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Life-cycle effects of public childcare: Evidence on children and their parents

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Abstract

This paper provides large-scale evidence linking the economic effects of childcare programs to social skills measured in adulthood. We examine Finland's first national public childcare program, and document that it increased parental labor supply —through retirement— while reducing the intergenerational persistence of income. Critically, we leverage Finnish Defence Forces data on the near population of males to show that effects on children's adult income are underlied by lasting effects on social skills. Further, we show that life-cycle cost-effectiveness estimates based on the assumption of constant effects after typical observation windows can considerably overestimate the net costs of public childcare.

Keywords: early childhood, social skills, parental labor supply
JEL Classification: J08, I24, J24

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Programs like public childcare are often considered the bedrock of modern welfare states. These programs have the potential to increase labor market participation for mothers – while also potentially leveling the playing field for children from all walks of life.

Despite the wide-ranging interest in childcare policies, key challenges obscure our understanding their effects. Few papers are able to follow parental outcomes beyond a handful of years after childcare, and no papers extend the follow-up window through retirement. Therein, it is hard to interpret the magnitude of the effects of public childcare on parental labor supply. Moreover, we lack empirical evidence on how the short-term effects of childcare on children's outcomes relate to long-term impacts (Duncan et al., 2022). A number of studies have found that childhood programs can affect short term outcomes across various domains, that these effects disappear in the medium term, but then re-emerge in adult outcomes such as earnings or crime (Deming, 2009; Chetty et al., 2011; Heckman et al., 2013; Bailey et al., 2020; Li et al., 2020). A common explanation for this pattern is that the persistent effects of childcare operate through lasting effects on social rather than cognitive skills (see, for example, Heckman et al., 2013). However, the inability to link the effects of childcare to measures of adult social skills has curtailed the assessment of this hypothesis.

We aim to make progress on both these key issues, and conduct a comprehensive evaluation of Finland's first national public childcare program. In the first part of the paper, we study the effects of public childcare access on parental labor market outcomes, paying close attention to the life-cycle dynamics of these effects for mothers and fathers. In the second part of the paper, we study how access to public childcare shapes children's labor market trajectories and shapes intergenerational mobility. Unique data from the Finnish Defence Forces provides us with skill outcomes typically unobserved by researchers, which we use to examine the role of skills in explaining effects we observe on children. We augment this data on skills with measures of occupational task content to gain a richer understanding of how effects on skills relate to labor market sorting and earnings. Finally, we tie these two portions of the paper together with a calculation of the total marginal value of public funds across parental and children's outcomes — and assess the sensitivity of these estimates to assumptions commonly made when data is only available for shorter follow-up periods.

Our focus is the *Childcare Law of 1973*, which established the first national public childcare program in Finland. Without sufficient resources for the government to provide public childcare in all municipalities right away, only some could receive funding for public childcare in the first years following the law. Since there were already municipality-provided public childcare programs in urban areas before 1973, we focus on rural municipalities for which the reform provided access to public childcare for the first time. Prior to the policy, childcare was provided primarily by mothers as well as a patchwork of informal and private services, though even these were often unavailable. We use a two-by-two differences-in-differences strategy to compare cohorts born in the first set of rural municipalities to receive public childcare (treatment) to the same cohorts born in similar

municipalities that only received public childcare in later years (comparison). Just a few years after the introduction of the policy, about 35 percent of eligible cohorts in the treatment municipalities attended public childcare while there remained no public childcare in comparison municipalities.

Our empirical approach captures the causal effects of public childcare access if the outcomes of cohorts in treated and comparison municipalities would have progressed in a parallel manner absent the *Childcare law of 1973*. Supporting a causal interpretation, outcomes of both parents and children in treatment and comparison municipalities progressed in a parallel manner before 1973. Moreover, the introduction of public childcare does not coincide with regional trends or changes in the composition of families in treated versus comparison municipalities. Since we observe annual municipality-level spots in public childcare rather than individual enrollment, this strategy estimates the results of access rather than enrollment.

As increasing maternal employment was the major motive for the policy, we begin our analysis with parents. We find that access to public childcare increased the family incomes of parents whose children were eligible for childcare by 1,141 euros annually (3.6 percent of the baseline). Perhaps more interestingly, these effects persist through retirement. In fact, the magnitude of the effects grows in both absolute and relative terms, such that by the time children are in their late teens, families whose children were eligible for childcare when they were young earn 2,078 euros (5.3 percent of the baseline) more each year than their untreated counterparts. We show that these total effects are underlied by increased wage income, and reduced self-employment income. Mothers shift away from manufacturing related occupations and towards more skill-intensive jobs in teaching and healthcare. Further, fathers also exhibit a shift away from manually intensive jobs towards more skill-intensive occupations. Interestingly, while we are unable to detect heterogeneity in effects on short term effects by baseline family income, we find that parents from higher income families exhibit larger effects over time, consistent with the idea that they may have been able to use the increased labor supply when their children were young to accumulate human capital and progress in their careers.

Next, we turn to children. With the exception of reducing dropout, childcare access does little to affect aggregate outcomes of treated cohorts exposed to childcare. However, these average estimates mask important heterogeneity between children growing up in different childhood environments. Access to public childcare reduces the association between family and child income percentile rank by 0.024 (18 percent of baseline). Additionally, we find that boys from poor families exposed to childcare are more likely to complete secondary education, and more likely to be employed when they are in their thirties. Broadly, the pattern of results for girls is similar to that for boys – with the exception that the effects on dropout are muted, and effects on tertiary completion are heightened. These results are robust to the inclusion of controls, regional trends, and alternative estimators. This pattern of divergent effects for children from rich and poor families is consistent with prior work

from various contexts (e.g. Havnes and Mogstad, 2015; Cornelissen et al., 2018; Ichino et al., 2019).

A common theory regarding how childcare shapes adult outcomes is that it has persistent effects on social skills (Deming, 2009; Heckman et al., 2013; Duncan et al., 2022). However, given the paucity of measures of social skills later in people's lives, little evidence exists to support this hypothesis. To make progress on understanding how childcare shapes long-term outcomes, we turn to exceptionally detailed data from the Finnish Defence Forces which provides detailed measures of adult skills for eighty percent of the male population. We augment this data on measures of skills with indices measuring the task content of people's jobs using data from O*NET as aggregated by Acemoglu and Autor (2011b) and Deming (2017). To both root our analysis in theory and facilitate interpretation, we aggregate our measures of skills to three constructs: one which measures social competence, a second which measures academic skills typically developed in school, and a third which measures visual-spatial skills – a major component of fluid intelligence. We then assess the plausibility that each of these candidate mechanisms explains the long-term effects of childcare.

As for labor market outcomes, our results show that public childcare levels the playing field in terms of skills. Access to public childcare considerably reduces the association between family income and both children's social and academic skills. We are unable to detect effects of public childcare on the association between family income and visual-spatial skills. Next, we study whether these effects are accompanied by changes in the types of jobs people do as adults. Our results suggest that access to public childcare shifts boys from poor families away from manually intensive jobs and towards jobs requiring a greater degree of social skills. The added benefit of the data on occupational tasks is that it is also available for females. Compared to boys, the results for girls exhibit a greater shift towards math (analytic) intensive jobs. These differences by gender may be explained by dynamic complementarities, and where public childcare prevented poor boys from dropping out, it helped girls from poor families continue to college.

To more directly assess the role of skills in explaining the effects of public childcare, we perform a decomposition-based approach to mediation following Imai et al. (2010) and Heckman et al. (2013). Results from this exercise show that the effects on social competence can explain at most up to 46 percent of the effects on intergenerational mobility in income, compared to 37 percent for academic skills, and 13 percent for visual-spatial skills. Importantly these results suggest that social skills are likely to play a role in explaining effects on income above and beyond academic skills or education. Together, these results —linking the effects of childcare on earnings, to effects on skills measured in adulthood—provide some of the first large-scale empirical support for the idea that the persistent effects of childcare on adult outcomes might operate through lasting effects on social skills.

The concomitant effects we observe on children and parents, and particularly mothers, suggest that the effects we see on children are likely to be explained by the quality of early childhood socialization in the absence of access to public childcare (Kline and Walters, 2016). The divergent

effects for children from rich and poor families can be explained by differences in parental attention in the absence of childcare. For example, prior research shows that more affluent mothers provide more attention to their children (Guryan et al., 2008; Falk et al., 2021). Additionally, in our context, it is possible that in some cases, in richer families public childcare substitutes the personalized and attentive care of a nanny with less focused adult attention. And, when parental attention is substituted for public childcare, the inputs shift from the attention of parents to not just attention from childcare teachers but also broader socialization with children from different types of families. To further probe the role of the quality of adult attention in explaining our results (e.g. Attanasio et al., 2020), we study heterogeneity in effects by birth-order. Existing research points to the first-born children receiving more attention from parents (Price, 2008; Black et al., 2018). We replicate the finding from Black et al. (2018) showing higher levels of skills amongst first-born children, and then show that access to public childcare lowers the first-born advantage – particularly in terms of social competence. The lack of alignment in the average effects for parents and children fits the results in Cesarini et al. (2016), who document a null effect of lottery windfalls and children's outcomes.

Finally, we bring together the life-cycle effects on parental labor supply and the (null) average effects on children to conduct an evaluation of the cost-effectiveness of the program based. Our results show that the program pays for itself, but that it takes more than thirty years for it to do so. Given that we observe effects through parents' retirement – something usually unavailable to researchers, we also assess the sensitivity of cost-effectiveness measures to estimates given shorter follow-up periods under the common assumption of constant effects. This counterfactual exercise suggests that, since effects on parental earnings increase through their late fifties, we would have under-estimated the cost-effectiveness and marginal value of public funds (MVPF) (Hendren and Sprung-Keyser, 2020) had we assumed constant effects over the life-cycle.

The first contribution this paper makes regards understanding the persistent role of skills in explaining the effects of childcare programs on children's outcomes. A voluminous literature studies the effects of childcare programs across national and temporal contexts – and shows that childhood programs have the potential to shape children's long-term outcomes in meaningful ways.[1] Our results add to this literature, providing new evidence that Finland's first national public childcare program had negligible average effects on children's outcomes, but reduced the persistence between family income and children's adult outcomes. Most importantly, we extend this literature by providing large-scale empirical evidence pointing to the role of social skills as a driver of these outcomes. These results lend empirical support for the hypothesis that behavioral or socio-emotional skills

[1] Evaluating public childcare programs continues to be an active area for research across several disciplines – and particularly in economics (e.g. Ludwig and Miller, 2007; Deming, 2009; Gupta and Simonsen, 2010; Havnes and Mogstad, 2011b; Carneiro and Ginja, 2014; Havnes and Mogstad, 2015; Kottelenberg and Lehrer, 2017; Cornelissen et al., 2018; Ichino et al., 2019; Pages et al., 2019; Bailey et al., 2021; Gray-Lobe et al., 2021; Barr and Gibbs, 2022; Humphries et al., 2025). See Baker (2011), Elango et al. (2016), or Duncan et al. (2022) for overviews of this literature.

drive the effects of childhood programs on long-term outcomes (Deming, 2009; Heckman et al., 2013; Bailey et al., 2017).

Existing research in economics and psychology provides a handful of estimates of the effects of childcare on detailed measures of socio-emotional skills measured in childhood (Weiland and Yoshikawa, 2013; Drange and Havnes, 2019; Ichino et al., 2019; Cappelen et al., 2020; Algan et al., 2022). However, in adulthood, effects on these skills are typically proxied by behavioral outcomes such as dropout, teenage pregnancy, and crime (Deming, 2009; Heckman et al., 2013). We draw on detailed measures of skills, measured upon conscription for nearly full Finnish cohorts of men, and show that childhood programs have the capacity to shape multiple dimensions of skills as measured in adulthood. Further, we show that effects on social competence – rather than academic skills or fluid intelligence – are most strongly tied to the effects of childcare on labor market outcomes. As the importance of social skills in the labor market continues to grow (Deming and Silliman, 2025; Woessmann, 2024), this result, linking effects on social skills to long-term outcomes, has implications beyond childcare programs. A number of recent papers have shown that interventions can affect the development of short-term social skills (e.g. Alan et al., 2019; Berger et al., 2020; Cappelen et al., 2020; Kosse et al., 2020; Sorrenti et al., 2020; Algan et al., 2022; Brown et al., 2022): our results provide a basis for optimism regarding the long-term effects of these programs. And, while speculative, our results suggest that one way which social mixing in childhood can influence adult outcomes (e.g. Chetty et al., 2022a,b) is through lasting effects on social skills linked to aspirations and motivation.

The second contribution we make relates to understanding the life-cycle payoffs of public childcare programs. With some exceptions, evaluations of the effects of public childcare programs on parental labor supply tend to find positive effects on maternal employment (e.g. Fitzpatrick, 2010; Havnes and Mogstad, 2011a; Cascio and Schanzenbach, 2013; Herbst, 2017; Morrissey, 2017; Andresen and Havnes, 2019; Carta and Rizzica, 2018; Bousselin, 2022; Humphries et al., 2025). Nonetheless, evaluating the overall cost-effectiveness of childcare programs requires understanding their temporal dynamics. For example, Hendren and Sprung-Keyser (2020) use a projection method to extrapolate policy effects over life-cycles by assuming constant earnings impacts beyond the period of observation. We compare estimates of cost-effectiveness based on the realized life-cycle effects of the program with those under the assumption of constant effects, and show that because the magnitude of earnings effects increase through the time parents are in their late fifties, the assumption of constant effects leads to an underestimate of the program's cost-effectiveness. These results underscore the importance of capturing the life-cycle dynamics in program evaluation, either through structural approaches which clarify the economic model underlying extrapolations over the life course, or data-driven approaches as in Athey et al. (2025).

1 Institutional context

The foundation for Finland's first national public childcare program was laid by the *Childcare Law* of 1973 (Law 36/1973).[2] After being in the works for nearly a quarter of a century (Alila et al., 2014), a proposal for a law concerning childcare was presented in parliament in 1972. With public childcare only available in cities, these legal proceedings emphasize the urgency of public support for childcare and highlight the "variability in quality and uneven geographic distribution of childcare" (Valtiopaivat 1972). Perhaps most importantly, both the parliamentary proceedings themselves as well as commentary from the time period (Hulkko, 1971) suggest that the increasing labor market participation of women was an important factor behind the newfound support for public childcare. In parliament, advocates of the new law cited demographic and cultural changes that resulted in the demand for childcare had far outstripped the supply: "employment rates of the mothers of young children have increased. The economic and demographic changes, as well as the increased time spent in education, have increased the demand for childcare" (Valtiopaivat 1972). Following decades of political gridlock, the law was just barely passed in parliament following an extended sitting.

The law was implemented quickly and on April 1st, 1973 the *Childcare Law* (Law 36/1973) made the provision of childcare a universal right, unified concepts surrounding childcare, and provided a transparent and simple mechanism for the government funding of childcare. To facilitate the expansion of public childcare, the national government agreed to provide funding for the fixed costs of establishing childcare centers and cover up to 80% of the annual costs, depending on the municipality's ability to pay. Given the enormous cost and time required to train qualified staff to supply the estimated 100,000-120,000 spots demanded, the government planned to grow childcare coverage by 5,000 annually until the year 1990 (Valtiopaivat 1972).

As shown in Figure 1a, the number of government funded daycare spots grows at almost exactly the planned rate of 5,000 a year after 1973. While there was some subsidized childcare in cities prior to 1973, the law made public childcare available in rural areas for the first time (Figure 1b). Given that these rural areas are where the expansion of childcare grew most, rural municipalities are the focus of this paper. Based on the digitized documents detailing childcare provision after the roll-out of the policy, the average cost of public childcare was around 4,000 euros in today's currency,

[2]The seeds of childcare provision in Finland were planted in 1919 under the auspices of social services, and by the 1920's and 1930's the first laws formalizing the government role came into place. In 1922, the *Poverty-care Law* (Law 145/1922) provided a legal basis for national support for childcare–but primarily for those with special needs or disabilities (Alila et al., 2014). As Alila et al. (2014) describe, this law provided support primarily for children that were mentally disabled, blind, deaf, or physically disabled. Still focused on children with special needs and disabilities, the *National Childcare Funding Law* of 1927 (Law 296/1927) provided government funding to individual childcare centers through application on the basis of demonstrated need. And, in 1936, the *Child-protection Law* (Law 80/1936) stipulated that municipalities must make efforts to supply childcare or support private childcare provision for children growing up in poverty or in unsafe home environments. Political gridlock made it impossible to make progress on childcare for the next four decades.

with families paying about 14 percent of the total cost (Association for Finnish Municipalities, 1974-1983).

Public childcare centers operated for ten months a year, and some of these centers had both half and full day care available, with some even providing free lunch. The concepts surrounding quality in early childhood education and care directly were still developing in 1973. For example, maximum group-size was capped at twenty – twice the teacher to student ratio in Finland today, and equivalent to countries like Brazil (OECD, 2021).[3] And, as there was not yet formal childcare training for teachers, the actual pedagogy these childcare centers employed in these early years was of likely of considerably inferior quality compared to modern childcare today. In large part, these public childcare centers were a place for parents – notably mothers – to put their children while they themselves worked. As such, the socialization between the children themselves was likely a crucial input of public childcare at this time.

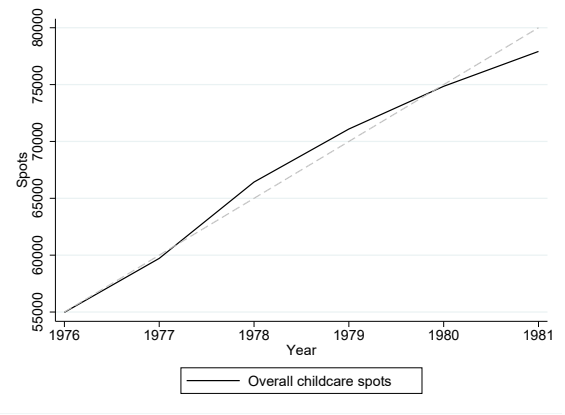
Prior to 1973, some urban municipalities had developed public childcare infrastructure, but families outside urban areas had little access to childcare. In these areas, childcare was provided primarily by mothers as well as a patchwork of informal and private services, though even these informal options were mostly unavailable. In affluent families, it was not uncommon for children to be taken care of by nannies.

After its birth, the next major period of childcare reform took place between the years 1984-1996. This wave of childcare reform in Finland in 1983 more explicitly emphasized the shift from social care to child development and education (Alila et al., 2014). During these years, childcare became a subjective right, first for children under the age of three (1990), and then for all children not yet in school (1996) (Alila et al., 2014). Further securing its position as a universal right integral to the operation of the Finnish welfare state, the legal basis for both home-care and private-care became linked to the *Childcare Law* of 1990. Today, the effects of public childcare access in Finland remains hotly debated by academics and policy-makers (Erola, 2018; Erola et al., 2020). This debate emerged after a pair of papers found participation in public childcare to be associated with positive outcomes (Karhula et al., 2017; Hiilamo et al., 2018) while another paper found there to be no association between learning outcomes and childcare participation (Saarinen et al., 2019). However, as one of the authors of these studies themselves notes, a potential reason for the discrepancies in these results is that these studies lack experimental or quasi-experimental designs (Erola, 2018).

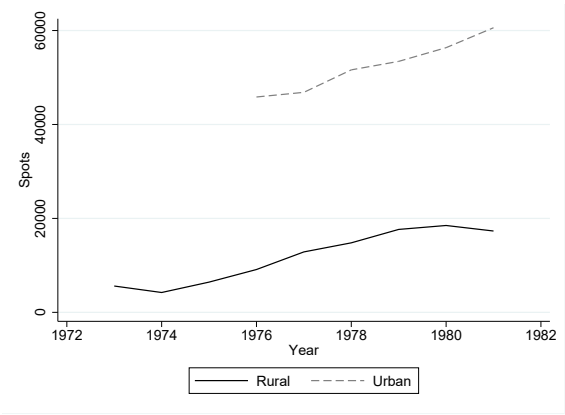
[3]Given its roots in social services, it was only in this period that the potential importance of childcare for child development was beginning to be acknowledged: a publication from the Finnish Population and Family Welfare League argues that "the work implies participation in productive activity, since it constitutes the production of coming labor power" (Hulkko, 1971). In 1980, the first year that we can accurately locate childcare teachers in the census, we see that childcare teachers in this period were primarily young married women, often with childcare-age kids themselves (Appendix Table A.1). Most of these women had completed some post-secondary education. For the latest cohorts in our sample, non-subsidized childcare options began to become available even outside municipalities that received public funding for childcare (in our comparison group).

Figure 1: The Expansion of Public childcare, 1973-1981

(a) New childcare spots



(b) Urban and rural municipalities



Notes: These figures show data on the growth in public childcare spots following the *Childcare Law* of 1973. Figure (a) shows that the annual increase in childcare spots in the data corresponds to almost exactly 5,000 spots annually (scenario in gray) – the target number in the parliamentary proceedings from 1972. These years (1976-1981) are the only years that public childcare data is available for all municipalities (urban and rural). Figure (b) shows the annual number of public childcare spots by urban and rural status. Prior to 1973 there was almost no public childcare available in rural areas. This set of municipalities is the focus of our paper.

2 Data and measurement

We link newly digitized data on the availability of public childcare annually in each municipality to several administrative registers from Statistics Finland, data on measures of personality and skills from the Finnish Defence Forces for the male population, and occupational characteristics from O*NET. We use these data to examine the effects of access to public childcare on parental labor supply and children's outcomes. In this section we describe the newly digitized data on childcare availability, the data we use to build the samples to study both parents' and children's outcomes, and the data from the Finnish Defence Forces we use to construct measures of skills.

2.1 Childcare availability

We begin with municipal-level data on public childcare. After the passing of the *Childcare Law of 1973*, data on childcare provision was collected for administrative use by the research and planning division of the Association for Finnish Municipalities and reported in their annual reports on social spending and services for the years 1973-1981 (Association for Finnish Municipalities, 1974; 1975; 1976; 1977; 1978; 1979; 1980; 1981; 1982). After the year 1981 the statistics are no longer reported in a consistent format that would allow for year to year comparisons. We transcribed these manually

from reports located at the archives of Statistics Finland. These reports include statistics on the number of spots for children three to six years old in municipal childcare centers. This data also contains some information on the total cost of childcare, and the extent of public funding for it.

Encouragingly, the digitized data lines up almost one-to-one with the pre-policy promise of 5,000 spots annually – suggesting that the data is not missing in its coverage. A further implication of the alignment between the pre-policy promise is that the roll-out of the policy was constrained by resources, making it more credible that the timing was exogenous. Since the administrative unit in the early seventies was different for municipalities classified as urban and rural, these data do not include urban municipalities for the years 1973-1975 (See Figure 1b).

While the data on public childcare availability provides only limited insight into the black-box of childcare provision, we augment this data with occupation data from Statistics Finland, (2021c). This data contains detailed information on occupations and places of work, allowing us to identify childcare professionals in census data. Unfortunately, these professionals are only identified for the year 1980, and we cannot differentiate between professional childcare providers working in public and private childcare centers or less formal family-run childcare centers.

2.2 Parent sample

Our main sample of parents is restricted to all parents whose youngest child is born in the cohorts 1962-1976. As described by Havnes and Mogstad (2011a), this ensures that parents do not have to take care of a younger child once a child is eligible for public childcare.

For parental earnings, we use population registry data for years 1988-2020 (Statistics Finland, 2021c) and census data for years 1971, 1975, 1980, 1985 (Statistics Finland, 2021b). Our measure of labor income is the sum of wage income and self-employment income. We also measure wage income and self-employment income separately.

We define the outcomes based on either parent's own age or the age of the youngest child. For the short-term outcomes, we use child's age in the outcome definitions. Because we use census data that is not available for all years, we use age-ranges in defining outcomes. We calculate parental earnings when their youngest child was either 3-9, 10-14 or 15-19 years old.

The first category, ages 3-9, can be understood as being "childcare-aged" as, apart from the very earliest – untreated – cohorts, parental incomes are measures when children are aged 3-6. This means that we use 1971 earnings information for cohorts 1962-1968, 1975 earnings for cohorts 1969-1972 and 1980 earnings for cohorts 1973-1976. For the other income measures, in which the child is either age 10-14 or 15-19, we use all the available income observations in this age-range and calculate the average income.

Because of a 1976 reform which shifted taxation from joint spousal earnings to individual

earnings, we cannot distinguish which parent received self-employment income in 1971 and 1975 (Mäkinen, 2025). Nonetheless, we can distinguish between mothers' and fathers' wage-income. Consequently, for the short-term outcomes, we rely on family income, which is the sum of parental earnings. From 1980 census onward, we can reliably distinguish changes in self-employment income separately for mothers and fathers and therefore we report estimates separately for the longer-term outcomes. In our later calculations of the marginal value of public funds we estimate maternal earnings in the early years based on the share of family income they earn in later years. We define that a person is full-time employed if her labor income (sum of wage and self-employment income) exceeds 40 percent of median labor income for the working-age population (age 20-60).

We use information on the sector of employment in classifying whether a person worked in agriculture and forestry, manufacturing and construction, health or education or in other sectors. We define occupation income rank as the mean income rank of all people working in the occupation, and within occupation rank as the rank amongst all people within that occupation –both ranked from zero to one. We classify the task content of parent's occupations between the ages of 50-55 using data from O*NET, as aggregated by Deming (2017) and Acemoglu and Autor (2011b) and ranked from zero to one. To reduce measurement error, we construct these measures with data when the parent is between ages 50 and 55.

We define marriage outcomes similarly as labor market outcomes, by youngest child's age, using information on marital status. For fertility, we use information on the number of older siblings, measuring selection into having a child.

2.3 Child sample

We link municipality-by-year data on childcare access for three to six year old children to individual data on the birth cohorts 1962-1976. Data from Statistics Finland's FOLK database details each child's gender as well as their year and municipality of birth (from Statistics Finland, 2021c). We then merge this data to a register containing parent-child links to identify the fathers and mothers of all individuals, and create measures of family composition (Statistics Finland, 2021c). Population-wide censuses from 1970-1985 contain data on parental education and income (Statistics Finland, 2021b). We form measures of family income rank based on cohorts from their childrens' birth year based on the full (not estimation) sample. As opposed to some other measures of family income rank which average family income through several years of childhood (Pekkarinen et al., 2017), we only include income measured prior to the reform, meaning that our measure likely contains more measurement error. Still, as noted by Kitagawa et al. (2018), rank based measures of mobility are subject to less problems than, for example, log-based measures.

National degree registries (Statistics Finland, 2021a) provide us information on educational

attainment for everyone in our sample. We construct simple binary measures of secondary school dropout, secondary-school completion, and tertiary completion. We use the FOLK databases to generate annual measures of cohort income rank and employment. To measure income, we form a measure of mean cohort income rank (ranging from 0-1) of incomes between the ages of 35 and 40 – typically a good proxy for lifetime income (Bhuller et al., 2017). To measure employment, we take the mean years of employment between thirty and forty (0-10). We create a measure for whether each person in our data is observed married at any point by the time they reach forty.

An exceptionally large and detailed data-set from the Finnish Defence Forces documents various dimensions of skills for everyone entering the military (Finnish Defence Forces, 2021). Due to national conscription for all male citizens, these measures—collected at age nineteen—are available for eighty percent of males from the cohorts we study. Our binary measure – "Military service" – measures whether such skill data exists for each individual. These data were collected upon conscription using testing instruments designed by psychologists that remained the same for all cohorts we study. This test includes three dimensions of cognitive skills—arithmetic, verbal reasoning, and visual-spatial skills—as well as several dimensions of socio-emotional skills including activity energy, achievement striving, deliberation, dutifulness, leadership motivation, self-confidence, and sociability. We standardize all test scores to have a mean of zero and a standard deviation of one for the cohort born in 1967, and anchor all other cohorts to this year. See Appendix Section A.3, Nyman et al. (2007), or Jokela et al. (2017) for more detailed overviews of this data. We report results for each of these outcomes in the appendix of the paper, but focus on a set of constructs motivated by the literature on child development and economics. Although these measures are taken at age nineteen – still early in adulthood – these types of skills are understood to be relatively stable through later adulthood (Cobb-Clark and Schurer, 2012).

Task intensity measures from Deming (2017) allow us to measure the extent to which individuals in our study end up in jobs using social skills and math, and whether occupations are service jobs. Task indices are scaled 0-1, such that 1 is given to the occupation that ranks most highly in task use. We also include a measure of how manual an occupation is (the mean of "non-routine manual physical" and "routine manual") from Acemoglu and Autor (2011a), re-scaled in a comparable way. We merge these data to four digit ISCO occupation codes for when individuals in our sample are in their late thirties.[4]

2.4 Measuring skills using data from the Finnish Defence Forces

Economists have argued that early childhood programs shape long term outcomes primary through social – as opposed to cognitive – skills (Deming, 2009; Chetty et al., 2011; Heckman et al., 2013).

[4]For prior work linking O*NET task measures to Finnish occupations using four digit ISCO codes, see Silliman and Virtanen (2022) who classify jobs based on Acemoglu and Autor (2011a).

Empirical studies report a pattern of results where childcare programs have positive effects on early measures of both learning outcomes and behavioral skills, exhibit no effects on later measures of achievement, but improve long-term economic outcomes (Heckman and Rubinstein, 2001; Gibbs et al., 2011).

Understanding how early childhood programs shape people's later behavior has also been a central goal of research in psychology. Psychologists understand a child's socialization both at home and in childcare, to play an important role in this process (Clausen, 1966; Baumrind, 1967). Waters and Sroufe (1983) argue that *social competence* – the ability to recruit personal and interpersonal resources in the context of goal achievement – is the central organizing construct of early childhood. Since then, social competence has been an important organizing concept in early childhood research (Dodge et al., 1986; Rose-Krasnor, 1997; Bost et al., 1998; Campbell et al., 2000; Denham et al., 2003; Ladd, 2005; Vaughn et al., 2009). Vaughn et al. (2009) describe that social competence consists of three parts: i) behavioral and cognitive skills for successful goal achievement in social contexts; ii) the ability to discover the goals of interactive peers; iii) the understanding of a child's relative value as a preferred playmate. Gunderson et al. (2013) describe one nice example of how such skills might develop, focusing on how parental praise can lead to persistent improvements in the self-confidence and motivation of young children. In its emphasis on achievement striving and motivation, social competence has strong conceptual links to well known psychological concepts outside child development, including growth mindset (Dweck, 2006), grit or perseverance, and passion for long-term goals (Duckworth et al., 2007). However, social competence is less associated with socio-emotional skills linked to introversion or conscientiousness.

To root our empirical analysis in theory, we aggregate our measures of skills to three constructs: one which measures social competence, a second which measures academic skills typically developed in school, and a third which measures visual-spatial skills – a major component of fluid intelligence. Following Lau (2025), we construct indices of these measures as simple standardized averages, rather than using principle component or factor analysis. To ease interpretation, we standardize this measure to have a mean of zero and a standard deviation of one. While these are the primary constructs we study, we complement these by reporting results for raw measures from the Finnish Defence Forces data in the Appendix.

Social competence. The measures from the Finnish Defence Forces that map most closely to the concept of social competence are achievement striving, leadership motivation, and self-confidence.[5] We take the average of each child's standardized score across these measures to define their social

[5]Sociability, another measure collected by the Finnish Defence Forces, measures a person's gregariousness and preference for socialization. This measure has little information on how well a person navigates social situations in the context of goal achievement. As such, it is not included in our measure of social competence. However, adding it to the measure of social skills does not affect our results, and we report estimates for all individual concepts separately in the Appendix.

competence. This measure is intended to gauge the hypothesis from developmental psychology and economics that the social competences developed in early childhood may explain the effects of public childcare on long-term outcomes (Waters and Sroufe, 1983; Deming, 2009).

Academic skills. Similarly, we create a blanket measure of academic skills by taking the mean of each child's arithmetic and verbal scores. While public childcare in 1970's Finland did not have an overt emphasis on academic learning, this skill is included to test the hypothesis that, through dynamic complementarity, public childcare may shape long-term outcomes by facilitating academic learning (Heckman et al., 2013; García et al., 2021).

Visual-spatial skills. To test the hypothesis that childcare might not affect intelligence unrelated to academic learning, we include the measure of visual-spatial skills from the Finnish Defence Forces. This measures fluid intelligence similar to Raven's matrices. We use this measure to see if the fadeout of cognitive skills affected by childcare may be explained by the fact that the effects on fluid intelligence remain small and potentially unrelated to long term outcomes (Deming, 2009; Chetty et al., 2011; Heckman et al., 2013).

We present correlations between these three measures and adult income rank in Table 1. This table shows that all three concepts exhibit positive correlations of roughly similar magnitudes with adult income rank. Nonetheless the correlations show that adult income rank is most correlated with academic skills ($\rho = 0.300$), and least correlated with social competence ($\rho = 0.256$). Interestingly, academic skills show a correlation of nearly 0.7 with visual-spatial skills, and a correlation of only 0.4 with social competence. We also examine the relationship between skills, measured at age 19, with occupational task content measured between the ages of 35 and 40 using data from O*NET. These correlations show that social competence is most strongly linked to social skill intensive jobs, and academic skills are most strongly related to math-intensive jobs (Table A.2). Correlations of tasks with income further highlight the potential importance of occupational sorting by task content in explaining on earnings differences between people (Table A.3). These results provide evidence of alignment between both the measures from the Finnish Defence Forces and O*NET, cross-validating the use of both measures.

The conceptual framework relating skill childcare, skill development, and labor market outcomes is laid out more thoroughly in Appendix Section A.4-A.5, and the ways in which public childcare may affect children from different families is described in Figure A.1.

Table 1: Correlations between skills (age 19) and adult income rank (ages 35-40)

	Income rank	Visual-spatial	Academic	Social competence
Income rank	1.000			
Visual-spatial	0.283	1.000		
Academic	0.300	0.693	1.000	
Social competence	0.256	0.365	0.422	1.000

Notes: This table is based on the estimation sample, and reports the correlations of our three primary skill outcomes with adult income rank, measured between the ages 35 and 40.

3 Evaluating the effects of access to public childcare

In this section we outline the empirical strategy we use to evaluate the effects of Finland's first national public childcare program. After presenting our approach, we assess the internal validity of our design, and compare our estimation sample to the broader population to gauge the potential generalizability of our results.

3.1 Empirical approach

The primary challenge in estimating the effects of access to childcare on later life outcomes is that municipalities that offer access to childcare may be different from municipalities that do not (childcare investments are *endogenously determined*). For example, while urban areas tend to have much greater access to childcare than rural areas, families living in urban areas differ from rural families in numerous ways, and growing up in a densely populated city might affect a child's trajectories through life through more channels than simply access to childcare.

We focus on changes in the geography of public childcare availability in the years immediately after the *Childcare Law of 1973*, a law that passed suddenly after decades of political gridlock. As a result of the *Childcare Law of 1973*, the government provided resources to fund 5,000 new childcare spots a year, so that by the 1990's, all children in Finland aged 3-6 would have access to public childcare—irrespective of the municipality in which they were born. However, for the initial years after 1973, childcare access was constrained by resources, such that some children in some rural municipalities had access to childcare while others did not. This change in the geographic availability of public childcare based on the swift passage of the *Childcare Law* provides us with the basis for our empirical strategy.

We use this change in childcare access to estimate the effects of childcare on parents and children using parallel differences-in-differences strategies. For parents, we estimate the effects of access to public childcare by studying the shift in parental outcomes based on their youngest child's year and municipality of birth.[6] Similarly, for children, we compare the adult outcomes of cohorts who are differentially exposed to public childcare access based on their birth-year and municipality of birth.

In our main analysis we consider the first municipalities to receive access to public childcare after the policy to be our treatment group, and compare their outcomes to the set of municipalities that remains untreated for the entire duration we study. This simple binary two-by-two differences-in-differences approach alleviates potential concerns arising from staggered designs (Goodman-Bacon, 2018) and complications arising from continuous treatment measures (Callaway et al., 2021).

Regardless of the rural municipality they were born in, members of the 1962 cohort had no access to public childcare. As a result of the 1973 *Childcare Law*, children born in the set of treatment municipalities in 1970 or later could access public childcare for the full period between the ages of 3-6. Those born between the years 1967-1979 might have been able to attend public childcare for at most a portion of this period (phase-in period), but the extent of their enrollment is at most minimal, and would have been limited to later ages. Figure 2a shows childcare availability by birth cohort in treatment and comparison municipalities. As shown in Figure 2b, the roll-out of childcare spots does not follow simple regional geography – both treated and comparison municipalities are distributed across the country. Just a few years after the introduction of the policy, upwards of thirty-five percent of children aged 3-6 were attending public childcare in treated municipalities, while no-one was attending public childcare in comparison municipalities.

Average treatment effects. We estimate the average effects of access to public childcare using the following specification:

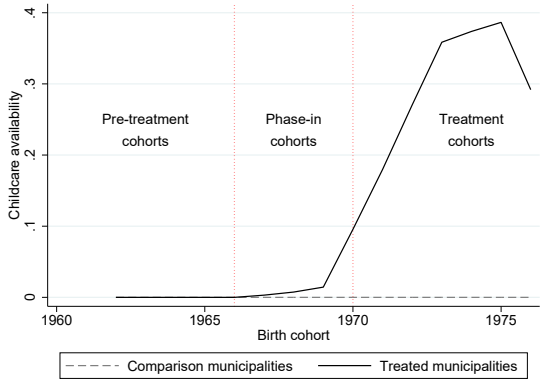
$$Y_{imc} = \beta(FIRST_m \times POST_c) + \pi_m + \gamma_c + e_i \tag{1}$$

In the above equation, we regress individual (i) outcomes (Y) in municipality m and cohort c on an indicator variable for whether or not the municipality belonged to the first set of municipalities covered by the 1973 policy ($FIRST$), and whether the child was aged 3 years old in the period after the policy was implemented ($POST$) (cohorts are born between 1970 and 1976). We account for consistent differences between children born in different municipalities (π_m) and cohorts (γ_c). Since cohorts born between 1967 and 1969 were already four, five, and six when the policy was implemented, they may have been exposed to treatment, but to a lesser extent. Results for these cohorts will be reported in our event-study estimates, but for simplicity, we exclude these cohorts from our estimation sample when running difference-in-differences estimates. Standard errors are

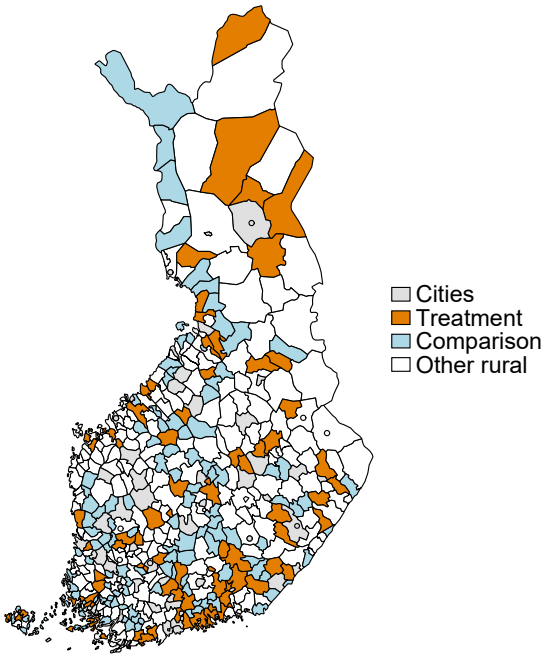
[6]Parents are anchored to the birth year of their last child, since if parents have later children – it is unlikely that they will enter the labor force directly after the older child is eligible (e.g. Havnes and Mogstad, 2011a).

Figure 2: Availability of public childcare in treatment and comparison municipalities

(a) Places per cohort



(b) Geography of public childcare



Notes: Figure (a) reports the availability of childcare spots compared to the number of three to six year olds in birth-cohorts in treated (N=89) and comparison (N=140) municipalities. Figure (b) shows the geographic distribution of treatment (orange) and comparison (blue) municipalities. In addition to the municipalities in our estimation sample, rural municipalities that were in the process of expanding childcare amidst our period of study are shown in white and urban municipalities are shown in gray.

clustered by individual in all our analysis (Abadie et al., 2023).

The coefficient of interest, β, is our difference-in-differences estimate of the effects of access to public childcare on outcome Y. The first difference measures the extent to which the outcomes of post-period cohorts vary from prior cohorts within their own municipalities. The second difference measures the extent that this within municipality variation differs between treated and comparison municipalities.

When we extend this estimation strategy to parental labor supply, we define parents by the birth-year of their youngest child. This is standard in the literature on parental labor supply – as anchoring parents based on their older children would result in parents potentially entering the labor market at different times based on whether or not they have later children. Additionally, to improve the comparability of parents of different ages, we include fixed effects for parents years of birth.

We also adapt the above specification to produce annual estimates of differences in outcomes between the first set of municipalities to receive access to public childcare and our set of comparison municipalities. This event-study specification is estimated by the following equation:

$$Y_{imc} = \sum_{c=1962}^{1976} \beta_c \Big(\mathbf{1}[c_i = c] \times FIRST_m \Big) + \pi_m + \gamma_c + \epsilon_i \tag{2}$$

The term β_c measures the extent to which the outcomes between the treatment and comparison sets of municipalities differ in outcomes in each year before and after the policy, taking into account initial differences in outcomes as well as annual variation in outcomes affecting both treatment and comparison municipalities.

Heterogeneity by family income. Building from prior research suggesting that the effects of public childcare may vary significantly by family background (e.g. Havnes and Mogstad, 2011b; Ichino et al., 2019), we modify our main specification to allow us to study heterogeneity in the effects of public childcare by family income.

We estimate heterogeneity in the effects of public childcare by family income as follows:

$$Y_{imc} = \beta_1 (FIRST_m \times POST_c) + \beta_2 (FIRST_m \times POST_c \times FINC_i) \tag{3}$$

$$+\theta_1 FINC_i + \theta_2 (FIRST_m \times FINC_i) + \theta_3 (POST_c \times FINC_i) + \pi_m + \gamma_c + e_{imc}$$

The above equation follows Equation 1, but includes an additional term ($FINC_i$) – which measures family income rank (0-1), which is interacted with treatment status. Additionally, to allow the association between family income and children's outcomes to vary over time, and municipality, we include family income alone, as well as interactions between family income and the post-period, and the first set of municipalities to expand childcare access. The parameter of interest in this specification is β_2, which measures the change in the association between family income rank and a

children's outcome (Y) resulting from access to public childcare.

In further specifications, we estimate versions of this model that include a vector of covariates, regional trends, and a triple-differences strategy – interacting municipality and cohort fixed effects. We also re-estimate the model, defining treatment as a continuous measure of the share of children aged three to six for whom there are places in public childcare.

To test for whether parallel trends hold for children of different types of families, we also modify our event-study model (Equation 2) as follows:

$$Y_{imcg} = \sum_{g=1}^{G} \sum_{c=1962}^{1976} \beta_{cgm}\Big(\mathbf{1}[g_i = g] \times \mathbf{1}[c_i = c] \times FIRST_m\Big) + \tag{4}$$

$$\sum_{g=1}^{G} \sum_{c=1962}^{1976} \beta_{cg}\Big(\mathbf{1}[g_i = g] \times \mathbf{1}[c_i = c]\Big) + \sum_{g=1}^{G} \beta_{gm}\Big(\mathbf{1}[g_i = g] \times FIRST_m) + \epsilon_{imcg}$$

The above equation produces one coefficient for each cohort (c) for each family-income group (g). This allows us to plot event-study pictures for different types of families. In our main event-study estimates, we estimate this for two groups of families – by simply splitting the groups into children from families who are in th bottom half of the family income distribution and those in the top half of the family income distribution.

Additionally, we complement this version of the event-study with a corresponding version based on the continuous measure of family income. There are tradeoffs to each, the version with discrete family income groups is clear to interpret, but disregards differences in the relative weights and precise position of family income within these broad groups. Instead, while the event study with family income coded as a continuous variable more closely corresponds to the main point estimates, it is more parametric regarding the relationship between family income and the treatment effects.

3.2 Internal validity and comparison of sample to broader population

Before examining the effects of public childcare, we assess the internal validity of our empirical design, and compare our estimation sample to the broader population.

Internal validity. The interpretation of the coefficients of interest as reflecting the causal effects of public childcare access rests on the assumption that, in the absence of public childcare, the outcomes of treated and comparison municipalities would have developed in a parallel manner. The key threats to identification would be if the set of municipalities which first accessed public childcare were on a divergent path from the set of municipalities which were treated later. This could have happened due to divergent patterns of migration or industrialization.

While we cannot observe what would have occurred in the absence of the policy – the identifying

assumption does provide testable implications. Before turning to empirical tests of our approach, we note a key institutional detail which lends credibility to our approach. Namely, while the idea of expanding public childcare was mulled over for decades, the *Childcare law of 1973* was passed suddenly and swiftly, such that the precise timing was unexpected. Moreover, as the policy expanded childcare to children aged 3-6 – this meant that the first cohorts of children exposed to public childcare were already born before there was knowledge of the policy, let alone the geography of its expansion. As we link children to municipalities based on their birth cohort, this rules out endogenous migration based on the policy – at least for the first several cohorts.

To empirically test for whether there may have been a shift in the composition of the populations of treated and comparison municipalities which could have coincided with the expansion of public childcare, we use Equation 1 to test for balance in terms of the observable characteristics of children and their parents. Table A.4 reports estimates of balance across children's observable family background characteristics. Since we estimate the effects of public childcare on parental labor supply require different sample restrictions, we present additional tests for balance in the parent samples (Table A.5).[7] There are a handful of statistically significant estimates – namely on parental education, but these do not show a systematic pattern, and the magnitudes of these point estimates are small. To more closely examine how such imbalances might bias our estimates, we plot event-study estimates of a joint-index of these characteristics using Equation 2. Figure A.2 suggests that these slight imbalances do not coincide with the policy or the later patterns of treatment effects we do observe, and that they are likely too small to explain any meaningful shifts in children's outcomes.

To test for whether treatment and comparison municipalities appear to be on divergent trajectories already prior to the expansion of childcare, we study pre-period trends in outcomes through event-study plots for all outcomes we study. Event-study plots for dozens of outcomes of parents (Figures A.3-A.9), children (Figures A.11-A.14), and sub-samples of children based on family income (Figures A.15-A.14), show no signs of systematic divergence in the trends prior to the expansion of childcare.

Together, the details regarding the timing of the roll-out, the balance in background characteristics, and pre-period trends in outcomes all support interpreting the results generated by our empirical design as stemming from the causal effects of access to public childcare.

Comparing the estimation sample to the broader population. To understand how our estimation sample compares to the broader population, we study compare the outcomes of children and parents to the broader population (Tables A.6-A.7). The *Childcare Law of 1973* expanded public

[7] A further point warranting discussion is that even if were to find evidence of imbalance in family characteristics – this would not necessarily invalidate our empirical design, but simply suggest that the results should be interpreted in a different light: public childcare access could change the types of families which select into having children. While there is little evidence for this in our data, such a mechanism would offer one way that public childcare could shift the outcomes of later cohorts.

childcare to rural areas, which are the focus of our study. In these rural areas, children tend to come from slightly poorer families with less education, and have slightly more siblings. Their parents are much more likely to work in agriculture or be self-employed, and reside in the same municipality as their grandparents. Nonetheless, as shown in Figure 1a, the rural municipalities in our estimation are geographically distributed across the country.

Although it is impossible to predict exactly how estimates from our setting would translate to other settings, we use the simple conceptual framework illustrated in Figure A.1 to guide our hypotheses of how public childcare might influence children in different settings. This figure highlights that the effects of public childcare depend on the quality of the public option, but also the quality of the counterfactual childhood environment. As children in our estimation sample tend to come from less resourced families than the general population – the effects in our setting may be more positive than in the full population. Nonetheless, as childcare centers in cities may be better resourced or have access to higher quality childcare teachers, the quality of the public option may also be better in these settings. This makes it ambiguous as to whether our results might extend to cities. Nonetheless, the prediction from the framework that childcare can level the playing field for children from more and less resourced families is likely to hold across contexts.

4 The effects of public childcare on parental outcomes

The primary motivation for the long-term effects of Finland's first national public childcare program, established by the Childcare Law of 1973, was to increase maternal labor market participation. Therein, we begin our evaluation of the program by reporting the results on parental labor supply.

Effects on parental labor supply. We start by plotting the evolution of mean differences in family income by birth cohort across treatment and comparison municipalities (Figure 3a). The outcome in this plot is total family income – across mothers and fathers – when children are childcare age. We focus on total family income in this first figure since it was only in 1976 that a policy change shifted taxation from being joint rather than separate for mothers and fathers. As such, in early years in our data, we are not able to accurately differentiate between mothers' and fathers' incomes.

Figure 3a shows that prior to the introduction of public childcare, family incomes in treatment and comparison municipalities progressed in a parallel manner across cohorts. After the introduction of public childcare, family income in municipalities that gained access to public childcare quickly rose by 1,141 euros – equivalent to 3.6 percent of the baseline mean (Table A.9 and Figure A.3). The magnitude of these effects increase in both absolute and relative terms as children grow older. By the time children are in their late teenage years, families with access to public childcare when their children were young earn a total of 2,078 euros (5.3 percent of baseline) more than those in the

comparison group.

As we shift to measuring income in later data-sets – we are able to accurately distinguish between mothers' and fathers' earnings. Figure 3b plots mothers income at ages 50-55 by birth cohort. The figure provides strong evidence of maternal income in treatment and comparison municipalities progressing in a parallel manner prior to treatment. By their fifties, mothers of treated cohorts experience an increase in earnings of 1,392 euros (9.2 percent of baseline) (Tables A.10-A.11). Perhaps surprisingly, we see a similar pattern for fathers – suggesting that fathers, too, were able to increase their labor supply as a result of public childcare (Figure 3c). While the estimates are of roughly the same absolute magnitude for fathers as for mothers, the relative size of the effect is smaller for fathers (6.0 percent of baseline). Although it may be somewhat surprising to see effects on fathers, this is not an altogether new finding, as Humphries et al. (2025) document a similar pattern of results.

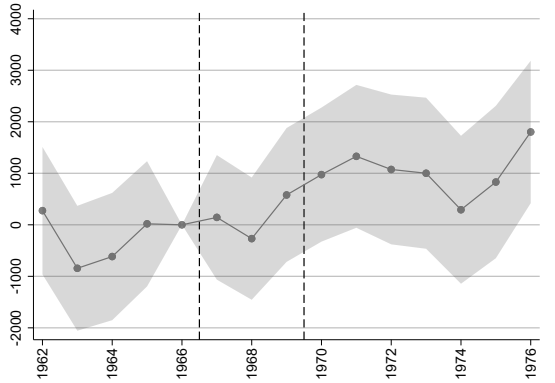
Next, we plot our difference-in-differences estimates of public childcare on parental labor supply through retirement (Figure 3d-e). Given that we are not able to accurately distinguish between mothers and fathers earnings when children are younger, and because parents have children at different ages – we begin our reporting of these life-cycle estimates when parents are aged 50. These age-profiles provide new evidence on the temporal dynamics of effects of early childhood policies on parental labor supply showing that the contours of the effects vary over the life-cycle and that public childcare when children are young has persistent effects on parental incomes through retirement.

Understanding the effects on mothers and fathers. Next, we try to better understand these effects on parental labor supply. For both fathers and mothers, we find that these increases in earnings stem from increased wage employment – rather than increased self-employment income, for example on the family farm (Table A.11 and Figures A.4-A.9). For mothers, we see a shift away from manufacturing and towards jobs in education and healthcare. As we see in Table A.12, this shifts women away from manual skill-intensive jobs to those requiring higher levels of math or analytic skills. For fathers, we observe a similar shift away from jobs in agriculture reliant on manual labor to more skill-intensive jobs in other sectors.

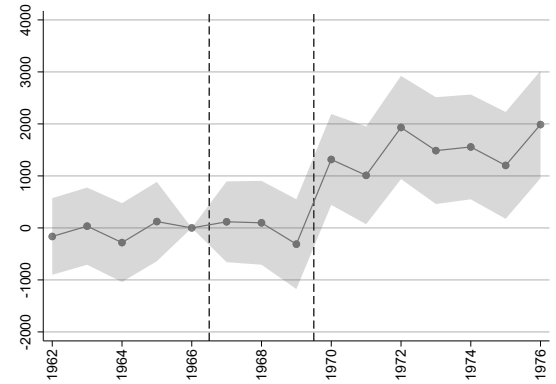
We are unable to detect a clear differences in the effects on parental labor supply for rich and poor families when children are childcare aged (Table A.13). Nonetheless, we do see that parents from higher income families experience greater increases in earnings over the life-cycle. This could be the case if increases in labor supply early in parents' careers allowed for human capital accumulation and career development as in (e.g. Mincer, 1974; Kleven et al., 2019; Adda and Dustmann, 2023; Deming, 2023; Silliman and Willén, 2025).

Figure 3: Effects of public childcare on parental earnings

(a) Family income, childcare age

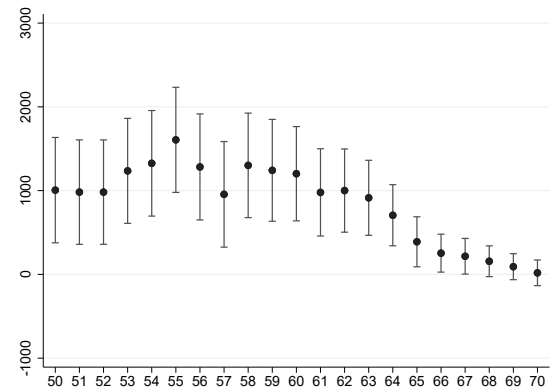


(b) Mother's mean annual income at age 50-55

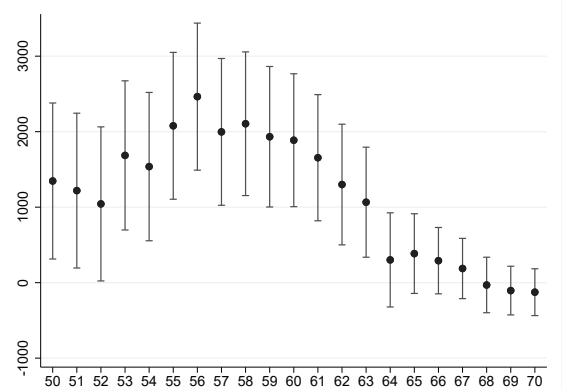


(c) Father's mean annual income at age 50-55

(d) Effects on mother's income over the life-cycle



(e) Effects on father's income over the life-cycle



Notes: Figures (a)-(c) show event study estimates of the effects of public childcare access – based on children's birth year – on parental labor supply following the specification in Equation 2. Figure (a) presents event-study estimates of the effects on total family income when the youngest child in a family is childcare-aged. Figures (b) and (c) report estimates on mean annual earnings between the ages of 50 and 55 separately for mothers and fathers. Figures (d) and (e) present estimates of the effects of public childcare access when children were childcare aged on the earnings of mothers and fathers from age 50 to age 70. Corresponding differences-in-differences estimates are reported in Tables A.9-A.11.

Effects on family outcomes. Finally, we examine the effects of public childcare on family outcomes (Table A.14). We find slight increases in divorce rates after the introduction of public childcare. This is likely caused by improved household bargaining for women – and reduced co-dependence between spouses. Nonetheless, we find no effects of public childcare on fertility. This is true when we use or main specification – which is restricted to parents and anchored by each families youngest child, but also when we anchor parents by their oldest child (Table A.15).

5 Effects on children

While the primary political impetus which lead to the passage of the *Childcare Law of 1973* centered around raising the employment of mothers, children were potentially the group most proximally affected by the policy. As a result of the policy, instead of spending time at home, children spent up to ten months a year in childcare.

While childcare may have been effective in raising the employment of mothers, a key question is whether this came at a cost to children. Conceptually, this depends on two key issues – the quality of public childcare – which was still developing, but also the quality of childhood socialization in the absence of childcare (see Figure A.1). The potential importance of these counterfactual childhood environments suggests that an analysis of the effects of public childcare would be incomplete without taking into account across differences in the effects for children across the family income distribution.

With these ideas in mind, we study the effects of public childcare on average, but pay particular attention to heterogeneity in the effects of public childcare across the family income distribution. Crucially, we move beyond the standard labor market outcomes available to researchers and use detailed measures of adult skills and job-tasks to understand how childcare affects long-term outcomes. Both because the data on skills is available only for men, and because relationships between child-development, skills, and labor market outcomes vary between by gender, we conduct all our analyses separately for men and women.

5.1 Children's adult outcomes and intergenerational mobility

We begin by reporting our estimates of the average effects of public childcare access on adult outcomes for men and women who were exposed to childcare when they were children. The estimates of average treatment effects as well as baseline means are reported in Table 2 for males (columns 1-3) and females (columns 4-6). Corresponding event-study results are shown in Figures A.11-A.12. By and large, these results suggest that access to childcare resulting from *Childcare Law of 1973* had no effect on the average outcomes of cohorts exposed to childcare when they

were children. The one notable exception to this is that males exposed to childcare when they were children are less likely to dropout of school before obtaining a secondary school degree. The lack of alignment between the average effects on parents and the average effects on children fit prior research focusing on lottery-winners and which documents a null relationship between lottery windfalls and children's outcomes (Cesarini et al., 2016).

Table 2: Descriptive data and average treatment effects

	Males			*Females*		
	Baseline mean	ATE	p-value	Baseline mean	ATE	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Dropout	0.19	-0.018	0.00	0.11	0.006	0.19
	(0.39)	(0.006)		(0.31)	(0.005)	
Tertiary education	0.27	-0.008	0.25	0.41	-0.013	0.10
	(0.44)	(0.007)		(0.49)	(0.008)	
Income rank	0.62	-0.001	0.71	0.51	-0.001	0.72
	(0.22)	(0.004)		(0.18)	(0.003)	
Income	24,470	157	0.60	16,768	-41	0.85
	(15,389)	(301)		(11,238)	(225)	
Years employed in 30's	8.08	-0.016	0.72	7.43	0.019	0.69
	(2.99)	(0.044)		(3.04)	(0.047)	
Ever married	0.59	-0.003	0.74	0.68	-0.003	0.65
	(0.49)	(0.008)		(0.47)	(0.008)	
Military service	0.81	0.011	0.07			
	(0.39)	(0.006)				
Municipalities	89	229		89	229	
Individuals	19,478	72,139		18,584	69,689	

Notes: This table reports the baseline mean as well as difference-in-difference estimates of the average treatment effects of access to childcare. Columns (1)-(3) report results for males, while columns (4)-(6) report results for females. Columns (1) and (4) report the mean of the pre-period outcome in treatment municipalities. Columns (2) and (5) report estimates of average treatment effects of how childcare access affects children's long-term outcomes, following Equation 1. Columns (3) and (6) report the p-values for these estimates. Event-study plots corresponding to these estimates are show in Figures A.11-A.12.

Nonetheless, if public childcare access leveled the playing field in terms of childhood environments (e.g. Figure A.1), estimates of the average effects may conceal any equalizing effects childcare access may have had. To study this, we next examine effects across the family income distribution.

Our main results for how public childcare access shifts the relationship between family resources and childrens outcomes are reported in Table 3. The baseline associations for all outcomes are reported in Column 1. For outcomes – such as earnings – which are positively correlated with family income, negative coefficients on the interaction between family income and access to public childcare can be interpreted as equalizing outcomes. Conversely, for outcomes – such as dropout – which are negatively correlated with family income, positive coefficients suggest that public childcare access

equalizes outcomes.

The results in Table 3 paint a nuanced picture. Earlier, our estimates of average treatment effects suggested that male dropout was reduced by access to public childcare. The results by family income suggest that these reductions were driven by boys born to poor families. Additionally, however, the results in Table 3 imply that childcare access leveled the playing field in terms of graduation from higher education. More importantly, these effects on education are accompanied by notable equalizations in terms of labor market outcomes. Where the association between family income rank and son's adult income rank was 0.133 at baseline, this was reduced by eighteen percent (-0.024).[8] Similarly while males from the richest families were employed for nearly a full year longer in their thirties compared to those in the poorest families, this gap was reduced by nearly thirty percent (-0.28) as a result of access to public childcare. These large equalizations in terms of labor market outcomes are not, however, paired with notable effects on the likelihood of forming a family or conscripting in the military at age nineteen. As we will be using data from the military to measure skills, the lack of effects on military conscription is important, as it implies that any effects we observe on skill outcomes are unlikely to be explained by differential selection into measurement.

By and large, females exposed to public childcare as children experienced a similar leveling of the playing field. Compared to their male counterparts, however, childcare access had little effect on girls' dropout rates, but had slightly larger effects on higher educational obtainment. Nonetheless, the magnitude of the effects on female employment and earnings are slightly smaller than those for males.

The combination of positive effects for poor children and negative effects for children from affluent families is consistent with prior work on universal childcare programs in Norway, Canada, Germany, and Italy (Havnes and Mogstad, 2011a; Kottelenberg and Lehrer, 2017; Cornelissen and Dustmann, 2019; Ichino et al., 2019). Additionally, the pattern of effects resemble those from Finland's comprehensive school reform, a reform which had no average effects but reduced intergenerational persistence in earnings (Pekkarinen et al., 2009). Relative to the magnitude of the effect of Finland's comprehensive school reform, however, the effects we estimate are somewhat smaller – roughly one half the magnitude of those reported in (Pekkarinen et al., 2009).

[8]Since the only income measure we have prior to the reform is from 1971, we can only use one year of data to to measure family income this slightly attenuates the association – but this number is still in the same ballpark as in Norway during the same time-period (see Pekkarinen et al. (2017)).

Table 3: Effects on the association between family income and children's adult outcomes

	Males			*Females*		
	Baseline association	Shift in slope	p-value	Baseline association	Shift in slope	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Dropout	-0.128	0.043	0.01	-0.089	0.010	0.47
	(0.011)	(0.017)		(0.009)	(0.014)	
Tertiary education	0.300	-0.052	0.01	0.282	-0.068	0.00
	(0.013)	(0.021)		(0.015)	(0.023)	
Income rank	0.133	-0.024	0.03	0.106	-0.030	0.00
	(0.007)	(0.011)		(0.006)	(0.010)	
Years employed in 30's	1.009	-0.280	0.03	1.087	-0.135	0.32
	(0.087)	(0.132)		(0.091)	(0.137)	
Ever married	0.128	-0.008	0.73	0.077	0.004	0.87
	(0.015)	(0.023)		(0.014)	(0.022)	
Military service	0.077	0.016	0.38			
	(0.013)	(0.018)				
Municipalities		229			229	
Individuals		72,139			69,689	

Notes: This table reports the baseline association between family income rank (0-1) and children's outcomes, as well as difference-in-difference estimates of the average treatment effects of access to childcare. Columns (1)-(3) report results for males, while columns (4)-(6) report results for females. Columns (1) and (4) report the baseline association between family income and each outcome in treatment municipalities. Columns (2) and (5) report estimates of how access to public childcare shifted this association between family income and children's outcomes following Equation 3. Columns (3) and (6) report the p-values for these estimates. Event-study plots corresponding to these estimates are show in Figures A.15-A.16.

5.2 How does public childcare shape long-term outcomes?

A prominent explanation for the effects of early childhood programs on adult economic outcomes is that they are driven by lasting effects on social skills (Deming, 2009; Heckman et al., 2013; Bailey et al., 2017; Pages et al., 2022). However, since linking the effects of childcare to measures of social skills from adulthood has been challenging, this hypothesis lacks strong empirical support.[9]

We perform several analyses to examine this hypothesis empirically. These analyses center on exceptionally detailed data from the Finnish Defence Forces which provides us with measures of adult skills (age 19) for eighty percent of the male population. To gain further insight into how skills

[9]Bailey et al. (2020) argue that for the long-term effects of childcare to be driven by some skill, the following conditions must be met: that skill must be i) malleable in early childhood; ii) relevant for long-term outcomes; iii) and be affected by childcare access.

shape later outcomes, we also link our data to information on people's job tasks from O*NET and use measures from Deming (2017) to measure social skill intensity.

To tie our empirical analyses to conceptual work in both economics and child development in the social sciences more broadly, we focus on three primary measures of skills (e.g. Heckman, 2006; Duncan et al., 2022). The first measure, visual-spatial skills focuses on pattern recognition, a core part of measures of IQ. While visual-spatial skills are sometimes considered to be innate, recent work has shown that working memory – an important dimension of these skills – is malleable (Berger et al., 2020). Still, as these skills are least linked to childhood socialization, access to childcare is unlikely to affect them. Academic-skills – measured as performance in verbal and math tests – is the second area of skill we focus on. While childcare in the period we study did not have any explicit focus on academic learning, work in economics suggests that dynamic complementarities between the development of social skills and academic learning (e.g. Cunha and Heckman, 2010; Johnson and Jackson, 2019; Gensowski et al., 2024) could lead to changes in academic skills. Finally, our core measure of study is social-competence, a concept long-considered central to child development (e.g. Waters and Sroufe, 1983; Gunderson et al., 2013). We measure this as the mean of achievement striving, leadership motivation, and self-confidence. We also complement these measures of skills – which we only have for men – with measures on occupational content from O*NET, as used by Deming (2017) and Acemoglu and Autor (2011b).

Earlier, we showed that visual-spatial skills, academic skills, and social competence all display a relatively similar correlation with labor market outcomes ($\rho = 0.25 - 0.30$) (Table 1). Interestingly, however – compared to visual-spatial skills or social competence – academic skills are most strongly related to labor market outcomes, and social competence has the weakest raw correlation with labor market outcomes. These correlations present an important foundation for our subsequent analysis: if we find a stronger relationship between treatment effects on income and those on social competence – this is not simply because these are most closely aligned in the underlying data. In Table A.8, we study sibling correlations in these different skill dimensions, and show that all three display correlations roughly between $\rho = 0.35$ and $\rho = 0.45$, with the sibling correlation in academic skills being the highest. Since siblings share much of the same childhood environment and genes, these correlations are often considered to capture information regarding the reliability of each construct (Grönqvist et al., 2017; Edin et al., 2022). These results suggest that, if anything, academic skills are better measured than social competence. This suggests that we might expect measurement error to play a greater role in attenuating any estimates on visual-spatial skills or social competence.

In a first set of results, we use our main difference-in-differences specification and study how access to public childcare shapes people's adult skills. As for the estimates on adult income, we show that access to public childcare has negligible average effects on average measures of skills (Table A.16, and Figures A.13-A.14). Nonetheless, the intergenerational persistence in academic

skills and social competence is reduced, while the persistence of visual-spatial skills is largely unaffected (Panel A of Table 4 and Figures A.17). The pattern of estimates across a broader range of disaggregated measures of skills add nuance to this story (Table A.17). We are unable to rule out no effects on masculinity or introversion skills such as deliberation or dutifulness. Instead, we see the evidence of effects on both verbal and math skills as well as skills associated with extroversion – but not introversion (Izadi and Tuhkuri, 2024). Beyond skills, we see a similar pattern of effects on job tasks measured in people's late thirties – the reduction in intergenerational persistence in income is accompanied by a similar pattern of effects in the social and math task intensities of people's jobs (Table 4, Panel B and Figures A.13-A.19).

These results provide preliminary support for the idea that the effects of public childcare on the intergenerational persistence in adult earnings could be driven by lasting effects on social competence. Or, even though Finnish public childcare in the early 1970's did not explicitly target the development of academic skills, the effects on long-term outcomes could be a result of dynamic complementarities in skill production (e.g. Heckman et al., 2013; Johnson and Jackson, 2019).

Next, we study how public childcare shifts the types of jobs people work in as adults (Panel B of Table 4). These results suggest that public childcare shifts boys from poor families from manual occupations to roles emphasizing a greater degree of social skills. Interestingly, the effects on social skill-intensive tasks are considerably larger for boys compared to girls, and the effects on math-intensive tasks appear stronger for girls than for boys. This aligns with the effects we see on labor market outcomes, where we document that where public childcare reduces dropout for boys and has little effect on tertiary graduation, the effects for girls emphasize tertiary graduation rather than dropout. Further, results in Panel C suggest that public childcare improves male outcomes by shifting the occupations they go into, while the effects on female earnings appear to be driven more by relative earnings within occupations. These suggest that there may be nuances in how childcare shifts the long-term outcomes for boys and girls. Broadly, however, Panels B and C further reiterate the potential role of social skills as the active ingredient underlying the effects of public childcare on labor market outcomes. These results extend the literature highlighting the role of skills in shaping people's tasks in the workplace (Acemoglu and Autor, 2011b; Deming, 2017; Speer, 2017).

In an attempt to more directly relate the effects we document on labor market outcomes in Table 3 to those we show for skills in Table 4, we perform a mediation analysis where we explicitly focus on how effects on different dimensions of skills may serve to drive the effects on earnings. As in Imai et al. (2010) or Heckman et al. (2013), the idea in these analyses is to add skill measures as controls to the treatment effect equation for earnings, and study what happens to the main coefficient. The extent that the main coefficient changes when a particular skill is included is indicative of the extent that the particular skill could play a role in driving that outcome. As such, the key parameter is the difference in magnitude between the coefficient of the treatment effect on earnings with and

without the inclusion of a skill as a mediator.

Table 4: Effects on the association between family income and skills, tasks, and jobs

	Males			*Females*		
	Baseline association (1)	Shift in slope (2)	p-value (3)	Baseline association (4)	Shift in slope (5)	p-value (6)
			Panel A: Skills			
Visual-spatial	0.626	-0.074	0.14			
	(0.035)	(0.050)				
Academic	0.719	-0.168	0.00			
	(0.034)	(0.051)				
Social competence	0.673	-0.155	0.00			
	(0.032)	(0.049)				
Municipalities		229				
Individuals		58,626				
			Panel B: Task content			
Math	0.082	-0.014	0.09	0.059	-0.019	0.00
	(0.005)	(0.008)		(0.004)	(0.007)	
Social	0.113	-0.031	0.00	0.071	-0.014	0.11
	(0.007)	(0.011)		(0.006)	(0.009)	
Service	0.085	-0.029	0.00	0.023	0.009	0.46
	(0.006)	(0.009)		(0.007)	(0.011)	
Manual	-0.183	0.050	0.00	-0.092	0.012	0.36
	(0.010)	(0.015)		(0.008)	(0.013)	
Municipalities		229			229	
Individuals		64,977			64,340	
			Panel C: Occupation income			
Mean occupational income rank	0.102	-0.033	0.00	0.091	-0.011	0.21
	(0.007)	(0.010)		(0.006)	(0.009)	
Income rank within occupation	0.049	0.028	0.03	0.026	-0.030	0.02
	(0.008)	(0.013)		(0.008)	(0.013)	
Municipalities		229			229	
Individuals		72,139			69,689	

Notes: This table reports the baseline association between family income rank (0-1) and children's outcomes, as well as difference-in-difference estimates of the average treatment effects of access to childcare. Columns (1)-(3) report results for males, while columns (4)-(6) report results for females. Columns (1) and (4) report the baseline association between family income and each outcome in treatment municipalities. Columns (2) and (5) report estimates of how access to public childcare shifted this association between family income and children's outcomes following Equation 3. Columns (3) and (6) report the p-values for these estimates. The measures of skills used in Panel A come from the Finnish Defence Forces, and are measured at age 19, upon conscription. The measures of occupational task content in Panel B come from Deming (2017) and Acemoglu and Autor (2011a), and are based on occupations observed when people are in their late thirties. Event-study plots corresponding to these estimates are show in Figures A.18-A.19.

The primary challenge in interpreting the results from a mediation exercise as implying that a

particular skill is the driver of the main results is the exclusion restriction – i.e. it might be that some other unobserved skill, and not social competence, is driving the effects on adult income. Strictly, this is almost undoubtedly true: the pattern of effects we document on children's income stem from a bundled treatment including not just the range of activities performed by childcare centers, but also the counterfactual socialization in children's homes. Given all that is going on, it would be strange to assume that the statistical measures of social competence or academic skills we have in the data could capture the entirety of the effects childcare has on the development of children's later outcomes. Our goal, then, is not to make the strong argument that some mediating skill – say, social competence – explains all the effects of public childcare on long-term outcomes. Instead, our goal is to assess the relative strength of empirical evidence for three candidate mechanisms for how childcare could shape long-term outcomes: A) through effects on visual-spatial skills – a measure of fluid intelligence closely related to I.Q.; B) academic skills; C) social competence. Our goal, then, is to compare the relative magnitudes of the share each of these skills explains – in a statistical sense – of the effects of childcare on adult earnings. If one potential mediator can only explain a low share of the effects on public childcare, while another explains a large share, this would shift the burn of evidence from one potential mediating channel to another.

The results from these exercises are reported in Table 5. Panel A reports the coefficient measuring the extent that public childcare affects adult income – restricting the sample to those for whom we observe skills. Panel B studies what happens to the coefficient in Panel A when potential mediating skills – visual-spatial, academic, or social competence – are added as independent variables to the estimating equation. Column 1 reports the effects of public childcare on children's adult income rank, holding constant their level of each mediating skill, one at a time. Column 3 calculates the extent that the coefficient decreases, comparing estimates in Panel B to that in Panel A. Columns 1-3 are estimated using our main specification, while Columns 4-6 are estimated in a specification with all observable background characteristics as control variables. The results show that effects on visual spatial skills explain less than 13 percent of the effects on income, while those on social competence explain 46 percent of the effects on income; academic skills explain roughly 37 percent of the effects of income. Note, these shares are not independent of one another: i.e. they are not additive. Instead, the larger share associated with social competence provides evidence that – amongst these candidate mechanisms – treatment effects on income are most closely aligned with shifts in social competence.

Column 2 of Table 5 shows the estimate of public childcare on adult earnings retains its statistical significance when visual-spatial skills are added to the equation, but ceases to produce statistical significant estimates upon the inclusion of academic or social skills. If anything, these estimates become even more apparent when we use a model which includes observable characteristics. The fact that this pattern withstands the inclusion of observable characteristics (Table A.19) provides support for the sequential ignorability assumption – that the treatment and mediator are both independent

of all observable pre-treatment outcomes – underlying mediation analyses (Imai et al., 2010). Additionally, the contrast between the pattern of effects on social competence versus visual-spatial skills provides a powerful placebo test – confirming that our strategy is not simply producing effects across all outcomes. Further, since the cross-sectional correlations between the skill dimensions and adult income rank show that social competence has the lowest correlation with adult income in the raw data, these patterns are not driven by the fact that social competence simply exhibits a stronger relationship with income *in general* (Table 1).

Table 5: Can effects on skills explain effects on adult income?

	β_2	p-value	Share explained
	(1)	(2)	(3)
	Panel A: Baseline specification		
Treatment	-0.024	0.03	
by family income	(0.011)		
	Panel B: Mediation, including skills		
With visual-spatial	-0.021	0.05	0.13
	(0.011)		
With academic	-0.015	0.16	0.37
	(0.011)		
With social competence	-0.013	0.24	0.46
	(0.011)		
Municipalities	221		
Individuals	60,195		

Notes: Analyses in this table study whether effects on skills – measured upon conscription to the Finnish Defence Forces at age 19 – are capable of explaining the effects on the association between family income and children's adult income rank – measured between the ages of 35 and 40. All analyses are restricted to men for whom we observe data on skills. Panel A reports the treatment effect estimate of how childcare access shapes the association between family income rank and child income rank following Equation 3. Apart from the restriction to males with observable measures of skills, this panel corresponds to Column 2, row three of Table 3. Panel B reports results from a regression of a similar form to that in Panel A, but includes measures of skills – visual-spatial, academic, and social competence – added individually on the right-hand side of the equation as potential mediating variables. Column (1) reports the estimate of β_2, which measures the extent that childcare access affects the association between family and child income rank, while Column (2) reports the corresponding p-values for these estimates. Column (3) reports the extent of the reduction in the estimate of β_2 from Panel A when mediating variables are added to the regression ($\frac{\beta_2^A - \beta_2^B}{\beta_2^A}$). The extent that the main estimate is attenuated when including measures of skills to the right-hand side tests for the extent that treatment effects on income co-vary with treatment effects on skills. As explained in Imai et al. (2010), these reductions do not necessarily imply mediation, but are useful in gauging for whether the treatment effect can potentially explained by the mediating variable.

Beyond showing that public childcare has larger effects on social competence than on visual-

spatial skills or that public childcare shifts people into more social skill intensive occupations (Table 4), the results in Table 5 link the effects on earnings to those on skills, suggesting that the pattern of effects of public childcare on adult earnings is mirrored by effects on social competence rather than visual-spatial skills. The consistent set of results also indicating effects on academic skills also suggests that one way in which social competencies developed in childhood shift adult outcomes is by dynamic complementarities in the production of skills (Heckman et al., 2013; Johnson and Jackson, 2019). Together, the totality of the results reported in this section provide strong evidence corroborating the idea that social skills may be the active ingredient driving the effects of childhood programs on long-term outcomes (Deming, 2009; Chetty et al., 2011; Heckman et al., 2013; Duncan et al., 2022).

In a final test of the idea that childcare shapes adult outcomes by changing the quality of socialization that children receive, we approach the question from a different angle. By and large, in this paper we have focused on heterogeneity by family income. Nonetheless, an important line of research shows that first-born children perform better in multiple dimensions and exhibit higher levels of social skills. As Black et al. (2018) argue, this finding is thought to stem from the greater levels of parental attention first-born children receive compared to their younger siblings. A natural question, then, if our story holds, is whether public childcare levels the playing field by birth order. Before answering this question directly, we replicate the findings in Black et al. (2018) in Norway using our data on skills from the Finnish Defence Forces and tasks from O*NET. We find a very similar set of results (Column 1 of Table A.18). Next, we study how the treatment effects of public childcare vary by birth-order. While our estimates are noisy, they are consistent in their sign, and of relatively large magnitude, thereby supporting our hypothesis. Estimates of the effects of public childcare for later-born children tend to be positive, but effects on first-born children tend to be negative. While speculative, these results are in line with the idea that the effects of public childcare on long-term outcomes operate through changes in the quality of socialization, and notably adult attention, children receive.

5.3 Robustness

Our main result concerning children, is that public childcare access reduces the persistence of family-child income rank, and that this reduction is driven by the role of skills – namely social skills. We assess the robustness of our results by probing for the sensitivity of our estimations the choice of specification and testing for potential threats to identification.

In our most simple specification we only use the structural controls required for identification in the differences-in-differences setup. Nonetheless, as we saw some small imbalances in the covariates when conducting a balance test, we test for the robustness of our design to the inclusion of covariates.

These are reported in Tables A.20-A.21, yield estimates in line with our original results. The inclusion of parental background characteristics do, however, attenuate the point estimates of our treatment effects by family income rank. But, importantly, given that family income is correlated with other family background measures, the baseline association between family income rank and outcomes decreases as well. This leaves the relative magnitude of the treatment effects we estimate – as a share of the baseline association – largely unchanged. When we zoom into the pattern of estimates for skills, the pattern whereby we see stronger effects on social competence than visual-spatial or academic skills further stands out with the inclusion of covariates. This is encouraging regarding our estimates on skills, since Garlick and Hyman (2021) suggest that the inclusion of covariates tends to provide efficient and valid estimates in the presence of missingness.

To simplify our empirical design as much as possible, we define treatment as a binary indicator in our main specification. This definition of treatment has the advantage of producing estimates which are easy to interpret – the effects of the introduction of public childcare into the municipality, and is not prone to endogeneity regarding the specific number of seats available. Nonetheless, as the share of children in municipalities who there actually were seats for varied across municipalities and year to year within municipalities, our main specification leaves a lot of potentially useful information on the table. We re-estimate all our estimates – with and without the inclusion of covariates, re-defining the treatment indicator as a continuous variable measuring the share of each municipalities 3-6 year children who there are seats in childcare available for. This definition of treatment also carries an additional functional form assumption. Despite these changes to the treatment definition, this design produces estimates in line with our main results (Tables A.22-A.23). Again, as the effects on skills are central to the story, we see that the effects on skills exhibit the pattern, whereby the estimates are largest for social-competence, and lowest for visual-spatial skills.

Next, we study for whether the effects of public childcare we estimate might be explained by regional trends or municipality-specific shocks. To test for whether our estimates may be picking up on regional trends, we re-estimate our equation including interactions between year and broader region (see Columns 1 and 5 of Tables A.24-A.25). To test for whether municipality-specific shocks are capable of explaining our main results we tighten our specification further with the inclusion of municipality-by-year fixed effects (see Columns 3 and 7 of Tables A.24-A.25). While particularly the latter of these two exercises adds hundreds of fixed effects to our main specification, our results are remarkably robust to their inclusion. Together, they suggest that our main results are unlikely to be explained by other broader regional changes or municipality-specific changes. The same pattern, whereby we see larger effects on social competence and the weakest effects on visual-spatial skills also extends to these specifications.

Further, we pay explicit attention to missingness in the skill data. As we only have measures of skills for about eighty percent of the male population from the Finnish Defence Forces, there is

room for the missingness in the skill data to bias our estimates and change the interpretation of our results. This is a particularly real fear, as the selection into testing is non-random – with the strongest missingness at the bottom of the population skill-distribution (Table A.26): for example, people with disabilities, or a criminal background, are excluded from conscription. Reassuringly, since there are small and insignificant effects on military service we may not expect the skill estimates to be particularly affected by any missingness in that data (Tables 2-3). Since our story ties together estimates of measures available in the populations-level administrative data to those in the skill data, we start be re-estimating all our main labor market outcomes in the sample for whom we observe skills. While our estimates are slightly attenuated – effects of public childcare can be particularly large at the bottom of the skill distribution (e.g. Deming, 2009; Heckman et al., 2010) – estimates in the skill-sample are very much in line with our main results (Column 1, Table A.27). Further, we perform bounding exercises, seeing what happens to our estimates of skills when we replace the missing data using extremely low values, impute them using other adult outcomes, or replace them with extremely high values (Columns 2-4, Table A.27). While such bounding exercises are typically understood to be very conservative (e.g. Horowitz and Manski, 2000), our main results are largely unaffected, likely due to comparable patterns of missingness in treatment and comparison municipalities.

Finally, we assess whether or not our results are sensitive to how we measure skills. There are many degrees of freedom in the raw-measures of skills could have been aggregated to simplify the story. We chose to lean on the literatures in economics and psychology to test a particular theory of how public childcare can affect child development – leveraging the idea that we might expect to see effects on social competence, rather than something like visual-spatial skills (Waters and Sroufe, 1983; Deming, 2009; Heckman et al., 2013). There could, however, be other ways to aggregate the data. While it is impossible to test all of these, we simply present estimates on each disaggregated outcome (Table A.17). To be as hands off as possible, we study results across all raw measures of skills available in the Finnish Defence Force data (Table A.17). The pattern of results across disaggregated outcomes present the same story.

6 The aggregate benefits of public childcare

We use the empirical estimates to assess the effectiveness of the policy. Following the framework of Hendren and Sprung-Keyser (2020), we calculate the marginal value of public funds (MVPF) of the policy, which is the ratio of policy benefits, measured by the policy recipients' willingness to pay (WTP) for the policy change, to the net cost of the program to the government.

Calculating the net cost to the government. The net cost of the policy includes all direct costs and fiscal externalities across time. While researchers must typically make assumptions regarding

the persistence of effects over time, we use our life-cycle estimates of treatment effects on parental earnings to calculate these through retirement. Since we cannot distinguish accurately between effects on mothers and fathers when children are young, we base estimates at early ages on family income, assuming the same ratio of earnings in early years as we observe at ages 50-55. The estimates imply life-cycle earnings effects from child's birth through retirement (until age 65). We use the average age of mothers and fathers when the child was born (31 and 34, respectively) to calculate the number of years that the policy affects parental earnings. While it may be intuitive to scale effects on parental earnings by the average increase in childcare coverage (0.3), this would be likely to over-state the effects of childcare access on parental labor supply – as families typically have more than one child, and our estimation sample for parents is always anchored on one child per family. To take this into account, we scale our estimates by the increase in coverage times the average family size ($0.3 \times 2.33 = 0.7$).

To calculate effects on tax revenue we use historical data on tax rates at different income levels from Honkanen (2000) to set tax rates for mothers was at 16 percent and tax rates for fathers at 39 percent. We use digitized data on the administrative costs of childcare to inform the costs of childcare and government's share of total costs, which corresponds to 86 percent (Association for Municipalities, 1974).

Calculating the willingness to pay for the policy. The willingness to pay (WTP) quantifies the benefits to the policy recipients (Hendren and Sprung-Keyser, 2020). While the totality of effects would in theory span the benefits to parents and children, given the statistically and economically insignificant effects on children, we focus on the labor market effects of parents in our calculations.

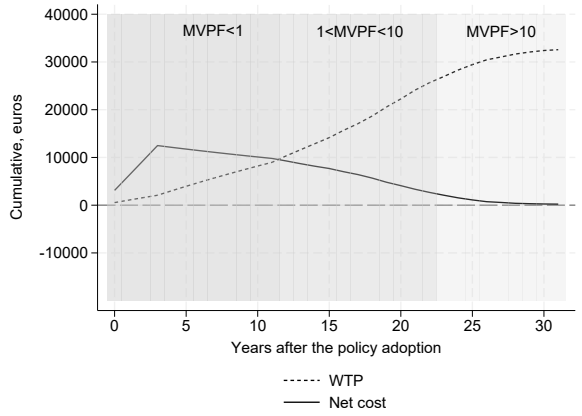
It is not always the case that changes in parental earnings should be included in calculations of the WTP, since, following the envelope theorem, small changes in a policy should not affect the welfare of marginal recipients (e.g. Hojman and Boo, 2022). Nonetheless, Humphries et al. (2025) argue that the inclusion of parental effects depends on the underlying economic model. They note that in a situation where parents can access private-market substitutes for childcare and can choose labor supply optimally, benefits would be fully offset by dis-utility of work. However, if parents do not have access to care in the private market, they may value additional earnings up to dollar-for-dollar. Since there was only very limited availability of other forms of care in rural municipalities during the 1970's, we follow the argument from Humphries et al. (2025) and include parental net-earnings gains in the WTP calculation. Our benchmark measure assumes that earnings effects are valued by parents one-to-one. We use estimates on parental earnings to calculate the benefits of the policy. The benefits are based earnings gains after taxes deducting for private childcare costs that correspond to 14 percent of total costs. Following the assumption in Hendren and Sprung-Keyser (2020), we discount benefits and costs with a 3 percent discount rate.

Results. We find that the program pays for itself – but that it takes more than thirty years for it

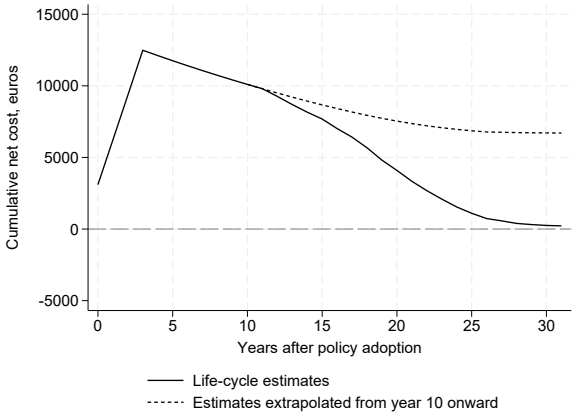
to do so (Figure 4a). Next, we assess the sensitivity of these estimates to assumptions regarding the life-cycle dynamics the effects of public childcare on parental labor supply. Typically, researchers can only estimate treatment effects for a handful of years – and are then forced to make assumptions regarding the pattern of effects over the life-cycle. To mimic the common assumption of constant effects after a relatively long follow-up period (10 years), we re-calculate the cumulative net costs of public childcare with the assumption that we observe treatment effects only in the ten years after policy implementation, and then projecting constant effects for the rest of the payoff period (Figure 4b) (e.g. Hendren and Sprung-Keyser, 2020). The results from this exercise show that the assumption of constant effects drastically changes estimates of the program's net costs: while estimates using the full life-cycle of observed treatment effect estimates imply that the program pays for itself in terms of taxes, those based on the assumption of constant treatment effects suggest that it does not. Although both approaches yield estimates of the MVPF which suggest the program is highly cost-effective – the MVPF is reduced from nearly infinite to about three under the assumption of constant treatment effects.

Figure 4: The marginal value of public funds as realized, and compared to constant effects after year 10

(a) WTP, realized net costs, and MVPF



(b) Comparison to net costs under constant effects



Notes: Figure (a) plots the willingness to pay, net costs, and marginal value of public funds. Willingness to pay (WTP) measures the policy's effect on parents' after-tax earnings. Net cost is the sum of costs and fiscal externalities as illustrated in Figure A.20. The marginal value of public funds (MVPF) is the ratio of WTP to net costs (Hendren and Sprung-Keyser, 2020). When net cost is either zero or negative, the policy pays for itself and the ratio is either not defined or meaningful and MVPF is set to infinity. Figure (b) plots the policy's net cost that are used in calculating the MVPF. For the solid line, the net cost is based on life-cycle estimates. As a comparison, we assume that we only have estimates 10 years after the policy implementation. We follow Hendren and Sprung-Keyser (2020) and use available estimates to extrapolate life-cycle effects under the assumption that the effect size stays constant relative to the counterfactual mean after 10 years of policy implementation. Life-cycle earnings trajectories are presented with and without these assumptions in Figures A.21c-d.

More broadly, these results underscore the sensitivity of cost-benefit calculations to the temporal dynamics of treatment effects. Had we only observed effects for the first ten years, we would have grossly over-estimated the net costs of the program, and underestimated the MVPF. A recurring issue in program evaluation is to extrapolate beyond the period of study: our estimates suggest that when researchers cannot estimate life-cycle treatment effects, combining reduced form estimates with either structural approaches which capture the underlying economic model or data-driven approaches as in Athey et al. (2025) may be helpful in generating insights beyond the period of study.

7 Conclusion

We provide a comprehensive evaluation of the effects of Finland's first national childcare program on parental labor supply and child outcomes. Due to scarce resources, the program was gradually rolled out beginning in 1973. In our two-by-two difference-in-differences analysis, we compare cohorts in the very first municipalities affected by the expansion of public childcare to cohorts in municipalities which only expanded public childcare later on.

We find that public childcare access results in substantial earnings gains for both mothers and fathers of young children who have access to childcare. Importantly, we find that these earnings gains persist through retirement.

While public childcare access had no effects on the average outcomes of children, it leveled the playing field – reducing the intergenerational persistence in income rank by 0.024, nearly twenty percent. To understand the role of lasting effects on skills in explaining these effects on labor market outcomes, we turn to data form the Finnish Defence Forces on the near universe of males. These data show that effects on labor market outcomes are accompanied by reduced persistence in the relationship between family income and adult measures of both academic and social skills – but not visual-spatial skills (a central component of IQ). We also observe a similar pattern of effects for both men and women in the task content of the jobs they do in their late thirties. Compared to effects on visual-spatial or academic skills, the pattern of effects on social skills maps most closely to the effects on income, explaining nearly half of the effects.

Despite the lack of average effects on children, the positive and persistent effects on parental labor supply show that the program pays for itself – but that it takes thirty years for it to do so. Given that most researchers are unable to estimate treatment effects over the life-cycle, we also perform exercises to understand the sensitivity of these estimates under the follow-up window defined by typical data constraints. These results show that, since the magnitude of the treatment effect on parental income grows through the time parents are in their late fifties, the assumption of constant

effects after year ten would have lead to considerably underestimates of the cost-effectiveness of the program.

These results extend the literature on public childcare in two primary ways. First, our results provide some of the first evidence on how childhood programs shape adult outcomes. A number of studies of childhood programs document a pattern of results whereby, they find effects on short-term measures of academic and social skills, no effects on observable measures in the medium-term, but then a re-emergence of effects on longer-run outcomes like earnings or crime (e.g. Deming, 2009; Chetty et al., 2011; Heckman et al., 2013; Bailey et al., 2020; Li et al., 2020). A common explanation for this pattern is that the long-term effects operate through social skills. However, these domains have remained unmeasured in adulthood, making it challenging to assess this hypothesis. Our results show that the pattern of effects of public childcare on children's labor market outcomes are accompanied by those on adult measures of social competence and academic achievement – but not fluid intelligence. These results provide some of the first large-scale empirical evidence pointing to the role of persistent effects on social skills as the active ingredient behind a childhood intervention.

Second, while the effects of public childcare on parental labor supply tend to be positive across numerous contexts – most studies only report short term effects, with no studies capturing life-cycle effects for both mothers and fathers. Our results suggest that the conclusions from evaluations of the cost-effectiveness of public childcare based only on the short-term responses can be sensitive to the assumptions regarding the temporal dynamics of treatment effects beyond the follow-up window. This finding implies the need for combining reduced form treatment effects with structural approaches to clarify the underlying economic model underlying extrapolations beyond the observed period. For example, building on the idea that work experience can be critical for building human capital (Mincer, 1974), Kleven et al. (2019) suggest that the loss of work experience can explain some of the persistence in the child penalty after mothers return to work. Likewise, the persistent effects of public childcare on parental earnings may be explained by the extended period of workplace human capital accumulation early in a person's career. In this sense, we propose that public childcare can result in the dual production of human capital – affecting not just children's but also parental human capital accumulation.

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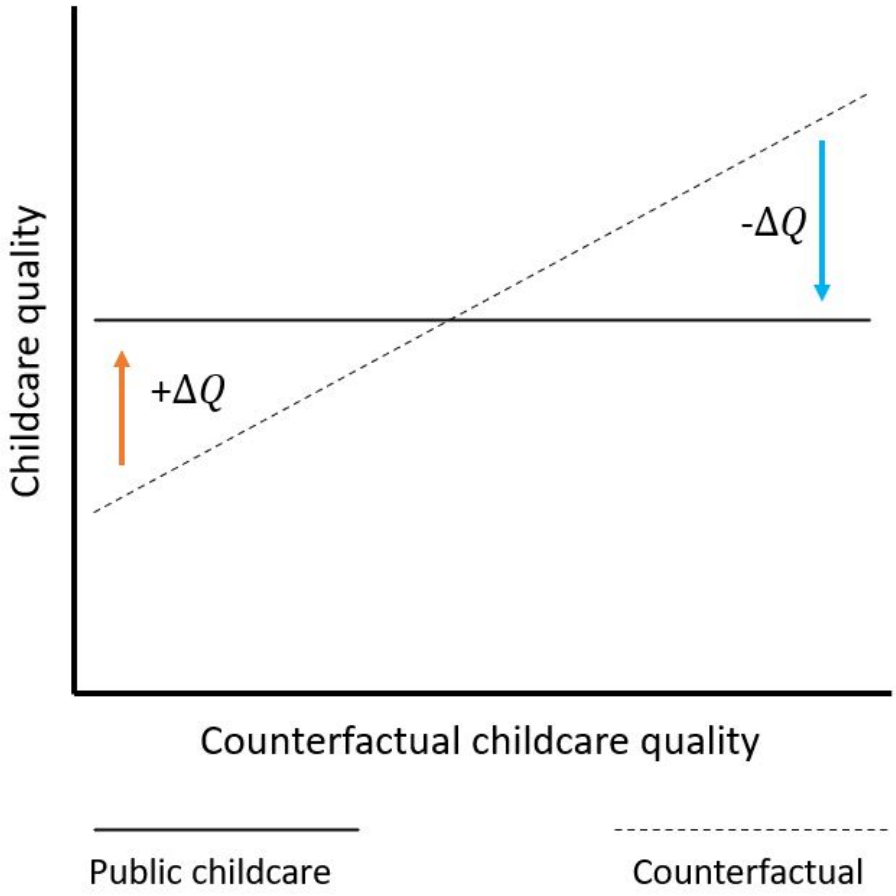
Appendix

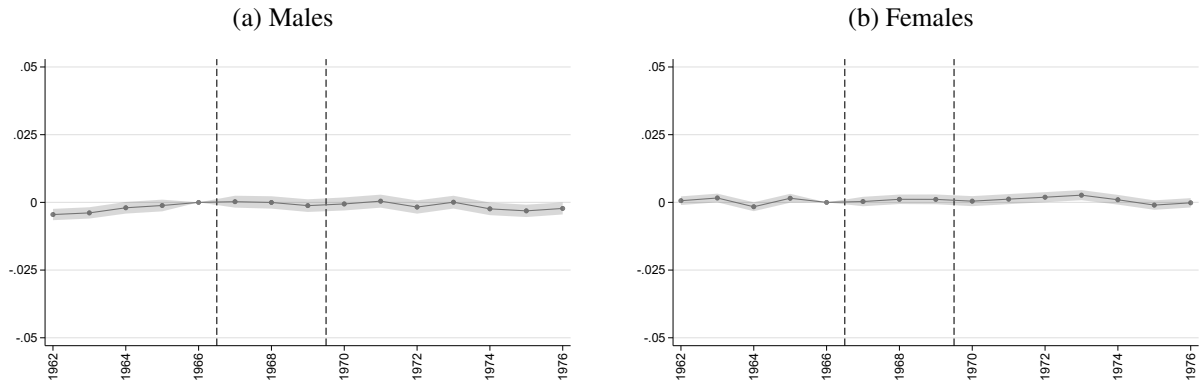
A.1 Figures

Figure A.1: Public childcare quality, counterfactual early childhood environment, and skill development



Notes: This diagram presents an organizing framework for how public childcare may affect children in different ways. The dashed line represents the quality of childcare experienced by children growing up in different early childhood environments, while the solid line represents the quality of early childhood environment if the child attends public childcare. As the framework shows, the effects of public childcare depend on the difference in quality between public childcare and the counterfactual option. Public childcare improves outcomes for children with a relatively low quality counterfactual childcare environment, and reduce outcomes for those with a high quality counterfactual environment. The average effects of public childcare depend on the quality of the public option. Accordingly, public childcare programs can achieve different average impacts as a result of both the level (quality) of the public option as well as the relative magnitudes of children with better and worse counterfactual options.

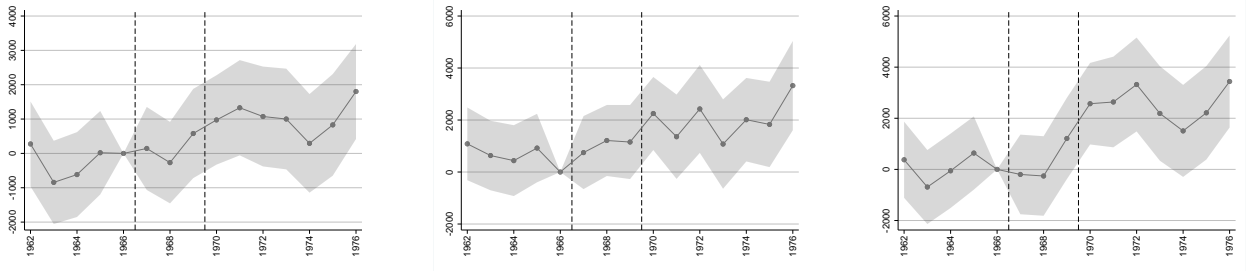
Figure A.2: Event-study estimates of covariate balance using a predicted index



Notes: This figure shows event-study plots which test for covariate balance using the specification from Equation 2. The outcome plotted in these figures is an index created by using all available background characteristics to predict our key children's outcome, income rank (0-1) ages 35-40. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. The corresponding differences-in-differences estimates for the disaggregated background characteristics are reported in Table A.4.

Figure A.3: Event-study plots of average treatment effects on family labor income

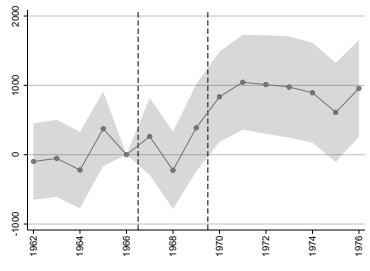
(a) Childcare age (b) Child age 10-14 (c) Child age 15-19



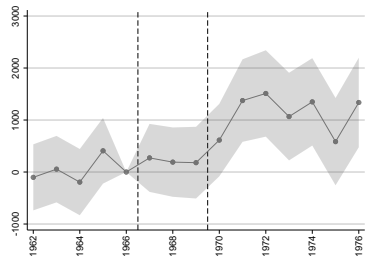
Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Earnings estimates are reported in 2024 euros, while employment takes the mean of binary indicator variables and is in the range of 0 and 1. The corresponding differences-in-differences estimates are reported in Table A.9.

Figure A.4: Event-study plots on mothers' outcomes by children's age

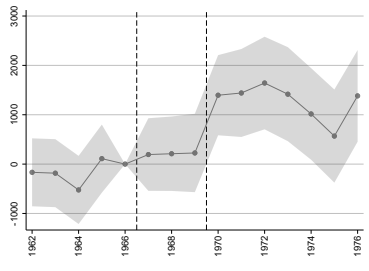
(a) Wage income, childcare age



(b) Wage income, child age 10-14

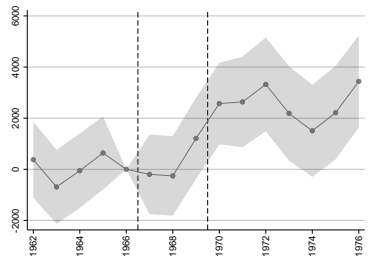


(c) Wage income, child age 15-19

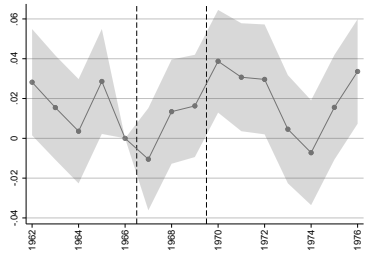


(d) Self-employment income, child age 15-19

(e) Labor income, child age 15-19



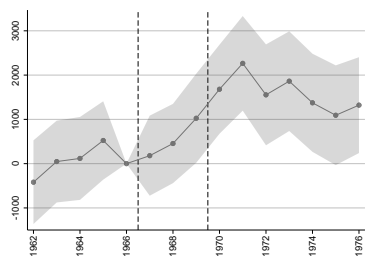
(f) Full-time employment, child age 15-19



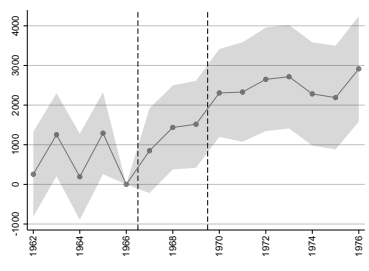
Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Earnings estimates are reported in 2024 euros, while employment takes the mean of binary indicator variables and is in the range of 0 and 1. The corresponding differences-in-differences estimates are reported in Table A.10.

Figure A.5: Event-study plots of fathers' outcomes by childrens' age

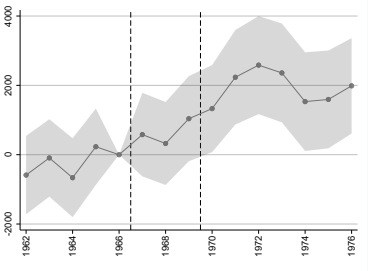
(a) Wage income, childcare age



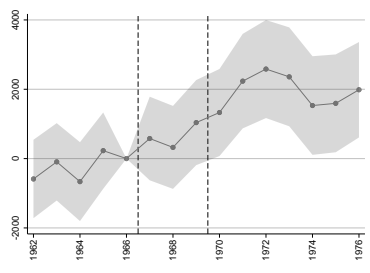
(b) Wage income, child age 10-14



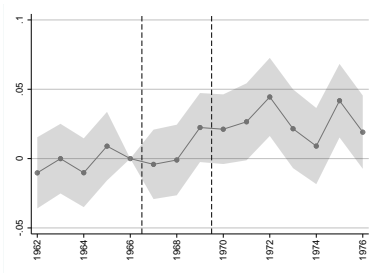
(c) Wage income, child age 15-19



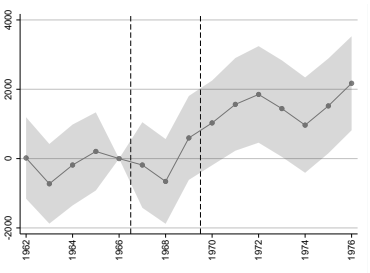
(d) Self-employment income, child age 15-19



(e) Full-time employment, child age 15-19



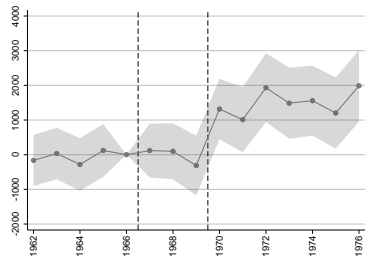
(f) Labor income, child age 15-19



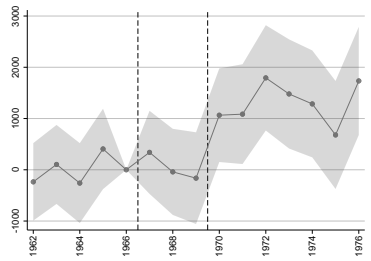
Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Earnings estimates are reported in 2024 euros, while employment takes the mean of binary indicator variables and is in the range of 0 and 1. The corresponding differences-in-differences estimates are reported in Table A.10.

Figure A.6: Event-study plots of average treatment effects on mothers' outcomes, ages 50-55

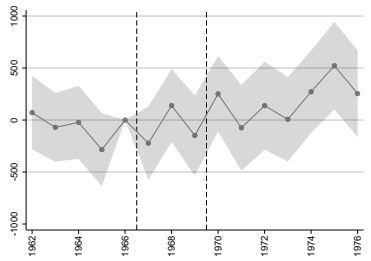
(a) Labor income



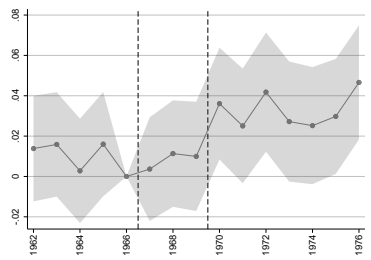
(b) Wage income



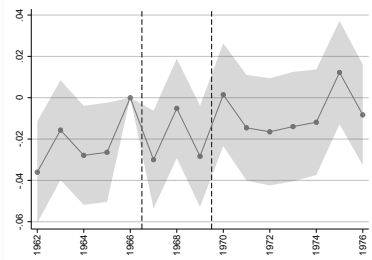
(c) Self-employment income



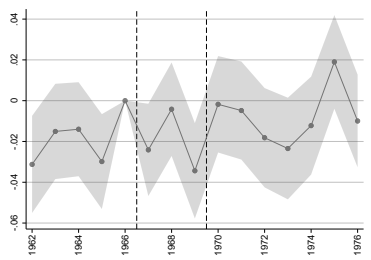
(d) Mean full-time employment



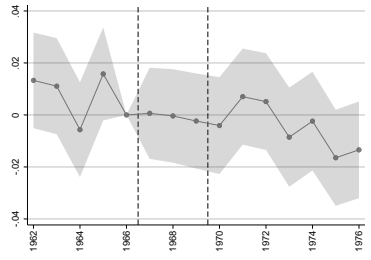
(e) Mean self-employment



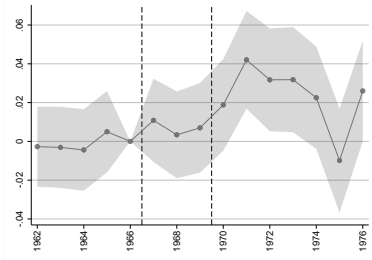
(f) Mean employment at agriculture



(g) Mean employment in manufacturing or construction



(h) Mean employment in healthcare or teaching

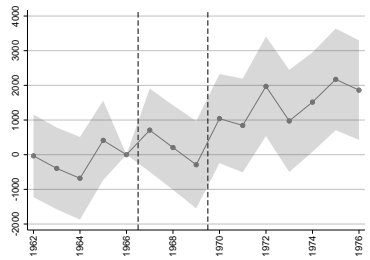


(i) Mean employment in other sectors

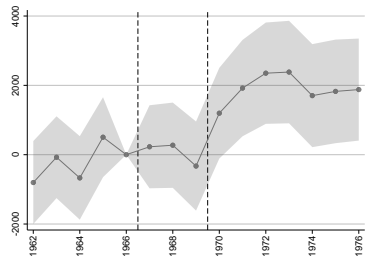
Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Earnings estimates are reported in 2024 euros, while employment takes the mean of binary indicator variables and is in the range of 0 and 1. The corresponding differences-in-differences estimates are reported in Table A.11.

Figure A.7: Event-study plots of average treatment effects on fathers' outcomes, ages 50-55

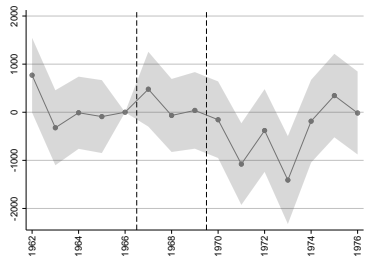
(a) Labor income



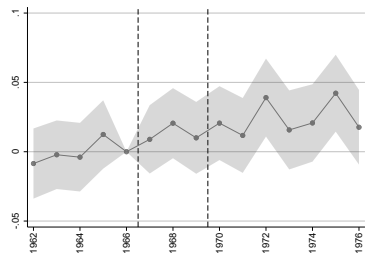
(b) Wage income



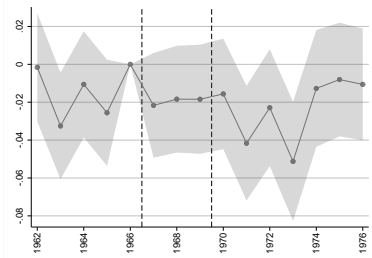
(c) Self-employment income



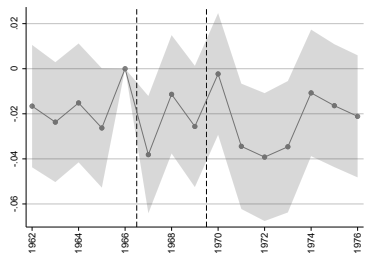
(d) Mean full-time employment



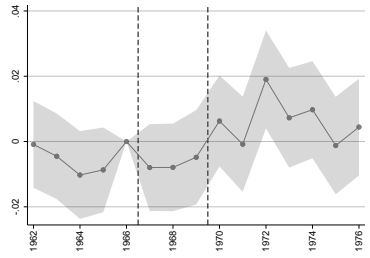
(e) Mean self-employment



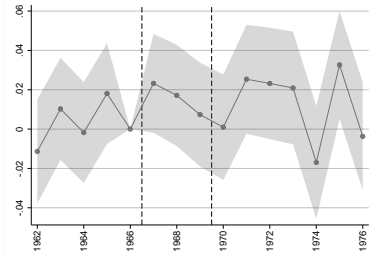
(f) Mean employment at agriculture



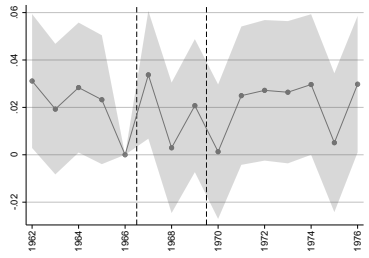
(g) Mean employment at manufacturing or construction



(h) Mean employment at healthcare or teaching



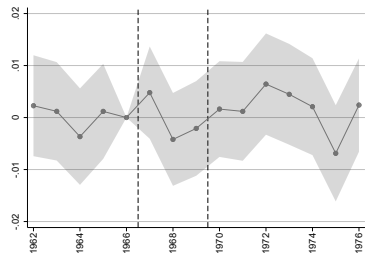
(i) Mean employment at other sectors



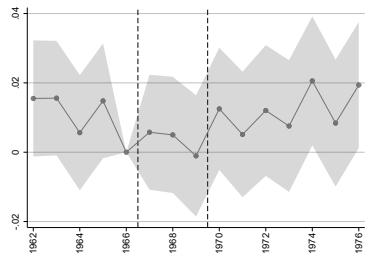
Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Earnings estimates are reported in 2024 euros, while employment takes the mean of binary indicator variables and is in the range of 0 and 1. The corresponding differences-in-differences estimates are reported in Table A.11.

Figure A.8: Event-study plots of average treatment effects, occupations and task intensity: Mothers ages 50-55

(a) Mean occupation income rank

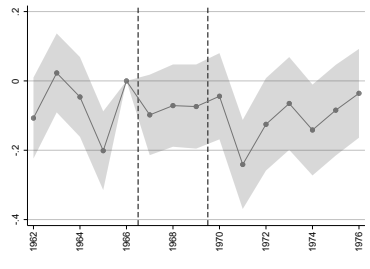


(b) Income rank within occupation

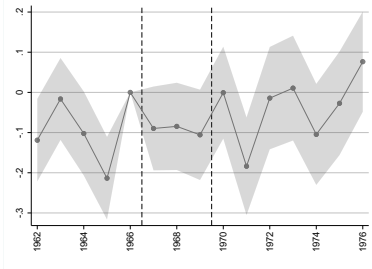


(c) Math task intensity

(d) Social task intensity



(e) Service task intensity

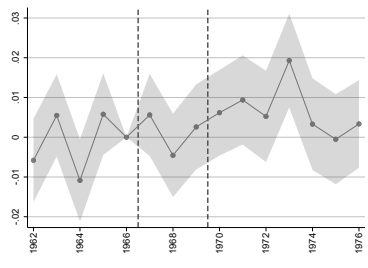


(f) Manual task intensity

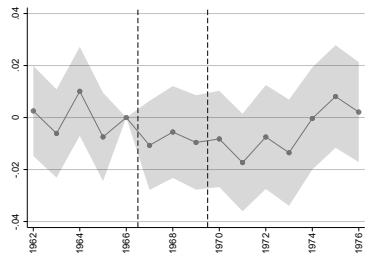
Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Mean occupation income rank measures the mean occupational rank (0-1) based on earnings. Income rank within occupation ranges from 0-1 and measures the relative earnings of each individual to others in the same occupation. Task intensities are measured using indices from Deming (2017) and Acemoglu and Autor (2011b), and ranked between 0 and 1. The corresponding differences-in-differences estimates are reported in Table A.12.

Figure A.9: Event-study plots of average treatment effects, occupations and task intensity: Fathers ages 50-55

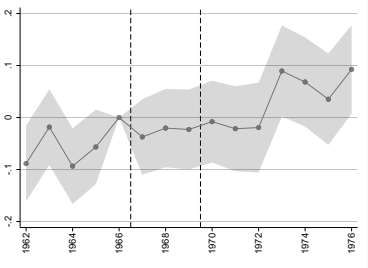
(a) Mean occupation income rank



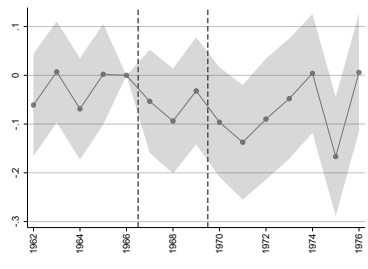
(b) Income rank within occupation



(c) Math task intensity

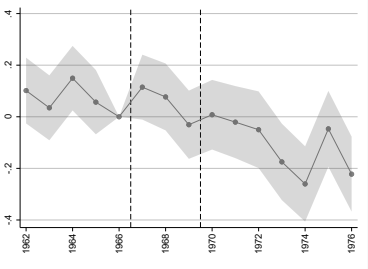


(d) Social task intensity



(e) Service task intensity

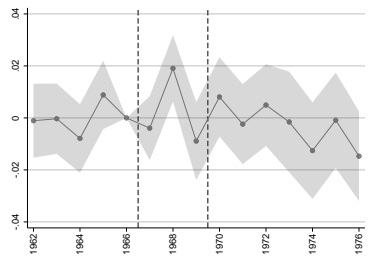
(f) Manual task intensity



Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Mean occupation income rank measures the mean occupational rank (0-1) based on earnings. Income rank within occupation ranges from 0-1 and measures the relative earnings of each individual to others in the same occupation. Task intensities are measured using indices from Deming (2017) and Acemoglu and Autor (2011b), and ranked between 0 and 1. The corresponding differences-in-differences estimates are reported in Table A.12.

Figure A.10: Divorce and fertility

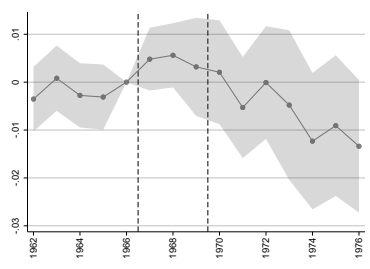
(a) Married (mothers), childcare age



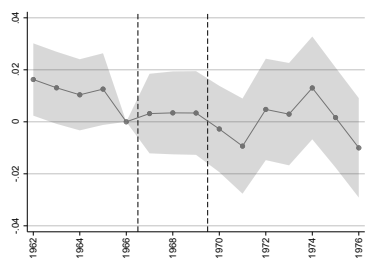
(b) Married (mothers), child ages 10-14

(c) Married (mothers), child ages 15-19

(d) Married (fathers), childcare age

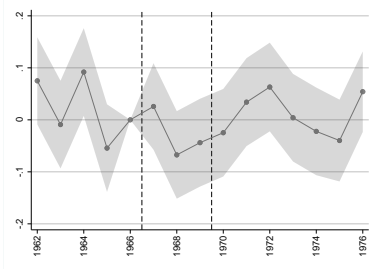


(e) Married (fathers), child ages 10-14



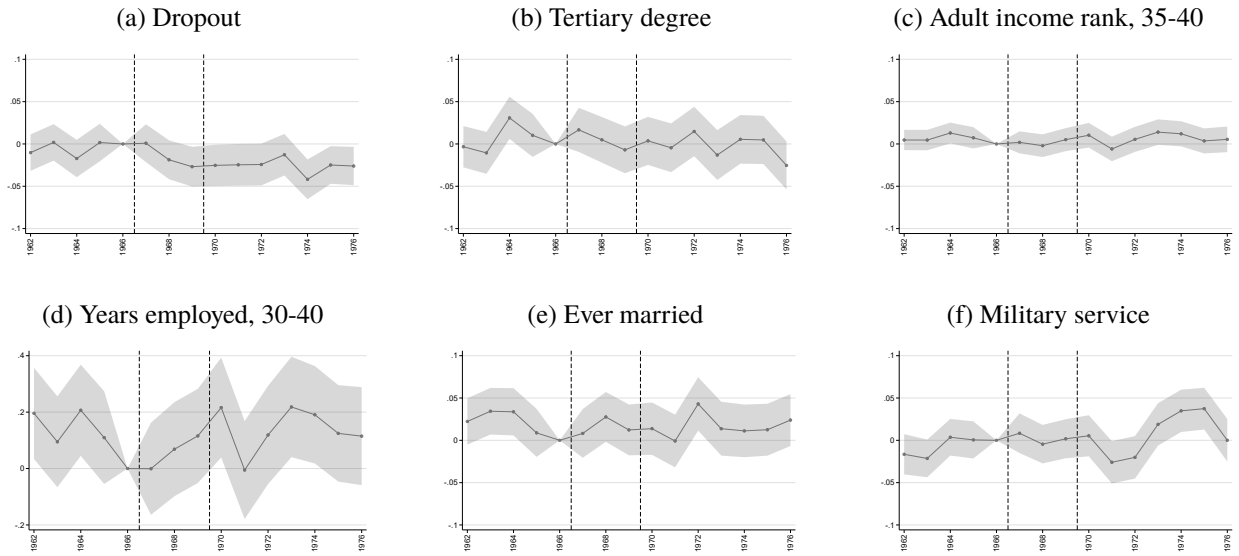
(f) Married (fathers), child ages 15-19

(g) Fertility



Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Marriage is indicator variable, and fertility is a measure of how many older siblings families have. The corresponding differences-in-differences estimates are reported in Table A.14.

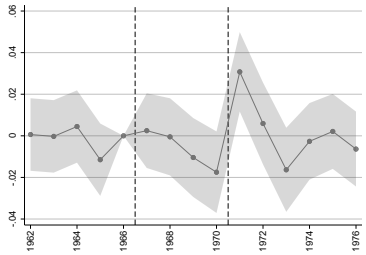
Figure A.11: Event-study plots of average treatment effects (Males)



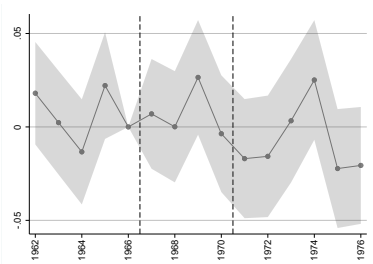
Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. All outcomes range from 0-1, with the exception of years of employment between the ages of 30 and 40, which ranges from 0-11. The corresponding differences-in-differences estimates are reported in Table 2.

Figure A.12: Event-study plots of average treatment effects (Females)

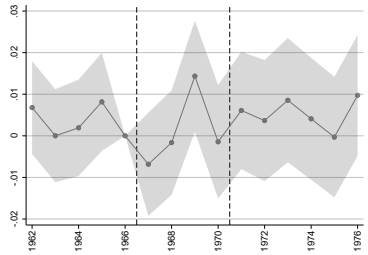
(a) Dropout



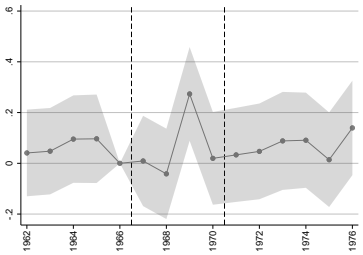
(b) Tertiary degree



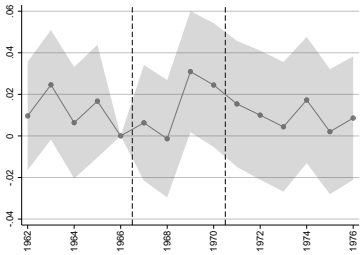
(c) Adult income rank, 35-40



(d) Years employed, 30-40



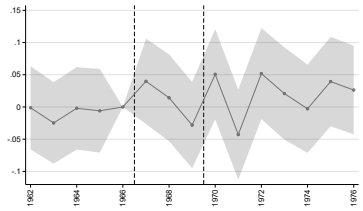
(e) Ever married



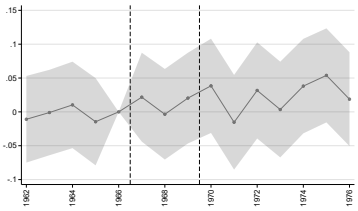
Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. All outcomes range from 0-1, with the exception of years of employment between the ages of 30 and 40, which ranges from 0-11. The corresponding differences-in-differences estimates are reported in Table 2.

Figure A.13: Event-study plots of skill outcomes (Males)

(a) Visual-spatial skills

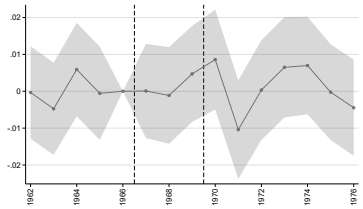


(b) Academic skills

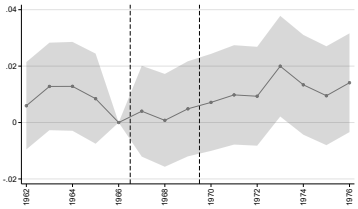


(c) Social competence

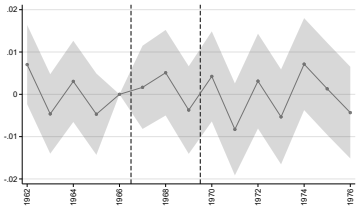
(d) Mean occupation income rank



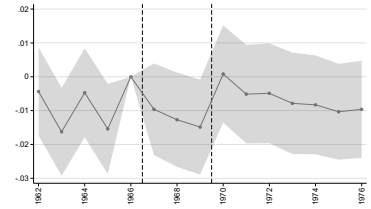
(e) Income rank within occupation



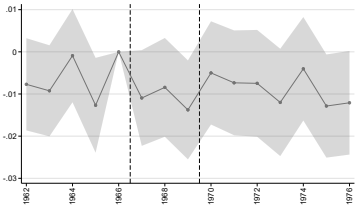
(f) Math task intensity



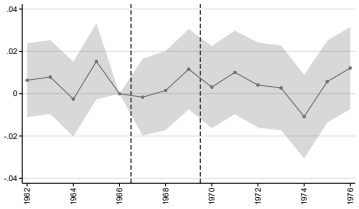
(g) Social task intensity



(h) Service task intensity

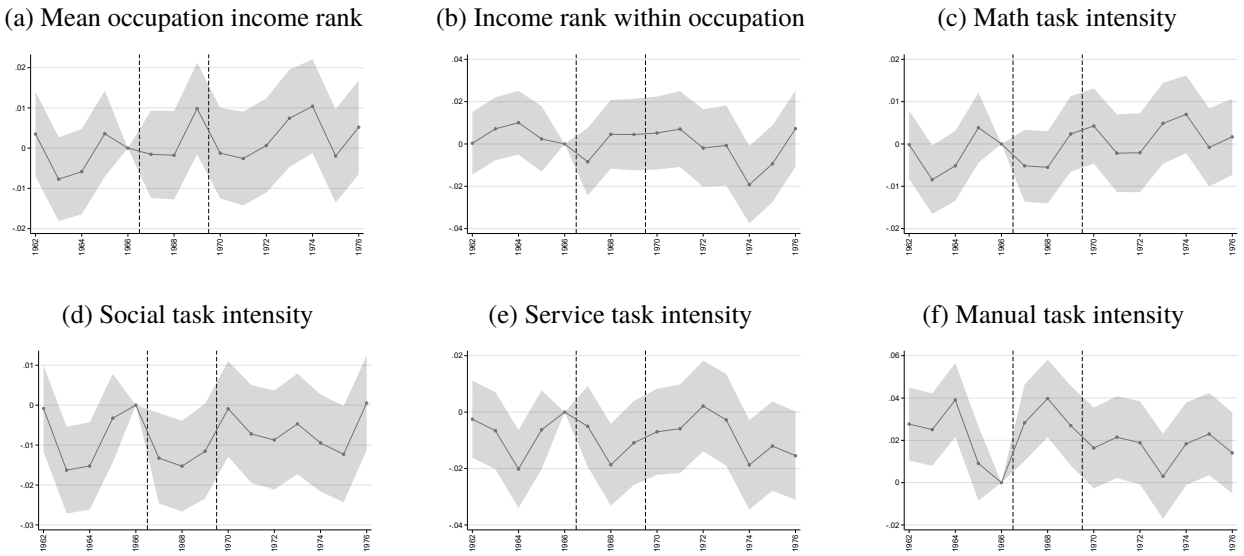


(i) Manual task intensity



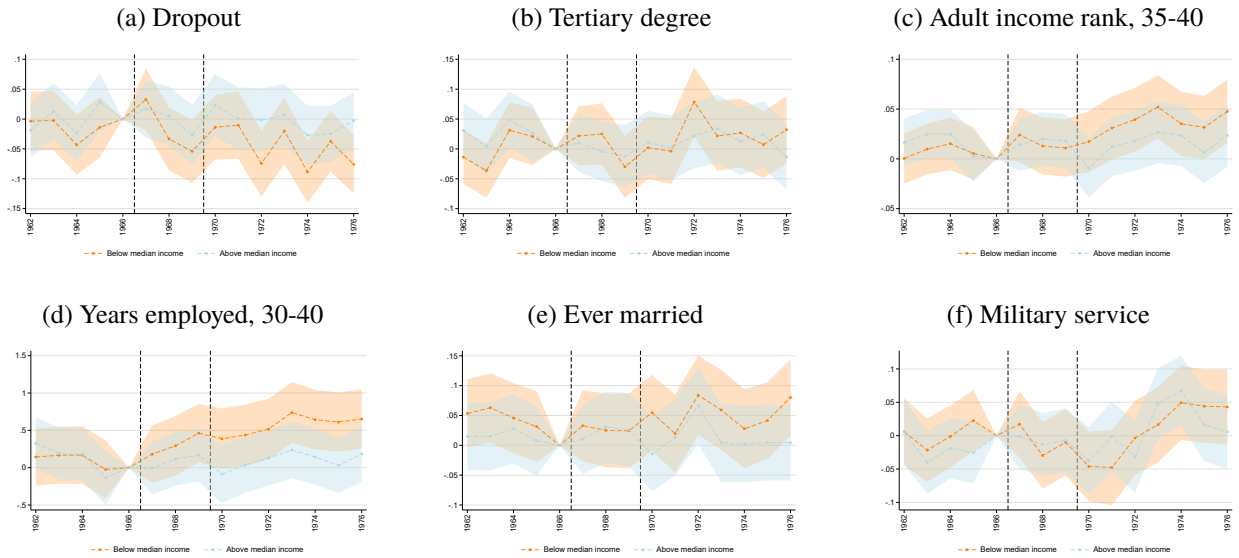
Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Skills are measured using data from the Finnish Defence Forces and standardized to have a mean of zero and standard deviation of one in the base period. Mean occupation income rank measures the mean occupational rank (0-1) based on earnings. Income rank within occupation ranges from 0-1 and measures the relative earnings of each individual to others in the same occupation. Task intensities are measured using indices from Deming (2017) and Acemoglu and Autor (2011b), and ranked between 0 and 1. The corresponding differences-in-differences estimates are reported in Table A.16.

Figure A.14: Event-study plots of job and task outcomes (Females)



Notes: This figure shows event-study plots using the specification from Equation 2. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Mean occupation income rank measures the mean occupational rank (0-1) based on earnings. Income rank within occupation ranges from 0-1 and measures the relative earnings of each individual to others in the same occupation. Task intensities are measured using indices from Deming (2017) and Acemoglu and Autor (2011b), and ranked between 0 and 1. The corresponding differences-in-differences estimates are reported in Table A.16.

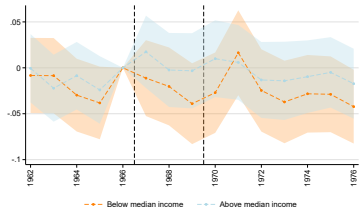
Figure A.15: Event-study plots of long-run outcomes based on family income (Males)



Notes: This figure shows event-study plots which study the treatment effects for children born to families above and below the median household income using the specification from Equation 4. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. All outcomes range from 0-1, with the exception of years of employment between the ages of 30 and 40, which ranges from 0-11. The corresponding differences-in-differences estimates are reported in Table 3.

Figure A.16: Event-study plots of long-run outcomes based on family income (Females)

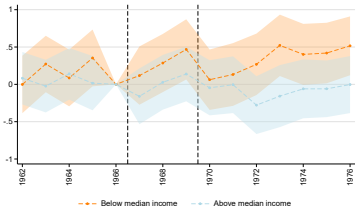
(a) Dropout



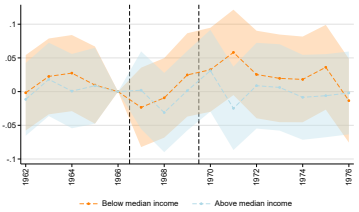
(b) Tertiary track secondary degree

(c) Adult income rank, 35-40

(d) Years employed, 30-40



(e) Ever married

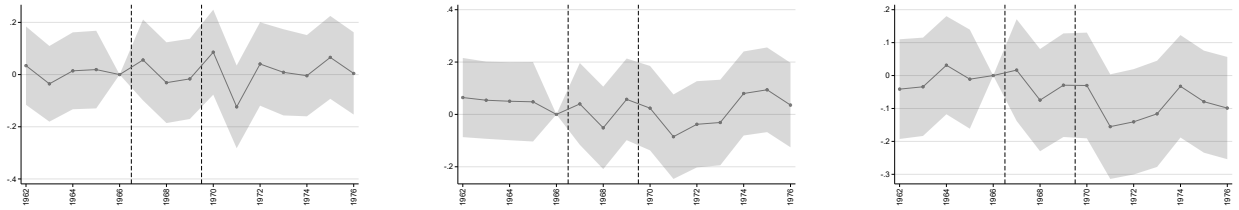


Notes: This figure shows event-study plots which study the treatment effects for children born to families above and below the median household income using the specification from Equation 4. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. All outcomes range from 0-1, with the exception of years of employment between the ages of 30 and 40, which ranges from 0-11. The corresponding differences-in-differences estimates are reported in Table 3.

Figure A.17: Event-study plots of skill outcomes based on family income (Males)

(a) Visual-spatial skills (b) Academic skills (c) Social competence

(d) Visual-spatial skills (e) Academic skills (f) Social competence



Notes: Figures (a)-(c) show event-study plots which study the treatment effects for children born to families above and below the median household income using the specification from Equation 4. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Given that these are our key outcomes, we complement these figures with more parametric versions of the event-study plots (Figures (d)-(f)) where we interact a binary measure of treatment each year with family income percentile, and include measures of family income rank separately for each cohort as covariates. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Skills are measured using data from the Finnish Defence Forces, and standardized to have a mean of zero and standard deviation of one in the base period. The corresponding differences-in-differences estimates are reported in Table 4.

Figure A.18: Event-study plots of adult job characteristics based on family income (Males)

(a) Mean occupation income rank

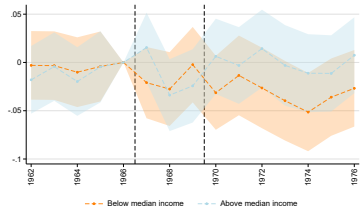
(b) Income rank within occupation

(c) Math task intensity

(d) Social task intensity

(e) Service task intensity

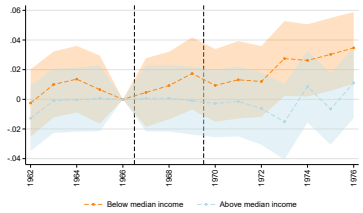
(f) Manual task intensity



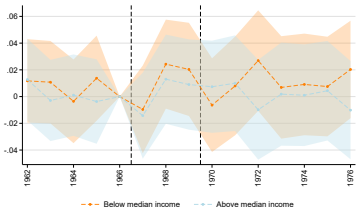
Notes: This figure shows event-study plots which study the treatment effects for children born to families above and below the median household income using the specification from Equation 4. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Mean occupation income rank measures the mean occupational rank (0-1) based on earnings. Income rank within occupation ranges from 0-1 and measures the relative earnings of each individual to others in the same occupation. Task intensities are measured using indices from Deming (2017) and Acemoglu and Autor (2011b), and ranked between 0 and 1. The corresponding differences-in-differences estimates are reported in Table 4.

Figure A.19: Event-study plots of adult job characteristics based on family income (Females)

(a) Mean occupation income rank



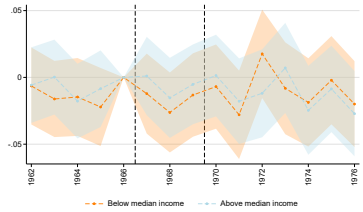
(b) Income rank within occupation



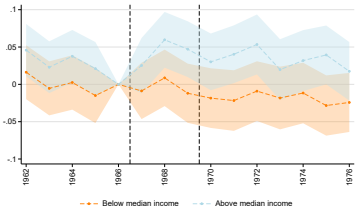
(c) Math task intensity

(d) Social task intensity

(e) Service task intensity

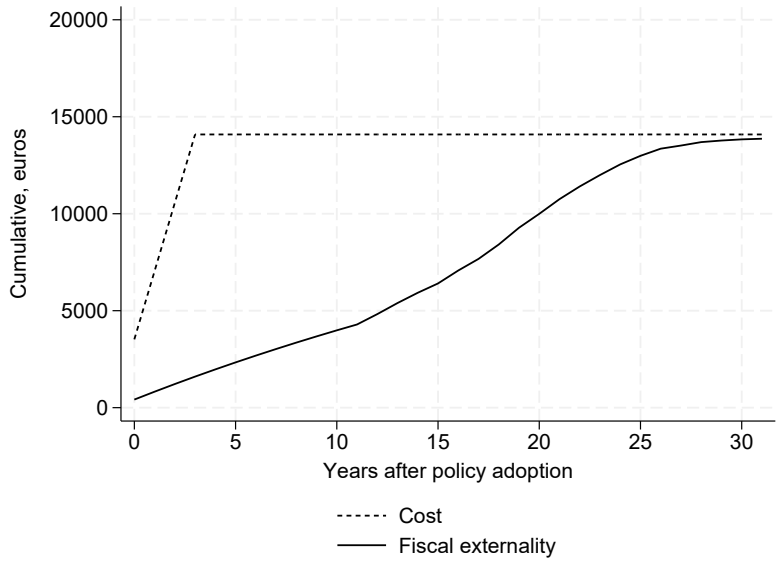


(f) Manual task intensity



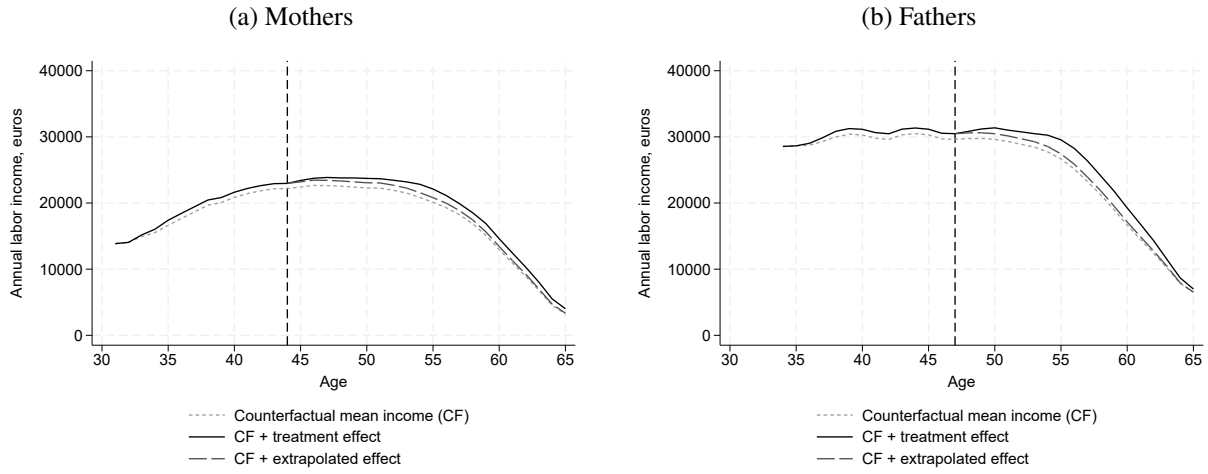
Notes: This figure shows event-study plots which study the treatment effects for children born to families above and below the median household income using the specification from Equation 4. These figures estimate the average treatment effects of public childcare access, comparing cohorts born in the first set of municipalities that gain public childcare following the implementation of the *Childcare law of 1973*, which established the first national childcare program, to cohorts born in municipalities which did not yet have any access to public childcare. Birth cohorts are plotted across the horizontal axis of the figures. The vertical axis of each figure represents units in each outcome. Mean occupation income rank measures the mean occupational rank (0-1) based on earnings. Income rank within occupation ranges from 0-1 and measures the relative earnings of each individual to others in the same occupation. Task intensities are measured using indices from Deming (2017) and Acemoglu and Autor (2011b), and ranked between 0 and 1. The corresponding differences-in-differences estimates are reported in Table 4.

Figure A.20: Costs and fiscal externalities



Notes: Costs include all direct costs involved in childcare provision, including wage expenses, for instance. Fiscal externality is the effect of the policy on government's budget through income taxation. These calculations are used to inform the results in Figure 4.

Figure A.21: Treatment effects and counterfactual earnings using estimates from the data and extrapolating under the assumption of constant effects after year 10



Notes: Figures (a)-(b) illustrate the scaled treatment effects applied to the calculation of the MVPF, and plot the counterfactual mean labor income and counterfactual mean labor income + scaled treatment effect by age for mothers and fathers. The scaled treatment effects by age are based on the life-cycle estimates presented in Figure 3 and further scaled by the difference in childcare coverage between treatment and control municipalities (0.35). For the ages 30-50, the scaled effects are based on the estimates for the family income by child's age as presented in Table A.10, dividing effects on total family income by relative shares between parents at later ages. We use the mean ages for parents at birth in the estimation sample (31 for mothers, 34 for fathers) as the base years. Counterfactual labor income, $\hat{Y}_{age}$, is calculated in the following way: $\hat{Y}_{age} = Y_{age}[FIRST_m = 1, post_t = 0] + \Big(Y_{age}[FIRST_m = 0, post_t = 1] - Y_{age}[FIRST_m = 0, post_t = 0]\Big)$. Furthermore, the counterfactual + extrapolated effect illustrates what would estimates of the life-cycle earnings look like if treatment effects on earnings were assumed to be constant after year 10 – representing a common assumption in studies which can only follow up the sample for 10 years. After year 10, the effects are extrapolated by assuming that the effect magnitude relative to the counterfactual mean stays constant until age 65. The treatment effects in these figures correspond to the effects applied in calculating the policy's net cost using extrapolated estimates in Figure 4b. Age-profiles are smoothed using three-year moving average.

A.2 Tables

Table A.1: Information on childcare teachers in 1980

	Treatment	Control
Age	27.11	29.29
	(11.42)	(9.54)
Male	0.11	0.07
	(0.31)	(0.25)
Married	0.46	0.56
	(0.50)	(0.50)
Kids at home	1.07	0.78
	(1.10)	(1.00)
Childcare-age kids	0.47	0.28
	(0.75)	(0.53)
At least high school	0.88	0.87
	(0.33)	(0.34)
Post-secondary degree	0.80	0.79
	(0.40)	(0.41)
Under the age of 19	0.11	0.06
	(0.31)	(0.24)
Income rank	61.87	64.19
	(15.51)	(14.96)
Months employed	10.02	10.09
	(3.32)	(3.28)
Childcare teachers	256	131
Municipalities	89	140

Notes: This table reports data on childcare teachers for the year 1980, the first year that childcare teachers are included as an occupation distinct from kindergarten teachers.

Table A.2: Associations between skills and tasks

	Visual-spatial	Academic	Social Competence
	(1)	(2)	(3)
	Panel A: Raw correlations		
Social skills	0.24	0.31	0.30
Math	0.30	0.36	0.28
Service	0.16	0.24	0.23
Routine	-0.06	-0.11	-0.13
Manual	-0.28	-0.37	-0.32
	Panel B: OLS coefficients, jointly regressed		
Social skills	0.031	0.498	0.451
	(0.005)	(0.005)	(0.004)
Math	0.157	0.400	0.238
	(0.004)	(0.004)	(0.003)
Service	-0.058	0.368	0.310
	(0.004)	(0.004)	(0.003)
Routine	0.051	-0.146	-0.197
	(0.004)	(0.004)	(0.003)
Manual	-0.019	-0.270	-0.195
	(0.002)	(0.002)	(0.002)
Observations			334,301

Notes: Panel A presents the simple correlations between our main three measures of skills, as measured by the Finnish Defence Forces, and tasks based on measures from Deming (2017) and Acemoglu and Autor (2011b). Panel B reports the coefficients and standard errors from a regressions with skills as the dependent variable, and tasks as the independent variable.

Table A.3: Associations between income rank and tasks

	Adult income rank	
	(1)	(2)
	Panel A: Raw correlations	
Social skills	0.19	
Math	0.35	
Service	0.08	
Routine	0.05	
Manual	-0.26	
	Panel B: OLS coefficients, individually and jointly	
Social skills	0.024	-0.005
	(0.000)	(0.000)
Math	0.060	0.051
	(0.000)	(0.000)
Service	0.012	0.005
	(0.000)	(0.000)
Routine	0.008	0.031
	(0.000)	(0.000)
Manual	-0.076	-0.061
	(0.000)	(0.001)
Adjusted R-squared		0.151
Observations		394,120

Notes: Panel A presents the raw correlations between income rank and occupational task content. Panel B reports the OLS coefficients and standard errors from regressions with income rank as the dependent variable, and task measures as the independent variable. Column 2 of Panel B includes all the task measures as independent variables in a multivariate regression. Tasks are measured following Deming (2017) and Acemoglu and Autor (2011b).

Table A.4: Descriptive data and covariate balance: Child sample

	Males		*Females*	
	Baseline	DiD	Baseline	DiD
	(1)	(2)	(3)	(4)
Mother's education	10.01	0.11	10.01	0.08
	(2.01)	(0.03)	(2.01)	(0.03)
Father's education	10.10	0.15	10.10	0.13
	(2.20)	(0.03)	(2.20)	(0.03)
Mother's age at first birth	23.91	0.05	23.91	-0.01
	(4.46)	(0.07)	(4.46)	(0.07)
Family size	2.06	-0.03	2.06	0.02
	(1.08)	(0.02)	(1.08)	(0.02)
Grandparent present	0.61	-0.03	0.61	-0.04
	(0.49)	(0.01)	(0.49)	(0.01)
Family income percentile	44.66	-0.89	44.66	-0.55
	(27.72)	(0.43)	(27.72)	(0.44)
Municipalities	388	229	388	229
Observations	21,581	72,119	21,581	72,119

Notes: This table reports the pre-period (cohorts 1962-1966) means and standard deviations of background characteristics for the first group of municipalities that receive public childcare after the 1973 *Childcare Law* (Columns 1 and 3 for males and females in the children's sample, respectively). The difference-in-differences estimate of the difference before and after the 1973 *Childcare Law* for treated and comparison municipalities is shown in Columns (2) and (4). These results can be interpreted as a test for balance in the trends in covariates between treatment and comparison municipalities.

Table A.5: Descriptive data and covariate balance: Parent sample

	Mothers			*Fathers*		
	Baseline mean	DiD	p-value	Baseline mean	DiD	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Pre-period income					
Wage income	6,870	225	0.15	16,559.90	192.47	0.43
	(9,619)	(157)		(16,380.60)	(244.54)	
Self-employment income	278	-20	0.74	6,356.74	15.25	0.94
	(2,803)	(60)		(13,069.17)	(210.56)	
Household income percentile	0.44	-0.00	0.66	0.45	-0.00	0.76
	(0.28)	(0.00)		(0.28)	(0.00)	
	Panel B: Demographics					
Years of education	9.94	0.12	0.00	10.07	0.19	0.00
	(1.97)	(0.04)		(2.20)	(0.04)	
Age at birth	31.28	-0.06	0.53	34.18	-0.03	0.80
	(6.46)	(0.10)		(7.21)	(0.12)	
Mother's age at first birth	24.75	0.05	0.54	24.73	0.08	0.33
	(4.86)	(0.08)		(4.81)	(0.08)	
Older siblings	1.87	-0.01	0.79	1.90	-0.01	0.81
	(1.61)	(0.02)		(1.61)	(0.02)	
Individuals	19,702	63,268		18,930	61,300	
Municipalities	89	229		89	229	

Notes: This table reports the pre-period (cohorts 1962-1966) means and standard deviations of background characteristics for the first group of municipalities that receive public childcare after the 1973 *Childcare Law* (Columns 1 and 3 for mothers and fathers in the parent sample, respectively). The difference-in-differences estimate of the difference before and after the 1973 *Childcare Law* for treated and comparison municipalities is shown in Columns (2) and (4). These results can be interpreted as a test for balance in the trends in covariates between treatment and comparison municipalities.

Table A.6: Estimation sample versus full sample: Child outcomes

	Males		*Females*	
	Full	Estimation	Full	Estimation
	(1)	(2)	(3)	(4)
Dropout	0.18	0.17	0.12	0.10
	(0.38)	(0.38)	(0.33)	(0.30)
Tertiary education	0.31	0.29	0.46	0.46
	(0.46)	(0.45)	(0.50)	(0.50)
Income rank at age 35-40	0.56	0.53	0.43	0.41
	(0.31)	(0.31)	(0.26)	(0.25)
Years employed in 30s	8.27	8.34	7.66	7.66
	(2.92)	(2.85)	(2.97)	(2.96)
Ever married	0.60	0.59	0.67	0.67
	(0.49)	(0.49)	(0.47)	(0.47)
Military service	0.81	0.82		
	(0.39)	(0.39)		
Municipalities	463	229	463	229
Individuals	472,591	90,434	455,909	87,374

Notes: This table reports the means and standard deviations of the outcomes for the full and estimation samples in this paper by gender. Results for males are reported in Columns 1 and 2 and results for females are reported in Columns 3 and 4.

Table A.7: Estimation sample versus full sample (parent sample)

	Mothers		*Fathers*	
	Full sample	Estimation	Full sample	Estimation
	(1)	(2)	(3)	(4)
		Panel A: Income		
Wage income	9,020	6,596	22,698	15,933
	(10,608)	(9,596)	(20,034)	(16,015)
Self-employment income	327	263	3,765	5,740
	(3,471)	(3,018)	(12,220)	(12,684)
Family income percentile	0.50	0.43		
	(0.29)	(0.28)		
		Panel B: Demographics		
Years of education	10.49	10.18	10.76	10.22
	(2.36)	(2.11)	(2.62)	(2.24)
Mother's age at first birth	24.48	24.46		
	(4.66)	(4.77)		
Age at birth	29.43	30.37	31.95	33.35
	(6.00)	(6.35)	(6.83)	(7.17)
Sibling rank	2.33	2.61		
	(1.33)	(1.51)		
Grandparent present	0.46	0.59		
	(0.50)	(0.49)		
		Panel C: Sector		
Agriculture	0.15	0.30	0.16	0.33
	(0.36)	(0.46)	(0.37)	(0.47)
Manufacturing or construction	0.29	0.24	0.41	0.34
	(0.45)	(0.42)	(0.49)	(0.47)
Services or other	0.43	0.35	0.37	0.28
	(0.49)	(0.48)	(0.48)	(0.45)
Self employment	0.18	0.32	0.18	0.32
	(0.38)	(0.47)	(0.38)	(0.47)
Municipalities	463	229	463	229
Individuals	337,686	63,268	326,180	61,300

Notes: This table reports the mean and standard deviation of key outcomes of mothers and fathers in the estimation sample as compared to the full population.

Table A.8: Sibling correlations in skills

	Sibling correlation
	Panel A: Main outcomes
Visual-spatial	0.37
Academic	0.47
Social competence	0.34
	Panel B: Cognitive measures
Arithmetic	0.44
Verbal	0.42
Visual-spatial	0.37
	Panel C: Socio-emotional measures
Achievement striving	0.27
Activity energy	0.23
Deliberateness	0.19
Dutifulness	0.24
Leadership motivation	0.33
Self-confidence	0.26
Sociability	0.24
Sibling pairs	69,015

Notes: This table presents the correlations between skills across siblings, using data from the full sample. The key skill indices used in our main estimates are reported in Panel A, while the individual measures of cognitive skills and personality measures are reported in Panels B and C, respectively.

Table A.9: Average treatment effects (ATEs) on family income by child's age

	Baseline mean	ATE	p-value
	(1)	(2)	(3)
Age 3-9	31,608	1,141	0.00
	(22,421)	(363)	
Number of families	38,813	61,207	
Age 10-14	39,310	1,141	0.01
	(24,468)	(414)	
Number of families	37,521	59,304	
Age 15-19	39,068	2,078	0.00
	(25,651)	(441)	
Number of families	35,730	56,437	
Municipalities (max)	89	229	

Notes: Column 1 of this table reports the pre-period means and standard deviations of family income for the first group of municipalities that receive public childcare after the 1973 *Childcare Law*. The difference-in-differences estimate of the difference before and after the 1973 *Childcare Law* for treated and comparison municipalities is shown in Column 2. Corresponding p-values are reported in Column 3. Family income is the sum of wage and self-employment incomes of mothers and fathers. See Figure A.3 for corresponding event-study estimates.

Table A.10: Average treatment effects (ATEs) for parents by child's age

	Mothers			*Fathers*		
	Baseline mean	ATE	p-value	Baseline mean	ATE	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Childcare age			
Wage income	7,301	815	0.00	17,599	1,320	0.00
	(10,223)	(180)		(17,409)	(285)	
Family labor income	31,608	1,178	0.00	32,258	1,134	0.00
	(22,421)	(368)		(22,311)	(369)	
			Panel B: Child's age 10-14			
Wage income	11,201	1,101	0.00	19,954	1,643	0.00
	(11,510)	(208)		(19,011)	(329)	
Family labor income	39,310	1,448	0.00	40,110	1,270	0.00
	(24,468)	(424)		(24,321)	(421)	
			Panel C: Child's age 15-19			
Wage income	12,377	1,176	0.00	18,489	2,009	0.00
	(12,193)	(229)		(19,478)	(346)	
Self-emp. income	2,481	-263	0.02	6,112	-503	0.01
	(6,330)	(114)		(13,607)	(204)	
Labor income	14,857	913	0.00	24,600	1,506	0.00
	(11,681)	(214)		(19,638)	(333)	
Family labor income	39,068	2,440	0.00	39,890	2,332	0.00
	(25,651)	(454)		(25,604)	(450)	
Full-time employment	0.67	-0.00	0.88	0.77	0.03	0.00
	(0.47)	(0.01)		(0.42)	(0.01)	
Individuals	38,804	61,512		35,386	55,837	
Municipalities	89	229		89	229	

Notes: This table reports the baseline mean as well as difference-in-difference estimates of the average treatment effects of access to childcare. Columns (1)-(3) report results for mothers, while columns (4)-(6) report results for fathers. Columns (1) and (4) report the mean of the pre-period outcome in treatment municipalities. Columns (2) and (5) report estimates of average treatment effects of how childcare access affects children's long-term outcomes, following Equation 1. Columns (3) and (6) report the p-values for these estimates. Event-study plots corresponding to these estimates are show in Figures A.4-A.5.

Table A.11: Effects on parents' long-term labor market outcomes: Ages 50-55

	Mothers			*Fathers*		
	Baseline mean	ATE	p-value	Baseline mean	ATE	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Annual mean earnings at age 50-55						
Labor income	15,131	1,392	0.00	24,972	1,509	0.00
	(13,656)	(252)		(19,613)	(364)	
Wage income	13,374	1,173	0.00	19,024	1,970	0.00
	(13,965)	(258)		(20,216)	(373)	
Self-emp. income	1,757	219	0.04	5,948	-461	0.04
	(5,466)	(105)		(12,458)	(223)	
Panel B: Mean employment at age 50-55						
Full-time employment	0.59	0.019	0.01	0.76	0.021	0.00
	(0.46)	(0.007)		(0.39)	(0.007)	
Self-employed	0.22	0.009	0.14	0.29	-0.010	0.19
	(0.40)	(0.006)		(0.44)	(0.008)	
Panel C: Sector of employment at age 50-55						
Agriculture	0.20	0.008	0.19	0.24	-0.012	0.08
	(0.38)	(0.006)		(0.42)	(0.007)	
Manufacturing or construction	0.15	-0.010	0.04	0.29	0.011	0.14
	(0.34)	(0.005)		(0.43)	(0.007)	
Healthcare and teaching	0.18	0.022	0.00	0.05	0.010	0.01
	(0.37)	(0.007)		(0.22)	(0.004)	
Other	0.36	-0.006	0.37	0.36	0.006	0.42
	(0.44)	(0.007)		(0.45)	(0.007)	
Individuals	38,667	61,381		35,468	55,998	
Municipalities	89	229		89	229	

Notes: This table reports the baseline mean as well as difference-in-difference estimates of the average treatment effects of access to childcare. Columns (1)-(3) report results for mothers, while columns (4)-(6) report results for fathers. Columns (1) and (4) report the mean of the pre-period outcome in treatment municipalities. Columns (2) and (5) report estimates of average treatment effects of how childcare access affects children's long-term outcomes, following Equation 1. Columns (3) and (6) report the p-values for these estimates. Event-study plots corresponding to these estimates are show in Figures A.6-A.7.

Table A.12: Parents: task content at age 50-55

	Mothers			*Fathers*		
	Baseline mean	ATE	p-value	Baseline mean	ATE	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Task content			
Math	3.69	0.067	0.00	3.62	0.081	0.00
	(1.24)	(0.022)		(1.10)	(0.021)	
Social	3.59	-0.052	0.11	4.17	-0.045	0.14
	(1.75)	(0.033)		(1.63)	(0.031)	
Service	3.01	0.035	0.26	3.44	-0.01	0.68
	(1.53)	(0.032)		(1.46)	(0.03)	
Manual	5.52	-0.145	0.00	5.30	-0.182	0.00
	(2.17)	(0.037)		(1.92)	(0.037)	
			Panel B: Occupation at age 50-55			
Occupation rank	0.49	0.001	0.60	0.59	0.007	0.02
	(0.16)	(0.002)		(0.16)	(0.003)	
Within-occupation income rank	0.42	0.002	0.71	0.51	-0.004	0.47
	(0.26)	(0.005)		(0.26)	(0.005)	
Individuals	30,664	48,208		29,607	46,863	
Municipalities	89	229		89	229	

Notes: This table reports the baseline mean as well as difference-in-difference estimates of the average treatment effects of access to childcare. Columns (1)-(3) report results for mothers, while columns (4)-(6) report results for fathers. Columns (1) and (4) report the mean of the pre-period outcome in treatment municipalities. Columns (2) and (5) report estimates of average treatment effects of how childcare access affects children's long-term outcomes, following Equation 1. Columns (3) and (6) report the p-values for these estimates. Event-study plots corresponding to these estimates are show in Figures A.8-A.9.

Table A.13: Effects on family income, heterogeneity by family income

	Baseline association	Shift in slope	p-value
	(1)	(2)	(3)
Age 3-9	63,636	287	0.80
	(407)	(1,138)	
Number of families	38,813	61,207	
Age 10-14	47,093	2,345	0.05
	(665)	(1,217)	
Number of families	37,521	59,304	
Age 15-19	47,133	4,352	0.00
	(807)	(1,321)	
Number of families	35,730	56,437	
Municipalities (max)	89	229	

Notes: Column 1 of this table reports the baseline association of family income and treatment efefcts for the first group of municipalities that receive public childcare after the 1973 *Childcare Law*. The difference-in-differences estimate of the shift in this association before and after the 1973 *Childcare Law* between treated and comparison municipalities is shown in Column 2. Corresponding p-values are reported in Column 3. Family income is the sum of wage and self-employment incomes of mothers and fathers.

Table A.14: Effects on divorce and fertility

	Mothers			*Fathers*		
	Baseline mean	ATE	p-value	Baseline mean	ATE	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Married, child age 3-9	0.94	-0.010	0.01	0.98	-0.007	0.05
	(0.24)	(0.004)		(0.12)	(0.003)	
Individuals	39,592	62,511		37,784	59,527	
Married, child age 10-14	0.88	-0.013	0.02	0.95	-0.010	0.03
	(0.32)	(0.005)		(0.21)	(0.005)	
Individuals	39,283	62,257		36,879	58,224	
Married, child age 15-19	0.83	-0.012	0.05	0.92	-0.011	0.04
	(0.38)	(0.006)		(0.27)	(0.005)	
Individuals	38,943	61,757		35,850	56,552	
Number of older children	1.87	0.001	0.95	1.90	0.001	0.95
	(1.61)	(0.021)		(1.61)	(0.021)	
Individuals	39,759	63,268		38,633	61,300	
Municipalities	89	229		89	229	

Notes: This table reports the baseline mean as well as difference-in-difference estimates of the average treatment effects of access to childcare. Columns (1)-(3) report results for mothers, while columns (4)-(6) report results for fathers. Columns (1) and (4) report the mean of the pre-period outcome in treatment municipalities. Columns (2) and (5) report estimates of average treatment effects of how childcare access affects children's long-term outcomes, following Equation 1. Columns (3) and (6) report the p-values for these estimates. Event-study plots corresponding to these estimates are show in Figures A.10.

Table A.15: Effects on parental family outcomes – anchored on oldest child

	Mothers			*Fathers*		
	Baseline mean	ATE	p-value	Baseline mean	ATE	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Married, child age 3-9	0.94	0.008	0.27	0.99	-0.004	0.54
	(0.23)	(0.008)		(0.12)	(0.006)	
Individuals	21,961	34,932		20,554	32,485	
Married, child age 10-14	0.90	0.007	0.42	0.96	-0.004	0.63
	(0.29)	(0.009)		(0.20)	(0.008)	
Individuals	21,829	34,877		20,279	32,221	
Married, child age 15-19	0.86	0.003	0.75	0.93	-0.005	0.54
	(0.34)	(0.010)		(0.25)	(0.008)	
Individuals	21,723	34,722		19,967	31,738	
Number of children	2.24	0.018	0.36	2.25	0.015	0.49
	(1.09)	(0.020)		(1.08)	(0.021)	
Individuals	35,484	56,708		33,887	53,793	
Municipalities	89	229		89	229	

Notes: This table reports the baseline mean as well as difference-in-difference estimates of the average treatment effects of access to childcare. As opposed to Table A.14, this defines treatment cohorts for parents based on the birth year of their oldest – rather than youngest – child. Columns (1)-(3) report results for mothers, while columns (4)-(6) report results for fathers. Columns (1) and (4) report the mean of the pre-period outcome in treatment municipalities. Columns (2) and (5) report estimates of average treatment effects of how childcare access affects children's long-term outcomes, following Equation 1. Columns (3) and (6) report the p-values for these estimates.

Table A.16: Descriptive data and average treatment effects: Skills and job characteristics

	Males			*Females*		
	Baseline mean	ATE	p-value	Baseline mean	ATE	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Adult skills			
Visual-spatial	-0.20	0.014	0.40			
	(1.02)	(0.017)				
Academic	-0.25	0.019	0.27			
	(1.03)	(0.017)				
Social competence	-0.33	-0.008	0.63			
	(1.01)	(0.016)				
Municipalities	88	221				
Individuals	17,553	58,430				
			Panel B: Task content			
Math	0.39	-0.002	0.50	0.36	0.002	0.30
	(0.16)	(0.003)		(0.14)	(0.002)	
Social	0.38	-0.001	0.83	0.43	-0.001	0.79
	(0.22)	(0.004)		(0.18)	(0.003)	
Service	0.29	-0.003	0.30	0.49	-0.002	0.64
	(0.19)	(0.003)		(0.23)	(0.004)	
Manual	0.63	-0.002	0.73	0.45	-0.003	0.55
	(0.30)	(0.005)		(0.25)	(0.004)	
Municipalities	89	229		89	229	
Individuals	39,767	64,340		18,584	69,689	
			Panel C: Occupation income			
Mean occupational income rank	0.61	-0.002	0.59	0.56	0.004	0.15
	(0.23)	(0.003)		(0.19)	(0.003)	
Income rank within occupation	0.48	0.004	0.33	0.39	-0.007	0.15
	(0.28)	(0.004)		(0.26)	(0.005)	
Municipalities	89	229		89	229	
Individuals	63,746	69,689		18,584	69,689	

Notes: This table reports the baseline mean and estimates of the average treatment effects of access to childcare. Columns (1)-(3) report results for males, while columns (4)-(6) report results for females. Columns (1) and (4) report the mean of the pre-period outcome in treatment municipalities. Columns (2) and (5) report estimates of average treatment effects of how childcare access affects children's long-term outcomes, following Equation 1. Columns (3) and (6) report the p-values for these estimates. See Figures A.13-A.14 for corresponding event-study plots.

Table A.17: Treatment effects by family income percentile: Disaggregated skill measures

	Baseline association (1)	Shift in slope (2)	p-value (3)
Visual-spatial	0.626	-0.074	0.14
	(0.035)	(0.050)	
Arithmetic	0.686	-0.165	0.00
	(0.034)	(0.051)	
Verbal	0.631	-0.143	0.00
	(0.034)	(0.050)	
Achievement striving	0.560	-0.137	0.00
	(0.032)	(0.048)	
Activity-energy	0.408	-0.087	0.07
	(0.032)	(0.048)	
Deliberation	0.137	-0.003	0.96
	(0.032)	(0.049)	
Dutifulness	0.439	-0.100	0.04
	(0.031)	(0.048)	
Masculinity	0.029	-0.021	0.68
	(0.032)	(0.050)	
Leadership motivation	0.653	-0.160	0.00
	(0.031)	(0.049)	
Self-confidence	0.502	-0.102	0.03
	(0.032)	(0.047)	
Sociability	0.523	-0.120	0.01
	(0.032)	(0.048)	
Municipalities		229	
Individuals		58,626	

Notes: This table reports the baseline mean and estimates of the average treatment effects of access to childcare, restricting the sample to males for whom we observe data from the Finnish Defence Forces. Column (1) reports the mean of the pre-period outcome in treatment municipalities. Column (2) reports estimates of average treatment effects of how childcare access affects children's long-term outcomes, following Equation 1. Column (3) reports the p-values for these estimates.

Table A.18: Treatment effects on skills by first-born status

	Birth order		*Treatment heterogeneity*			
	Oldest sibling	p-value	Childcare	p-value	X first-born	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Labor market outcomes			
Income rank	0.018	0.00	0.001	0.84	-0.005	0.46
	(0.002)		(0.005)		(0.007)	
Years employed in 30's	0.120	0.00	0.015	0.80	-0.081	0.34
	(0.025)		(0.060)		(0.084)	
Municipalities	229		229			
Individuals	72,139		72,139			
			Panel B: Skill measures			
Visual-spatial	0.140	0.00	0.033	0.16	-0.003	0.92
	(0.010)		(0.023)		(0.032)	
Academic	0.198	0.00	0.025	0.28	0.028	0.39
	(0.010)		(0.023)		(0.032)	
Sociability	0.079	0.00	0.019	0.38	-0.039	0.21
	(0.009)		(0.022)		(0.031)	
Municipalities	221		221			
Individuals	58,626		58,626			
			Panel C: Job characteristics			
Math	0.016	0.00	-0.000	0.98	-0.002	0.71
	(0.002)		(0.004)		(0.005)	
Social	0.018	0.00	0.006	0.25	-0.010	0.14
	(0.002)		(0.005)		(0.007)	
Service	0.012	0.00	-0.002	0.56	0.002	0.76
	(0.002)		(0.004)		(0.006)	
Manual	-0.029	0.00	-0.011	0.12	0.015	0.13
	(0.003)		(0.007)		(0.010)	
Municipalities	229		229			
Individuals	64,977		64,977			

Notes: This table studies the effects of sibship rank on key outcomes we focus on, and then estimates whether there might be heterogeneity in the effects of public childcare access by sibship rank. Column 1 replicates the approach from Black et al. (2018), focusing on the gap between first born sons and their brothers. Column 3-6 study the differential effects of public childcare access for males of different birth orders following Equation 3, but including an interaction between treatment is interacted with being the first-born son rather than family income. Therein, Column 3 represents an estimate of the results for later-born children, where Column 5 is the difference in the average effect and the effect for the oldest born child.

Table A.19: Do effects on skills explain effects on adult income? With full covariates

	β_2	p-value	Share explained
	(1)	(2)	(3)
	Panel A: Baseline specification		
Treatment	-0.024	0.03	
by family income	(0.011)		
	Panel B: Mediation, including skills		
With visual-spatial	-0.021	0.05	0.13
	(0.011)		
With academic	-0.015	0.16	0.37
	(0.011)		
With social competence	-0.013	0.24	0.46
	(0.011)		
Municipalities	221		
Individuals	60,195		

Notes: Analyses in this table study whether effects on skills – measured at age 19 – are capable of explaining the effects on the association between family income and children's adult income rank – measured between the ages of 35 and 40. All analyses are restricted to men for whom we observe data on skills. Panel A reports the treatment effect estimate of how childcare access shapes the association between family income rank and child income rank following Equation 3. Apart from the restriction to males with observable measures of skills, this panel corresponds to Table 3. Panel B reports results from a regression of a similar form to that in Panel A, but includes measures of skills on the right-hand side of the equation as mediating variables. Columns (1) reports the estimate of β_2, which measures the extent that childcare access affects the association between family and child income rank, while Column (2) reports the corresponding p-values for these estimates. Column (3) reports the extent of the reduction in the estimate of β_2 from Panel A, when mediating variables are added to the regression. As explained in Imai et al. (2010), this can be interpreted as the share of the treatment effect explained by the mediating variable. This table corresponds to Table 5, but includes a full set of background characteristics in all regressions.

Table A.20: Effects on the association between family income and children's adult outcomes: Including background covariates

	Males			*Females*		
	Baseline association	Shift in slope	p-value	Baseline association	Shift in slope	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
Dropout	-0.049	0.029	0.09	-0.050	0.003	0.80
	(0.013)	(0.017)		(0.011)	(0.014)	
Tertiary education	0.132	-0.020	0.33	0.138	-0.043	0.06
	(0.015)	(0.021)		(0.017)	(0.023)	
Income rank	0.094	-0.018	0.10	0.065	-0.024	0.02
	(0.008)	(0.011)		(0.007)	(0.010)	
Years employed in 30's	0.774	-0.268	0.04	0.862	-0.119	0.39
	(0.099)	(0.132)		(0.104)	(0.137)	
Ever married	0.077	0.000	0.99	0.058	0.008	0.74
	(0.017)	(0.023)		(0.016)	(0.022)	
Military service	0.082	0.012	0.51			
	(0.015)	(0.018)				
Municipalities		229			229	
Individuals		72,139			69,689	

Notes: This table reports the baseline association between family income rank (0-1) and children's outcomes, as well as difference-in-difference estimates of the average treatment effects of access to childcare. Columns (1)-(3) report results for males, while columns (4)-(6) report results for females. Columns (1) and (4) report the baseline association between family income and each outcome in treatment municipalities. Columns (2) and (5) report estimates of how access to public childcare shifted this association between family income and children's outcomes following Equation 3. Columns (3) and (6) report the p-values for these estimates. As opposed to Table 3, this table includes observable covariates in both the descriptive associations as well as the differences-in-differences estimates.

Table A.21: Effects on the association between family income and skills, tasks, and jobs: Including background covariates

	Males			*Females*		
	Baseline association	Shift in slope	p-value	Baseline association	Shift in slope	p-value
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Effects on skills			
Visual-spatial	0.258	-0.011	0.82			
	(0.039)	(0.049)				
Academic	0.275	-0.087	0.07			
	(0.038)	(0.049)				
Social competence	0.311	-0.094	0.05			
	(0.036)	(0.047)				
Municipalities		229				
Individuals		58,626				
			Panel B: Task content			
Math	0.039	-0.005	0.50	0.026	-0.014	0.04
	(0.006)	(0.008)		(0.005)	(0.007)	
Social	0.050	-0.020	0.05	0.026	-0.007	0.45
	(0.008)	(0.010)		(0.007)	(0.009)	
Service	0.036	-0.020	0.03	0.004	0.012	0.31
	(0.007)	(0.009)		(0.008)	(0.011)	
Manual	-0.078	0.030	0.04	-0.038	0.002	0.87
	(0.011)	(0.015)		(0.009)	(0.013)	
Municipalities		229			229	
Individuals		64,977			64,340	
			Panel C: Occupation income			
Mean occupational income rank	0.064	-0.028	0.00	0.059	-0.006	0.52
	(0.008)	(0.010)		(0.006)	(0.009)	
Income rank within occupation	0.045	0.030	0.02	0.020	-0.030	0.02
	(0.009)	(0.013)		(0.009)	(0.013)	
Municipalities		229			229	
Individuals		72,139			69,689	

Notes: This table reports the baseline association between family income rank (0-1) and children's outcomes – conditional on controls, as well as difference-in-difference estimates of the average treatment effects of access to childcare. In contrast to Table 3, estimates in this table include all observable covariates – including parental education, maternal age at first birth, sibship size, the presence of grandparents. Columns (1)-(3) report results for males, while columns (4)-(6) report results for females. Columns (1) and (4) report the baseline association between family income and each outcome in treatment municipalities. Columns (2) and (5) report estimates of how access to public childcare shifted this association between family income and children's outcomes following Equation 3. Columns (3) and (6) report the p-values for these estimates.

Table A.22: Continuous treatment version: Labor market outcomes

	Males				*Females*			
	No controls	p-value	Controls	p-value	No controls	p-value	Controls	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dropout	0.130	0.01	0.085	0.09	-0.016	0.69	-0.041	0.32
	(0.050)		(0.050)		(0.041)		(0.041)	
Tertiary education	-0.184	0.00	-0.086	0.17	-0.076	0.27	0.018	0.79
	(0.064)		(0.062)		(0.070)		(0.068)	
Income rank	-0.067	0.04	-0.050	0.12	-0.088	0.00	-0.066	0.03
	(0.033)		(0.033)		(0.031)		(0.031)	
Years employed in 30's	-0.656	0.08	-0.660	0.07	-0.345	0.40	-0.278	0.50
	(0.371)		(0.371)		(0.412)		(0.411)	
Ever married	-0.013	0.84	0.010	0.88	-0.005	0.94	0.008	0.90
	(0.067)		(0.067)		(0.067)		(0.067)	
Military service	0.017	0.76	-0.001	0.98				
	(0.055)		(0.055)					
Municipalities	229		229		229		229	
Individuals	72,139		72,139		69,689		69,689	

Notes: This Table studies the effects of public childcare access on the shift in association between family income and children's outcomes, but replaces the treatment indicator from a binary to a continuous variable measuring the share of children aged 3-6 (0-1) who there are public childcare seats available for in each municipality each year. As this continuous measure of treatment is then interacted with family income percentile (0-1), interpreting the magnitudes of treatment effects is not trivial. Columns 1-4 report results for males, where columns 5-8 report results for females. Columns 1-2 and 5-6 report results from a specification with no additional controls for family background, while Columns 3-4 and 7-8 report results including the full set of covariates – including parental education, maternal age at first birth, sibship size, the presence of grandparents. Table 3 is otherwise similar, but defines treatment using a binary indicator.

Table A.23: Continuous treatment version: Skills and job characteristics

	Males				*Females*			
	No controls	p-value	Controls	p-value	No controls	p-value	Controls	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Panel A: Effects on skills				
Visual-spatial	-0.358	0.02	-0.163	0.27				
	(0.151)		(0.147)					
Academic	-0.466	0.00	-0.214	0.14				
	(0.151)		(0.145)					
Social competence	-0.577	0.00	-0.377	0.01				
	(0.141)		(0.138)					
Municipalities	229		229					
Individuals	58,626		58,626					
				Panel B: Task content				
Math	-0.030	0.20	-0.004	0.85	-0.034	0.09	-0.014	0.47
	(0.024)		(0.023)		(0.020)		(0.020)	
Social	-0.091	0.00	-0.055	0.07	-0.045	0.09	-0.017	0.53
	(0.031)		(0.030)		(0.027)		(0.027)	
Service	-0.086	0.00	-0.056	0.04	-0.028	0.43	-0.016	0.64
	(0.028)		(0.027)		(0.035)		(0.035)	
Manual	0.144	0.00	0.080	0.06	0.071	0.06	0.038	0.31
	(0.044)		(0.043)		(0.038)		(0.037)	
Municipalities	229		229		229		229	
Individuals	64,977		64,977		64,340		64,340	
				Panel C: Occupation income				
Mean occupational income rank	-0.071	0.01	-0.055	0.05	-0.032	0.23	-0.012	0.65
	(0.028)		(0.028)		(0.026)		(0.026)	
Income rank within occupation	0.031	0.42	0.036	0.34	-0.103	0.01	-0.102	0.01
	(0.038)		(0.038)		(0.040)		(0.040)	
Municipalities	229		229		229		229	
Individuals	72,139		72,139		69,689		69,689	

Notes: This Table studies the effects of public childcare access on the shift in association between family income and children's outcomes, but replaces the treatment indicator from a binary to a continuous variable measuring the share of children aged 3-6 (0-1) who there are public childcare seats available for in each municipality each year. As this continuous measure of treatment is then interacted with family income percentile (0-1), interpreting the magnitudes of treatment effects is not trivial. Columns 1-4 report results for males, where columns 5-8 report results for females. Columns 1-2 and 5-6 report results from a specification with no additional controls for family background, while Columns 3-4 and 7-8 report results including the full set of covariates – including parental education, maternal age at first birth, sibship size, the presence of grandparents. Table 4 is otherwise similar, but defines treatment using a binary indicator.

Table A.24: Robustness to regional trends: Labor market outcomes

	Males				*Females*			
	Regional trends	p-value	Within municipality	p-value	Regional trends	p-value	Within municipality	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dropout	0.054	0.00	0.051	0.00	0.019	0.17	0.020	0.17
	(0.017)		(0.018)		(0.014)		(0.015)	
Tertiary education	-0.065	0.00	-0.062	0.01	-0.083	0.00	-0.075	0.00
	(0.022)		(0.022)		(0.024)		(0.024)	
Income rank	-0.023	0.04	-0.023	0.05	-0.033	0.00	-0.030	0.00
	(0.011)		(0.012)		(0.010)		(0.011)	
Years employed in 30's	-0.197	0.14	-0.287	0.04	-0.122	0.38	-0.117	0.41
	(0.134)		(0.138)		(0.139)		(0.144)	
Ever married	-0.010	0.68	-0.010	0.67	0.001	0.95	0.006	0.81
	(0.023)		(0.024)		(0.023)		(0.023)	
Military service	0.006	0.72	0.006	0.76				
	(0.018)		(0.018)					
Municipalities	229		229		229		229	
Individuals	72,139		72,139		69,689		69,689	

Notes: This studies the sensitivity of results by family income (Table 3) to various regional trends. Columns 1-2 and 5-6 include additional fixed effects for the broader sub-region each municipality is in, interacted with year. Columns 3-4 and 7-8 add year-by-municipality fixed effects to absorb all potential municipality changes not associated with the introduction of childcare.

Table A.25: Robustness to regional trends: Skills and job characteristics

	Males				*Females*			
	Regional trends	p-value	Within municipality	p-value	Regional trends	p-value	Within municipality	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Panel A: Effects on skills				
Visual-spatial	-0.083	0.10	-0.072	0.17				
	(0.051)		(0.053)					
Academic	-0.179	0.00	-0.181	0.00				
	(0.051)		(0.053)					
Social competence	-0.167	0.00	-0.164	0.00				
	(0.049)		(0.051)					
Municipalities	229							
Individuals	58,626							
				Panel B: Tasks				
Math	-0.018	0.03	-0.014	0.10	-0.022	0.00	-0.024	0.00
	(0.008)		(0.008)		(0.007)		(0.007)	
Social	-0.035	0.00	-0.037	0.00	-0.017	0.06	-0.016	0.08
	(0.011)		(0.011)		(0.009)		(0.009)	
Service	-0.029	0.00	-0.031	0.00	0.006	0.59	0.013	0.28
	(0.010)		(0.010)		(0.012)		(0.012)	
Manual	0.053	0.00	0.055	0.00	0.011	0.39	0.013	0.31
	(0.016)		(0.016)		(0.013)		(0.013)	
Municipalities	229		229		229		229	
Individuals	64,977		64,977		64,340		64,340	
				Panel C: Job				
Mean occ. inc. rank	-0.031	0.00	-0.032	0.00	-0.014	0.12	-0.015	0.10
	(0.010)		(0.010)		(0.009)		(0.009)	
Inc. rank within occ.	0.025	0.06	0.027	0.04	-0.029	0.04	-0.022	0.11
	(0.013)		(0.014)		(0.014)		(0.014)	
Municipalities	229		229		229		229	
Individuals	72,139		72,139		69,689		69,689	

Notes: This studies the sensitivity of results by family income (Table 4) to various regional trends. Columns 1-2 and 5-6 include additional fixed effects for the broader sub-region each municipality is in, interacted with year. Columns 3-4 and 7-8 add year-by-municipality fixed effects to absorb all potential municipality changes not associated with the introduction of childcare.

Table A.26: Male estimation sample outcomes by the availability of skill data

	Skill data (1)	No skill data (2)
Dropout	0.16	0.26
	(0.36)	(0.44)
HS graduate	0.28	0.28
	(0.45)	(0.45)
Tertiary education	0.30	0.27
	(0.46)	(0.44)
Years of education	12.58	12.24
	(2.27)	(2.53)
Income rank at age 35-40	0.54	0.46
	(0.30)	(0.33)
Years employed in 30s	8.58	7.28
	(2.57)	(3.69)
Ever married	0.60	0.52
	(0.49)	(0.50)
Skill data exists	1.00	0.00
	(0.00)	(0.00)
Municipalities	223	229
Individuals	73,999	16,435

Notes: This table estimates the mean and standard deviations of outcomes for the individuals in our sample with (Column 1) and without (Column 2) skill data.

Table A.27: Treatment effects by family income percentile: Missingness in skill data

	Restricted sample (1)	Missings as low (2)	Missings imputed (3)	Missings as high (4)
	Panel A: Effects on education, marriage, and the labor market			
Dropout	0.032			
	(0.018)			
Tertiary education	-0.021			
	(0.023)			
Income rank	-0.017			
	(0.011)			
Years employed in 30's	-0.142			
	(0.129)			
Ever married	-0.003			
	(0.025)			
		Panel B: Effects on skills		
Visual-spatial	-0.008	0.019	-0.021	-0.029
	(0.049)	(0.054)	(0.041)	(0.052)
Academic	-0.088	-0.050	-0.090	-0.097
	(0.049)	(0.053)	(0.042)	(0.053)
Social competence	-0.102	-0.048	-0.084	-0.082
	(0.048)	(0.052)	(0.040)	(0.052)
Municipalities	221	229	229	229
Individuals	58,435	72,139	72,139	72,139

Notes: This studies the sensitivity of results by family income (Table 4) to potential non-random missingness in the measures of adult-skills from the Finnish Defence Forces. Column 1 re-estimates the results in Table 3, but this time restricts the sample to individuals for whom we observe data on skills. Columns 2-4 impute missing data in different ways in an attempt to bound the results with missingness in mind. Column 2 replaces all missing values of skills with the lowest observed values of those skills. Column 3 replaces all missing values using regression-based predictions of skills triangulating from observed background covariates. Column 4 replaces all missing values with the highest observed values of those skills.

A.3 Data details

Our measures of skills come from the The Finnish Defence Forces. These data include measures of cognitive skills (arithmetic, verbal skills, and visual-spatial skills) as well as socio-emotional skills (achievement striving, activity energy, deliberation, dutifulness, leadership motivation, self-confidence, and sociability) measured upon conscription at age 19 through a battery of tests and surveys. Researchers are only able to able to access the raw composite scores, not the items or item level data. The Finnish Defence Forces report that the Cronbach alphas for the set of cognitive skills ranges between 0.76 and 0.88 and socio-emotional skills ranges between 0.6 and 0.9, but do not allow researchers to see which skills are measured with which reliabilities. The following descriptions of the different dimensions measured can be found in Nyman et al. (2007) and Jokela et al. (2017).

Arithmetic reasoning. Arithmetic reasoning is measured through numeric pattern completion, solving verbal problems, simple arithmetic operations, and choosing relationships between numbers.

Verbal reasoning. This test measures verbal abilities, focusing on the definitions of words, as well as relationships between words.

Visual-spatial skills. This test measures pattern recognition and matrix completion in a manner similar to Raven's Progressive Matrices.

Achievement striving. 24 items measuring the extent that an individual wants to perform well and achieve socially valued life goals. This measure includes questions aimed at revealing the extent a person is ready to make sacrifices to achieve success.

Activity energy. 28 items measuring the way that individuals approach their day to day activities, including how fast or vigorously someone gets things done, and preferences for fast-paced work.

Deliberation. 26 items measuring the extent that some plans ahead rather than acts in the moment, related to for example, a person's ability to save money rather than spend it right away.

Dutifulness. 18 items measuring the degree that someone follows social norms, for example if they would return incorrectly given change at the store.

Leadership motivation. 30 items measuring people's preferences for taking charge in group situations and abilities to influence others.

Masculinity. The degree that people exhibit steoretypically masculine preferences.

Self-confidence. 32 items measuring a person's self-esteem and beliefs regarding their own abilities. Two examples of underlying concepts are whether a person feels as if they are as good and able as others, and whether the person can meet other people's expectations

Sociability. 27 items measuring a person's gregariousness and preference for socialization. These include measures such as a person's preference for hosting parties and not withdrawing from social events.

A.4 Social competence as an organizing concept

In this paper we are interested in how public childcare might shape the social and emotional skills of children aged between three and six years old. The literature in child development and psychology provide an important base from which to approach the potential effects such an intervention may have. We outline the relevant literature from child development here, and show how these concepts may be incorporated into an economics framework in the context of this paper.

The importance of early childhood is documented in prior research across a wide range of disciplines including economics, psychology and child development, as well as sociology (Duncan et al., 1994, 2010; Currie and Almond, 2011; Black et al., 2017). In a recent overview of the science of child development, Black et al. (2017) suggest that childhood is a period consisting of ordered stages in which perceptual, motor, cognitive, language, socio-emotional, self-regulation, and cultural skills develop through a rich series of interactions. They explain that several factors can affect the development of these skills, including play, socialization, responsive caregiving and early learning.

For children three to six, the literature on child development has long emphasized that how children are socialized shapes their behavior in later years (Erikson, 1950; Piaget, 1954; Baumrind, 1967). The treatment we study is exposure to public childcare between the ages of three and six. While we might expect public childcare itself to be relatively constant in our context, the family environment or other type of informal care which public childcare substitutes for may vary drastically. And, understanding the role of public childcare involves understanding how it may potentially substitute for this informal childcare option, often in the family (Clarke-Stewart et al., 1994; Busch-Rossnagel and Knauf-Jensen, 1995; Maccoby and Lewis, 2003; Csibra and Gergely, 2009). Moreover, as has been long understood, the family presents not only the likely counterfactual for public childcare, but also the first place where young children are socialized (Clausen, 1966). As such, the actual treatment we study is likely to vary at the family level and be defined by the difference in early childhood environments between informal or home care and public childcare.

Waters and Sroufe (1983) argue that social competence – the ability to recruit personal and interpersonal resources in the context of goal achievement – is the central organizing construct of early childhood. Since then, social competence has played an important organizing role in early childhood research (Campbell et al., 2000; Denham et al., 2003; Vaughn et al., 2009). Vaughn et al. (2009) describe that social competence consists of three parts: i) behavioral and cognitive skills for successful goal achievement with social contexts; ii) the ability to discover the goals of interactive peers; iii) the understanding of a child's relative value as a preferred playmate. For example, focusing on parents, Pomerantz et al. (2005) highlight the role of parental socialization as a determinant of how children approach achievement, and Gunderson et al. (2013) describe one nice example of how such skills might develop, focusing on how parental praise can lead to persistent

improvements the self-confidence and particularly motivation of young children still several years after treatment. Phillips et al. (1987) emphasize verbal interactions between caregivers and children more broadly in childcare settings. Another potential mechanism behind the development of social skills in childcare is simply the informal interactions between children themselves. The role of peer interactions in formal and informal contexts in early childhood and elementary school has been a large area of research (see, for example, Ladd 1990; Coolahan et al. 2000; Chetty et al. 2022a,b).

In turn, social competence – through motivation in social contexts – may shape other learning outcomes (Dweck, 1986). Of course, in addition to shaping a child's social competence, early childhood socialization may directly affect other areas of learning such as verbal skills (Hart and Risley, 1995).

A.5 Life-cycle skill development, a framework

As has been noted in the prior literature in economics, the way early experiences may affect later outcomes is not necessarily obvious. We formalize key points using a multi-period model of childhood investment as laid out in the prior literature (Becker and Tomes 1986; Heckman 2006; Cunha and Heckman 2010; Heckman et al. 2013). People's skills (θ) across various dimensions (k) develop over multiple periods of childhood and adolescence ($t \in 1, 2, ..., T$)—shaping various adult (A) outcomes. Skill development in one period is a function of household investments (H)[10], public investments (D), and skills in the prior period such that,

$$\theta_{k,t+1} = f_{t,k}(H_{k,t}, D_{k,t}, \theta_{k,t}).$$

Self productivity. Higher levels of skills in one period may allow for more efficient learning of the same skill in later periods, suggesting that the possibility for effects of childhood investments measured at later stages to be larger than those measured initially.

$$\frac{\partial f_{k,t}(H_{k,t}, D_{k,t}, \theta_{k,t})}{\partial \theta_{k,t}} > 0$$

Dynamic complementarity. Individuals with greater early childhood skills in one domain may be more efficient in learning other types of skills later (say in elementary school). This idea highlights the potential for initial effects in one area to result in later effects in others, and stresses the highly interactive nature of skill investments across periods. This is referred to as dynamic complementarity

[10]While children themselves may be unlikely to make consequential investment decisions in early childhood, we consider the household to include the child themselves—whose own investments become more consequential in later years.

between investments in one skill (k) and the development of other skills (l) in later periods:

$$\frac{\partial^2 f_{k,t}(H_{k,t}, D_{k,t}, \theta_{k,t})}{\partial D_{k,t} \partial \theta_{l,t}} > 0$$

Endogenous investments and substitution. Additionally, we might imagine that household and public investments are endogenously determined.[11] Accordingly, households may react to public investments in childcare by changing their own investment behavior - potentially substituting away from other forms of childcare:

$$H_{k,t+1} = f(H_{k,t}, D_{k,t}, \theta_{k,t})$$

$$D_{k,t+1} = g(H_{k,t}, D_{k,t}, \theta_{k,t})$$

Skills, education, and the labor market. Lastly, educational attainment is a function of skills as well as household and public investments. Following seminal models in education and labor economics, we consider labor market performance to be a function of education (Becker, 1962; Mincer, 1974) potentially in addition to the direct effect of skills on labor market outcomes (Deming, 2017; Papageorge et al., 2019; Izadi and Tuhkuri, 2024).

$$E_{k,t+1} = f(\theta_{k,t}, H_t, D_t)$$

$$Y_{k,t+1} = f(E_t, \theta_{k,t})$$

Empirical implications. Thus, an empirical implication of the above model is that if changes in some skill $\theta_{k,t}$ are part of the reason we see effects on a long-term outcome $Y_{k,t+1}$, it should be the case that the people who experience effects on the long-term outcome also experience effects in that particular skill:

$$corr[(\frac{\partial \theta_k}{\partial D})_i, (\frac{\partial Y}{\partial D})_i] \neq 0$$

An important note, here, is that this correlation can be different from zero even if some particular skill (θ_{kt}) does not causally drive the the effects on Y. It could, for example, be that some skill adjacent to k is driving the effect, and we simply happen to observe the effect on k. Likewise, since it is not necessarily some particular skill (k) that shifts Y, it is possible for effects on multiple skills (k, l, m) to all be correlated with the effect on Y such that the sum of these correlations is greater than one.

[11] If households are more nimble to respond to public provision than the government is in responding to household provision, the function (f) may include an additional term for same-period public investment ($D_{k,t+1}$).

In the context we study – where public investment in early childhood (D) changes – this framework suggests the following points: i) public investments in early childhood can shift skill development in specific domains, and affect the level of these skills at different points in time; ii) skills acquired in one domain (say social competence) can shape the productivity of later investments in other domains (say verbal skills); iii) changes in public investments in early childhood may affect household investments in skills; iv) skills and education may have distinct effects on labor market outcomes; v) since childcare investments are endogenously determined (by both municipalities and households), the relationship between household or public investments in childcare and later outcomes is not identified by a cross-sectional comparison of households accessing public childcare with those that do not.