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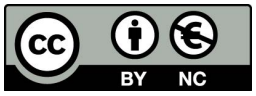

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Timing of early childcare take-up in Germany: An application of rational choice theory

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Abstract

Objective: This study investigates some of the mechanisms, which may explain social inequalities in the usage of early childhood education and care (ECEC) by focusing on a recently born child cohort born in Germany, a universal childcare regime.

Background: Research recognizes rational cost–benefit considerations as important for understanding social inequalities in educational decisions. Yet, given data limitations, we know relatively little about how these considerations are associated with inequalities in ECEC take-up. Thus, we model the decision to use ECEC as a rational cost–benefit investment strategy, which simultaneously affects the human capital of mothers and children.

Method: We test our assumptions with data from the newborn cohort of the National Educational Panel Study (NEPS), estimating the timing of first entry into ECEC, using discrete-time event history models ($N = 3257$).

Results: Results indicate that cost–benefit calculations are relevant for the timing of ECEC take-up, but do not explain social differences. Mothers who perceive ECEC as an investment in child development, and as an opportunity to maintain their own employment status use ECEC earlier. This association is particularly pronounced for more highly educated mothers.

Conclusion: Findings highlight mothers' awareness of future educational returns for ECEC decisions. Additionally, they illustrate the importance of the cultural and structural context for these decisions.

KEYWORDS

child care, decision-making, early childhood, inequalities, longitudinal research, social class

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INTRODUCTION

Social inequalities in educational participation are a worldwide phenomenon. In the course of educational expansion, they seem to have declined and changed their patterns over the last decades, but they are still widespread and visible today (OECD, 2018). There is a rich tradition of theoretical frameworks which aim at explaining these inequalities in educational attainment (e.g., Bourdieu, 1986; Breen & Goldthorpe, 1997; Coleman, 1988). Rational choice theory (RCT) is one of these theories. Even if not identical in their particulars, all models are based around the central constructs of benefits, costs and success probabilities within the educational system (Breen & Goldthorpe, 1997; Erikson & Jonsson, 1996). RCT explains systematic differences in educational decisions between different social groups by pointing out differences in the perception of these parameters. A large body of research has provided ample evidence to support these assumptions, in particular on branching points in school where tracking happens.

Educational processes before school entry have been analyzed less often, probably because they are less institutionalized. However, that has changed over the past years. Almost all European countries increased expenditures on and provision of early childhood education and care (ECEC) (Kulic et al., 2019; OECD, 2017). Despite these investments, not all children seem to profit equally from ECEC. Previous research shows that the use of ECEC is socially stratified across Europe (Pavolini & van Lancker, 2018; van Lancker & Ghysels, 2016) and the United States (Coley et al., 2014; Magnuson & Waldfogel, 2016). The micro mechanisms in family decision-making which lead to these early social disparities are not yet completely understood.

This study seek to address this gap by adopting assumptions of sociological RCT (e.g., Breen & Goldthorpe, 1997) to explain inequalities in the timing of ECEC enrolment. We examine whether such inequalities can be explained by different perceptions of costs and benefits for mothers and children. Furthermore, by considering the German institutional and cultural context we investigate whether effects of rational choice (RC) parameters vary among different social groups. Here, we focus on disparities between less and highly educated mothers as well as East and West German born mothers. Our study draws on the newborns study of the National Educational Panel Study (NEPS) (Hachul et al., 2019), which comprises children born in Germany in 2012 (https://doi.org/10.5157/NEPS:SC1:4.0.0). Whereas previous studies had to rely on objective indicators of ECEC costs and benefits, we directly relate to mothers' subjective perceptions of these. We explicitly focus on ECEC for children under three, because for this age group, ECEC participation is socially more selective than at higher ages.

PREVIOUS RESEARCH

From a social investment perspective, high-quality ECEC is considered as an effective means of reducing social inequalities. Its provision is expected to increase maternal employment rates and to benefit the cognitive and non-cognitive development of young children, especially from potentially disadvantaged families (for a recent overview, see van Huizen & Plantenga, 2018).

However, ECEC take-up is unequally distributed. Research findings showed Matthew effects of ECEC participation in the United States (Bainbridge et al., 2005; Magnuson & Waldfogel, 2016), in Europe (Pavolini & van Lancker, 2018; van Lancker & Ghysels, 2016) as well as in Germany (Jessen et al., 2020), according to which policy reforms favor better-off families instead of achieving their aim to reduce social inequalities. Thus, children from a disadvantaged background attended ECEC less than children living in more advantaged families. This disparity was also found in the timing of ECEC take-up (Campbell et al., 2018).

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A first dimension of social inequalities in ECEC take-up is parental educational attainment. Higher maternal education indicated higher rates and earlier ECEC take-up (Augustine et al., 2009; Coley et al., 2014; van Lancker & Ghysels, 2016), was positively associated with greater use of non-formal educational activities (Schober & Spiess, 2013), as well as more developmental care activities and more parental time inputs with children (Altintas, 2016; Dotti Sani & Treas, 2016; Kalil et al., 2012). These results are consistent with McLanahan's (2004) argument of "diverging destinies," which explains the increasing social divide of children in the United States and some European countries with growing dissimilarities in childcare investments between more- and less-educated parents.

Parental education is closely connected to family income, which is a second important predictor for the usage of ECEC, especially for younger children (Coley et al., 2014; Ertas & Shields, 2012; Petitclerc et al., 2017). Particularly in US context, lower-income families were more likely to rely on care by relatives or home care arrangements receiving lower quality of childcare (Bainbridge et al., 2005; Coley et al., 2014; NICHD ECCRN, 2004). Due to an extensive offer of subsidized programs research in the Anglo-American context pointed often to a curvilinear relationship between family income and ECEC participation (Dowsett et al., 2008; NICHD ECCRN, 1997). In Germany, children from low-income families and recipients of social assistance had significantly lower attendance rates than children from higher-income families (Schober & Spiess, 2013), indicating that higher opportunity costs of staying at home enhance ECEC enrolment.

Differences in parental attitudes might explain some part of the social gap in ECEC take-up. Several studies showed that cultural norms differed along educational lines with less traditional attitudes towards gender roles and motherhood more common among highly educated mothers (Crompton & Lyonette, 2006; Davis & Greenstein, 2009). Parents with more traditional attitudes were less likely to work and use ECEC services (Fortin, 2005; Steiber & Haas, 2012).

Socio-economic differences might be a result of both attitudes and access, which depends on policy context, information and knowledge. A large body of studies investigated the impact of ECEC provision on maternal employment, finding a positive, albeit sometimes small, impact of lower fees and greater availability of ECEC services (for an overview, cf. Morrissey, 2017). However, low affordability of high-quality ECEC services, such as in the United States, the Netherlands, the United Kingdom or Switzerland, contributed to social inequalities in ECEC take-up. In countries with publicly subsidized ECEC, where demand for ECEC exceeds supply, such as Germany (Gambaro et al., 2014; van Lancker & Ghysels, 2016), higher educated parents had advantages as well because they were typically better informed, were able to rely on more competent social networks and are better equipped to secure ECEC places (Becker & Schober, 2017; Stahl et al., 2018). They also employed more effective search strategies and started their search much earlier (Vandenbroeck et al., 2008).

In sum, research shows that ECEC take-up and timing is socially stratified in industrialized countries. Previous studies have mostly examined objective parental resources, preferences, and opportunity structures to explain these disparities. Our study contributes to the research by focusing on the decision-making process of ECEC take-up. We ask whether mothers decide rationally about ECEC enrolment, taking their own, as well as their children's, human capital into account. To this end, we measure mothers' evaluations of ECEC cost and benefit considerations, and investigate whether these calculations explain social inequalities in ECEC enrolment. By using panel data, we are able not only to consider inequalities in participation in ECEC, but also in the timing of first enrolment. Furthermore, we extend previous research by examining how the effects of cost–benefit considerations on ECEC enrolment interact with educational, social and cultural contexts. To this end, we use the unique case of West and East Germany.

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THEORETICAL FRAMEWORK

Modeling ECEC enrolment as rational decision

Sociological frameworks of rational educational decisions (e.g., Breen & Goldthorpe, 1997) have been designed for explaining social inequalities in educational take-up. They model systematic social differences in parental decisions regarding the educational transitions of their children, that is, deciding whether their children should stop or continue with their education. These frameworks start from the premise that, due to imperfect information, it is not accurate costs of and returns from education, but an approximate idea of these that matters for decision-making. Theory expects that different endowments with economic and social resources, which are reflected in families' social status, lead to different perceptions of success prospects, costs and returns from investing in education and, in turn, to systematic social differences in educational attainment. Aside from financial expenditures and returns, these theories also expect non-economic costs and benefits to influence educational decision-making. In particular, they consider the motive to maintain a family's social status as the most important non-economic return from education (Erikson & Jonsson, 1996).

We argue that the assumptions of sociological RCT may be transferred to parental decisions regarding ECEC. These decisions may be framed as rational investments in the human capital of parents, in particular mothers, and children. There are three main reasons for this application: first, in most highly developed industrialized countries there is a choice between different care arrangements in early years. Second, similar to other educational decisions, ECEC decisions are based on calculations of perceived costs and benefits. Third, ECEC decisions are characterized by systematic differences in the assessments of costs and benefits between social status groups. By distinguishing between objective resources and subjective perceptions, sociological RCT models account for imperfect information—an aspect which has been used in alternative theories that criticize the framing of ECEC participation as rational choice (Chaudry et al., 2010; Meyers & Jordan, 2006). Regarding ECEC decisions, however, there are two crucial differences compared to later educational decisions. First, because participation in ECEC does not result in certification or grades, success expectations do not have to be considered. Second, decisions on ECEC affect not only children, but also their parents and mostly mothers.

Cost–benefit perceptions

Taking the gendered division of labor in modern societies into account, parental consequences affect mothers more than fathers. The ability to hand over care responsibilities to others means that mothers benefit from returning to employment earlier, maximizing their incomes faster and minimizing career penalties. ECEC might help realize this aim better than informal care by relatives, because mothers can rely on consistent opening hours. Due to higher previous investments in education high-status mothers should expect stronger employment benefits from ECEC usage than low-status mothers.

ECEC participation may be also beneficial for the child's future education. In particular today, ECEC is viewed more and more as investment in early education (OECD, 2017). Hence, if parents share this view, they might decide for earlier ECEC enrolment. It is reasonable to assume that these processes of societal and institutional change have not been adopted by all groups in the population to the same degree. According to the diffusion-of-innovations approach (Strang & Meyer, 1993), it is mostly younger, high-status groups that change their attitudes first, before these changes diffuse to other groups.

ECEC investments also imply different types of costs. Maternal opportunity costs of caring for their children themselves relate to forgone earnings and the risk of qualification losses, as

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discussed above. In contrast to later educational decisions, participating in ECEC obviously does not involve opportunity costs for children.

Direct costs relate to monetary expenditures for ECEC, which differ strongly throughout Europe and the United States, according to the amount of state subsidies and policies to guarantee a universal ECEC system available to all families. Because expenditures for ECEC act as a tax on income, universal state-subsidized ECEC effectively raises mothers' net revenue from employment. In market-based ECEC systems, this kind of return is lower and depends on the share of ECEC costs in maternal income. Even in subsidized systems, parental expenditures may increase if availability of ECEC is restricted, because then parents have to switch to more expensive private providers. Hence, financial cost perceptions affect parental decision-making, and in general parents with less monetary resources perceive ECEC costs more negatively than parents with more resources. The precise weight and impact of monetary cost considerations, however, is strongly dependent on institutional context.

Social costs might be incurred if mothers anticipate a discrepancy between social norms in their surroundings about the "ideal" entry age of children into ECEC and their preferred work-care arrangements. Social norms regarding mothers' care responsibilities vary throughout European countries, and the United States, but in general these norms are stronger the younger children are (Collins, 2019, 2021). Hence, mothers who intend to enroll their children earlier in ECEC than most others in their social context might experience a conflict between their own behavior and the cultural ideals of mothering. Because care-work ideals of less educated groups have been shown to be more traditional (Davis & Greenstein, 2009), we expect lower-status mothers to perceive higher social costs when enrolling their child in ECEC relatively early, compared to higher-status mothers.

Taken together, our expectations start from the well-documented observation that high-status families enroll their children earlier in ECEC than low-status families. RCT models make two central assumptions which contribute to explaining these effects. First, social status systematically influences the perception of educational decisions' costs and benefits. Second, they assume that these perceptions are crucial for decision-making and therefore result in dissimilar ECEC decisions. Accordingly, we expect that mothers' subjective cost–benefit perceptions significantly mediate the effect of their social status on ECEC enrolment (Hypothesis 1). Next, we contextualize these considerations for the empirical case under view in our study, the universal, low-cost, but limited availability ECEC system in Germany.

Institutional and cultural context of ECEC in Germany

The provision and usage of ECEC services for young children expanded massively over the last years in Germany. Vast changes in German family policy are the main reason for this expansion. They aimed at increasing maternal labor supply and paternal care giving, as well as promoting equal educational opportunities for children from an early age.

Two childcare reforms in 2005 and 2008 gradually extended the provision of ECEC and introduced a legal entitlement to half-day ECEC for children aged one or older. Thus, from 2006 to 2018, ECEC attendance rates for children under three increased from 14 to 34% (BMFSFJ, 2019). Moreover, in 2007, a parental leave reform introduced income-related paid leave for 12 months, and incentives couples to share parental leave for at least 2 months. Despite fathers' uptake of parental leave mothers still remained the main caregivers: they interrupt employment longer than fathers, and after a return to work often reduce their hours, whereas full-time work among fathers is still the norm (Keller & Haustein, 2013).

Due to high state subsidies to ECEC, parents in Germany pay on average 14% of the total costs, which is substantially less than in many other OECD countries (Schober & Spiess, 2015). Payment rates usually staggered by income, and sometimes fees are waived for low-income

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families as well as for welfare recipients, but regulations vary across municipalities. Nevertheless, according to a 2017 study, German parents evaluate ECEC costs as the most critical aspect regarding their satisfaction with ECEC services (BMFSFJ, 2019). Despite the reforms and state expenditures, the take-up of ECEC under 3 years is not yet universal in Germany. ECEC availability for children under three is still scarce in many regions, and demands exceeds supply (BMFSFJ, 2019). Limited availability and evidence on the importance of costs are two reasons why we expect cost considerations to play a mediating role also in the universal ECEC system of Germany.

Besides structural reasons, disparities in ECEC take-up are also rooted in historical differences between East and West Germany. West Germany provided for a long time social policies which supported the traditional male breadwinner model (Rosenfeld et al., 2004). Institutional infrastructure for children under three barely existed. Consequently, younger children were primarily taken care of at home (Schober, 2014). Accordingly, mothers displayed a common pattern of long employment interruptions and low labor supply. This pattern was supported by long-term parental leave entitlements, child benefits, and spousal tax-splitting. In contrast, in the socialist welfare regime of the former GDR mothers were strongly encouraged to work full-time by the state, and full-day childcare was extensively provided. Even today, significant East–West differences in maternal employment and ECEC participation are found (Stahl & Schober, 2018). These differences are also reflected in preferences. Even decades after unification, East Germans continued to report less traditional work-care attitudes than West Germans (Bauernschuster & Rainer, 2012).

The impact of context on rational ECEC decisions

Besides analyzing the *general* effects of parents' cost–benefit calculations on the timing of ECEC enrolment, and their role in mediating social disparities, we next ask whether the strength of these effects varies between social groups. By examining rational choices in different social contexts, we consider the complex interactions of contextual constraints and individual behavior (see, Gambetta, 1987, for a discussion). Two dimensions are particular salient in German context: less- and more highly educated mothers, and mothers who were born and live today in West and East Germany. Whereas our considerations regarding educational differences might be transferable to other countries, the East–West dimension implies a comparison which might be informative for applying our approach to other welfare-state contexts.

As discussed above, less educated mothers face lower job prospects than highly educated mothers, and traditional gender norms are stronger (Davis & Greenstein, 2009; Stahl & Schober, 2018). Believing in these norms could "override" rational considerations on labor market benefits for mothers. Thus, when making their ECEC decision, less educated mothers might attach less weight to maternal employment benefits of ECEC participation. Furthermore, highly educated parents have more resources to realize a beneficial parenting behavior (McLanahan, 2004), and they are in general better informed about childcare alternatives and access to subsidies (Meyers & Jordan, 2006). They observe and foster the specific talents of their children and try to provide the best opportunities for them to realize status maintenance, whereas less educated parents are convinced that their children will grow up well, as long as they provide emotional support (which highly educated parents deem similarly important) (Lareau, 2011). Hence, child development considerations might affect ECEC decisions of less educated parents less. The relatively small sums parents have to pay for ECEC in Germany suggest ceiling effects for families who are better off. Because ECEC costs do not play a crucial role in their monthly budget, we expect financial cost considerations to be less relevant for their enrolment decisions than for parents on a tight budget. Social costs might affect ECEC decisions more when mothers have strong ties to social networks with homogeneous norms or are

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strongly dependent on their neighbors, but these characteristics do not systematically differ by educational attainment. In sum, the arguments suggest that employment and educational benefit considerations might be less relevant for the timing of ECEC enrolment, and financial cost considerations more relevant among less educated mothers than among more highly educated mothers. Social cost considerations should be equally important (Hypothesis 2).

Differences in effects between parents in East and West Germany might stem from two sources: from having been socialized in different welfare regimes, or from being exposed to different structural conditions today. Despite some convergence after re-unification, mothers born in East Germany still subscribe to less traditional work-care norms (Bauernschuster & Rainer, 2012; Zoch, 2021), show more positive attitudes towards public childcare (Goerres & Tepe, 2012), feel less conflicted about working (Collins, 2019), and have a stronger labor market attachment than mothers born in West Germany (Keller & Haustein, 2013). Today, ECEC supply is higher in East than in West Germany. Employment security is still lower, which is reflected in higher unemployment rates, but the gender pay gap is smaller, full-time rates are higher, and accordingly mothers' career prospects may be somewhat better than in West Germany. Higher ECEC availability and prevalent norms suggest that mothers who were born in East Germany and continue to live here—*stayers*—might enroll their children in ECEC early, even when they do not expect advantages for their own career, whereas the perception of employment benefits is more relevant for West German stayers' ECEC decisions. Mothers who were born in one part of Germany and moved to the other—*movers*—are affected either by less traditional norms, or by higher ECEC availability. Thus, the effects of employment benefits in these groups should lie in between the stayers in West and East. Despite differences in the perception of benefits for child development between East and West German stayers, we assume them to affect decisions in the same way in both parts of Germany, because these perceptions are at the core of the prevalent parenting norms in West and East, and therefore an important aspect of decision-making. ECEC costs are low in both parts of the country. Accordingly, when social disparities in parental resources are controlled, we do not expect to see regional differences in the effects of monetary costs perceptions on ECEC entry. Differences in the relevance of social costs are harder to predict. In general, social costs might be more important in contexts of higher social control and/or lower social trust. There is some evidence that state control in the GDR had a destructive impact on trust in other people, and converged only slowly in younger generations (Heineck & Süssmuth, 2013; Rainer & Siedler, 2009). These findings suggest that East German stayers might weigh social costs higher than West German stayers. Because evidence is largely indirect and scarce, we refrain from hypothesizing differences in effects of social costs. In sum, these arguments suggest that employment benefits considerations might be more relevant for the timing of ECEC enrolment for mothers who were born and stayed in the West than East German context, whereas we do not expect any regional differences with regard to the other three aspects of cost–benefit considerations (Hypothesis 3).

DATA AND METHODS

Data and analysis strategy

We tested our hypotheses with data from the newborns study of the NEPS (NEPS-SC1) (Hachul et al., 2019), which comprises a register-based probability sample of 3481 children born in Germany between February and July 2012. The first study wave was conducted when the infants were 6–8 months old. The second wave took place at the age of 12–17 months. Afterwards, parents and children were followed up yearly. In the first three waves, computer-assisted interviews with one parent, preferably the mother, as well as video-based observations of child–parent interaction and child development were conducted at the homes of the selected families.

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To estimate the timing of first ECEC entry, we applied event history models (Allison, 1982). It models the probability that an event of interest occurs in each time period, given that the event did not occur in an earlier period. We estimated this conditional probability, the hazard function of the first entry in ECEC, by applying event history models for discrete time with a logistic link function on a monthly time scale (Singer & Willett, 2003). To specify the baseline hazard function, we tested various specifications of time (linear, quadratic, dummies for age, etc.) and assessed the model fit. We finally modeled time dependency using nine time intervals of 3 months, except for the first and the last intervals, which both pool 6 months.

We defined our dependent variable as the first entry into ECEC. ECEC services include all types of nurseries, day-care centers or kindergartens. Moreover, because in Germany parents often choose family day care when availability of institutional care is scarce, we also include family day care, assuming that it acts as a substitute for ECEC services. Mostly mothers were interviewed, thus we restricted our sample to data provided by biological or foster mothers of the target children. To avoid problems of reverse causality, we excluded children who had already attended an ECEC institution before the first interview. Overall, we excluded 260 interviewed fathers or other persons, 61 respondents with a child that had attended an ECEC institution before the first interview, and four mothers younger than 18. Because we were interested in the timing of ECEC take-up under the age of three, and participation is nearly universal at higher ages, our analysis sample was based on the first four interview waves, which cover a period of 36 months after childbirth. Observed target children were at risk from Wave 1 onwards until we observed an ECEC entry. Study dropouts, as well as mothers whose child did not enter ECEC until Wave 4 were defined as right-censored at the last observed time point.

To capture potential bias from item nonresponse and temporary panel dropouts, we used multiple imputation (Little & Rubin, 2002). Using the chained equations routine, we generated 20 imputations and combined them using Rubin's rules. Based on these decisions, our analytical sample included 3257 children and their mothers, for whom we observed 2322 events. In sum, our analytical sample contained 42,066 person-months.

In order to test our first hypothesis, we examined to what extent mothers' cost–benefit perceptions of ECEC mediate educational differences in the timing of ECEC up-take. Second, we analyzed differences in subgroup effects by estimating separate models. In all models, independent and control variables were entered stepwise. Because comparing models and subgroups is central for our analysis, we display results as average marginal effects (AME), which provide easily interpretable information (Breen et al., 2018). Additionally, we examined whether effects significantly differ between subgroups using χ^2 tests.

Covariates

The central covariates in our models were the perception of different cost and benefit aspects of ECEC participation. These RC parameters were developed specifically for the NEPS newborns study (Stocké et al., 2019), based on previous studies of sociological RC frameworks of education. Items were measured during the first wave, before the majority of ECEC entries took place. Two dimensions of benefits of ECEC take-up were included: mothers were asked about their employment prospects and the development prospects of their child if it would attend an ECEC institution. For both dimensions, the response scales ranged from 1 (*very poor prospects*) to 5 (*very good prospects*). To measure cost aspects, mothers were asked how hard it would be for them to pay for ECEC and how much they would expect friends and relatives to look at them askance. Responses ranged again from 1 (*very easy/not at all*) to 5 (*very hard/very much*). Distribution of all covariates is presented in Table S2.

Another covariate of interest was mothers' educational attainment. Based on the CASMIN classification (Koenig et al., 1998), we distinguished four educational levels: compulsory (school

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dropouts and persons with *Hauptschulabschluss: 1a-c*), intermediate (*Realschulabschluss: 2a,b*), maturity (*Hochschulreife: 2c*) and tertiary education (*3a,b*). Furthermore, we tested differences of effects in East and West German contexts. To disentangle effects of regime socialization and today's structural conditions, we considered maternal birthplace and current place of residence, distinguishing five groups: mothers born and living in West or East Germany (*stayers*), *movers* from East to West and vice versa, as well as first-generation immigrants. Distributions of our dependent variables among the relevant subgroups presented in Table S3.

We added various control variables at the individual and household level, as well as contextual factors which are likely to influence parents' ECEC decisions and cost–benefit perceptions of ECEC take-up. To account for individual factors, we controlled mothers' pre-parental labor market status as a proxy for employment decisions after childbirth. To capture influences of fathers' and partners' resources on decision-making, we considered cohabitating partners' educational attainment, distinguishing between tertiary and lower education. To also control for family stability, we added a category for having no partner in the household; and additionally, we considered marital status (married vs. not married). Finally, we controlled for childcare provided by grandparents (>5 h per week), and for the number and age structure of siblings living in the household. Informal childcare provided by grandparents might help to facilitate childcare at home, and thus reduce the importance of ECEC. Having multiple young children increases the costs of ECEC and may lower the opportunity costs of staying at home, but may also reflect more traditional work-family preferences. All household characteristics were included as time-varying variables. As ECEC take-up is dependent on availability, we used annual administrative records on ECEC availability at the county level, defined as the annual ratio of under threes enrolled in ECEC services to the population of this age group, including half-day and full-day childcare centers, as well as childminders. Because decisions about ECEC enrolment are based on perceptions of preceding availability, we lagged this variable by 1 year, mean centering it separately in West and East Germany. To capture further regional aspects that might influence the demand for employment as well as for ECEC, we included the annual regional unemployment rate, again mean-centered for East and West, and urbanization according to the German BIK classification. Owing to few cases in some categories, we only distinguished big cities with 500,000 or more inhabitants from others.

RESULTS

Descriptive findings

We start our overview on results by presenting descriptive findings on the timing of ECEC take-up and maternal perceptions on ECEC decisions, distinguishing mothers by educational attainment and region. Figures 1 and 2 illustrate how the proportion of entries into ECEC increased from the first interview until the children were 36 months old. Figure 1 shows that the more highly educated the mothers were, the earlier they enrolled their children, and the higher their share of ECEC usage. These differences started to appear when children were around 12 months old, and were most pronounced between 18 and 24 months. After this point, the gap in ECEC enrolment rates between tertiary educated mothers and mothers with higher and middle education declined, whereas mothers with compulsory education remained behind. At the end of the observation period, nearly all children of tertiary educated mothers had entered ECEC, whereas the proportion of children in ECEC with compulsory educated mothers only reached 65%.

Figure 2 shows that children with mothers who were born and stayed in East Germany entered ECEC earlier, compared to mothers who lived continuously in West Germany. In this group, half of the observed children had started ECEC at 15 months. Children of West German

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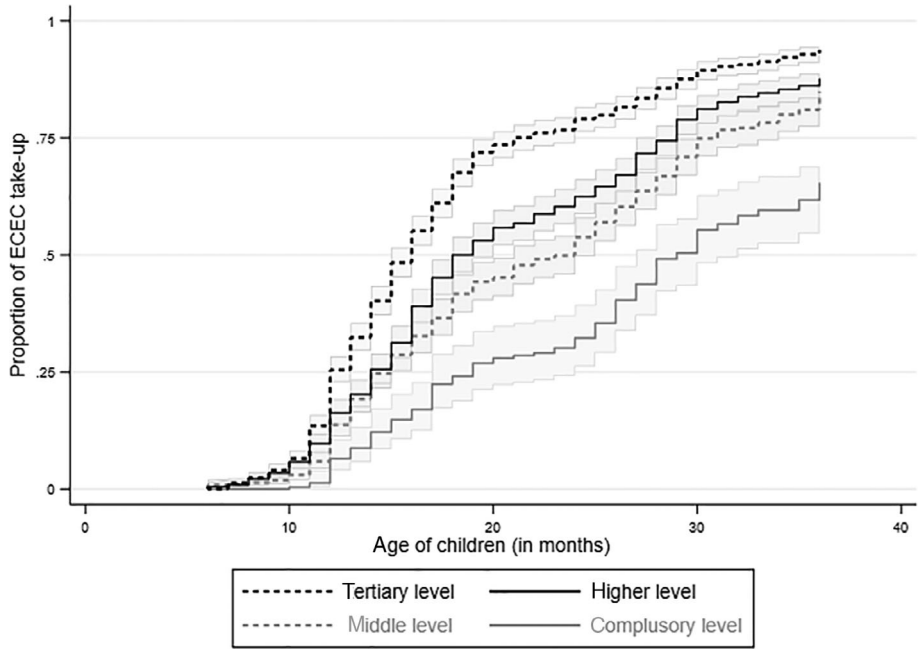

FIGURE 1 First entry into early childhood education and care by mothers' educational attainment (Kaplan–Meier failure curves, 95% confidence intervals). *Source:* NEPS Data Starting Cohort 1: doi.org/10.5157/NEPS:SC1:4.0.0, own calculations

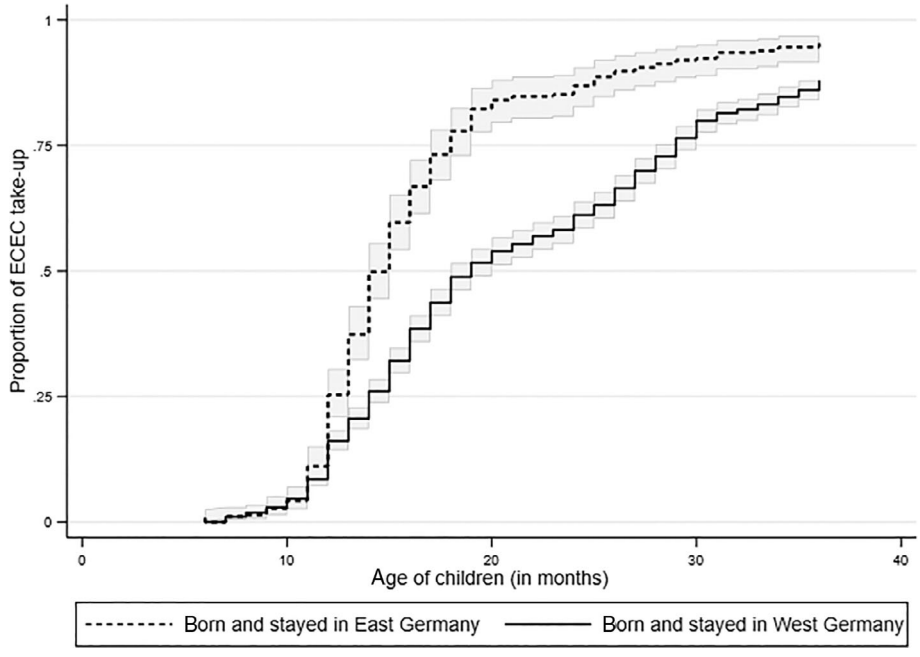

FIGURE 2 First entry into early childhood education and care among West and East German stayers (Kaplan–Meier failure curves, 95% confidence intervals). *Source:* NEPS Data Starting Cohort 1: doi.org/10.5157/NEPS:SC1:4.0.0, own calculations

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stayers reached this share 3 months later. Differences between both groups decreased after 20 months, but were still visible at the end of the observation period.

Table 1 presents average cost–benefit perceptions (on a 5-point scale), by education and region. Overall, mothers assessed the benefits of ECEC take-up for employment and child development quite high (4.23 and 4.03) and financial and especially social costs quite low (2.54 and 1.73). Educational groups differed primarily in the perception of economic factors. The higher the educational attainment, the higher mothers assessed employment benefits and the lower they perceived financial costs. The benefit of ECEC take-up for child development shows no systematic variation by educational attainment, but is highest among tertiary educated mothers. The perception of social costs does not differ along educational lines. Overall, variances were more uniform among tertiary educated mothers, indicating more commonly shared RC perceptions in this group.

Mothers who were born and stayed in West Germany generally perceived lower benefits and higher costs of ECEC, compared to East German stayers. Similarly, movers from West Germany evaluated benefits of ECEC lower and social costs higher than movers from East Germany. Both groups of movers seemingly adjusted their perceptions to the respective place of residence, particularly with regard to financial costs, whereas employment benefit perceptions were unaffected by moving.

Disparities in ECEC entry, and the role of cost–benefit perceptions

In the next step, we analyzed whether these disparities in the timing of ECEC take-up can be explained by cost–benefit perceptions, estimating determinates of the risk of entering ECEC stepwise. In Table 2, we separately present results on the effects of mothers' educational attainment (M1), as well as of cost–benefit considerations (M2), reporting average marginal effects (AME). Model (3) combines both sets of variables in order to assess to what extent cost–benefit perceptions mediate the effect of education on the timing of ECEC take-up. All models include the control variables, plus a set of duration dummies. The full models are presented in Table S4.

Results of Model (1) indicate that the take-up hazard increased significantly along with mothers' levels of education. Model (2) shows positive effects of the two benefit items on ECEC enrolment. Mothers' perceptions of employment advantages due to ECEC take-up, and better prospects due to the perceived developmental benefits of ECEC increased the hazard of ECEC take-up significantly. Contrary to our expectations, the perception of the social or financial burden of ECEC did not significantly influence the timing of ECEC enrolment. Estimating the effects of maternal education and cost–benefit perceptions simultaneously (Model 3), we found that the effect sizes of educational attainment, as well as those of the RC parameters were of similar magnitude as in Models M1 and M2. In line with this finding, the differences between direct and total effects are negligible in the KHB decomposition model, and the indirect effects are not significant (see Supplemental Materials, Table S5). Against our expectations, we did not find a mediating effect of cost–benefit perceptions on the association between education and the timing of ECEC take-up. Therefore, we have to reject Hypothesis 1.

Differential effects by context

In the third step, we estimated separate models to examine whether the direct effects of RC parameters vary between different educational groups (Table 3), or between mothers who were born and live in East or West Germany (Table 4). Besides the AMEs, the two tables show the results of χ^2-tests on effect differences between the respective subgroups (for full models,

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TABLE 1 Descriptive statistics of rational choice parameters by maternal subgroups

		Mother's educational attainment				Mother's place of birth and residence			
	Overall Mean (SD)	**Compulsory Mean (SD)**	**Intermediate Mean (SD)**	**Maturity Mean (SD)**	**Tertiary Mean (SD)**	**West German stayers Mean (SD)**	**East German stayers Mean (SD)**	**West to east movers Mean (SD)**	**East to west movers Mean (SD)**
Benefit perceptions									
Maternal employment	4.23 (1.04)	3.71 (1.17)	4.14 (1.07)	4.23 (1.03)	4.47 (0.86)	4.29 (1.01)	4.36 (0.99)	4.28 (0.98)	4.35 (0.92)
Child development	4.03 (1.02)	4.00 (1.01)	3.97 (1.04)	3.98 (1.07)	4.11 (0.96)	3.89 (1.02)	4.50 (0.78)	4.12 (1.02)	4.24 (0.97)
Cost perceptions									
Financial costs	2.54 (1.12)	3.06 (1.24)	2.78 (1.11)	2.57 (1.09)	2.14 (0.96)	2.48 (1.08)	2.38 (1.05)	2.09 (1.02)	2.51 (1.09)
Social costs	1.73 (1.05)	1.75 (1.20)	1.69 (1.09)	1.78 (1.09)	1.70 (0.92)	1.88 (1.06)	1.26 (0.71)	1.69 (1.00)	1.48 (0.84)

Source: NEPS Data Starting Cohort 1: doi.org/10.5157/NEPS:SC1:4.0.0.

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TABLE 2 Effects of rational choice parameters and social background on the timing of first ECEC take-up (discrete-time event history models)

	Education Model 1		RC parameters Model 2		Full model Model 3	
	AME	SE	AME	SE	AME	SE
Benefit perceptions						
Maternal employment			0.01***	(0.00)	0.01***	(0.00)
Child development			0.01***	(0.00)	0.01***	(0.00)
Cost perceptions						
Financial costs			0.00	(0.00)	0.00	(0.00)
Social costs			−0.00	(0.00)	−0.00	(0.00)
Education *(ref. intermediate)*						
Compulsory	−0.02***	(0.00)			−0.02***	(0.00)
Maturity	0.01**	(0.00)			0.01**	(0.00)
Tertiary	0.03***	(0.00)			0.02***	(0.00)
McFadden R^2	0.07		0.08		0.09	
N person-months	42,066		42,066		42,066	
N persons	3257		3257		3257	

Note: Models include mother's place of birth and residence, employment status 12 month prior to birth, marital status, partner's educational attainment, childcare provision by grandparents, age of siblings, childcare ratio, unemployment rate, BIK classification and time dummies; AME, average marginal effects; SE, clustered standard errors.
Source: NEPS Data Starting Cohort 1: doi.org/10.5157/NEPS:SC1:4.0.0.
**$p < .01$. ***$p < .001$.

cf. Tables S6 and S7 in Supplemental Materials). Due to small sample sizes in some subgroups, we had to simplify some control variables. Thus, in Table 3, we only distinguish between mothers born in West and East Germany and neglect place of residence. In Table 4, we only distinguish tertiary and lower educated mothers.

In Table 3, results of Models (4)–(7) indicate positive effects of employment benefits on the take-up hazard in all educational groups. Consistent with Hypothesis 2, perceived employment benefits were more relevant for more highly educated mothers than for those with compulsory education, for whom effects were not significant. This effect difference was found to be significant only between mothers with compulsory and maturity education. Child development benefit considerations also showed significant positive effects on the hazard of ECEC enrolment for mothers with intermediate education levels and higher. As expected, these considerations gained in importance with increasing educational attainment, and group differences were significant for most of the contrasts. Against our expectation, financial cost considerations were not more relevant for mothers with a presumed tighter budget. The associations between direct cost perceptions and ECEC take-up among mothers with compulsory or intermediate education are negative, but effect sizes are insignificant and small, and group differences are never significant. In line with Hypothesis 2, the relevance of the perception of social costs did not vary among higher- and less-educated mothers. In sum, the results confirm our expectations regarding the effects of employment and educational benefits as well as social costs, but not regarding direct cost considerations. Therefore, Hypothesis 2 is only partially supported.

Table 4 shows effect differences among four groups of mothers in East and West Germany. In line with Hypothesis 3, Models (8) and (9) show that for West German stayers, employment benefits were more relevant for the take-up than for East German stayers, but the effect differences were not significant. Also in line with our expectations, benefits for child development had positive, non-differing effects among both groups. Interestingly, among movers from East

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TABLE 3 Modeling the timing of ECEC take-up for differently educated mothers (discrete-time event history models)

	Effects				Effect differences ($\chi 2$ tests)					
	Compulsory Model 4	Intermediate Model 5	Maturity Model 6	Tertiary Model 7	M 4–M 5	M 4–M 6	M 4–M 7	M 5–M 6	M 5–M 7	M 6–M 7
Benefit perceptions										
Maternal employment	0.00 (0.00)	0.01** (0.00)	0.01*** (0.00)	0.01** (0.00)	0.72	6.48*	1.83	3.20	0.38	1.02
Child development	0.00 (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.02*** (0.00)	4.81*	11.77***	28.55***	1.60	11.44***	4.89*
Cost perceptions										
Financial costs	−0.00 (0.00)	−0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.22	1.46	2.17	1.43	3.69*	0.72
Social costs	−0.00(0.00)	0.00 (0.00)	0.00 (0.00)	−0.00 (0.00)	2.03	1.46	0.03	0.02	1.00	0.72
McFadden R^2	0.09	0.09	0.09	0.08						
N person-months	5404	11,233	12,139	13,290						
N persons	405	829	919	1104						

Note: Models include mother's place of residence, employment status 12 month prior to birth, marital status, partner's educational attainment, childcare provision by grandparents, age of siblings, childcare ratio, unemployment rate, BIK classification and time dummies; average marginal effects; clustered standard errors in parentheses.
Source: NEPS Data Starting Cohort 1: doi.org/10.5157/NEPS:SC1:4.0.0.
*$p < .05$. **$p < .01$. ***$p < .001$.

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TABLE 4 Modeling the timing of ECEC take-up by mother's place of birth and residence (discrete-time event history models)

	Effects				Effect differences (χ^2 tests)					
	West German stayers Model 8	East German stayers Model 9	West to East movers Model 10	East to West movers Model 11	M 8–M 9	M 8–M 10	M 8–M 11	M 9–M 10	M 9–M 11	M 10–M 11
Benefit perceptions										
Maternal employment	0.01***(0.00)	0.00 (0.00)	0.02* (0.01)	0.01 (0.01)	2.63	0.83	0.12	2.78	1.65	0.24
Child development	0.02*** (0.00)	0.02** (0.01)	0.00 (0.01)	0.02* (0.01)	0.62	5.83	0.11	5.26*	0.09	3.53
Cost perceptions										
Financial costs	0.00 (0.00)	0.00 (0.01)	−0.00 (0.01)	0.00 (0.01)	0.09	0.35	0.00	0.09	0.03	0.20
Social costs	0.00 (0.00)	−0.01 (0.01)	−0.01 (0.01)	−0.01 (0.01)	2.56	1.33	3.19	0.13	0.02	0.26
McFadden R^2	0.08	0.12	0.10	0.09						
N person-months	23,463	3841	1896	2671						
N persons	1672	425	160	245						

Note: Models include mother's educational attainment, employment status 12 month prior to birth, marital status, partner's educational attainment, childcare provision by grandparents, age of siblings, childcare ratio, unemployment rate, BIK classification and time dummies; average marginal effects; clustered standard errors in parentheses.
Source: NEPS Data Starting Cohort 1: doi.org/10.5157/NEPS:SC1:4.0.0.
*$p < .05$. **$p < .01$. ***$p < .001$.

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to West, the effect size of employment benefits was similar in size to West German stayers, but not significant. Educational benefits were similarly important for the ECEC timing in this group as for both groups of stayers. In contrast, movers from West to East showed the strongest effects of employment benefits, whereas benefits for child development were not important at all for ECEC entry. These results indicate that this group of mothers was highly selective, with their pattern of effects possibly reflecting regional mobility for career reasons. Perceptions of monetary and social costs did not matter significantly for any of the four groups. The negative effect sizes of social costs perceptions were larger among the two groups of women who were born in East Germany, but did not differ significantly from the other groups. Overall, the effects of cost and benefit considerations for mothers who were born and living in different parts of Germany are in line with Hypothesis 3.

Sensitivity checks

We ran several sensitivity checks to test the validity our findings. First, we replicated all models whilst progressively including maternal, household and regional controls, to assess whether specific controls drive our results. Second, to consider possible endogeneity problems we tested whether our results changed when excluding (a) provision of grandparental childcare and (b) regional childcare ratio. Third, we reconstructed our dependent variable—timing of ECEC take-up—considering only entrance into ECEC services, without family day care, to ensure that results are not driven by family day care take-up. Finally, we estimated all models with an indicator of social class (EGP) instead of mothers' educational attainment. Similarly, we modified our four groups of the CASMIN indicator. In sum, all sensitivity analyses showed comparable and robust patterns of findings (cf. Tables S8–S13).

SUMMARY AND CONCLUSIONS

This study is the first that has applied sociological RCT to explain the mechanisms of socially selective ECEC usage for under threes in Germany. It investigated whether cost–benefit perceptions of ECEC contribute to explaining social inequalities in ECEC enrolment, and how decisions for participation in ECEC are associated with these perceptions in different contexts. The results show that mothers with higher educational attainment enroll their children in ECEC earlier than less educated mothers. Controlling for RC parameters does not reduce these social disparities. Thus in our study, RCT does not constitute a mechanism that explains the pronounced social inequalities in ECEC decisions. The decision to take up ECEC is partly based on cost–benefit considerations, but these are made largely independently of educational background. Mothers who perceive ECEC as beneficial for the development of their child, as well as for maintaining their employment participation, take up ECEC earlier. In contrast, perceived financial and social burdens are irrelevant for the timing of ECEC enrolment. This might be explained by low ECEC costs in Germany, especially for low-income families. Similarly, our results suggest that perceived social disapproval of ECEC enrolment might be less important than often assumed in the public discourse in Germany.

Furthermore, our findings suggest that some RC parameters affect the timing of ECEC take-up differently among social groups. Benefit considerations are important for ECEC decisions among more highly educated mothers, but fail to account for the decisions of mothers with only compulsory education. Employment benefit considerations only matter for mothers who were born and stayed in West Germany, whereas considerations on child development benefits are equally relevant for the decisions of mothers in both East and West Germany.

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Before discussing these findings, some limitations need to be noted. First, we cannot exclude the possibility that ECEC decisions might have already been made before or shortly after childbirth. Nevertheless, even at earlier time points, the same rational considerations might have been considered by mothers. Second, unobserved differences between parents, such as knowledge about the ECEC system or social networks might affect awareness of ECEC. However, theory assumes that these characteristics are reflected in cost and benefit perceptions. Thus, we indirectly accounted for these aspects in our models. Third and more fundamentally, measurement issues might be responsible for the low mediating effects of the perceptions we found. For example, maternal work benefits today might be less about overall employment prospects, because these are given in most modern labor markets. But the rich literature on mothers' career and wage penalties has shown that the prospects of continuing qualified, rewarding work that opens career pathways are still rare and subject to social stratification in many countries (for an overview, see Gough & Noonan, 2013). Moreover, in German context as well as in other universal childcare systems, perceived availability of ECEC in general and high-quality ECEC in particular might be more relevant than financial costs (Gambaro et al., 2014; van Lancker & Ghysels, 2016). Whereas this is true for many, particularly low-income mothers might have simply no other chance than continuing to work and enrolling their children in ECEC, regardless of any cost–benefit considerations. Hence, in future studies it might be fruitful to measure considerations of quality work and career benefits, availability costs, quality issues, and subjective perceptions of limited choices.

Next to measurement, theory building may be necessary to explain the observed effects better than assumptions of purely rational, benefit-maximizing behavior do. First, our results suggest that the cost–benefit perceptions we measured rather reflect work-parenting preferences, which affect ECEC decisions irrespective of social position. According to the accommodation model (Chaudry et al., 2010; Meyers & Jordan, 2006) these preferences are not fixed, but simultaneously accommodated to multiple constraints, such as family and job demands, restricted ECEC supply, child characteristics, and social network demands. Hence, the accommodation model assumes that ECEC decisions do not solely follow the principle of utility maximization but rather the concept of satisficing, choosing the best option under the current circumstances (Chaudry et al., 2010). It remains up to future research to apply these rather complex assumptions systematically to social stratification in early childcare use and examine how these sets of constraints affect the work-parenting preferences *within* groups of differently educated mothers. Second, our study could not explain the large effect that mothers' educational attainment had on their ECEC decisions. Hence, future research will need to apply alternative theoretical ideas about how educational background translates into systematic differences in ECEC attendance and thus contributes to the diverging destinies of children today (McLanahan, 2004). To reveal mechanisms which have the potential to explain socially selectivity in ECEC take-up, studies could draw on asymmetries in parental information and search strategies for ECEC providers as well as a deeper look into objective and perceived constraints to parental choices.

Finally, our empirical results referred to the highly specific context of Germany. Hence, the question arises to which degree our results are transferable to other countries. Our findings on East–West differences suggest that cost–benefit considerations play a lesser role in universal, lost-cost ECEC systems with a longer history of mandatory maternal employment and a higher ECEC availability, such as in Scandinavian countries. In contrast, we would expect a stronger mediating effect of monetary cost considerations in countries without a universal ECEC system, such as the United States, particular among families not targeted by subsidized programs. In Southern European countries with strong familial elements and inadequately developed ECEC structures, stronger differences by educational background as well as stronger mediation effects of cost–benefit considerations might be found, also due to a socially and regionally unequal modernization. In a world where early education is becoming increasingly significant, it is important for both research and policy advice to identify the role of objective resources and

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barriers, as well as subjective perceptions and preferences, in the use of ECEC in different country contexts.

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