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Social Background and Children's Cognitive Skills: The Role of Early Childhood Education and Care in a Cross-National Perspective

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Keywords

early childhood, early childhood education and care, ECEC, inequality of educational opportunity, life-course research, social stratification, cross-national research

Abstract

This review looks at the current state of research on early childhood education and care (ECEC) from a sociological stance. We summarize how children's experiences and benefits from participation in ECEC are related to their families' socioeconomic position in modern industrial nations. By bringing together child development and intervention research from economics, education, and psychology with a sociological, social stratification perspective, our report focuses on ECEC as a policy strategy for equalization in early childhood. We argue that two major stratifiers, families and country-specific ECEC settings, need to be considered more closely when we seek to understand the efficacy of early educational interventions in modern societies. While well-targeted educational programs are found to lower

achievement gaps among children from different social backgrounds, a disproportionate use of early education by socioeconomically privileged families may offset the benefits of early interventions. In addition, the current stratification patterns in various nationwide ECEC contexts may further strengthen the gaps in children's (early) achievements.

INTRODUCTION

Research has consistently demonstrated the efficacy of early childhood education and care (ECEC) programs in improving the cognitive and noncognitive skills of young children facing disadvantaged environmental conditions in their parental homes (Heckman 2006). From a life-course view, however, sociologists do not address the long-term consequences of early investments alone—they also focus on how children's experiences of early education are embedded in the larger system of social stratification (Mayer 2004) and how institutional, country-specific settings of ECEC contribute to it (Blossfeld et al. 2017).

In recent years, the demand for ECEC services, such as formal childcare and preschool, has been rising steeply in all industrialized societies both as a form of social investment and as a social policy instrument to promote female employment (Esping-Andersen et al. 2002). As a result, many nations have been expanding and universalizing their ECEC facilities to unprecedented levels, and new generations of children enter educational institutions earlier than ever before (OECD 2015, Van Lancker & Ghysels 2016). As of today, however, knowledge is surprisingly limited on the consequences of ECEC's expansion on social mobility and inequality in educational opportunity. As we show, evidence from ECEC intervention studies is not sufficient to allow generalizations on the role of ECEC as an equalizer across contemporary societies. Rather, our literature review demonstrates why children's participation in ECEC institutions and the benefits they might gain from them tend to be strongly related to their parents' socioeconomic position. Importantly, by combining the results from child development and intervention studies from economics, education, and psychology on the one hand and sociological stratification and social policy research on the other, our review asks whether ECEC serves as an equalizer or even increases inequalities. Moreover, much of the empirical evidence on the impact of ECEC on child development comes from Anglophone-centric empirical studies, which reflect liberal welfare state and free market contexts. Yet, by taking a cross-national perspective on ECEC, our review broadens our understanding of how different nationwide settings of ECEC may influence the distribution of benefits for different children (e.g., Blossfeld et al. 2017). Indeed, not only do the availability and quality of childcare provisions vary across countries, there are also major cross-national differences in the variety of childcare options and services (Gambaro et al. 2014). For instance, whereas early childhood education in Anglophone countries varies widely in the type and quality of service (e.g., Vandell & Corasaniti 1990) and the provision is strongly market-based (Kamerman & Waldfogel 2005), early childhood programs in continental Europe are usually more regulated by the state, more homogeneous, and provided universally (Spiess et al. 2003).

Our review is guided by five major research questions: (a) What are the theoretical mechanisms underpinning the influences of family social background on the skill development of children? (b) How can ECEC be an equalizer? (c) Is ECEC attendance beneficial for children's cognitive skills, and are there children who benefit more than others from ECEC attendance? (d) Who has the opportunity to participate in ECEC at all? (e) To what extent do country-specific ECEC contexts shape social inequality in ECEC participation and early educational achievement? Here, we argue that the effect of ECEC on social equality depends on the utilization gap by social

background, the degree to which nationwide settings of ECEC may reinforce those gaps, and the level of heterogeneity in ECEC gains between advantaged and disadvantaged children.

THE DEVELOPMENT OF ACHIEVEMENT GAPS IN EARLY YEARS

Research on Achievement Gaps in Preschool and School Age

Decades of social science research demonstrated a strong link between children's academic achievement and the socioeconomic status (SES) of their families. In addition, meta-analytical studies summarizing a vast body of earlier literature quantified the average correlation of SES and student achievement from kindergarten age through grade 12 to be about 0.30 (Sirin 2005). Recent trend studies revealed that SES gaps in achievement have been on the rise over the past 50 years in the United States and in many other countries in the world (Chmielewski 2017, Reardon 2011). Large-scale international student assessment studies such as the Programme for International Student Assessment (PISA), the Progress in International Reading Literacy Study (PIRLS), or the Trends in International Mathematics and Science Study (TIMSS) have documented substantial SES gaps in students' academic achievement in primary and secondary education (reviewed in Van de Werfhorst & Mijls 2010).

Recent longitudinal research has provided evidence that inequality of achievement is rooted very early in children's lives. While cognitive gaps in postbirth abilities among babies from different social backgrounds are tiny in magnitude (Fryer & Levitt 2013), they clearly emerge and widen rapidly when infants become toddlers and toddlers become preschool children (Feinstein 2003, Fernald et al. 2013, Skopek & Passaretta 2018). At entry into kindergarten, SES gaps in early reading and math skills are substantial and are able to predict quite well later achievement differences in school (Bodovski & Youn 2012, Lee & Burkam 2002). Although skill gaps in language and reading emerge during preschool years, there is empirical evidence that gaps barely narrow or widen as children progress through elementary school and secondary school (Bradbury et al. 2015, Farkas & Beron 2004, Skopek & Passaretta 2018). The latest comparative research reports rather stable SES gaps in reading and math from the end of primary schooling to the end of schooling altogether (Dämmrich & Triventi 2018, Rözer & Van de Werfhorst 2017).

SES inequality in cognitive and academic achievement is substantial and tends to grow across recent birth cohorts. It seems to develop early in infancy and toddlerhood, and thus it is profound before children enter school, and it does not decline during the school years. Thus, social disparities across families during early skill development seem to lay the foundation of children's later achievement differences in school and later in life.

Socioeconomic Status and Child Development: From Parenting Practices to Schooling Opportunities

Scholarship on child development theorizes on the causal processes linking family social background and child achievement (Bradley & Corwyn 2002, Duncan & Magnuson 2003, Duncan et al. 2015). In general, the notion of social background refers to a family's socioeconomic position in the stratification system (or SES; for the sake of simplicity, we use SES and social background interchangeably throughout the text), which may enable or offset access to financial and material resources, driven by income; skills and knowledge, driven by education; and social capital and prestige, driven by occupational position (Bollen et al. 2001, Duncan et al. 2015). Common explanations of the SES-achievement link encompass four major theoretical perspectives: parents' investments and resources, family and environmental stress, families' cultural practices

(Bradley & Corwyn 2002, Conger & Donnellan 2007, Duncan et al. 2015), and the stratification of schooling opportunities by family SES (Boudon 1974, Jackson 2013).

Models of family investment underscore SES differences in parents' capacity to invest beneficial resources and time into child-rearing (Conger & Donnellan 2007). Resources (e.g., money, housing, equipment at home, social contacts, or skills) and behavior (e.g., spending time with children; being involved in children's lives; or providing support, guidance, warmth, and love) are conceived of as two fundamental forms of parental investment (Longo et al. 2017). For example, more affluent families can afford better home educational material, higher-quality care, or better early childhood institutions. Recent studies on parental spending on children show that such monetary investments have risen from the 1970s to the 2000s but also that SES inequality in parental investment has grown substantially (Kornrich & Furstenberg 2013). More highly educated parents may possess more knowledge and skills that can be transmitted to children through adequate parenting (Ermisch 2008) or stronger involvement in their children's (pre)school lives (Fan & Chen 2001). Better conditions at work may allow higher-SES parents to spend more and higher-quality time with their small children (Gracia 2015). At (pre)school age, SES may influence parents' choices on the quantity and quality of schooling as a result of cost-benefit considerations (Breen & Goldthorpe 1997). Investment perspectives also emphasize the cross-fertilizing and dynamic nature of competence development (skills beget skills), which makes the marginal productivity of investment in children a function of skills produced by earlier investment (Heckman & Cunha 2007). Furthermore, recent genetics research suggests a substantial SES-gene interaction, with higher SES promoting the genetic influence on achievement. This could be explained by the fact the high-SES children have more opportunities to experience a learning quality that is in line with their genetically influenced propensity to learn (Tucker-Drob & Harden 2012). Thus, particularly early investment is considered to be more efficient and to promise greater returns in the long run (Heckman 2006). On the level of socioeconomic groups, path dependency in learning can unleash potent mechanisms of cumulative advantage by which even small initial disparities in early skills could fan out to sizable gaps over the life course (DiPrete & Eirich 2006).

According to models of family stress, the experience of economic hardship, deprivation, or poverty may put parents under pressure and emotional distress with negative consequences on family life and positive parenting (Conger & Donnellan 2007). Adverse parenting, such as inconsistent, nonsupportive, punitive, or even harsh parenting practices, in turn, can be detrimental to cognitive development through children's psychological maladjustment (McLoyd 1998). For example, unemployment and unstable work relationships can act as stress factors that compromise children's cognitive development by destabilizing household relationships and worsening the quality of parenting and parent-child interaction (McLoyd et al. 1994). Recent models of toxic stress delineate the psychological, neurological, and biological underpinnings through which early experiences of violence, environmental hazards, and other childhood adversities can impair children's cognitive and physical development (McEwen & McEwen 2017).

Cultural accounts of SES emphasize the role of parenting practices as groups of beliefs, values, and norms that guide parents in raising their children. Families reproduce their class-specific cultural capital via parenting characterized by culturally distinct belief systems, knowledge and information, language and behavioral codes, and activities (Bourdieu 1977, De Graaf et al. 2000, Lareau 2003), which create advantages for children from families higher on the social scale, who are consequently more likely to succeed in educational institutions (Lareau 2003). Earlier socialization research shows that occupational positions may have an impact on parenting values and norms through parents' experiences of self-direction and autonomy in their work relationships (Kohn et al. 1986). Class-specific motives and considerations are also likely to drive families' educational aspirations and decision making (Breen & Goldthorpe 1997).

These different forms of parental influences shape children's achievement both before and after they enter into the school system. Although the overall effect of schools might operate toward compensating for social gaps in skills that could grow even larger in absence of formal schooling (Downey & Condron 2016, Raudenbush & Eschmann 2015), initial allocation of children to educationally differentiated environments based on ability has powerful consequences for later social inequality (Domina et al. 2017). Sorting to heterogeneous schools and classrooms not only may create differential experiences in relation to curriculum, school resources, instructional quality and pace but may also reinforce peer effects (van Ewijk & Sleegers 2010) or self-fulfilling prophecy effects through teachers' expectations, labeling, and teacher-student interactions (Eder 1981). Examples of these processes are ability grouping in primary school (Condron 2008) and tracking of students in secondary education (Blossfeld et al. 2016). Yet, family SES may also shape students' educational experiences through differences in educational choices for equally performing students, usually referred to as secondary effects of social background (Boudon 1974, Breen & Goldthorpe 1997, Jackson 2013). Hence, when children transition to formal schooling, the interaction of family SES with educational differentiation and institutional sorting may give rise to processes of cumulative advantage in learning, disfavoring children from lower-SES families.

In summary, family investments, family stress, and culture represent complementary and partly overlapping perspectives to explain how differences across social background shape divergent outcomes among children. These theories identify the nature of adult-child interaction, the kind of parenting and care, and the quality of the environment as central conditions for children's development and important mediators of the SES-achievement link. Yet, through its various interactions with stratification mechanisms in school, family SES continues to shape educational outcomes as children navigate through school life.

Early Childhood Education and Care and Social Inequality in Educational Achievement

The provision of ECEC has gained significant attention at the crossroads of contemporary family and educational policy agendas in modern societies (Esping-Andersen 2008, Gambaro 2017). As the term ECEC demonstrates in and of itself, the boundaries between early education and care have become fuzzy, and the diversity of labels for contemporary childcare services challenges clear-cut terminological distinctions. Most generally, nonparental care might take the form of informal care as provided at home (e.g., by grandparents or nannies) and formal care as provided within institutional, center-based settings involving trained staff, structured activities, curriculum content, and opportunities for multiple social interactions (Blossfeld et al. 2017, Hansen & Hawkes 2009). Examples of formal care include crèches, day care centers, play groups, kindergartens, and other preschool institutions that, in some countries, might be tightly linked to elementary school. For the sake of clarity, henceforth we use ECEC and formal care synonymously.

ECEC support can affect children's development through various mechanisms related to family functioning, well-being, and parent-child interaction (ECEC support may also have effects on children being born in the first place; see the sidebar titled *Can Provision of Early Childhood Education and Care Promote Fertility?*). The availability of ECEC may facilitate maternal employment by fostering stable routines at home (Bianchi & Milkie 2010) and may improve the quality of time mothers spend with their children (Hsin & Felfe 2014). Besides such indirect effects on the home environment, ECEC may have direct effects on children's cognitive and noncognitive development. The majority of related research rests upon the investment paradigm, arguing that educational intervention in the early years yields the most powerful effects on later achievement and other relevant life outcomes (Heckman 2006, Heckman & Cunha 2007). Hence, ECEC intervention targeted to children of socioeconomically disadvantaged families

CAN PROVISION OF EARLY CHILDHOOD EDUCATION AND CARE PROMOTE FERTILITY?

A neighboring question is to what extent the increasing provision of ECEC can contribute to rising fertility rates, particularly in the low-fertility countries of Europe. A common hypothesis is that public provision of ECEC can help families and mothers ease the work-family conflict arising with young children and therefore may stimulate fertility decisions of couples in the first place. Empirical evidence, however, is mixed and seems to depend on characteristics of families and countries (Yakita 2018). Several studies did not detect any causal effect of public provision of childcare on fertility rates (e.g., Hank & Kreyenfeld 2003 for Germany, Lee & Lee 2014 for Japan). Nonetheless, a growing set of findings are in favor of a positive effect of ECEC on fertility (e.g., Del Boca 2002 for Italy, Hilgeman & Butts 2009 for 20 countries, Rindfuss et al. 2010 for Norway).

is commonly considered an effective policy to level out the playing field before children enter school (Barnett 1995, Burger 2010, Nores & Barnett 2010).

How exactly can ECEC equalize educational opportunities? To address this issue, we resort to general frameworks on the role of schooling in educational inequality (Downey & Condron 2016, Raudenbush & Eschmann 2015), which suggest that two principal factors might drive the impact of an ECEC intervention on SES gaps in children's achievement: SES heterogeneity in the individual consequences of ECEC participation (who benefits and how much) and SES heterogeneity in access to ECEC (who is exposed to certain benefits). Thus, the intervention's overall impact on a population of children results from an interplay of SES-specific effects and exposure to those effects.

Who benefits from early childhood education and care and how much? Consistent with investment theories, ECEC may be understood as an educational treatment providing instructional inputs to children. To define the treatment's effect, we require a counterfactual model that contrasts the (potential) skill outcome under the ECEC treatment with the (potential) skill outcome in the absence of the ECEC treatment (e.g., the home environment). The direction and magnitude of the treatment effect are therefore functions of (a) the treatment's effect on the quality of the learning environment as experienced by a child, i.e., the difference in quality as provided by the ECEC versus the home environment, and (b) a child's ability to benefit from certain instruction that may depend on prior skills (on the principle that skills beget skills). As **Figure 1a** illustrates, lower-SES children are more likely to experience gains in instructional quality by ECEC participation (Cascio 2015). One could argue that, similar to the situation in schooling in general, inequality across ECEC institutions is likely to be smaller than inequality across family environments (Downey & Condron 2016). This is an important source of greater gains for children from more disadvantaged families and, consequently, the equalizing power of ECEC. However, the comparably higher-quality gains through ECEC for lower-SES children might be balanced out by their comparably lower learning efficiency if SES gaps in initial skills, driven by family differences, are large, and skills beget skills (see **Figure 1b**). Accordingly, the equalizing effect of ECEC can be expected to be greater at younger ages when skill gaps are smaller. Below, we review the experimental and quasi-experimental literature on the treatment effects of ECEC interventions and the variability in effects along social lines.

Who is exposed to benefits? Selection into ECEC environments determines who will benefit from their effects. However, the broader societal context of ECEC may exhibit much more social heterogeneity than small-scale, highly standardized, and targeted ECEC intervention programs.

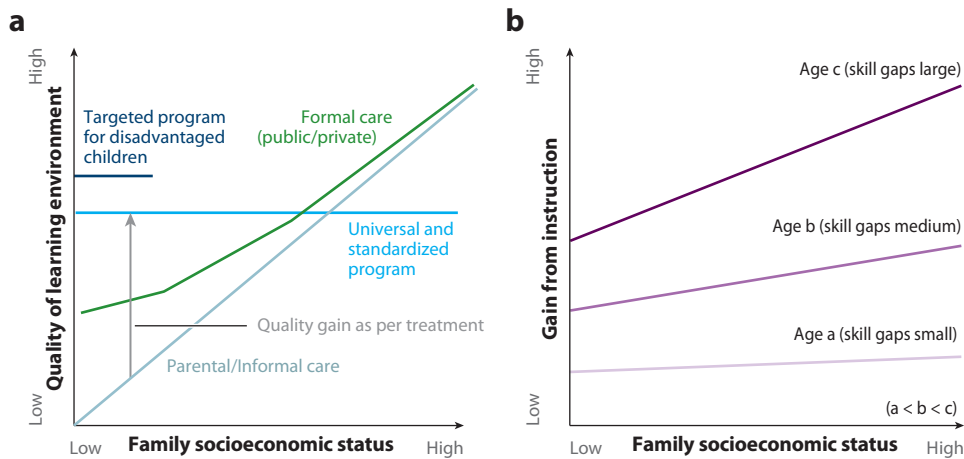


Figure 1

Illustration of the sources of early childhood education and care treatment effects: (a) Effect of family socioeconomic status (SES) on the quality of the child's learning environment. Adapted with permission from Cascio (2015) and Cascio & Schanzenbach (2014). (b) Effect of family SES on gains from instruction in early childhood education and care programs.

Parental decisions about the forms, timing, and intensity of ECEC shape children's exposure to certain treatments and, consequently, their opportunities to gain from it (Kulic et al. 2017). Moreover, parental decisions on ECEC are constrained by the availability of services and costs, which are driven by the overall societal and institutional context of ECEC. Accordingly, children's experiences and opportunities may vary within systems of ECEC as a function of SES. Based on this perspective, the institutional context of ECEC as part of the larger stratification system could offset equalizing effects and even act as a de-equalizer, very much like school systems (Domina et al. 2017). Therefore, understanding the role of ECEC for processes of social stratification involves a treatment of how families make early educational choices, which we cover in the section titled Socioeconomic Stratification of Early Childhood Education and Care Participation.

BENEFITS OF EARLY EDUCATION

Experimental Research on Targeted Early Childhood Education and Care Interventions

Studies evaluating the outcomes of targeted ECEC interventions are the most important part of research on ECEC effectiveness. This is true not only because of the comparably long tradition of ECEC intervention research, especially in the United States, but also because of the frequently randomized designs that make them an exceptionally reliable source of causal evidence on the potential short- and long-term benefits of early educational interventions. Typically, model interventions target children below the age of five from low-income families, are generously funded, and frequently implement an entire series of quality measures involving home visits, low child-to-staff ratios in centers, highly trained staff, and expert supervision (Barnett 1995, Currie 2001, Karoly et al. 1998).

Influential projects from the United States dominate the literature on randomized interventions (Nores & Barnett 2010). Without a doubt, the High/Scope Perry Preschool stands out as one of the most well-known model projects to demonstrate the substantial short- and long-term gains

in cognitive, social, and economic outcomes that disadvantaged children can achieve through targeted preschool interventions (Heckman et al. 2010, Karoly et al. 1998, Schweinhart et al. 2005). The Carolina Abecedarian project is a famous example of a postbirth, day care intervention program aimed at improving the cognitive and noncognitive skills of newborn children in economically disadvantaged families (Campbell et al. 2002). The federally funded and nationwide Head Start program in the United States extended targeted preschool interventions to a large scale. Although Head Start enrollment was found to yield positive effects on disadvantaged children, the gains appear to be generally smaller compared with those found with small-scale model programs (Barnett 2011, Deming 2009).

Meta-analytical studies are rich sources from which to gauge the impact of early interventions as well as the ingredients of successful programs (e.g., Barnett 1995, Burger 2010, Camilli et al. 2010, Nores & Barnett 2010, Wong et al. 2008). For example, analyzing 123 experimental and quasi-experimental studies on center-based interventions in the United States (at age three to five), Camilli and colleagues (2010) report average treatment effects from preschool age to adulthood of 0.23 standard deviations (SD) on cognitive achievements such as IQ and test scores and 0.14 SD on school success such as grades, high school completion, or college attendance. Other research highlights that early enrichment has long-lasting effects that go beyond immediate effects on cognitive abilities (Reynolds & Temple 2008). Such sleeper effects of early interventions can generate long-term gains in individual well-being through various indirect paths, including improved family and parent-child relations, better social adjustment, and enhanced motivation, all of which may result in societal gains such as reducing school dropout, criminal behavior, or reliance on welfare state (Reynolds et al. 2004, Belfield et al. 2006). Unfortunately, the literature provides less systematic evidence on programs outside the US context. A notable exception is the review by Nores & Barnett (2010) of 30 interventions in 23 mostly low-income countries, which reported effect sizes generally larger than for the United States. Characteristics of individual programs partly explain impact variability; while entry age, intensity, and duration of interventions seem to matter little, intentional teaching and direct instruction were associated with more substantial gains (Barnett 2011).

Taken together, a plethora of program evaluations demonstrate that early educational interventions can improve the life chances of children at the lower end of the SES distribution in profound and durable ways. Note that although intervention gains extend to noncognitive outcomes such as socioemotional skills, health, and well-being, our review is limited to research on children's gains in cognitive skills and educational outcomes. At the same time, however, findings from research that evaluates the effectiveness of targeted interventions provide little insight into the role that ECEC may play in the broader context of social inequalities of educational opportunities and social mobility in contemporary societies. Limitations arise, first of all, from the apparent concerns of external validity, and the degree to which we can generalize findings from targeted programs to larger-scale and universal programs, more common in the European context of ECEC. Moreover, benefitting low-SES children is not the same as reducing achievement gaps in a population perspective, as children from higher-SES families may benefit as well (Duncan 2008). Finally, assessing the population-level impact of ECEC on social inequality requires considering an entire nation's ECEC context rather than examining the effects of a specific intervention program in a carefully designed randomized control trial.

The Overall Effects of Early Childhood Education and Care: Findings from Observational Studies

These limitations can be addressed using observational studies that analyze the effects of ECEC participation based on samples that are representative of larger populations of children.

Obviously, studying ECEC effects in uncontrolled, real-world settings imposes validity challenges to causal inference, since children might be enrolled in formal childcare based on relevant but unobserved characteristics. However, provided that feasible identification strategies are carefully applied, population-based designs yield generalizable estimates, in contrast to small-scale intervention studies (Duncan 2008).

Various forms of ECEC can be considered effective to the extent that they improve the development of a random child. While most of the observational studies report positive and statistically significant effects of ECEC on child outcomes, effect sizes in studies on the general population of children [e.g., the Effective Provision of Pre-School Education (EPPE) project or the German Socio-Economic Panel] are considerably smaller than in intervention programs targeting children from low-income families (see Burger 2010). This is because the impact of ECEC attendance on children's outcomes is related to a variety of characteristics of the experience of formal childcare, including age (zero to two, three to five), starting age, duration, and intensity of exposure, as well as the structural and process quality of the attended program (Camilli et al. 2010, Love et al. 2003).

The variation in these characteristics leads results in various directions. On the one hand, some research shows improved cognitive and language development associated with ECEC attendance under the age of two (Melhuish et al. 2015), in the United States (Bassok et al. 2019), and in many European countries (e.g., Broberg et al. 1997, Dearing et al. 2018, Sylva et al. 2010). On the other hand, some studies find no effect or even some small negative effects for this age group (Driessen 2004, Jaffee et al. 2011). Findings on the benefits of ECEC for children's cognitive development are more conclusive for children aged three to five (Melhuish et al. 2015, Mitchell et al. 2008, Pianta et al. 2009) and are corroborated by a variety of research designs, such as regression discontinuity design based on birthday cutoffs in the United States (e.g., Barnett et al. 2007, Gormley et al. 2008), studies exploiting the expansion over time in public preschool education in European countries (reviewed in Ruhm & Waldfogel 2012), and instrumental variables (Datta Gupta & Simonsen 2010) or value-added regression models (Sylva et al. 2004).

A too-early start within a child's first year can affect cognitive and language development negatively, although this is not always the case (Gregg et al. 2005, Waldfogel et al. 2002), while a preschool starting age of two to three years old is the most beneficial for children (Barnett & Lamy 2006, NICHD Early Child Care Res. Netw. 2005). A recent meta-analysis suggests that starting age is more strongly related to children's outcomes than the duration of ECEC attendance (Leak et al. 2010), although the effects were found to be rather small (Melhuish et al. 2015).

ECEC quality is important per se but also as a moderator of the effects of intensity and duration of attendance of formal childcare and preschool (Ruhm & Waldfogel 2012, Zaslow et al. 2010). Although there is no full agreement as to whether indicators of ECEC quality at the age of zero to two lead to better children's outcomes (e.g., Pinto et al. 2013), a large number of longitudinal studies consistently report that attending high-quality ECEC in the age span of three to five significantly enhances children's academic, cognitive, and educational outcomes, a conclusion that appears to be robust to the use of different statistical methods (Duncan 2003). The type of quality indicator also matters: Process quality, e.g., sensitive responsiveness of the teachers and the social environment, is usually more important than structural quality for children aged zero to two. Instead, cognitive stimulation and instructional quality appear to be particularly important for children's cognitive outcomes and school achievement in the age span of three to five (Burchinal et al. 2011).

Can Preschools Compensate for Disadvantage?

Given the substantial inequality in the characteristics of home environments and resources that children can experience in the early years, early educational programs can be a key tool to equalize the cognitive development and educational achievement of children from different socioeconomic backgrounds (Magnuson et al. 2007b). Several reviews of studies report the positive impact of childcare participation on cognitive development, and these benefits are especially marked in disadvantaged children (reviewed in Burger 2010, Kamerman et al. 2003, Reynolds et al. 2010). The equalizing effects are strongest in early randomized interventions (Barnett 1995) but are also reported in studies using observational data (Burger 2010) or natural experiments that result from the introduction of universal programs (Van Huizen & Plantenga 2018). Nonetheless, a review of international nonexperimental literature suggests that despite children from lower-SES families gaining, on average, more from ECEC attendance than their higher-SES peers, these gains cannot compensate completely for the important developmental shortages of some of the most disadvantaged children (Burger 2010). Also, research on the role of preschool for social inequality in different forms of educational achievement, such as reading and mathematics or school readiness, points to a large variation in the magnitude of compensatory effects (Berlinski et al. 2009, Hansen & Hawkes 2009, Magnuson et al. 2007b, Melhuish et al. 2008). Yet, there is more conclusive evidence that high-quality preschool programs direct students to “succeed against the odds” (Siraj-Blatchford et al. 2011, p. 6; Sylva et al. 2011), highlighting the crucial role of quality of formal care in compensating for disadvantage (Currie 2001, Karoly et al. 1998, Leseman 2009, Meyers et al. 2004, Vandell et al. 1988, Vandell & Corasaniti 1990).

Particularly relevant studies are those that use variation in the introduction of universal programs as a form of natural experiment (Blanden et al. 2016, Gormley & Gayer 2005, Havnes & Mogstad 2015). In contrast to intervention research, findings from these studies are representative for larger populations of children while still being robust in terms of causal inference. In the latest meta-analysis of 30 quasi-experimental studies from 2005 to 2017, Van Huizen & Plantenga (2018) investigate the effects of universal ECEC on child development. Surprisingly, just one-third of estimates indicate positive and statistically significant effects, while half are nonsignificant and one-sixth are significantly negative effects. However, their findings clearly indicate that gains from universal ECEC are concentrated mostly among children from lower-SES family backgrounds.

Cross-National Studies on Early Childhood Education and Care

The past decade has also brought out more comparative research on the consequences of ECEC participation for children’s cognitive development. Recent cross-national studies use standardized and preharmonized data from large-scale international surveys such as PISA or PIRLS to analyze the relationship between preschool attendance and children’s competencies (Cebolla-Boado et al. 2017, Dämmrich & Esping-Andersen 2017, Montie et al. 2006, Schütz 2009). Although they suffer from the limitations of cross-sectional designs, such comparative studies have two major benefits: First, by comparing ECEC effects across a range of nations based on harmonized data, they can establish the generality of previous findings across various societal contexts; second, even more importantly, cross-national data make it possible to study how the contextual features of ECEC systems in countries shape ECEC effectiveness.

In one of the seminal papers, Schütz (2009) uses data on 38 countries from the 2003 round of PISA, finding that the structural quality of preprimary education is associated with increased mathematics test scores among 15-year-olds and that the cross-country variation in the effects of preprimary education attendance is—to a significant extent—accounted for by differences in structural quality across countries. A more recent study by Dämmrich & Esping-Andersen (2017)

analyzes data on 14 developed countries using PIRLS 2011 and PISA 2012, covering cohorts born in the late 1990s and early 2000s. This study finds that the positive association between preschool attendance and reading competencies in both primary and secondary school is stronger when the share of children with high-intensity preschool attendance is larger. Moreover, the beneficial relationship between attendance and reading competencies in secondary (and to a lesser extent also primary) education is stronger in countries with a higher preschool quality (low child-to-staff ratio and staff with higher qualifications).

The contribution of Cebolla-Boado and colleagues (2017) examines instead the extent to which preschool education can reduce social background differentials in pupils' competencies in a cross-national setting. Using data on 28 developed countries from PIRLS 2011, they find that preschool is positively associated with pupils' reading performance in most countries and that the benefits are lower for children who have more involved or better educated parents. Therefore, according to this research, parental involvement and parental education seem to be substitutes (rather than complements) for preschool attendance in the children's skill production function. As a consequence, preschool education is likely to reduce social inequality in educational achievement. Nonetheless, the magnitude of the estimated associations is not very strong, leading the authors to argue that the equalizing potential of preschool education could have been overstated in previous debates. Similar conclusions are also provided by *eduLIFE*, a collaborative project based on a large number of in-depth case studies analyzing social inequality in education with a life-course perspective (Blossfeld et al. 2017). However, to further advance comparative work on observational data, there is a need for surveys with prospective measures of school attendance and children's outcomes. This could be similar, for instance, to the International Association for the Evaluation of Educational Achievement Preprimary Project, a longitudinal cross-national study of preprimary care and education in ten countries (Montie et al. 2006), which collected data in the early 1990s but has not been followed up since with similar research.

SOCIOECONOMIC STRATIFICATION OF EARLY CHILDHOOD EDUCATION AND CARE PARTICIPATION

Nearly all Western societies have witnessed a substantial rise in the public provision of formal childcare and institutions of preschool education (OECD 2015). Nonetheless, when comparing countries, we can detect a considerable heterogeneity in ECEC utilization rates. **Figure 2** exemplifies this by plotting the percentages of children enrolled in ECEC institutions at different ages in selected countries. Participation rates in children aged three to five exceed 60%, reaching nearly 100% coverage in European countries such as Italy, Germany, or France. Among the younger age group of ages zero to two, ECEC utilization varies more strongly, with 24% in Italy, 28% in Finland and in the United States, and up to 66% in Denmark. Such cross-national heterogeneity underlines the relevance of considering the national context of ECEC opportunities when addressing questions of social inequality related to ECEC.

In our theoretical discussion on the role of ECEC in social inequality in children's intellectual achievement in the section titled *The Development of Achievement Gaps in Early Years*, we argued that analyzing how socioeconomic groups utilize ECEC is essential for assessing the total effect of ECEC on inequality. Indeed, the literature reports considerable disparities in ECEC participation along regional, ethnic, and social lines (Bainbridge et al. 2005, Fram & Kim 2008, Van Lancker & Ghysels 2016). The social policy literature (e.g., Pungello & Kurtz-Costes 1999) suggests that equal versus unequal access to ECEC institutions must be evaluated from the sides of both demand (the situation of families) and supply (costs and availability). In nationwide ECEC contexts, demand and supply can interact in complex ways to create social and regional

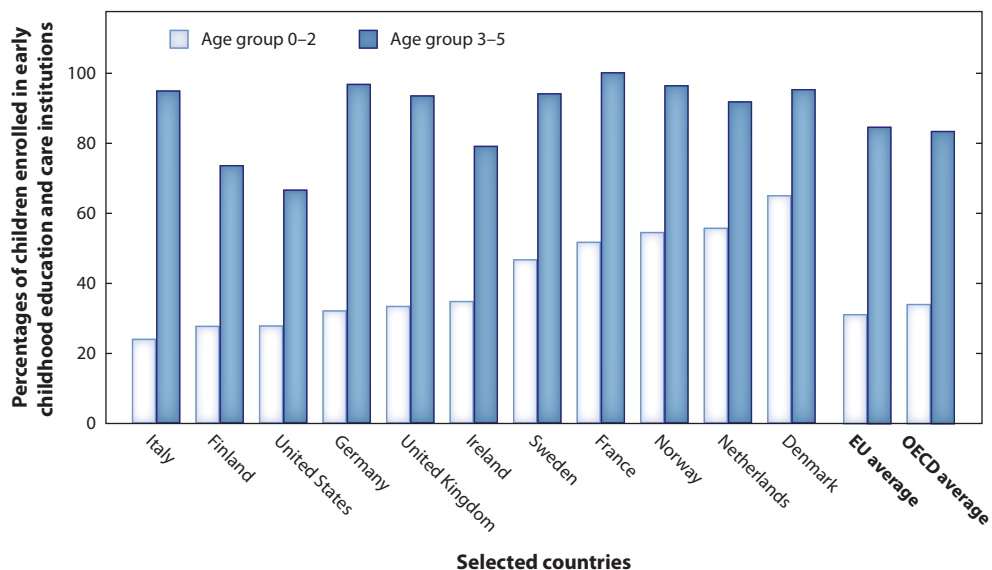


Figure 2

Percentages of children enrolled in early childhood education and care institutions at different ages in selected countries in 2014. Figure based on OECD data. Abbreviations: EU, European Union; OECD, Organisation for Economic Co-operation and Development.

heterogeneity in ECEC utilization patterns. Thus, the question of who benefits from ECEC genuinely involves behavioral differences across families (choices) but also structural opportunities and incentives created by the social policy context (constraints).

Demand: Socioeconomic Status and Families' Choices in Relation to Early Childhood Education and Care

Nationally representative survey studies almost univocally demonstrate that the dimensions of family SES are associated with ECEC participation. In the United States, family income turns out to be an important structural predictor of ECEC participation. Children from lower-income families are more likely to be cared for in home arrangements and less likely to attend center-based care (Duncan & Brooks-Gunn 2000, Fuller et al. 2002, Magnuson & Shager 2010, Tang et al. 2012). Family income is more predictive for children's ECEC usage in the younger age groups than at later age groups, which benefit from higher rates of subsidized care (Ertas & Shields 2012, Schmit et al. 2013). Moreover, family income predicts time spent in center-based care and the number and quality of experienced care arrangements (Early & Burchinal 2001, Peisner-Feinberg et al. 1999). However, because of the abundance of subsidized programs directed at low-income families, the precise relationship of family income and ECEC participation may be U-shaped (Coley et al. 2014). The same seems to hold true for income and care quality: The best-quality care is bought by well-off families, whereas low-income families are eligible for different government programs of high quality, leaving out the bulk of medium-income families whose children benefit from neither of these (Phillips et al. 1994). Finally, Hynes & Habasevich-Brooks (2008) find that two-thirds of all children experience variation in childcare quality over their childhood, and that more highly educated parents are more likely to spot unsuitable arrangements, while persistent low-quality experiences prevail among children from disadvantaged families.

In European countries, inequality in ECEC participation is also profound (Mamolo et al. 2011, Sylva et al. 2011, Vandenbroeck et al. 2008). However, the national contexts of ECEC matter to a significant extent (Zachrisson et al. 2013). For example, Brilli et al. (2017) find considerable social disparities in childcare usage for children below age two in Italy. Similar conclusions have been reached for Germany and Finland (Karhula et al. 2017, Krapf 2014). In the Scandinavian universal ECEC systems, however, SES seems to matter only a little for children's age at entry, as studies of preschools in Sweden (Krapf 2014, Viklund & Duvander 2017) or of public childcare of infants in Norway (Zachrisson et al. 2013) have shown. Furthermore, Vandenbroeck and colleagues' (2008) report on Belgium revealed that quality of center-based care is unequally distributed by family income.

Next to family income, maternal education is another important predictor of ECEC participation (Fuller et al. 1996, Suárez 2013, Vandenbroeck et al. 2008). Education seems to drive mothers' choices for their children's early education and care over and above financial resources (Augustine et al. 2009, Li-Grining & Coley 2006). An explanation is that more highly educated mothers possess more skills in screening, evaluating, and choosing the best ECEC experiences for their children. This is reflected not only in choices for high-quality childcare but also in a constant evaluation of childcare options that best fit children's needs (Fuller et al. 1996). Children of more highly educated mothers attend formal childcare more frequently, independently of a child's age and across all countries (Brilli et al. 2017, Hofferth 1996, Hynes & Habasevich-Brooks 2008, Krapf 2014). The association of maternal education and ECEC quality was found to be strongest when children arrive at preschool age and preparation for school becomes salient (Augustine et al. 2009, Greenberg 2011).

Importantly, observed SES differences in ECEC participation might be a result of both preferences and better access, which depends on neighborhood characteristics, state support, information and knowledge, and costs (Fram & Kim 2008, Pungello & Kurtz-Costes 1999). In the absence of data about external constraints, however, one strategy with which to analyze family choices is to study parents' stated preferences for care (Early & Burchinal 2001, Zachrisson et al. 2013).

Supply: Costs, Availability and the Redistributive Function of the State

The socioeconomic context of the family shapes parents' motivation and capacity to enroll their children in ECEC institutions (Early & Burchinal 2001, Fram & Kim 2008). Consequently, social policy can play a decisive role in reducing socioeconomic inequality in access to ECEC; for instance, public spending can be used in the form of subsidies to reduce families' out-of-pocket expenses for childcare or through a direct provision of public childcare services (Hemerijck 2017).

Subsidies and public programs in the United States. In the past 20 years, childcare subsidies and state-funded and federally funded programs were introduced in the United States with the scope to increase parental resources available for childcare and provide the means to improve children's educational opportunities (Adams & Rohacek 2002, Gormley & Gayer 2005). Some of the more recent public ECEC programs were inspired by Heckman's early investment model (Heckman 2006), while subsidies were introduced in particular with the 1996 welfare reform to promote the active employment of parents (Hirshberg et al. 2005, Ertas & Shields 2012).

Many low-income families receive subsidies in the form of vouchers that working parents can use to cover the costs of childcare (Gormley & Gayer 2005). Although subsidies can also be used for informal care or expenses other than center-based childcare, Ertas & Shields (2012) find that US families that rely on subsidies are more likely to enroll their children in center-based childcare, and this pattern is particularly pronounced among poor parents. Some studies using

administrative data from US states and counties find important between-state variation as to whether the subsidies are used for home care or formal care, attributable to a strong preference for home providers in some states (Fuller et al. 2002, Meyers et al. 2002). Hirshberg and colleagues (2005) further show that there is variation within the group of low-income subsidy users: Better educated and wealthier subsidy users seem to favor center-based care. Overall, granted subsidies increase the likelihood of families enrolling their children in center-based programs (Fram & Kim 2008, Ertas & Shields 2012), particularly when subsidies are directly linked to the condition of formal childcare (Fuller et al. 2002).

If we look closely at the use of publicly funded programs (e.g., Head Start or other state-funded programs) by children from low-income families, the participation tripled in recent decades (Bainbridge et al. 2005) and inequality of access by social background consequently went down between 1992 and 2000 (Magnuson et al. 2007a). Using the National Household Education Survey, Greenberg (2010) shows that public funding over 14 years, which included both subsidies and funded childcare, favored the use of formal childcare for low-income households relative to other forms of care, without altering the reliance on childcare in high-income families. However, the link between family income and early education enrollment remains strong for children aged three to five, despite a marked increase in enrollment in center care (Bainbridge et al. 2005, Magnuson et al. 2007a). The inequality of access, however, is most pronounced at an earlier age, because opportunities for lower-class children are more restricted by economic conditions (Bainbridge et al. 2005, Coley et al. 2014). Inequality of access largely disappears for 5-year-olds, when funded programs are more available. This goes in favor of the role of public policy in closing the gap in access between socioeconomically advantaged and disadvantaged children (Gambaro et al. 2014).

Publicly funded early education in Europe. Access to publicly available care is a particularly relevant question in Europe, where public childcare is a dominant childcare arrangement, promoted by the objectives of the European Union development plans (Eur. Council 2002) and often of a universal character for children above the age of three. Public childcare in Europe has its origins in the social investment paradigm (Hemerijck 2017), which underlines the availability and affordability of childcare arrangements as a key social investment policy that also lowers access-to-childcare bias (Abrassart & Bonoli 2015). Yet, inequality of access is also pervasive in Europe (OECD 2015, Van Lancker & Ghysels 2016); advantaged families are more likely to choose childcare services, and those chosen are of a better quality (Skopek et al. 2017). Welfare state policies may be able to support the most disadvantaged families through setting the criteria and determining the costs and availability of services, and by designing the redistribution of childcare toward the low-SES families.

In this regard, the selection criteria in deciding who gets priority are key instruments that policy makers use to influence the enrollment in childcare (Del Boca et al. 2016). Welfare state policies at the state, regional, or municipal level may decide to prioritize families that are supposed to value childcare services the most: those who need help maintaining a work-life balance, or those who have no financial means to access these services (Van Lancker & Ghysels 2016). Differential selection criteria in public childcare are also the reason for different patterns of access by social background across countries and states in Europe. The role of selection criteria is addressed through single-country studies (Abrassart & Bonoli 2015, Del Boca et al. 2016, Felfe & Lalive 2012) or comparative work (Pavolini & Van Lancker 2018; Van Lancker & Ghysels 2012, 2016). For instance, Abrassart & Bonoli (2015) show that in a Swiss canton, lower-class children are more likely to attend formal childcare in the municipalities with lower fees, despite the same availability. In a simulation exercise of selection criteria in six Italian municipalities, Del Boca and colleagues (2016) find that lowest access bias and the strongest effects of ECEC on lowering SES

achievement gaps are observed when the criteria prioritize disadvantaged children in a context of limited availability of service.

Turning to comparative work, Van Lancker & Ghysels (2016) argue that while government involvement in providing affordable and available formal care for children below age three is associated with smaller inequality in access to ECEC in developed economies, the only two countries close to equalizing use are Denmark and Iceland. Van Lancker & Ghysels (2012) further compare Sweden and Flanders as two systems with a similar availability of formal care but different costs for the most disadvantaged, demonstrating that Sweden fares better at redistributing the access opportunities across groups. Yet, some authors claim that ECEC in Europe in its current state creates a Matthew effect of accumulated advantage as the current costs of attendance and limited availability contribute to inequality rather than reducing it (Van Lacker 2013, Pavolini & Van Lancker 2018). Therefore, even though it is recognized that low-income families are in most need of early education (Esping-Andersen et al. 2002, Karoly et al. 1998), childcare policies in Europe—in their design of costs, availability, and redistribution of resources—might still favor socioeconomically advantaged families, failing to redistribute the opportunities toward lower-SES families.

CONCLUSIONS AND AVENUES FOR FUTURE RESEARCH

The strongest evidence on the effects of childcare on early educational achievement is based on randomized intervention programs, which take place within particular contexts and are mostly limited to very specific populations of the most disadvantaged children. Therefore, the results of these studies are difficult to generalize to other populations and countries. What we have argued in this review article is that these programs may positively change the course of life of a single individual in disadvantaged conditions, yet the overall effect of ECEC in reducing social inequalities in life chances is less conclusive and will depend on how social contexts—family, as well as nationwide settings of ECEC—affect human behavior.

The benefits of early education are widespread for the whole population of children who increasingly rely on it. In this review we propose that two major stratifiers, families and institutions, need to be considered jointly in order to place the effects of early intervention in a broader context. While well-targeted educational programs may lower achievement gaps by SES, the disproportionate use of early education by privileged families that consider early education as an investment may offset the equalizing effects of early intervention at the population level. Also, the stratification patterns we observe in many of the current childcare systems across Europe and the United States, as our review suggests, further contribute to widening gaps in children's achievements.

Families

In the context of the increasing expansion of educational services for the early years, a family's choices about investment in children also encompass the decisions about enrolling children in ECEC. The decision making of parents related to their children's education is known to be driven by socioeconomic conditions (Breen & Goldthorpe 1997) and cultural capital (Bourdieu 1977). In the case of early education, the differences in the propensity to invest across socioeconomic groups are likely to be larger than in primary and secondary education since in many countries preprimary education is not mandatory. The findings are consistent across Europe and the United States that more educated mothers and wealthier parents are more likely to enroll children in ECEC, contributing to diverging destinies from the very start (Augustine et al. 2009, Krapf 2014, Van Lancker & Ghysels 2016). Here, we aimed to highlight that the current ECEC system is actually on the way to becoming a new stratification system in education, and formal care might tend

to reinforce social inequality. Based on our review, we suggest that more theoretically-informed empirical evidence from population data in different countries is needed to assess the effects of ECEC on social inequality in children's outcomes, as well as to quantify the relative weight and potential interaction between social selection into and heterogeneous effects of ECEC attendance.

Institutions

The institutional organization of ECEC may further contribute to socioeconomic inequalities in access to formal care and children's cognitive achievement: A plurality of arrangements in the ECEC systems make their effects rather heterogeneous across groups of individuals and countries. The Matthew effect observed in early education in some systems contributes to the idea that childcare policies can actually reinforce inequality (Pavolini & Van Lancker 2018). It is thus unlikely that the gap in access and achievement can be closed unless there is an organized effort from the state (Ertas & Shields 2012); massive budgetary investment is needed to enable equal use of high-quality services, while coverage needs to be widespread if substantial inequalities have to be offset (Van Lancker 2013). Yet, more importantly, the stratification patterns that we observe in ECEC are not necessarily the product of childcare systems per se but may be the result of interconnected characteristics of country contexts that covary with ECEC characteristics or are moderated by them: a labor market in which discrimination against women (particularly those who are less educated) may take place, parental policies that intervene with childcare policies, ethnic discrimination, or failed integration of immigrants. To summarize, the organization of childcare systems cannot be taken as independent from other sets of policies and country-specific institutions (Hemerijck 2017).

Race, Ethnicity, and Migration

Our review was unable to look at the intersection between class and race, or class and ethnicity, even though extant literature occasionally shows ethnic and racial differences in use and effects of childcare over and above SES differences. For instance, recent work highlights how ECEC systems in many countries might be ill-equipped to address the aspirations of immigrant parents and to bridge cultural differences, which would make them more effective (Tobin et al. 2013). Particular disadvantages for minority groups, however, might stem from a lack of integration policies in other spheres and domains, including the labor market and the education of parents, forcing them into specific childcare options or no formal care. We thus argue that a broader picture needs to be considered, opposing the vision in which small-scale early interventions alone may change the social reality.

While this review focuses on social inequality in children's cognitive skills, childcare policies have a broad scope that includes human capital enhancement, living standards and the well-being of families, gender integration and gender equality, and benefits for the overall population of children. Our reflections are mostly limited to inequality in (early) cognitive-related achievement, and we encourage discussions on how childcare relates to other key topics for societal development—such as family and child well-being and gender equality—as these are fundamental to our understanding of its overall contribution in modern societies.

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