychiatric hospital contact	0.10	0.06	0.03***	(6.4)
N	6,194	6,191	12,385	

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

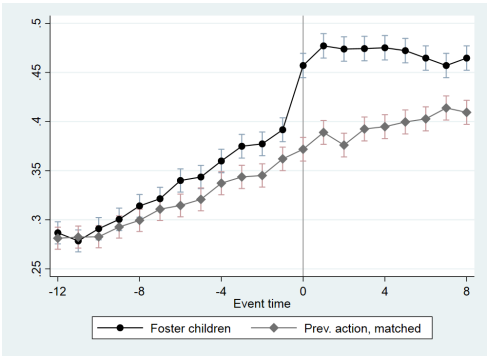
In figure H.1, we have shown the event graphs for the children placed in out of home

care and the new control group. The event graphs show that even when using the predicted risk assessment, we are not able to create a credible control group. The control group improves in the sense that the level of the outcome variables are much closer before the placement, but still we do not see parallel pre-trends. This is especially clear for psychiatric hospitalization, where the group of children in care increases their hospitalization rate up to one year prior to the placement. This implies that the risk assessment contains additional information which are not captured by information in the register.

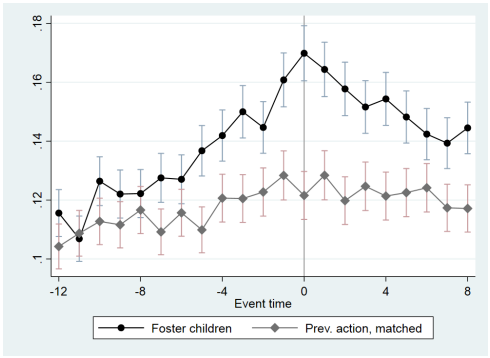
Figure H.1: Control group using predicted risk assessment



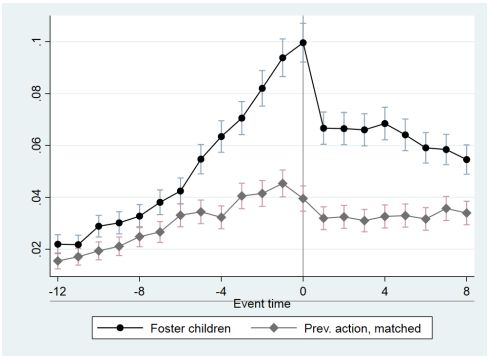
(a) Number of GP visits



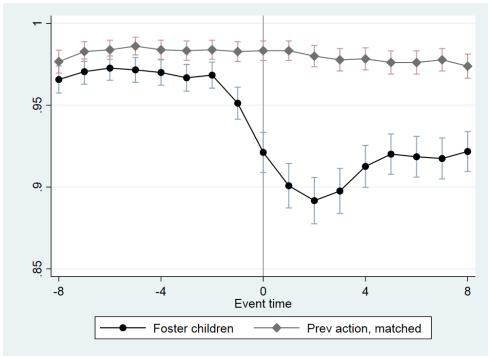
(b) Prescription drugs



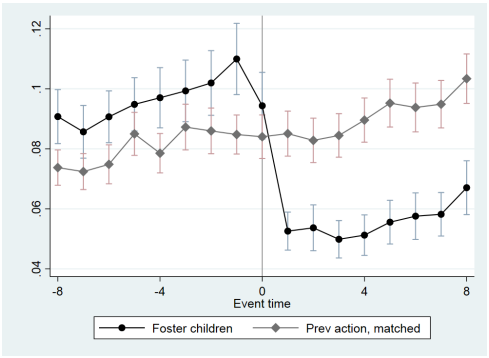
(c) Somatic hospitalization



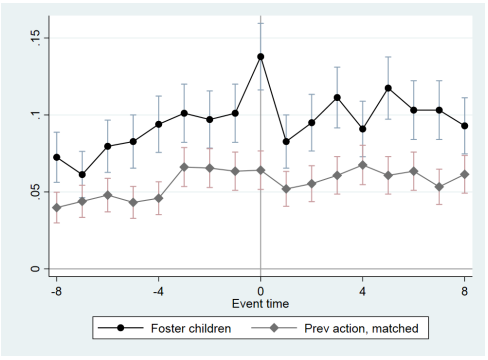
(d) Psychiatric hospitalization



(e) Enrollment



(f) Absenteeism

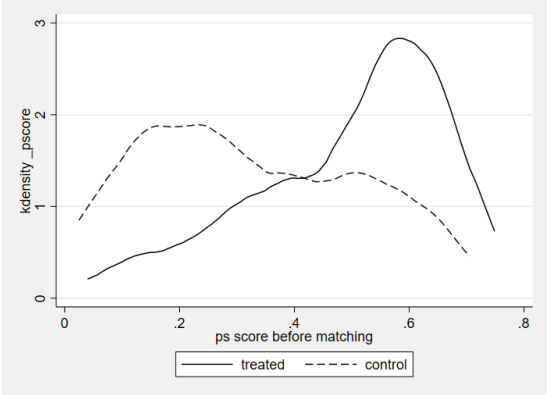


(g) Criminal charges

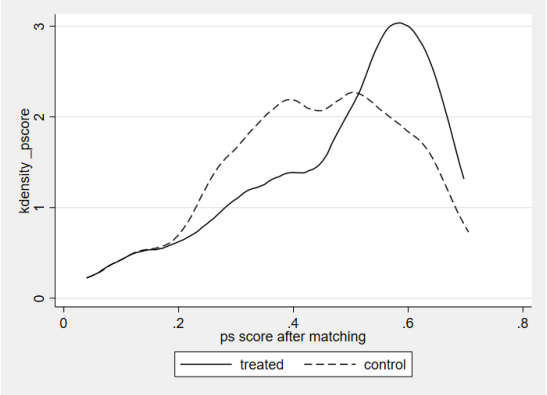
Note: The figures show the outcome variable for the children in care in t=0 compared to a control group based of children who receive preventive actions at period t=0.The control group is constructed based on predicted risk assessment, age, sex, calendar year, preventive action in t=-1.

I Supplementary survey evidence

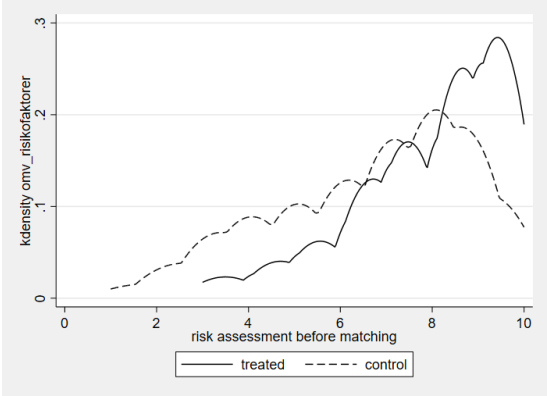
Figure I.1: Common Support



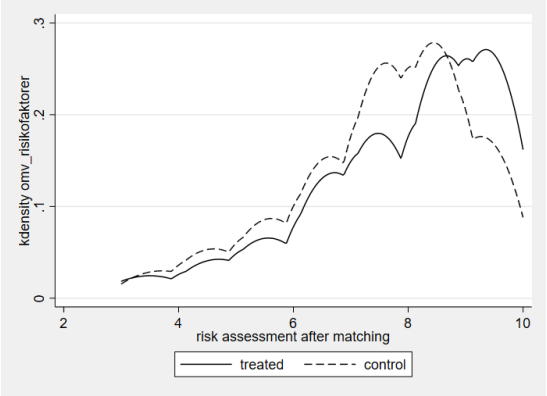
(a) Propensity score distribution, before matching



(b) Propensity score distribution, after matching



(c) Risk assessment distribution, before matching



(d) Risk assessment distribution, after matching

Note: The figure shows kernel density plots of the sample distributions before and after matching. The upper two panels show the estimated propensity score and the lower two panels the caseworker risk assessment. The matching procedure imposes a common support restriction on the propensity score and any observations not on common support are dropped from the matched sample.

Table I.1: Survey regression estimates, post-periods pooled, unmatched sample

	(1) Number of GP visits	(2) Somatic hospital contact	(3) Psychiatric hospital contact	(4) Prescription drug purchase	(5) Enrolled in elementary school	(6) Absenteeism	(7) Criminal charge
Placed in out-of-home care	0.270	0.0101	0.00460	0.0690	-0.0338	-0.00743	-0.00845
	(1.94)	(0.47)	(0.28)	(1.90)	(-0.59)	(-0.31)	(-0.26)
Age at time of survey	0.0251*	0.000901	0.00464***	0.0159***	-0.0165*	0.0111***	-0.000510
	(2.06)	(0.42)	(3.58)	(5.00)	(-2.13)	(3.65)	(-0.05)
Girl	0.415***	-0.0126	0.00941	0.0925**	0.0725	-0.0248	-0.110***
	(3.53)	(-0.68)	(0.70)	(3.04)	(1.84)	(-1.38)	(-3.57)
Caseworker risk assessment	0.0236	0.00971	0.00462	0.0135	-0.00841	0.00408	0.0223**
	(0.81)	(1.82)	(1.35)	(1.88)	(-0.70)	(1.04)	(3.05)
Mother's characteristics at year of birth of the child							
Age	-0.0276*	-0.00247	-0.000959	-0.00655*	0.00392	-0.00152	-0.000640
	(-2.41)	(-1.34)	(-0.81)	(-2.33)	(0.88)	(-0.92)	(-0.21)
Married/Registered partnership	-0.205	-0.0284	-0.0185	-0.0824*	0.0735	0.0175	0.00434
	(-1.55)	(-1.44)	(-1.23)	(-2.39)	(1.72)	(0.86)	(0.14)
Highest completed elementary school	0.201	0.0102	0.00867	0.0990	-0.125	-0.00660	-0.0475
	(0.90)	(0.21)	(0.42)	(1.27)	(-1.39)	(-0.18)	(-0.55)
Highest completed secondary education	0.478**	0.0237	0.0201	0.171***	0.0322	-0.0262	-0.0362
	(2.84)	(0.85)	(1.47)	(3.70)	(0.48)	(-1.05)	(-0.90)
Highest completed tertiary education	0.956***	0.0244	0.0763**	0.248***	-0.0683	-0.0345	-0.0889
	(4.12)	(0.69)	(2.85)	(4.40)	(-0.66)	(-0.93)	(-1.77)
Unemployed	-0.0238	-0.0217	0.0415	-0.0427	0.104*	0.0737*	-0.0168
	(-0.08)	(-0.57)	(0.85)	(-0.56)	(2.22)	(2.12)	(-0.51)
On disability pensiont	1.133*	0.0458	0.00783	0.249*	0	0	-0.0874*
	(2.49)	(1.06)	(0.42)	(2.36)	(.)	(.)	(-2.29)
On cash benefits	-0.268*	-0.00174	0.00353	-0.0742*	0.0331	-0.00578	0.0511
	(-2.06)	(-0.08)	(0.28)	(-2.23)	(0.74)	(-0.34)	(1.47)
Criminal charge	0.0342	-0.00566	0.0181	0.00955	0.0180	0.0370*	0.0221
	(0.23)	(-0.26)	(1.11)	(0.26)	(0.38)	(2.29)	(0.48)
Psychiatric hospital contact	0.0363	-0.0215	-0.0111	-0.0175	-0.114	-0.00157	-0.0377
	(0.23)	(-0.85)	(-1.11)	(-0.42)	(-1.74)	(-0.09)	(-0.49)
Constant	0.975**	0.135	-0.0502	0.0512	0.936***	0.0241	0.0637
	(2.64)	(1.88)	(-1.09)	(0.50)	(5.30)	(0.41)	(0.33)
Observations	2786	2786	2786	2786	1051	613	1402

t statistics in parentheses

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

Table I.2: Survey regression estimates, change with respect to t=0, unmatched sample

	(1) Δ Number of GP visits	(2) Δ Somatic hospital contact	(3) Δ Psychiatric hospital contact	(4) Δ Prescription drug purchase	(5) Δ Enrolled in elementary school	(6) Δ Absenteeism	(7) Δ Criminal charge
Placed in out-of-home care	0.488*	0.0199	-0.0561*	0.0881	-0.103	-0.0106	-0.00222
	(2.50)	(0.46)	(-2.11)	(1.95)	(-1.62)	(-0.18)	(-0.04)
Constant	-0.240	-0.0316	0.00836	-0.0304	0.0713*	0.00811	0.00539
	(-1.75)	(-1.24)	(0.61)	(-1.10)	(2.15)	(0.60)	(0.14)
Observations	2786	2786	2786	2786	948	459	1188

t statistics in parentheses

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

Table I.3: Survey regression estimates, post-periods pooled, matched sample

	(1) Number of GP visits	(2) Somatic hospital contact	(3) Psychiatric hospital contact	(4) Prescription drug purchase	(5) Enrollment in elementary school	(6) Absenteeism	(7) Criminal charge
Placed in out-of-home care	0.333*	0.0158	0.00503	0.0727	-0.0239	-0.00562	-0.00707
	(2.29)	(0.71)	(0.30)	(1.91)	(-0.44)	(-0.23)	(-0.21)
Age at time of survey	0.0550***	0.00449	0.00443**	0.0208***	-0.0181*	0.0164***	-0.00104
	(3.45)	(1.43)	(2.92)	(5.04)	(-2.07)	(3.67)	(-0.09)
Girl	0.612***	-0.00481	0.0167	0.135***	0.0741	-0.0488	-0.112***
	(4.31)	(-0.22)	(1.05)	(3.63)	(1.53)	(-1.91)	(-3.41)
Caseworker risk assessment	0.0450	0.0163**	0.00932**	0.0150	0.00832	0.00558	0.0231*
	(1.17)	(2.63)	(2.73)	(1.47)	(0.43)	(0.72)	(2.40)
Mother's characteristics measured at year of birth of the child							
Age	-0.0330**	-0.00345	-0.000677	-0.00875**	0.00257	-0.000489	-0.000609
	(-2.63)	(-1.66)	(-0.49)	(-2.85)	(0.49)	(-0.22)	(-0.18)
Married/Registered partnership	-0.340*	-0.0326	-0.0282	-0.0925*	0.0768	0.0339	0.00176
	(-2.21)	(-1.40)	(-1.64)	(-2.21)	(1.49)	(1.15)	(0.05)
Highest completed elementary school	0.413	0.0487	0.00679	0.130	-0.110	0.0106	-0.0354
	(1.73)	(0.97)	(0.32)	(1.54)	(-1.09)	(0.26)	(-0.40)
Highest completed secondary education	0.590**	0.0467	0.0173	0.218***	0.0503	-0.0112	-0.0227
	(3.07)	(1.56)	(1.10)	(4.19)	(0.61)	(-0.35)	(-0.52)
Highest completed tertiary education	1.273***	0.0476	0.0937*	0.334***	-0.151	0.0464	-0.0757
	(4.34)	(1.15)	(2.42)	(4.75)	(-1.20)	(0.71)	(-1.38)
Unemployed	-0.122	-0.0120	0.0195	-0.0154	0.120*	0.0864	-0.0599*
	(-0.34)	(-0.23)	(0.45)	(-0.16)	(2.08)	(1.86)	(-2.16)
On disability pension	0.460	0.103*	0.0129	0.263*	0	0	-0.0861*
	(1.25)	(2.33)	(0.54)	(2.22)	(.)	(.)	(-2.06)
On cash benefits	-0.316*	-0.0148	0.0129	-0.0951*	0.0561	0.00813	0.0534
	(-2.08)	(-0.60)	(0.85)	(-2.44)	(1.19)	(0.37)	(1.41)
Criminal charge	0.0326	-0.00630	0.00403	-0.00896	0.0177	0.0378	0.00942
	(0.18)	(-0.24)	(0.23)	(-0.19)	(0.31)	(1.67)	(0.20)
Psychiatric hospital contact	-0.0282	-0.00488	-0.0138	-0.0191	-0.102	0.0151	-0.0132
	(-0.15)	(-0.15)	(-1.00)	(-0.36)	(-1.26)	(0.71)	(-0.15)
Constant	0.398	0.0367	-0.0941	-0.00812	0.815**	-0.0922	0.0584
	(0.83)	(0.41)	(-1.64)	(-0.06)	(2.99)	(-0.81)	(0.27)
Observations	2087	2087	2087	2087	821	426	1265

t statistics in parentheses

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

Table I.4: Survey regression estimates, change with respect to t=0, post-periods pooled, matched sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Δ Number of GP visits	Δ Somatic hospital contact	Δ Psychiatric hospital contact	Δ Prescription drug purchase	Δ Enrolled in elementary school	Δ Absenteeism	Δ Criminal charge
Placed in out-of-home care	0.428*	0.0318	-0.0459	0.0822	-0.0994	-0.0130	0.00529
	(2.02)	(0.65)	(-1.45)	(1.71)	(-1.45)	(-0.22)	(0.09)
Constant	-0.163	-0.0394	0.00288	-0.0125	0.0675	0.0105	-3.69e-17
	(-1.03)	(-1.19)	(0.14)	(-0.39)	(1.63)	(0.56)	(-0.00)
Observations	2087	2087	2087	2087	759	332	1076

t statistics in parentheses

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

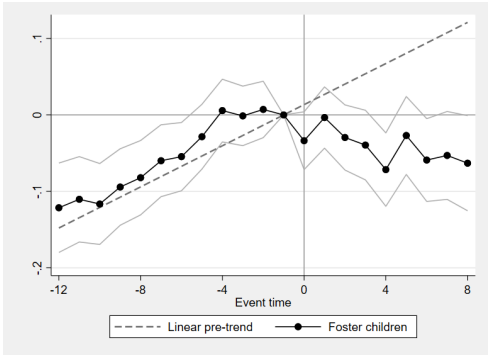
J First preventive care measure

This section presents results in the same way as the main results in the paper, but where we have defined the event to be 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.

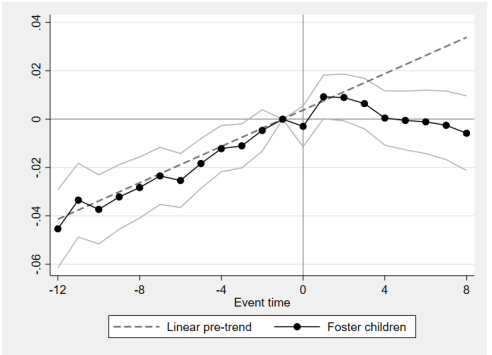
Table J.1: Foster children at time of first preventive care measure, balanced samples

	Health sample		Enrolment sample		Absenteeism sample		Crime sample	
	mean	(sd)	mean	(sd)	mean	(sd)	mean	(sd)
Age	13.46	(4.1)	11.35	(1.4)	11.11	(1.4)	17.83	(1.1)
Girl	0.45	(0.5)	0.39	(0.5)	0.39	(0.5)	0.49	(0.5)
Placed in FC with no prior preventive care	0.08	(0.3)	0.03	(0.2)	0.03	(0.2)	0.17	(0.4)
Quarters from first preventive care to first out-of-home care placement	6.59	(5.0)	8.41	(5.9)	9.34	(6.2)	1.65	(0.7)
Placement ongoing	0.10	(0.3)	0.26	(0.4)	0.29	(0.5)	0.01	(0.1)
Legal action								
Placement with consent	0.86	(0.4)	0.80	(0.4)	0.86	(0.4)	0.93	(0.3)
Placement without consent	0.07	(0.3)	0.09	(0.3)	0.07	(0.3)	0.01	(0.1)
Urgent placement	0.02	(0.2)	0.11	(0.3)	0.07	(0.3)	0.00	(0.0)
Other	0.05	(0.2)	0.00	(0.0)	0.00	(0.0)	0.06	(0.2)
Placement Type								
Foster family care	0.21	(0.4)	0.40	(0.5)	0.56	(0.5)	0.05	(0.2)
Kinship care	0.06	(0.2)	0.13	(0.3)	0.25	(0.4)	0.00	(0.0)
Group home	0.14	(0.4)	0.15	(0.4)	0.00	(0.0)	0.08	(0.3)
Institutional care	0.27	(0.4)	0.27	(0.4)	0.19	(0.4)	0.16	(0.4)
Independent living	0.32	(0.5)	0.04	(0.2)	0.00	(0.0)	0.72	(0.5)
Length of placement								
Duration, years	1.02	(1.1)	2.13	(2.1)	3.19	(2.3)	0.55	(0.4)
Spell duration, years	2.37	(3.1)	3.94	(3.9)	4.83	(4.5)	1.98	(2.9)
Reason for placement								
Child risk/externalizing behavior	0.89	(0.3)	0.82	(0.4)	0.79	(0.4)	0.91	(0.3)
Child health concerns	0.20	(0.4)	0.23	(0.4)	0.14	(0.4)	0.19	(0.4)
Abuse/neglect of child	0.52	(0.5)	0.64	(0.5)	0.79	(0.4)	0.47	(0.5)
Adult risk/externalizing behavior	0.48	(0.5)	0.50	(0.5)	0.71	(0.5)	0.59	(0.5)
Other	0.27	(0.4)	0.27	(0.4)	0.21	(0.4)	0.16	(0.4)
Share of reasons due to child	0.51	(0.3)	0.43	(0.3)	0.34	(0.3)	0.49	(0.2)
Share of reason due to parents	0.49	(0.3)	0.57	(0.3)	0.66	(0.3)	0.51	(0.2)
At end of first placement								
Exit before age 18	0.34	(0.5)	0.44	(0.5)	0.40	(0.5)	0.09	(0.3)
New placement	0.13	(0.3)	0.28	(0.5)	0.10	(0.3)	0.05	(0.2)
Continued care after age 18	0.01	(0.1)	0.00	(0.0)	0.00	(0.0)	0.00	(0.0)
Age out	0.52	(0.5)	0.28	(0.5)	0.50	(0.5)	0.86	(0.4)
N	12,995		4,790		1,887		4,434	

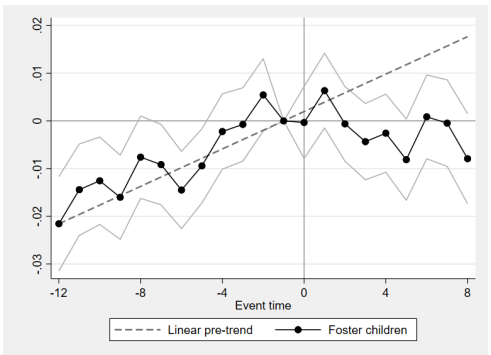
Figure J.1: Health



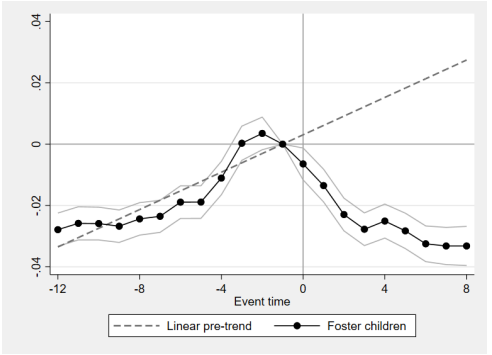
(a) Number of visits to general practitioner



(b) Share with prescription drug purchase



(c) Share with somatic hospitalization



(d) Share with psychiatric hospitalization