Family foster care or residential care: the impact of home environment on children raised in state care

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ABSTRACT

This paper investigates how the type of home environment – family foster care or residential care – affects the adult outcomes of individuals who were raised in state care during adolescence. While it is established in the literature that living in residential care is detrimental for babies, the effect of living in different types of care as an older child is underexplored. We use Hungarian individual-level administrative panel data and follow the children from age 13 until age 19. We show that the adult outcomes of adolescents who grew up in a foster family are substantially better even after controlling for a rich set of variables, including indicators of cognitive and non-cognitive skills, and mental problems observed at age 13. Young adults who grew up in family foster care are 8 percentage points more likely to complete secondary education, and 11 percentage points less likely to spend at least 6 months without either working or studying at age 19, than comparable peers raised in residential care. Using mental health medication is 5 percentage points less likely. For girls, the probability of teenage birth and abortion are smaller by 12 percentage points each. IV estimations using local foster mother capacity as an instrument reinforce the beneficial effect of family foster care.

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Nevelőszülői családban vagy intézményben felnőni:
A nevelési környezet hatása az állami gondozott gyerekek fiatal felnőttkori életkezdésére

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ÖSSZEFOGLALÓ
Ez a tanulmány azt vizsgálja, milyen hatással van a nevelési környezet – a nevelőszülői család vagy annak alternatívája, a bentlakásos intézmény – a serdülőként állami gondozásban élő gyerekek fiatal felnőttkori életkezdésére. Bár a gyermekfejlődéssel foglalkozó tudományos szakirodalom erős bizonyítékokat szolgáltat arra, hogy az intézményi elhelyezés káros hatással van az egészen kicsi gyerekek fejlődésére, és a gyermekvédelmi szakemberek a nagyobb gyerekek esetében is egyértelműen a nevelőszülői elhelyezést tartják előnyösebbnek, kevés meggyőző nemzetközi statisztikai bizonyíték áll rendelkezésünkre arról, hogy a kétfajta elhelyezésből következő, tartósan eltérő nevelési környezet, minden egyéb tényező változatlansága mellett, milyen nagy mértékű különbségekhez vezethet az önálló felnőttkori életkezdés olyan fontos dimenzióira, mint a tanulás, a munkavégzés és az egészség. Tanulmányunk ezt a hiányt igyekszik – állami gondozott gyerekeket 13 éves koruktól 19 éves korukig követő, egyéni szintű magyarországi adminisztratív paneladatokra támaszkodva – pótolni. Kimutatjuk, hogy azok a serdülők, akik nevelőszülői családban nőttek fel, fiatal felnőttként lényegesen jobb esélyekkel kezdik el életüket, mint a számos megfigyelhető szempont szerint velük jól összehasonlítható, intézményben nevelkedő gyerekek. Ezekben a becslésekben kontroll alatt tartjuk a gyerekek 13 éves kori kognitív és nem kognitív képességeinek, illetve mentális állapotának megfigyelhető különbségeit. Azok a fiatal felnőttek, akik nevelőszülői családban nevelkedtek, 19 éves korukra 8 százalékponttal nagyobb valószínűséggel fejezik be a középiskolát és 10 százalékponttal kisebb valószínűséggel töltik az év legalább felét munkavégzés és tanulás nélkül, mint velük összehasonlítható, de bentlakásos intézményben felnőtt társaik, továbbá 5 százalékponttal kisebb eséllyel kell pszichés problémáikra valamilyen gyógyszert szedniük. A lányok esetében egyaránt 12/12 százalékponttal kevésbé valószínű a tinédzserkori szülés, illetve az abortusz. A nevelőcsaládi elhelyezés okságnak tekinthető pozitív hatásait az OLS-becslések mellett IV-becslések is megerősítik. Ez utóbbiakban instrumentumként azt használjuk ki, hogy megyénként különböző mértékben állnak rendelkezésre nevelőszülői munkát elvállalni hajlandó és képes szakemberek.

JEL: J12, J13
Kulcsszavak: nevelőszülői család, gyermekotthon

Family foster care or residential care: the impact of home environment on children raised in state care[1]

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Abstract

This paper investigates how the type of home environment – family foster care or residential care – affects the adult outcomes of individuals who were raised in state care during adolescence. While it is established in the literature that living in residential care is detrimental for babies, the effect of living in different types of care as an older child is underexplored. We use Hungarian individual-level administrative panel data and follow the children from age 13 until age 19. We show that the adult outcomes of adolescents who grew up in a foster family are substantially better even after controlling for a rich set of variables, including indicators of cognitive and non-cognitive skills, and mental problems observed at age 13. Young adults who grew up in family foster care are 8 percentage points more likely to complete secondary education, and 11 percentage points less likely to spend at least 6 months without either working or studying at age 19, than comparable peers raised in residential care. Using mental health medication is 5 percentage points less likely. For girls, the probability of teenage birth and abortion are smaller by 12 percentage points each. IV estimations using local foster mother capacity as an instrument reinforce the beneficial effect of family foster care.

Introduction

When a child is neglected, abused, or lacks a protective family for some other reason, she is placed into state care. Children who spend time in state care are a vulnerable group: compared to the general population their average outcomes related to mental- and physical health, education, employment, homelessness, substance use and contact with the criminal justice system are worse (McDonald & Others, 1996, Bald et al., 2022). The two main forms of state care are residential care[2] and family foster care. In residential care, groups of children live together in an institution and are cared for by a team of child protection workers. In foster care, professional parents raise the children in their own homes, sometimes together with their own children. In the United States and other English-speaking countries, residential care is thought of as a last resort for children with severe mental or behavioral problems, unfit for foster care (del Valle, 2014). Child protection experts have long argued for the de-institutionalization of children, and foster care started to spread in other countries as well. But in developing countries, and the majority of industrialized countries as well, residential care is still common: worldwide 2.7 million children live in such settings (Petrowski et al., 2017). Notably, in most European countries, more than 25% of children in state care live in residential care, and their share exceeds 50% in some countries (Figure 1).

There is convincing randomized controlled trial evidence that psycho-social deprivation experienced by young children raised in institutions has detrimental effects on their future lives (see e.g. Wade et al., 2019, Stamoulis et al., 2015). However, the majority of children living in state care spend their early years in their biological families and are only removed to live in state care

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[2] Residential care is also referred to as institutional care, congregate care or group care in the literature.

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later in childhood.[3] Evidence comparing the effects of being raised in an institution and a foster family as an older child is scarce with mixed results on few outcomes (see the review Lee et al., 2011). In our research, we ask how previously unexplored adult outcomes related to education-, labor market- and health are affected by the type of care children are raised in as teenagers.

Figure 1: Rate of children in state care and percent in residential care in high-income countries, 2019
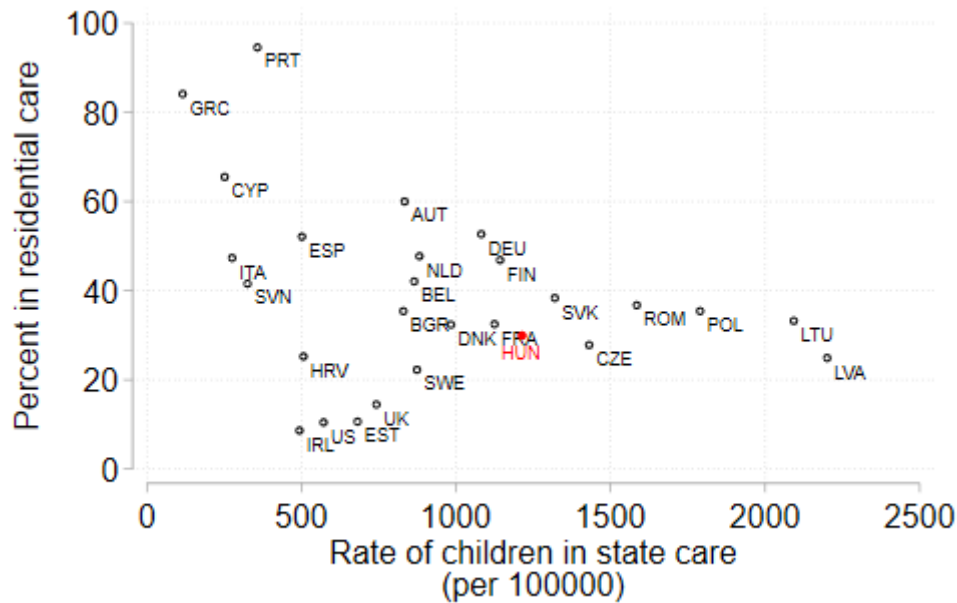
Note: Data source for Europe: Datacare project of UNICEF and Eurochild (UNICEF, 2022), for the US: (Bald, Doyle Jr., et al., 2022)

To answer this, we analyze data from Hungary, a high-income country where foster care and residential care co-exist, with 56% of children raised in the former and 44% in the latter.[4] As foster parents are in short supply in Hungary (SOS Hungary, 2023), many children who do not exhibit

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[3] In the US, in 2013, 61percent of children were over 5 at first entry   https://cascw.umn.edu/policy/new-data-on-adoption-and-foster-care-in-the-us/ (downloaded 2023.04.03). In the UK, 2021, 63 percent https://explore-education-statistics.service.gov.uk/find-statistics/children-looked-after-in-england-includingadoptions/2021(downloaded 2023.04.03)
[4] At the beginning of our observation period, 2008.

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severe behavioral problems and would be fit to live in foster families are raised in residential care. This creates an empirically ideal setting to compare similar children living in residential care and family foster care. We use individual-level monthly administrative panel data on employment, wages, doctor's visits, and purchases of prescription drugs to measure the outcomes. These data are linked to the National Assessment of Basic Competencies, a standardized mathematics and reading test conducted annually on the whole population of 6th 8[th,] and 10th -grade students, with information on the home type (own family, foster care, or residential care) and a rich set of variables measuring cognitive and non-cognitive skills.

We document that the average outcomes of children raised in foster care are substantially better than the outcomes of children raised in residential care. By age 19, 40% of children raised in foster care finish secondary school, compared to only 21% of those raised in residential care. At age 19, 37% of youth raised in foster families spend at least 6 months without either working or studying, which is 16 percentage points lower than the corresponding figure for children raised in residential care (53%). Indicators of mental health are also better for teenagers raised in foster care: they are 6 percentage points less likely to buy prescribed antidepressants or tranquilizers. By age 19, 22% of girls raised in foster families become mothers, while the corresponding figure for girls raised in residential care is a troubling 40%. Additionally, teenage abortions are less frequent among girls raised in foster families, with a rate of 15%, compared to a rate of 30% among girls in residential care.

However, these large raw differences in the means are likely to overestimate the positive effect of foster care on future outcomes. The reason for this is that foster parents can decide not to take in, or to let go of a child. Foster parents are more likely to refuse to take care of older children and

children with severe behavioral problems. Thus, children living in residential care are a selected sample of more problematic children with worse potential outcomes as adults. We use two empirical approaches to tackle this selection issue.

First, we estimate OLS regressions of adult outcomes on home type and a large set of control variables observed in 6th grade (around age 13): rich measures of cognitive and non-cognitive skills, including standardized test scores, and detailed indicators of psychological and behavioral problems and disabilities, gender, year dummies, and county of residence. The OLS estimates show that by age 19, young adults who were raised in family foster care are 8.3 percentage points more likely to finish secondary education (p=0.021) than comparable youth raised in residential care. They are 4.9 percentage points less likely to have ever bought antidepressants or tranquilizers (p=0.039), and 11.4 percentage points less likely to spend more than 6 months without either working or studying at age 19 (p=0.0043). For girls, teenage births and abortions are less likely, by 11.5, and 12.1 percentage points respectively (p=0.047, and 0.023). To address the problem of testing multiple outcomes, we estimate regressions of a composite index of the outcomes, and we also find a large and significant gain from foster care (0.216 with p=0.0001).

These results still might be biased estimates of the true causal effects, and we argue that the OLS is likely to underestimate the true beneficial effect of foster care for two reasons. Firstly, because the control variables measured at 6th grade can be outcomes themselves of living in a given home type from an early age. We show that this proxy control problem makes us underestimate the true beneficial effect of foster care under plausible assumptions. Second, the presence of important omitted variables might also bias the estimates. We argue that the most important omitted variables, Roma ethnicity and age of first placement, cannot explain the large differences between the two

groups. We propose that the true causal effect is likely to be between the raw mean differences and the OLS estimates.

To provide further support for the causal interpretation of the results, we estimate IV regressions using spatial variation in the local capacity of the foster mothers as an instrument for being placed into foster care. As children must be placed close to their biological families, local foster parent capacity is positively correlated with being placed into foster care. The reduced form from this strategy shows that comparable children raised in state care have better outcomes as adults in counties with higher foster mother capacities. A placebo test on children living with their own parents confirms that omitted county characteristics cannot explain these differences. This result is of importance in itself as it shows that local child protection systems operating with more foster parents are leading to better outcomes for the children placed in state care. The exclusion restriction assumption of the IV further states that the effect we detect in the reduced form is driven solely by the increased probability of foster care placement. To support this assumption, we present balance tables showing that the characteristics of children living in state care are similar in 6th grade regardless of local foster mother capacity. Additionally, other features of the local child protection systems, including measures of foster parent quality are also similar. The estimates from the IV model are not statistically significant but are large, and point in the same direction as the OLS. This lends additional support to the beneficial causal effect of foster placement.

We provide evidence that the characteristics of foster mothers matter as well for outcomes. Children placed with foster mothers with at least academic secondary education[5] exhibit better outcomes

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[5] In Hungary there are two tracks in secondary education: a 3-year long vocational track, and a 4-5 year long academic track. Completed academic secondary school is a prerequisite for college application.

than comparable children placed with foster mothers with lower levels of education, though the difference is only statistically significant in the case of teenage births. The outcomes of children placed with low-educated foster mothers are still significantly better than the outcomes of children in residential care.

We analyze if specific subgroups of children can gain more from foster care. We find no difference between children with and without special needs. Boys experience somewhat larger gains than girls, but the differences are statistically insignificant.

The main results of large gains from family foster care are robust to several modifications in the empirical strategy. Estimating regressions on the subsample where overlap in the control variables is satisfied, using different sample selection criteria, and changing the set of control variables do not affect the estimates substantially.

Our results contribute to the literature on the economics of foster care (see Bald et al., 2022). This literature mainly focused on assessing the causal effect of removing a child from her own family, with mixed results: Doyle Jr. (2007) finds a negative insignificant effect, Gross & Baron (2022) a positive effect, and Bald, Chyn, et al. (2022) a positive effect for girls, and no effect for boys. To our knowledge, no economics paper compared the outcomes of children raised in residential care and foster care. One possible reason behind this is that in the US and the UK, residential care is uncommon and reserved for troubled children (del Valle, 2014), making it challenging to find comparable groups in the two types of settings. Another potential reason behind the scarcity of results is that disadvantaged groups, like homeless people, criminal offenders, and drug addicts – groups that are over-represented among former foster and residential care youth – are notoriously

difficult to reach with surveys (Lambert, 1990). Having access to administrative data with information on past home types and long-term outcomes provides a unique opportunity to learn something about the population of adults who were raised in state care as children.

We also contribute to the literature on the outcomes of children in state care from other disciplines, psychology, social work, and sociology. There is convincing causal evidence from a randomized controlled trial, the Bucharest Early Intervention Project, that children below the age of 3 who are placed into foster families are better off in terms of a large set of psychological outcomes than children who stay in institutional care (Nelson et al., 2014; Wade et al., 2019, Stamoulis et al., 2015). Evidence on older children, however, is mostly descriptive, and documents that children in residential care exhibit worse outcomes, but without controlling for baseline differences (see (McDonald at al, 1996 and Li et al., 2019). The small number of studies comparing children with similar characteristics in residential care and foster care in the US, find mixed evidence for a limited number of outcomes (see the review of Lee et al., 2011). In particular, DeSena et al. (2005) evaluated the Safe Homes program, and they found that children placed in residential care experienced more placements during the following year than matched children in foster care. Friedrich et al. (2005) use panel data with two time periods, and find that problematic sexualized behaviors tend to persist more for youth placed in residential care. Ryan et al., (2008) find that youth placed into residential care are more likely to be arrested in the 5 years following the placement than matched youth placed in foster care. In the UK, Dregan & Gulliford, (2012) find that children who spent time in residential care are more likely to be convicted for crimes as adults and to experience depression compared to the general population of children in state care, however, the estimates are not statistically significantly different from each other. These prior literature offer

insights into the adverse impact of residential care on specific outcomes and particular populations, notably infants and troubled children placed in such care as a last resort. However, it remains unclear whether these findings generalize to children who have spent their early years in their own families and who do not suffer from severe psychological problems. The majority of children living in residential care in Hungary and other European countries fall into this category, and we contribute by presenting results relevant to this large group.

Our results inform policy by showing that governments can potentially increase the well-being of children raised in state care by placing more children in foster families. There is plenty of room of manoeuvre in this respect. It is enough to refer to the fact that in developed European countries, such as France, Germany, Italy, Spain, Belgium, Netherlands and Scandinavia (Denmark, Finland, Sweden), altogether 200 thousand children are raised in residential care.[6] To remove them from institutions is an important policy goal. One way to do this is increasing the supply of foster parents by incentivizing more people to choose this occupation. Since foster care is typically less expensive than residential care (Eurochild, 2014), decreasing the number of children in residential care would make it possible to reallocate resources to foster care even within existing budgetary constraints.[7] Another way is decreasing the demand for state care, by reducing the number of children needed to be removed from their birth families in the first place. One way to decrease their number is highlighted by our result on decreased teenage births. Children of teenage mothers without family support are more at risk of ending up living in state care themselves (Wall-Wieler et al., 2018),

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[6] UNICEF (2022), p. 9.

[7] In Hungary, child protection experts estimate that the cost per child in residential care is 1.3 times higher than in foster care https://index.hu/belfold/2019/05/06/allami_gondozas_gyerek_kiemeles_tamogatas/ (downloaded 2023.06.16.)

thus, providing quality family foster care for teenage girls has the potential to break the cycle of involvement with child protection services.

The rest of the paper is organized as follows: Section 1 summarizes the Hungarian institutional background, and Section 2 describes the data and the descriptive differences between individuals raised in foster care and residential care. Section 3 presents the empirical strategy and Section 4 and 5 the OLS and IV results. In Section 6 we present robustness checks, and Section 7 concludes.

1 Institutional background

In Hungary, similarly to other developed countries, the primary reason for removing children from their biological families is parental neglect, accounting for 70% of all placements (KSH, 2012). In principle, state care is a temporary solution until the child's own family is ready to take care of her again, or until the child is adopted[8]. In practice, however, biological parents can rarely solve the problems fast leading to the removal of the child, and children older than 10 are almost never adopted. Thus, children typically spend many years (5.5 on average before they turn 18) in state care (SOS, 2015). The number of children raised in state care slowly increased in the last decades, from 17 thousand in 2006 to 21 thousand in 2019 (or from 1 to 1.2% of all children). It is estimated that every third child is taken into state care for reasons closely related to poverty (AJBH, 2017). These children are either placed in residential care or family foster care.

In family foster care children are placed to live in the private homes of trained and paid professional temporary parents. In Hungary, foster parents can raise a maximum of 7 children in their homes, including their biological children. To become a foster parent, they complete a 60-hour training

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[8] Adoption is only possible when the birth parents do not have custody rights anymore, which happens 8% percent of all cases.

and comply with other eligibility criteria (age between 24 and 65, passing a psychological test, and suitable living conditions). They work under county-level foster parent networks maintained by the state, churches, or non-profit organizations. Foster parent wages are low: the base salary is 30% of the minimum wage, with an increase of 20% of the minimum wage per every additional foster child. Despite this, the share of children living in foster families among all children in state care steadily increased from less than 40% in 1996 to over 70% in 2020 (Figure A1 in the appendix). But foster parents are still in short supply: in 2021, 5863 people worked as foster parents in Hungary, and at least additional two thousand foster parents were missing from the system only to make it possible that all children under 12 are raised in foster families.[9]

As a result, in the period we use in our data, many children (44%) still lived in residential care. The main form of residential care is the children's group home. Group homes can accommodate a minimum of 12 and a maximum of 40 children, who live in small and typically mixed-age and mixed-gender groups of a maximum of 12 children. A team of childcare professionals[10] looks after the children 24 hours a day, but they do not live together with the children.

When a child enters state care the local authorities decide the placement of the child. According to the law[11], children should be primarily placed in foster families, and if this is not possible, in residential care. The younger the child, the more authorities prefer placement into foster care. When

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[9] See the following article in HVG: https://hvg.hu/itthon/20231006_Ketezer_neveloszulo_hianyzik_ahhoz_hogy_Magyarorszagon_minden_gyermek_csaladban_nojon_fel (downloaded: 15.10.2023). According to a 2014 legistation, children under 12 should be placed into foster homes, but this legislation was not in place yet in our observation period for 6th grade students.

[10] The professionals include teachers, psychologists or social workers, trained child protection assistants, child supervisors, developmental teachers, and psychologists)15/1998. (IV. 30.) NM rendelet a személyes gondoskodást nyújtó gyermekjóléti, gyermekvédelmi intézmények, valamint személyek szakmai feladatairól és működésük feltételeiről, 2010-ben hatályos változata

[11] 1997. évi XXXI. Törvény a gyermekek védelméről és a gyámügyi igazgatásról

multiple siblings need to be placed, the authorities attempt to keep them together. As children are often removed from large families with many siblings, finding a foster parent who is willing to take care of all of them is challenging. Placing the child close to her previous home is also important, as there are compulsory regular meetings with the biological parents, and placements outside the county of the child are extremely rare (Vígh, 2015). Foster parents decide to take in a child based on information about their age, disabilities, and special needs, and foster parents prefer young and healthy children.

The institutional setting has two important consequences for our empirical analysis. First, many children who would be capable to live in foster families are placed in residential care because not enough foster families are available locally at the time they need to be placed. This means that many children in residential care are comparable to children in foster care. Second, children in residential care are a selected sample: they are taken into state care older, have more siblings, and are more likely to have disabilities and behavioral problems, on average.

2 Data and sample

Our main data source is an administrative individual-level monthly panel hosted by the Databank of the Centre for Economic and Regional Studies, Budapest. The data set contains information on a 50% random sample (5.17 million people) of the Hungarian population. The sample is aging: the original sample of people taken in 2003 is followed until 2017, and no new observations are included. Administrative records of individuals from the National Health Insurance Fund Administration, the Hungarian State Treasury, the National Tax and Customs Administration, the Ministry of Finance, and the Educational Authority are linked based on social security numbers

(for more details see Sebők, 2021)[12]. We observe employment, school enrollment, and completed education. We also observe ICD codes from medical visits which we use to measure abortions and pregnancies, and purchases of prescribed drugs, which we use to measure mental health. These outcomes related to healthcare are only available between 2009 and 2017.

We observe the care type of the children in the 2008-2017 waves of the National Assessment of Basic Competencies (NABC), which are linked to the administrative data. The NABC is an annual standardized mathematics and reading test conducted on the whole population of 6th 8th and 10th grade students. A background survey accompanies the tests with a rich set of questions about the student and her family environment. Two questions in the survey helps to identify the home type: foster family or residential care, or own family as well.[13] Using the NABC to identify home type means that we observe the home type of the child 3 points in time: 6th grade, 8th grade, and 10th grade.[14] Non-response is a problem in the NABC data. We estimate that we observe around 80% of 6th-grade children who live with their own family, 65% of all children in foster care, and 39% of children in group homes (see Table A2 in the appendix). The high non-response rate arises because children must be present in school on the day of the test, and they have to take the background questionnaire home and answer it with their caregivers. Thus, the sample we observe is plausibly less problematic and has more involved and less overwhelmed caregivers than the whole sample

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[12] The administrative database used in this paper is a property of the National Health Insurance Fund Administration, the Central Administration of National Pension Insurance, the National Tax and Customs Administration, the National Employment Service, and the Educational Authority of Hungary. The data was processed by the Databank of the Centre for Economic and Regional Studies

[13] We use two questions from the NABC survey to define an unambiguous home type. The details of the definition are presented in the Appendix Table A1.

[14] More observations are possible if the child is repeating grades, and fewer observations are possible if the child is not taking the test, or does not answer the background questionnaire in a given year.

of children in state care. This indicates that we observe a sample with more favorable outcomes than the full population of children in state care in Hungary, especially in the case of children in group homes. We take this selection problem into account when we interpret the results.

From this pool of children, we include those in our sample whom we observe as young adults – until the end of age 19 – in the administrative data, which ends in 2017. A last step in our sample selection is that we keep only those children who did not change their home type. This criterion applies to 86% of children in state care within our sample. By doing so, we focus specifically on children who have been in long-term foster care or long-term residential care during their teenage years, excluding those who have only had short-term stays in state care. This restriction can also introduce some selection problems: for example, we exclude those children as well who started to live in foster care, but for some reason, continued to live in residential care. It is possible that these children are especially problematic, and their foster parents let go of them. To make sure that the exclusion of these children is not an important issue in our analysis, we run robustness checks on the sample where we include children who have changed home type as well and use 6th -grade home type as the explanatory variable. Our final sample consists of 890 children, 616 children in foster care, and 274 in residential care.

Table 1 - Means of variables by care type

	Foster care	Residential care	Difference
Control variables			
Age in 6th grade	12.9	13.3	-0.45***
Boy	0.49	0.49	-0.004
Number of siblings	3.24	3.50	-0.26*
Mathematics test score	1343	1324	18
Reading test score	1342	1302	40**
Mathematics grade	2.65	2.41	0.24***
Grammar grade	2.96	2.72	0.24***
Literature grade	3.29	2.98	0.40***
Behavior grade	3.73	3.44	0.30***
Effort grade	3.32	3.02	0.30***
No special need	0.807	0.741	0.07*
Mild mental disability	0.003	0.015	-0.011
Physical disability	0.003	0.004	-0.000
Speech impairment	0.002	0.007	-0.007
Psychological problems	0.117	0.161	-0.044+
Behavior or learning problems	0.068	0.073	-0.005
Outcome variables			
Secondary education	0.401	0.208	0.193***
Using mental health medication	0.135	0.197	-0.062*
Birth	0.221	0.400	-0.179***
Abortion	0.141	0.300	-0.149***
NEET at least 6 months	0.372	0.526	-0.154***
Index of all outcomes	0.105	-0.223	0.329***
N	616	274	

Note: For the statistical significance of the differences we use robust standard errors, + p < 0.10, *p < 0.05, ∗ ∗ p < 0.01, ∗ ∗ ∗p < 0.001. Grades are measured on a 1 to 5 scale, with 5 being the best grade. In the regression, test scores and grades are included as categorical dummies with a separate category for missing values. Fertility outcomes are calculated in the sample of girls.

Table 1 shows the descriptives: the means of variables observed in 6th grade and the means of the outcomes at age 19 for children raised in foster care and residential care. It is clear from the table that children in foster care and children in residential care are already different on average by 6th grade. One reason could be that these variables are already outcomes of the different types of care.

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Another possible mechanism is that children with special education needs and psychological problems are more likely to be placed into residential care, as foster parents willing and capable of taking care of these children are even more in short supply than regular foster parents. However, the differences are moderate, and in some cases, not statistically significant. For example, in 6th grade, the mathematics test scores of children in foster care and residential care are not statistically significantly different.

The differences between youth raised in foster and residential care are larger for adult outcomes. Children raised in foster care are twice as likely to complete secondary education by the age of 19 (40% versus 20%). In addition, children raised in foster care are 6 percentage points less likely to purchase mental health medication during their teenage years (14%), than children raised in residential care (20%). The difference is also striking in terms of fertility outcomes, which we identify from the ICD codes recorded by the doctors during patient visits: 40% of girls in residential care give birth in their teens, as opposed to 22% in foster care. Abortions are also less frequent among girls raised in foster care (14%) than among girls raised in residential care (30%).

To capture the effects on the labor market situation of young adults we use an indicator of being NEET for at least 6 months during age 19 (not in employment, education, or training). We prefer this outcome to the share of employed individuals, as successful youth might not work but still study at this age. Individuals raised in residential care are 15 percentage points more likely to spend at least 6 months as NEETS at age 19.

3   Empirical strategy

While we observe large raw differences in the outcomes of children placed into foster care and residential care, we cannot conclude that it is the different types of placements causing these

differences. Older children, and children with special needs, or disabilities are overrepresented in residential care and have worse potential outcomes to start with.

We use two empirical approaches to deal with this selection problem. The first is an OLS strategy controlling for a rich set of variables measuring cognitive and noncognitive skills in 6th grade to capture and control for the different underlying abilities of the children. The second is an instrumental variable strategy, using local foster parent capacity as an IV.

3.1 OLS identification

To identify the causal effect of placement type on future outcomes, ideally, we would run an experiment where children taken into state care are randomly assigned to foster care or residential care and compare the means of adult outcomes. The next best would be to observe all features of the children that influence the placement decision, at the time of the decision (location of the biological parents, age, special needs, and the number of siblings that need to be placed), and control for these variables. Our empirical setting gets close to this, however, we first observe the variables that can affect the placement of the children in 6th grade, when they have already spent some time in state care. Our first strategy is to control for the variables that can affect placement along with rich measures of ability at age 13, and discuss how the late measurement biases our estimates. We estimate the following OLS model:

$$Y_i = \alpha + \beta foster_i + X'_{i,gr6}\gamma + u_i \tag{1}$$

where Y_i is the outcome: an indicator for finishing secondary education, an indicator of mental health problems, births, and abortions, and being NEET for at least 6 months at age 19. The main explanatory variable is *foster$_i$*, an indicator of living in long-term foster care as a teenager, with living in residential care as the reference group. $X'_{i,gr6}$ is a set of controls measured in 6th grade:

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gender, age, number of siblings, county indicators, calendar year indicators, measures of cognitive ability (standardized mathematics, and reading test scores, grades in mathematics, literature, and grammar), and measures of non-cognitive ability (grades for behavior and effort in school, and the presence of the following special education needs: mild mental disability, autism, physical disability, speech impairment, psychological problems, and behavior or learning problems). We include grades and test scores as categorical dummies (6 categories for grades, 8 for test scores) with a missing value as a separate category[15], and we use heteroskedasticity-robust White standard errors. As we use multiple outcomes, the probability of Type I error is higher than the simple p-values. We tackle this problem by two methods: first, we estimate the regression of a composite index, which combines all outcomes[16], to check whether this variable is affected statistically significantly. In addition, we calculate Benjamini-Krieger-Yekutieli sharpened two-stage q-values for false discovery rates based on Benjamini et al.(2006).

The coefficient of interest is β, which would identify the effect of placement type if, conditional on the variables in $X'_{i,gr6}$, care type was independent of potential outcomes. There is some randomness in the placement decision, as described in Section 1, and the set of controls we use is very rich providing some support for the unconfoundedness assumption. Still, the assumption is not fully satisfied, first, because some variables in $X'_{i,gr6}$, are bad controls: cognitive and non-cognitive ability in 6th grade can be already outcomes of the earlier placement. In the appendix

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[15] For grades in different subjects, 6-7 percent of our sample has missing values, and for test scores less than 1 percent, but every child has a non-missing value at least on one of these variables. By allowing for missing values on some of the variables, we can keep more observations.

[16] To calculate the outcome index, we standardize, and add up the following variables: an indicator for obtaining secondary education, an indicator of *not* using mental health mediaction, and indicator of spending less than 6 months as NEET at age 19, and for girls an indicator of not having a teenage pregnancy.

(section B), we show, that under plausible assumptions, these are special versions of bad controls, proxy controls, biasing gains from foster care *downwards*. There is a straightforward intuition behind this result. By controlling for 6th grade variables we compare children, who are similar at that time. If we consider the findings from the literature that residential care affects young children negatively, comparing children who are similar in 6th grade means that the child in foster care started with a *worse* early ability: thus, comparing her to a child with better underlying ability in residential care underestimates the true gains from foster care.

A second threat to the unconfoundedness assumption is the presence of omitted variables that can affect placement type and future outcomes as well. An important unmeasured variable is the history of previous placements, with the age when the child is removed from the biological family. Although our dataset lacks information on the age of first placement, in a separate dataset on children in state care from Nógrád County, Hungary (Darvas et al., 2014), we observe that children in foster care are typically removed from their biological families at a significantly younger age, with first placements occurring at 4.2 years, compared to 9.1 years of age on average for children in residential care. The direction of the bias caused by this omitted variable is not straightforward, as it depends ultimately on the question of whether children are better off in their biological families or in state care. However, in the literature the effect of removal is ambiguous: some find that the marginal child is better off in the biological family (Doyle Jr., 2007), while others find the opposite (Bald, Chyn, et al., 2022). The studies looking into the correlation between placement age and future outcomes mostly find no significant relationship between age of placement, with some studies finding small negative or small positive correlations (see McDonald & Others, 1996). To further study the role of this omitted variable we re-estimate the regressions on a small sample who

is taken into state care between 6th and 8th grade (156 children) to take the age of placement under control, as a robustness check. The effects have the same size and magnitude as in our main specification. This result taken together with the mixed findings in the literature shows that it is unlikely that the unobserved difference in placement age explains the difference in the outcomes between children in foster and residential care.

Another potentially important unobserved variable that could be correlated with placement type and future outcomes is ethnicity. Roma children are overrepresented among children in state care. In 2005, it was estimated that 32% of children in state care were members of the Roma ethnic minority, while the Roma ratio was 13% in the general population (ERRC, 2007). If Roma children were more overrepresented in residential care than in foster care, we could find worse outcomes for children in residential care because of discrimination against the Roma, rather than residential placement itself. However, in the dataset on Nógrád county, we observe that Roma children were *more* overrepresented in foster care (80%) than in residential care (73%)[17]. This indicates that omitted ethnicity biases estimated gains from foster care downward. Considering the proxy control problem, the selection arising from non-response, and the most important omitted variables, we posit that β likely measures a lower bound of the average treatment effect of foster care on future outcomes.

3.2   IV identification

To provide further support for the causal interpretation of the results, we turn to an IV strategy. In this specification, we use variation in county-level foster parent capacity to instrument getting into

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[17] Nógrád has one of the highest Roma ratios within Hungarian counties

foster care. We define foster mother capacity as the number of foster mothers[18] in the county per 100 children living in state care in 2015[19]. The number of foster mothers is calculated from the administrative data where we observe the occupation code[20] of employees. We split the 19 counties into two categories, at the median foster parent capacity (24 per 100 children in state care).[21]

The idea is that counties that are similar otherwise, can have low or high foster parent capacity. In Figure A2 in the appendix we show that generally, in more developed counties (measured by the average wage in the county), there are fewer foster parents relative to the number of children living in state care.[22] Still, there is variation in foster parent capacity even within similarly developed counties. For example, Vas and Fejér counties have a similar mean wage, but while in Vas there were only 10 foster parents per 100 children in state care, in Fejér, the same number is 26.

As there are regular compulsory meetings with the biological parents, children need to be placed close to their previous living location. Indeed, in the sample of children who live with their biological family in 6th grade and in state care in 8th grade, we observe that 95% of children stay in the same county when they are placed in state care. Thus, authorities in counties with few foster parents are less likely to find foster placements for children living there. In our IV approach, we

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[18] 96 percent of foster parents are women.

[19] The number of children in state care per county in 2015 is reported by the Hungarian Statistical Office. Link We use the year 2015 because we have observed foster parents as a separate occupation only since then.

[20] Occupation code (FEOR) 3512 identifies foster parents.

[21] We prefer this indicator variable to a continuous instrument for two reasons. First, using a simple Wald estimator makes the interpretation of the results more straightforward and intuitive. Second, while we have an acceptable first stage with cutting at counties at the median, the first stage is weaker at other cutoffs, and as a consequence, the continuous IV also has a weaker first stage.

[22] To calculate the foster mother capacity, we pool Pest county and Budapest, which are administratively separate entities (with separate child protection services), but geographically, the city of Budapest is located inside Pest county. For this reason, children removed from their biological families in Budapest can be placed to live in foster families living in Pest county, while still complying with the rule of compulsory meetings with biological parents.

compare children in state care who live in similar counties with different foster mother capacities. Specifically, we estimate the following model:

$$Y_i = \alpha + \beta foster_i + C'_{c,gr6}\gamma + u_i, \tag{2}$$

where *foster*$_{i,gr6}$ is instrumented by *highcapacity*$_c$, an indicator of living in a county with high foster mother capacity. Y_i denotes the same outcomes as in equation (1). We use county-level controls, $C_{c,gr6}$ measured in grade 6 (employment, unemployment, mean wage, birth rate, and a composite development indicator of the county). Including the county-level controls is necessary to get meaningful estimates, as foster mother capacity is correlated with county characteristics . Note that we do not use individual controls, thus the proxy control problem is not present in the IV results. We report unclustered, standard errors, as the number of clusters is small, and robust Anderson p-values in our main specification. In a robustness check, we also present standard errors clustered by county.

The coefficient β measures the local average treatment effect on compliers – the effect of foster care on those children who would be placed into residential care in a county with low foster parent capacity, and into foster care with high foster parent capacity – if the usual IV assumptions hold.

In the results section, we show that the instrument is relevant. The other key assumption behind the IV is the exclusion restriction: the outcomes of children who are assigned to be treated (i.e. live in a county with high foster mother capacity) are only affected through the increased probability of being placed into family foster care. We present multiple pieces of evidence to support this assumption. First, we make use of a unique feature in our data: we observe a large number of children, who do not live in state care, but with their own parents. This group of children is not

affected by foster parent capacity but can be affected by non-measured county features, e.g. local school quality. If their outcomes were correlated with high foster parent capacity, it would show that omitted county-level variables confound the IV estimates. Specifically, we estimate the following placebo equation on the sample of children who live with their birth families:

$$Y_i = \alpha + \beta highcapacity_c + C'_{c,gr6}\gamma + u_i. \tag{3}$$

In these regressions, β should be 0, if foster parent capacity is uncorrelated with unobserved county characteristics correlated with the outcomes.

However, even if the placebo confirms that the instrument is conditionally uncorrelated with outcomes of the general population of children, a remaining issue with the IV is that there can be omitted county-level features of the child protection system that do not affect the outcomes of children who live with their own parents but can confound the estimates for children who live in state care. To address concerns regarding this issue, we present balance tables showing that children living in low-capacity and high-capacity counties are similar in 6th grade, and that other features of the child protection system (the quality of residential care institutions and foster parents, and the age distribution of children placed in state care) are also comparable.

4   OLS results

Table 2 shows the OLS regression results for the outcomes. Along with the estimates for β from equation (1), we show the uncontrolled difference between children in foster care and residential care for the given outcome. As discussed above, we think of these as lower and upper bounds of the true causal effect of foster care.

Column (1) shows that those children who are raised in foster care are 8.3 percentage points more likely to obtain secondary education by age 19. This is statistically significant (p=0.021), and we consider it large: it is a 40% increase compared to the baseline share of 21% of secondary school graduates in residential care. Without secondary education, the labor market prospects of children are dire.

In the second column of Table 2, we show that young adults raised in foster care are 6% (p=0.067) less likely to have ever bought prescribed mental health medication than comparable children in residential care. Generally, the absence of prescription drug use can suggest the absence of a mental health issue, but it may also indicate the presence of an untreated one. However, the likelihood of untreated mental health issues among children in our sample, particularly while under state care, is small, as children both in foster care and residential care have regular meetings with psychologists. Thus, the negative coefficient estimates indicate that mental health issues are less likely to appear among children placed in foster care.

Columns (3) and (4) show the effects on births and abortions, estimated on the sample of girls. We consider these outcomes important as teenage motherhood harms teen mothers' prospects (see for example Ashcraft et al., 2013), and their children are more likely to have adverse outcomes as well (see for example Aizer et al., 2020). In the context of children in state care, teenage motherhood is possibly even more difficult, as the girls lack a supportive family background. In a recent study, children of teenage mothers in state care were found to be more than seven times more likely to lose custody of their babies by the time children were two years old (Wall-Wieler et al., 2018), creating a cycle of involvement with the child protection services. Even if the pregnancy is terminated, having an abortion as a teenager can be painful both mentally and physically. Our

estimates show that foster care reduces the probability of teenage births and abortions by 12 percentage points each (p=0.047, and p=0.023 respectively).

Similarly to previous outcomes, we find large gains from foster care on the labor market outcomes of youth raised in state care (column (5)). Conditional on 6th-grade ability, foster youth are 11 percentage points less likely to spend at least 6 months as NEET at age 19 (p=0.004).

Lastly, in column (6) we re-estimate equation (1) on a standardized index of four outcomes (secondary education, mental health, pregnancy, 6 months as NEET, larger for better outcomes). The estimate is large (0.216) and highly statistically significant for this composite outcome as well (p=0.0001), supporting that significant results on the other outcomes are not an artifact from multiple hypothesis testing. To further support this, we show Benjamini-Krieger-Yekutieli sharpened two-stage q values for false discovery rates in Table A3 in the appendix, calculated with the code of Anderson (2008). Using a 5% threshold for false discovery the estimates on all outcomes are statistically significant.

To gain even more insight into the effect size, we also estimate a version of equation (1) where we add children to the sample who live with their own parents: in this specification, the difference between children living with their own parents and children in foster care is comparable in magnitude to the difference between children in foster care and residential care, and in some cases, it is even larger (Table A4 in the appendix).

Table 2 - OLS estimates for the effect of foster care on outcomes measured at age 19

	(1) Secondary Education	(2) Mental Health Medic.	(3) Birth	(4) Abortion	(5) NEET at least 6 months	(6) Outcome index
Foster care	0.083*	-0.058+	-0.115*	0.121*	-0.114**	0.217***
	(0.036)	(0.031)	(0.058)	(0.053)	(0.040)	(0.054)
Raw difference	0.193***	-0.062*	-0.179***	-0.149***	-0.154***	0.329***
N	890	890	457	457	890	890
Adj. R squared	0.156	0.028	0.097	0.043	0.123	0.176

Note: The following controls (measured at 6th grade) are included in all models: gender; age; number of siblings; county indicators; calendar year indicators; standardized mathematics-, and reading test scores; grades in mathematics, literature, behavior, and effort; indicators for the presence of mild mental disability, autism, physical disability, speech impairment, psychological problems, and behavior or learning problems. Robust standard errors in parentheses, *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

4.1 Quality of foster care

In the following, we analyze the differences in the outcomes by home type, separately by the educational attainment of the foster mother. Specifically, instead of a dummy indicating residential or foster care in equation (1), we include a dummy with three categories: living in residential care, living in foster care with a foster mother with primary or vocational secondary education, and living in foster care with a foster mother who has academic secondary education or university diploma. Children with more educated foster mothers have better material circumstances, and spend more time with their foster parents (see Table A4 in the appendix) [23], thus foster mother education can be regarded as a proxy for foster care quality.

We present the results in Table 3. The first lesson from the estimates is that the beneficial effect of foster care is present regardless of the foster mother's education: children raised by foster mothers

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[23] For 35 children we do not observe the education of the foster mother, we exclude them from this analysis

with low levels of education perform better than children in residential care: they are significantly more likely to finish secondary school (8.2 percentage points), less likely to have an abortion (-15.1 percentage points), and 12.3 percentage points less likely to spend at least 6 months as NEETs at age 19. The estimate on the index of the outcomes is also positive and statistically significant (0.210). Mental health problems and births are also less likely among children placed with foster mothers with low education than children in residential care, but the differences are not statistically significant.

The other lesson is that the beneficial effects are larger for children living with more educated foster mothers. The point estimates are larger for most outcomes in the case of children living with foster mothers with higher levels of education. The difference by the foster mother's education is only statistically significant in the case of teenage births, however. Girls living with more educated foster mothers are 21 percentage points less likely to become teenage mothers than girls in residential care, and 14 percentage points less likely than girls living with less educated foster mothers.

The quality of foster care really matters, but even foster parents with low human capital yield better outcomes for the children compared to residential care. Other than the features of foster care itself, specific groups of children can be affected differently by the two types of care. In the following, we analyze differential effects by gender and special education needs.

Table 3 - OLS estimates for the effect of foster care by foster mother's education

	(1) Secondary Education	(2) Mental Health Medic.	(3) Birth	(4) Abortion	(5) NEET at least 6 months	(6) Outcome index
Low educ foster mother	0.082* (0.039)	-0.055 (0.034)	-0.070 (0.063)	-0.151** (0.058)	-0.123** (0.043)	0.215** (0.057)
High educ foster mother	0.094* (0.048)	-0.064+ (0.037)	-0.208* (0.060)	-0.122* (0.063)	-0.113* (0.049)	0.242*** (0.068)
N	855	855	438	438	855	855
Adj. R squared	0.158	0.024	0.098	0.048	0.113	0.172

Note: The table shows estimates of a modified version of equation (1): $Y_i = \alpha + \beta_1 foster\_loweduc_i + \beta_2 foster\_higheduc_i + X'_{i,gr6}\gamma + u_i$, with children living in residential care as the reference category. Low educated foster mothers is defined as maximum vocational education. The following controls (measured at 6th grade) are included in all models: gender; age; number of siblings; county indicators; calendar year indicators; standardized mathematics-, and reading test scores; grades in mathematics, literature, behavior, and effort; indicators for the presence of mild mental disability, autism, physical disability, speech impairment, psychological problems, and behavior or learning problems. Robust standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

4.2   Heterogeneous effects for different groups of children

In this subsection, we re-estimate equation (1) with the inclusion of interaction terms to see whether specific groups of children benefit more from foster care. First, we estimate heterogeneous effects by gender. Table 4 shows that the gains from foster care seem to be smaller for girls for all outcomes. While these differential effects are not significant for any outcome, they are large for finishing secondary school and mental health medication. In the appendix, we show heterogeneities by an indicator of the presence of any special needs: psychological, behavioral problems, or disabilities (Table A5). The coefficient of the interaction term is alternating in sign, and close to 0 in most cases, except for outcomes related to fertility.

Table 4 - OLS estimates for the effect of foster care by gender

	(1) Secondary Education	(2) Mental Health Medic.	(3) NEET at least 6 months	(4) Outcome index
Foster care	0.126*	-0.080+	-0.119*	0.239**
	(0.050)	(0.046)	(0.056)	(0.079)
Foster care X Girl	-0.084	0.043	0.010	-0.042
	(0.066)	(0.059)	(0.074)	(0.100)
N	890	890	890	890
Adj. R squared	0.157	0.028	0.122	0.171

Note: The table shows estimates of a modified version of equation (1): $Y_i = \alpha + \beta_0 girl + \beta_1 foster_i + \beta_3 foster \times girl_i + X'_{i,gr6}\gamma + u_i$, with children living in residential care as the reference category. The following controls (measured at 6th grade) are included in all models: age; number of siblings; county indicators; calendar year indicators; standardized mathematics-, and reading test scores; grades in mathematics, literature, behavior, and effort; indicators for the presence of mild mental disability, autism, physical disability, speech impairment, psychological problems, and behavior or learning problems. Robust standard errors in parentheses, *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

These results suggest that regardless of gender and the presence of special needs, children can benefit from being raised in family foster care. The beneficial effect seems to be a bit larger for boys, but the gains are not statistically significantly larger than for girls.

5   IV results

5.1   Evidence supporting the IV assumptions

Before turning to the IV results, we present evidence supporting the identification assumptions of the IV. Table 5 reports the first-stage results and shows that the instrument is relevant – controlling for county characteristics, children who live in counties with high foster parent capacity are 13 percentage points more likely to be placed into foster care (p=0.0001). The same number using only the sample of girls (the relevant sample for the fertility outcomes) is 15 percentage points (p=0.0001). But, even though foster parent capacity is correlated with getting

into foster care, the F values are close to the usual rule-of-thumb value of 10 in the whole sample (12.2) and a bit smaller than that in the sample of girls (8.6). The Stock and Yogo critical values for a maximum 15 and 20% size distortion are 8.96 and 6.66, thus our F values indicate that the instrument is moderately weak but the bias the weakness causes is likely to be small, especially for outcomes defined on the whole sample.

Table 5 - First stage regression of foster care placement on an indicator of high foster mother capacity

	Outcome: Raised in foster care	
	(1)	(2)
Lives in a county with high foster parent capacity	0.134*** (0.039)	0.152*** (0.052)
Sample	Full	Girls
CD Wald F	12.16	8.61
N	869	443

Note: Coefficient estimates of β from first stage equation: $foster_i = \alpha + \beta highcapacity_c + C'_{c,gr6}\gamma + u_i$. Counties where above 24 foster mothers live per 100 children in state care are categorized as high capacity counties. Employment, unemployment, mean wage, birth rate, and a composite development indicator of the county are included in $C'_{c,gr6}$. Standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Next, as we show in the Appendix in Table A7, the coefficient estimates of the placebo regression (equation (3)) are small, and when they are statistically significantly different from zero, they show that the outcomes of children living with their own parents, are slightly *worse* in counties with high foster mother capacities. This shows that the set of county-level controls we use are sufficient to make counties with high and low foster capacities comparable, and unmeasured county features, if anything, can bias gains from foster care *downwards*.

Further, as the balance Table A8 in the appendix shows, children in state care living in high capacity and low capacity counties are similar, and the differences between the two groups are even closer to zero when we control for county characteristics.

Table 6 – Reduced form: the effect of foster parent capacity on outcomes children living in state care

	(1) Secondary Education	(2) Mental Health Medic.	(3) Birth	(4) Abortion	(5) NEET at least 6 months	(6) Outcome index
Lives in a county with high foster parent capacity	0.039 (0.040)	-0.032 (0.035)	-0.032 (0.052)	0.009 (0.043)	-0.041 (0.042)	0.087 (0.059)
N	869	869	443	443	869	869
Adj. R squared	0.011	0.002	0.006	0.006	0.000	0.000

Note: Estimates of β in equation (3). The following county level controls are included in all models : employment, unemployment, mean wage, birth rate, and a composite development indicator of the county. Standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Next, we turn to the reduced form – equation (3) estimated on the sample of children in state care – in Table 6. Except for the prevalence of abortions, most outcomes are better on average in counties with high foster mother capacity. Children living in state care are 4 percentage points more likely to finish secondary education, 3 percentage points less likely to use mental health medication, 3 percentage points points less likely to give birth as teenagers, and 4 percentage points less likely to spend 6 months as NEETs at age 19 if they live in counties where foster parent capacity is high. These point estimates are large – an order of magnitude larger, and in the opposite direction as the placebo – albeit not statistically significant. We consider these estimates important. The reduced form shows that the outcomes of children in state care are better in places with high foster mother

capacity, and the placebo confirms that omitted county-level features (like local labor market opportunities, or local school quality) cannot explain this difference. Keeping county characteritics constant, a child protection system with more abundant foster parents seems to lead to better outcomes for children in state care.

5.2 IV estimates

After presenting evidence supporting the IV assumptions, we turn to our estimates (Table 7). From the IV, we measure large but noisy local average treatment effects of foster care placement. Compliers are estimated to be 29 percentage points more likely to finish secondary education (column 1) if they are raised in foster care. The estimated LATE of foster care is -24 percentage points on the probability of using mental health medication, 21 percentage points on teenage births, and 31 percentage points on being NEET. None of these estimates are statistically significant, but they are larger than the OLS estimates. This is consistent with our argument that the OLS likely underestimates the true benefits. In addition, as Table A9 in the appendix shows, compliers are different than the full population of children in state care: girls, children with special needs, and more siblings are overrepresented among them.

To sum up, the reduced form from the IV strategy provides evidence that children living in counties with higher foster mother capacity are better off in terms of education, mental health, and labor market outcomes. The final IV estimates show large gains from foster care. However, due to the small complier population, we cannot pinpoint precise quantitative estimates for the average effect of foster care on children from this specification.

Table 7 – IV estimates for the effect of foster care placement on future outcomes

	(1) Secondary Education	(2) Mental Health Medic.	(3) Birth	(4) Abortion	(5) NEET at least 6 months	(6) Outcome index
Foster care	0.289	-0.238	-0.213	0.057	-0.306	0.647
	(0.299)	(0.237)	(0.337)	(0.309)	(0.315)	(0.434)
N	869	869	443	443	869	869
CD Wald F	12.16	12.16	8.61	8.61	12.16	12.16
Anderson-Rubin p value	0.339	0.307	0.536	0.853	0.334	0.137

Note: Estimates of β in equation (2), being placed to foster care is instrumented with high foster mother capacity in the county of living. The following county level controls are included in all models : employment, unemployment, mean wage, birth rate, and a composite development indicator of the county. Standard errors in parentheses, *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$.

Both the OLS and the IV are imperfect with untestable identifying assumptions boiling down to not omitting important individual-level variables in the case of the OLS, and not omitting important county-level features of the child protection system in the case of the IV. The two strategies pointing in the same direction, combined with the large effect sizes support that it is not an omitted variable causing the large differences between youth raised in foster care and in residential care, but indeed children raised in foster care are better off than children raised in residential care because of the home type they lived in as teenagers.

6   Robustness checks

In this section, we show that our results are robust to several modifications in the empirical strategy. Specifically, we re-estimate regressions of the outcome index on the foster family placement indicator using different samples and equations. The coefficient estimates from the robustness checks are shown in Figure 2.

First, we check the robustness of the OLS estimates. We begin by refining our sample to satisfy the overlap of the control variables. Specifically, we restrict the sample to those children, who based on their observed features in 6th grade would have a positive probability of being placed either into residential care or foster care.[24] The estimate of the coefficient of the outcome index in his sample is 0.197, and statistically significant (p=0.001), and of the same magnitude as in our main results. This robustness check confirms that the beneficial effects of foster care remains if we only include children who would be capable to live in foster care based on their observables. In our next robustness check, we add an indicator of early ability, specifically delayed school start, as an additional control variable. The estimate of foster placement on the outcome index is again positive and statistically significant (0.186, p=0.001). This modification provides evidence that our results are not driven by early differences in ability. In our third robustness check, we include every child of whom we observe home type in 6th grade and estimate the effect of care type in grade 6. Another worry with the main results is that by excluding children who are in foster care in grade 6, and in residential care later, we exclude problematic foster children, and thus overestimate the beneficial effect of foster care. Figure 2 A) confirms that this effect is not driving our main estimates, as the results are similar in magnitude in this sample too (coefficient estimate of 0.189 on the outcome index, with p=0.000). Finally, we re-estimate equation (1) on the sample of children who lived with their own parents in grade 6, and in state care in grade 8.

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[24] To achieve this, we estimate the following probit model: $P(foster = 1|X'_{i,gr6}) = \phi(X'_{i,gr6}\beta)$, where $X'_{i,gr6}$ contains the same variables as in equation 1: gender, age, number of siblings, county indicators, calendar year indicators, measures cognitive ability - standardized mathematics, and reading test scores, grades in mathematics, literature, and grammar -, and measures of non-cognitive ability: grades for behavior and effort in school, and the presence of special education needs The distribution of the predicted propensities by placement type are shown in Figure A3. Based on the figure, we drop observations with a propensity score over 0.9 and below 0.3.

In this sample, we know that the placement happens between 6th and 8th grade. The coefficient estimate of foster care placement on the outcome index is 0.211, which is very similar to our main results, albeit only marginally statistically significant (p=0.097) due to the small sample size. This provides a piece of evidence that unobserved placement age does not bias the main results substantially.

Figure 2 – Robustness of the OLS and IV estimates

(A) OLS **(B) IV**
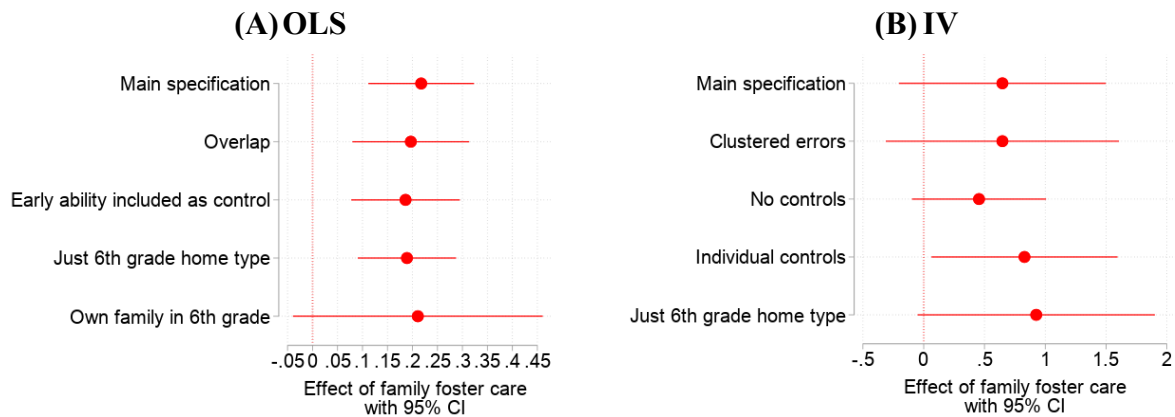
Note. Coefficient estimates for the effect of foster care on the index of outcomes using different specifications.. For detailed regression results see Table A10 and Table A11 in the appendix.

On panel B) of Figure 2 we show that our IV results remain similar regardless of specification: large positive estimated effects of foster care, however non-significant, or only marginally significant. In all robustness checks, we have a strong enough first stage. First, we cluster the standard errors at the county level, which slightly increases the standard errors (coefficient estimate of 0.647 with p=0.186). Then, we show that the results are not sensitive to the set of controls we use in equation (2). We re-estimate equation (2) without county level controls, and with a full set of individual controls. The coefficient estimate is again large and positive and

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qualitatively similar than the main results (0.455 with p=0.106 with no controls; and 0.829 with p=0.034 with individual controls.). Lastly, we re-estimate equation (2) on the sample where we only take into account on home type in grade 6, again estimating a positive but only marginally significant coefficient of the effect of foster care (0.926 with p=0.063).

7   Conclusion

In this study, we compare the outcomes of young adults in Hungary who were raised in foster care during their adolescence with those who were raised in residential care. We make use of individual administrative panel data linking information of indicators of ability at around age 13 and a large set of adult outcomes. We present evidence that young adults raised in foster care experience significantly better outcomes compared to similar youth raised in residential care, conditional on a large set of indicators measuring childhood cognitive ability (for example test scores) and non-cognitive ability (for example behavioral problems). They are substantially more likely to complete secondary education, less likely to use medication for mental health issues, less likely to give birth and have an abortion as teenagers and spend less time without either employment or enrollment in education.

We argue that unobserved variables, like previous placement history, and ethnicity cannot account for these large differences, but it is indeed foster care that improves the outcomes of children compared to residential placement. To further support the causal interpretation, we estimate IV models instrumenting foster placement by local foster mother capacity. The estimates are large and point in the same direction as the OLS estimates, albeit they are not statistically significant.

Prior research has shown the beneficial effects of foster care compared to residential care, for children who were placed in state care before the age of 3 (Nelson et al., 2014). Existing research

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on older children suggests that foster care is likely to have a positive impact on some children (see Lee et al., 2011). However, these findings are valid for the group of children with severe behavioral problems and pertain to only a few specific outcomes. Our study provides the first evidence supporting the positive effect of foster care on a wide range of adult outcomes for the typical adolescents raised in such settings.

Delving into a comprehensive analysis of why being raised in foster care can offer greater benefits compared to residential care is beyond the scope of this analysis. But probably one of the most important channels that can explain the large gains from foster care is the larger opportunity for the child to form a trusting and caring relationship with a supportive adult figure in this type of care. These relationships can be important for children to successfully navigate in life, and having a loving adult figure is not only important for young children, but also for teenagers (Nagaoka et al., 2015) and young adults (Gypen et al., 2017). Even in well-functioning group homes with highly trained professionals, such relationships are less likely to form (UNICEF, 2022).

In English-speaking countries, residential care is only reserved as a last resort for children whose placement into foster families is not possible (del Valle, 2014). But in most other countries, including Hungary, a large number of children who would be capable to live in foster families, live in residential care. Child welfare organizations have long called for the de-institutionalization of these children (see e.g. UNICEF, 2022). Our study shows that living in a family-like environment during adolescence can not only be thought of as a normative principle but also as a means to improve outcomes. Efforts to increase the number of foster parents to be able to place more children in foster care could be important policies in those countries, where residential care is still common (for example Germany, France, the Benelux countries, and the Mediterranean and post-Socialist

countries in Europe). In these countries, the exact effect of foster care might differ from our estimates because of the local details of the child protection system - for example, the quality of both residential and foster care can be substantially different than in Hungary. Still, the fact that we find better outcomes for foster youth regardless of gender, special needs, and the quality of foster care, suggests that gains from living in a family-like environment might be quite universal.

Future research in different child protection settings can shed more light on what features of children and foster families make it more likely that children raised in state care grow up to be successful adults. To pin down precise causal effects, randomized controlled trials similar to the Bucharest Early Intervention Project could provide high-quality evidence about the effectiveness of different care types for different subgroups of children. Finally, it is important to acknowledge that while foster care has the potential to improve the well-being of children living in state care, even foster youth have much worse outcomes than the general population of children. More research is needed to gain a better understanding of how governments can improve the overall quality of state care to raise successful individuals when their birth families fail them.

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APPENDIX

A Figures and Tables

Figure A1 Share in foster care among children in state care in Hungary
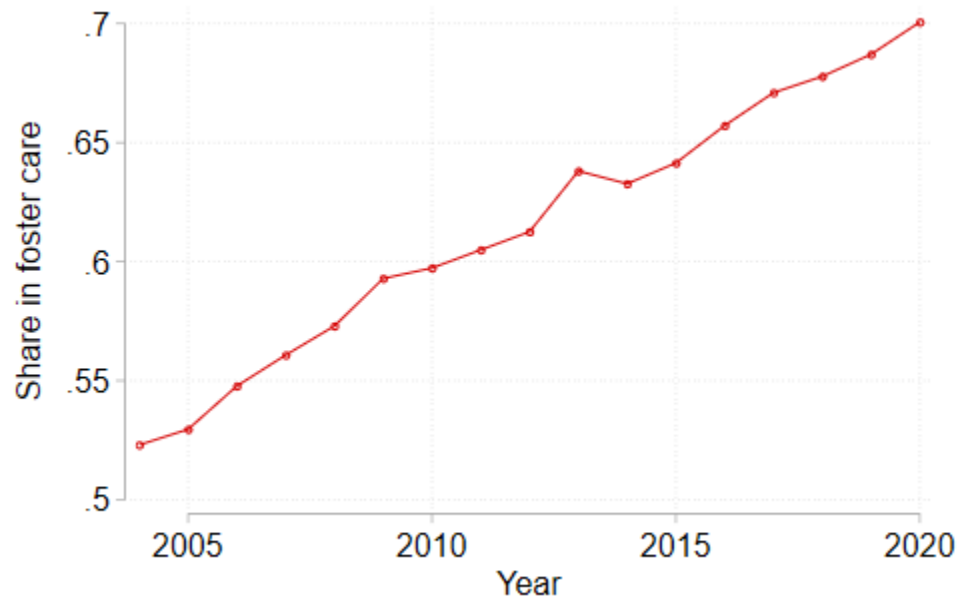
Note: Source: Hungarian Statistical Office (https://www.ksh.hu/stadat_files/szo/hu/szo0017.html, downloaded 2024.02.09)

Figure A2 - Number of foster mothers per 100 children in state care by mean wage in the county
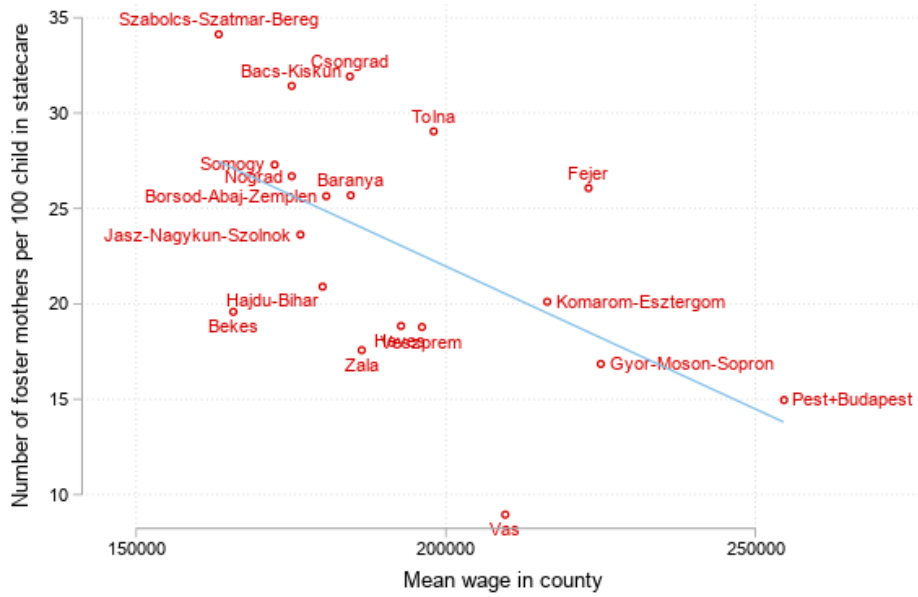
Note: Linear fit with light blue. Data from Pest and Budapest are pooled. Number of foster mothers per 100 children is calculated as 2 times the sum of employees with occupation code (FEOR) 3512 in the 50% Admin data, over the number of children in state care in 2015 using https://www.ksh.hu/stadat_files/szo/hu/szo0017.html, downloaded 2024.02.09)

Figure A3 – Overlap of the control variables
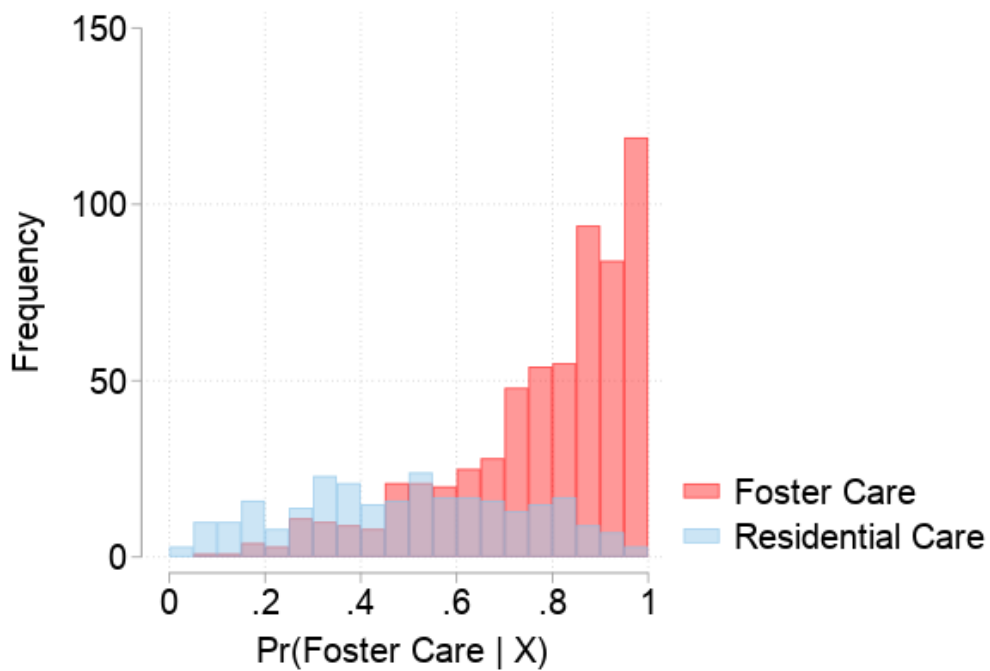
Note: Distribution of the estimated propensity scores for children living in foster care and residential care. We use the following probit model to estimate the propensity score : $P(foster = 1|X'_{i,gr6}) = \phi(X'_{i,gr6}\beta)$, where $X'_{i,gr6}$ contains the same variables as in equation 1: gender, age, number of siblings, county indicators, calendar year indicators, measures cognitive ability - standardized mathematics, and reading test scores, grades in mathematics, literature, and grammar -, and measures of non-cognitive ability: grades for behavior and effort in school, and the presence of special education needs.

Table A1 – Definition of home type based on the survey questions

Household Members indicated in the survey		Home Type indicated in the survey	Cleaned variable indicating the home type
Lives with	Does not live with		
Biological parent	-	Own family	Own parents
		Foster family	Own parents
		Group home	Missing (inconsistent)
		Missing	Own parents
Grandparents and/or other relatives (e.g. uncle, aunt)	Biological parent, foster parent	Own family	Kinship care
		Foster family	Kinship care
		Group home	Missing(inconsistent)
		Missing	Kinship care
Foster mother	-	Own family	Missing (inconsistent)
		Foster family	**Foster care**
		Group home	Missing (inconsistent)
		Missing	Missing (insufficient)
-	Biological parent, foster parent, grandparent, other relative	Own family	Missing (insufficient)
		Foster family	Missing (insufficient)
		Group home	**Residential care**
		Missing	Missing (insufficient)
All other combinations			Missing (inconsistent

Note: Categorization based on two questions in the National Assessment of Basic Competencies

Table A2 – Steps in the sample selection, and observations compared to the whole population

2008				
	All children	Own parents	Foster care	Residential care
Estimated number of 6th graders*	110875	108231	758	564
Observed in NABC				
N	107654	85296	474	202
Ratio to full population	0.97	0.79	0.63	0.36
Observed in Admin data until age 19**				
N	50927	40568	222	87
Ratio to NABC population	0.47	0.48	0.47	0.43
Does not change home type***				
N		40219	**173**	**78**
Ratio to Admin data + NABC		0.99	0.78	0.90
Ratio to full population		0.37	0.23	0.14
2009				
	All children	Own parents	Foster care	Residential care
Estimated number of 6th graders	104712	102081	785	530
Observed in NABC				
N	100620	79295	488	211
Ratio to full population	0.96	0.78	0.62	0.40
Observed in Admin data until age 19				
N	47254	37723	213	81
Ratio to NABC population	0.47	0.48	0.44	0.38
Does not change home type				
N		37394	**174**	**73**
Ratio to Admin data + NABC		0.99	0.82	0.90
Ratio to full population		0.37	0.22	0.14
2010				
	All children	Own parents	Foster care	Residential care
Estimated number of 6th graders	98756	96179	773	516
Observed in NABC				
N	96898	78935	562	204
Ratio to full population	0.98	0.82	0.73	0.40
Observed in Admin data until age 19				
N	39715	32354	230	77
Ratio to NABC population	0.41	0.41	0.41	0.38
Does not change home type				
N		32055	**194**	**68**
Ratio to Admin data + NABC		0.99	0.84	0.88
Ratio to full population		0.33	0.25	0.13

Note: *Estimates based on data from the Hungarian Statistical Office ("Tájékoztatási Adatbázis, Gyermekjóléti Szakellátások" at https://statinfo.ksh.hu/Statinfo/, downloaded 2023.11) which reports the overall age distribution of children in state care in a given year, but no conditional distributions by home type. Along with this, the aggregate

number of children in different types of state care is reported. We use third of 12-14 age group as the full aggregate number of children state care, and assuming the same age distribution for foster and residential care.
**Sample used in a robustness check
***Sample used in the main analysis. In our main analysis, we include 75 additional foster children and 55 in residential care, who are 6th graders in 2011 or later, but are observed until age 19.

Table A3 – P values in the main analysis and Benjamini-Krieger-Yekutieli sharpened two-stage q values

	p value	q value
Secondary Education	0.021	0.032
Mental Health Medication	0.066	0.040
Birth	0.047	0.040
Abortion	0.023	0.032
NEET 6 months	0.004	0.022

Note: The q values are calculated with the code of Anderson (2008).

Table A4 - OLS estimates including children living with their own parents

	(1) Secondary Education	(2) Mental Health Medic.	(3) Birth	(4) Abortion	(5) NEET at least 6 months	(6) Outcome index
Foster care	-0.038*	0.092***	-0.001	0.023	0.052**	-0.213***
	(0.019)	(0.014)	(0.023)	(0.020)	(0.019)	(0.035)
Residential care	-0.091***	0.148***	0.114**	0.149***	0.138***	-0.482***
	(0.025)	(0.024)	(0.041)	(0.039)	(0.029)	(0.056)
N	114934	114934	57233	57233	114934	114934
Adj. R squared	0.267	0.010	0.193	0.060	0.101	0.222

Note: The table shows estimates of a modified version of equation (1): $Y_i = \alpha + \beta_1 foster_i + \beta_2 residcare_i + X'_{i,gr6}\gamma + u_i$, with children living with their own parents as the reference category. The following controls (measured at 6th grade) are included in all models: gender; age; number of siblings; county indicators; calendar year indicators; standardized mathematics-, and reading test scores; grades in mathematics, literature, behavior, and effort; indicators for the presence of mild mental disability, autism, physical disability, speech impairment, psychological problems, and behavior or learning problems. Robust standard errors in parentheses, *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$.

Table A5 – Quality of foster care by foster mother's education

| | Foster mother's education | | |
| | Maximum vocational | Minimum secondary | |
	Mean		Difference
Internet connection	0.65	0.87	0.221***
Own desk	0.88	0.94	0.064**
Family owns 300 books minimum	0.31	0.7	0.392***
Family regulary talks about what child reads	0.71	0.82	0.113**
Family regularly talks about school	0.94	0.98	0.040*
Parents almost always go to parent-teacher conference	0.67	0.74	0.075+
Household size minimum 7	0.53	0.55	0.019
N	372	209	

Note: Children with no information on the foster mother's education are dropped from the sample. , *** p<0.001, ** p<0.01, * p<0.05, + p<0.1. Mothers obtaining high-school leaving exam ("érettségi") are categorized in "minimum secondary".

Table A6 - OLS estimates for the effect of foster care by the presence of special needs

	(1) Secondary Education	(2) Mental Health Medic.	(3) Birth	(4) Abortion	(5) NEET at least 6 months	(6) Outcome index
Foster care	0.089*	-0.061+	-0.132*	-0.082	-0.124**	-0.230***
	(0.040)	(0.034)	(0.064)	(0.059)	(0.044)	(0.060)
Foster care X special needs	-0.021	0.018	0.010	-0.172	0.044	-0.057
	(0.074)	(0.072)	(0.120)	(0.107)	(0.088)	(0.118)
N	890	890	457	457	890	890
Adj. R squared	0.151	0.030	0.039	0.079	0.124	0.175

Note: The table shows estimates of a modified version of equation (1): $Y_i = \alpha + \beta_0 specialneeds + \beta_1 foster_i + \beta_3 foster \times specialneeds_i + X'_{i,gr6}\gamma + u_i$, with children living in residential care as the reference category. Low educated foster mothers is defined as maximum vocational education. The following controls (measured at 6th grade) are included in all models: gender; age; number of siblings; county indicators; calendar year indicators; standardized mathematics-, and reading test scores; grades in mathematics, literature, behavior, and effort; Robust standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table A7 – Placebo estimates for the effect of foster parent capacity on outcomes using children living with their own parents

	(1) Secondary Education	(2) Mental Health Medic.	(3) Birth	(4) Abortion	(5) NEET at least 6 months	(6) Outcome index
Lives in a county with high foster parent capacity	-0.018** (0.003)	-0.000 (0.002)	-0.004 (0.003)	-0.001 (0.003)	0.015** (0.003)	-0.024*** (0.005)
N	113180	113180	56333	56333	113180	113180
Adj. R squared	0.008	0.000	0.002	0.019	0.005	0.008

Note: Estimates of β in equation (3). The following county level controls are included in all models : employment, unemployment, mean wage, birth rate, and a composite development indicator of the county. Standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table A8 – Balance:6th grade characteristics of children living in state care and the local child protection system by the capacity of foster mothers

	Low foster parent capacity	High foster parent capacity	Difference	Conditional Differences[1]
Individual characteristics				
Age	12.99	13.03	0.04	0.15
Boy	0.47	0.51	0.03	0.03
Number of siblings	3.23	3.43	0.20+	0.02
Mathematics test score	1346.94	1324.83	-22.11+	-11.97
Reading test score	1345.79	1313.69	-32.10**	-15.74
Mathematics grade	2.66	2.52	-0.14*	-0.12
Grammar grade	2.92	2.86	-0.06	-0.11
Literature grade	3.11	3.21	0.10	0.01
Behavior grade	3.65	3.64	-0.00	-0.10
Effort grade	3.25	3.21	-0.04	-0.09
No special need	0.76	0.81	0.058*	-0.029
Mild mental disability	0.012	0.000	-0.012*	-0.013*
Physical disability	0.005	0.002	-0.002	0.003
Speech impairment	0.005	0.002	-0.002	0.003
Psychological problems	0.137	0.124	-0.013	0.035
Behavior or learning problems	0.086	0.057	-0.028	0.002
Local child protection system				
Mean age of children in state care[2]	10.0	10.0		
Share of foster mothers with at least vocational education	0.76	0.73	-0.027	-0.005
Indicator of foster family quality[3]	-0.08	-0.11	-0.023	0.119
N	432	437		

Note: For the statistical significance of the differences we use robust standard errors, + p < 0.10, ∗p < 0.05, ∗ ∗ p < 0.01, ∗ ∗ ∗p < 0.001. Grades are measured on a 1 to 5 scale, with 5 being the best grade.

[1] For the conditional difference the variables in $C_{s,gr6}$ equation (2) (employment, unemployment, mean wage, birth rate, and a composite development indicator of the county) are controlled for.

[2] Calculated using aggregate county-level data of the Hungarian Statistical Office ("Tájékoztatási Adatbázis, Gyermekjóléti Szakellátások" at https://statinfo.ksh.hu/Statinfo/, downloaded 2023.11.01).

[3] Measured by the first principal component of the following variables: education of fotser mother and father; indicators for owning a desk and books outside of textbooks, the number of books, bathrooms, and computers in the household, indicators for having a car and internet connection in the hosuehold, size of the household, number of rooms per person in hosuehold

Table A9 – Characterization of compliers

	First stage for the given group	First stage for the given group/overall first stage
Boy	0.11	0.91
Girl	0.15	1.25
Any special need	0.16	1.33
No special need	0.13	1.08
Number of siblings max 1	0.08	0.67
Number of siblings min 2	0.15	1.25
Good behavior grade	0.16	1.33
Low behavior grade	0.11	0.91

Note: Coefficient estimates of first stage equation: $foster_i = \alpha + \beta highcapacity_c + C'_{c,gr6}\gamma + u_i$

Table A10 – OLS robustness checks: the effect of foster care on the outcome index in different specifications

	(1) Main	(2) Overlap.	(3) Early ability included as control	(4) Just 6th grade home type	(5) Own family in 6th grade
Foster care	0.217***	0.197***	0.186***	0.189***	0.211+
	(0.054)	(0.061)	(0.055)	(0.050)	(0.126)
N	890	596	840	1043	156
Adj. R squared	0.246	0.253	0.258	0.225	0.692

Note: Estimates of β in equation (1) using different samples and different controls in X_{gr6}. The variable $foster$ is 1 if the child lives in foster care on all observed periods for models (1) (2) and (3), and 0 if the child lives in residential care in all observed period. In the case of model (4), $foster$ is 1, if the child's home type is foster care in grade 6, and 0 if it is residential care. In model (5), children are included who live in their own family in grade 6, and variable $foster$ is 1 if the child lives in foster care in grade 8, and 0 if she lives in residential care in grade 8. The following controls (measured at 6th grade) are included in all models: gender; age; number of siblings; county indicators; calendar year indicators; standardized mathematics-, and reading test scores; grades in mathematics, literature, behavior, and effort; indicators for the presence of mild mental disability, autism, physical disability, speech impairment, psychological problems, and behavior or learning problems. Robust standard errors in parentheses, *** p<0.001, ** p<0.01, * p<0.05, + p<0.1

Table A11 – IV robustness checks: the effect of foster care on the outcome index in different specifications

	(1) Main	(2) Clustered errors	(3) No controls	(4) Individual controls	(5) Just 6th grade home type
Foster care	0.647	0.647	0.455	0.829*	0.926+
	(0.434)	(0.489)	(0.281)	(0.391)	(0.498)
N	869	869	869	869	1039
CD Wald F	12.159	12.159	26.84	15.318	10.630
Anderson Rubin p-value	0.137	0.284	0.113	0.026	0.050

Note: Estimates of β in equation (3) using different specifications.. The variable $foster$ is 1 if the child lives in foster care on all observed periods for models (1) (2) (3) and (4), and 0 if the child lives in residential care in all observed periods In the case of model (5), $foster$ is 1, if the child's home type is foster care in grade 6, and 0 if it is residential care. The following county-level controls are included in models (1) (2) (4) and (5) : employment, unemployment, mean wage, birth rate, and a composite development indicator of the county. Further, the following individual controls (measured at 6th grade) are included in model (4): gender; age; number of siblings; county indicators; calendar year indicators; standardized mathematics-, and reading test scores; grades in mathematics, literature, behavior, and effort; indicators for the presence of mild mental disability, autism, physical disability, speech impairment, psychological problems, and behavior or learning problems. Robust standard errors in parentheses, *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$

B Bias resulting from the late measurement of ability

In the empirical strategy, we argue that the fact that we measure our outcomes late, when children already spent some time in residential or foster care, makes us underestimate the true gains from foster care. In the following, we spell out the argument in detail following the derivation of Angrist & Pischke (2009 p50). Say that we could measure cognitive and psychological ability early, before the placement decision. (For simplicity, instead of a vector of variables, we use one variable a_i in this derivation - we think of this as a composite measure of early cognitive and non-cognitive ability, where a larger value of a_i shows better ability.) In this case, we would estimate the following model:

$$Y_i = \alpha + \rho foster_i + \gamma a_i + \varepsilon_i \qquad (B1)$$

If a_i perfectly captures ability related to future outcomes, ρ shows the true effect of foster care. Again for simplicity, we think of Y_i now as a variable where a larger value means a better outcome,e.g. an indicator of finishing secondary school, an indicator of not having a teenage abortion, etc. We suppose γ is positive, i.e. children with better cognitive and non-cognitive early ability are more likely to have better outcomes. However, instead of a_i, we only observe ability later, denoted by $a_{i,gr6}$, when a child already spent some time in state care. We suppose that this late ability depends on early ability and placement in the following way:

$$a_{i,gr6} = \pi_0 + \pi_1 foster_i + \pi_2 a_i \qquad (B2)$$

It is plausible that π_2 is positive: children with better early ability have better ability later. The literature results on the beneficial nature of early foster care suggest that π_1 is also positive. But, to gain better insight about these signs we also try to estimate equation (B2). Even though we do

not have a rich set of indicators for early ability, we have an imperfect measure of it: starting primary school on time. Children who start later than the age of 7.5 were not mature enough to start school at age 6.5, thus starting late can be an indicator of early problems. We regress ability in grade 6 on living in foster care in 6th grade and starting primary school in time. In this regression, the coefficient on foster care and starting school in time are positive and significant indeed (see Table B1), supporting that π_1 and π_2 are positive as well. Rearranging equation (B2) to a_i, and plugging it into equation (B1) we get:

$$Y_i = \left(\alpha - \gamma\frac{\pi_0}{\pi_1}\right) + \left(\rho - \gamma\frac{\pi_1}{\pi_2}\right)foster_i + \frac{\gamma}{\pi_2}a_{gr6,i} + \varepsilon_i. \tag{B3}$$

This is a simplified version of equation (1), which we can actually estimate. We run this version of the main equation and we see that children with better ability in grade 6 have better outcomes (see Table B2). This means that the sign of γ/π_2 is positive. As we argued $\pi1, \pi2$ are plausibly positive as well. This means that the coefficient of $foster_i$ is underestimated in our main equation compared to ρ. Thus the proxy control problem likely makes us underestimate the true beneficial effect of foster care on future outcomes.

Table B1 – *Regression of 6th grade ability on foster care and early ability*

	(1) Ability in 6th grade
Foster care	0.182***
	(0.045)
Starts primary school in time	0.087*
	(0.041)
R squared	0.022
N	840

Note: The following variables are included in calculating the ability index: standardized mathematics-, and reading test scores; grades in mathematics, literature, behavior, and effort; indicators for the presence of mild mental disability, autism, physical disability, speech impairment, psychological problems, and behavior or learning problems. Standard errors in parentheses, *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$.

Table B2 - *OLS estimates for the effect of foster care with a 6th grade ability index as a control*

	(1) Secondary Education	(2) Mental Health Medic.	(3) Birth	(4) Abortion	(5) NEET at least 6 months	(6) Outcome index
Foster care	0.142***	-0.057+	-0.183***	-0.137**	-0.133***	0.282***
	(0.035)	(0.030)	(0.054)	(0.048)	(0.038)	(0.052)
6th grade ability index	0.156***	-0.081***	-0.096**	-0.093**	-0.189***	0.310***
	(0.025)	(0.021)	(0.036)	(0.036)	(0.026)	(0.037)
N	890	890	457	457	890	890
Adj. R squared	0.092	0.048	0.076	0.037	0.106	0.146

Note: The table shows estimates of a modified version of equation (1): $Y_i = \alpha + \beta foster_i + \gamma ability_i + X'_i \delta + u_i$, with children living in residential care as the reference category. The following variables are included in calculating the ability index: standardized mathematics-, and reading test scores; grades in mathematics, literature, behavior, and effort; indicators for the presence of mild mental disability, autism, physical disability, speech impairment, psychological problems, and behavior or learning problems. Number of siblings, gender and calendar year are included in X. Robust standard errors in parentheses, *** $p<0.001$, ** $p<0.01$, * $p<0.05$, + $p<0.1$