

**Social background and children's cognitive skills**  
**The role of Early Childhood Education and Care in a Cross-National Perspective**

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*Abstract*

This literature review looks at the current state of research on Early Childhood Education and Care (ECEC) from a sociological point of view. We summarize how children's experiences and benefits from participation in ECEC are related to their families' socio-economic positions 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 an 'equalizer' or 'de-equalizer' in early childhood. We argue that two major stratifiers, notably 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 thought to lower achievement gaps among children from different social backgrounds, a disproportionate use of early education by socio-economically privileged families may offset the benefits of early interventions. In addition, the current stratification patterns in various nation-wide ECEC contexts may further strengthen the gaps in children's (early) achievements.

*Key words*

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

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## INTRODUCTION

Research has consistently demonstrated the efficacy of Early Childhood Education and Care (ECEC) programs in improving the cognitive and non-cognitive skills of young children facing disadvantaged environmental conditions in their parental homes (Heckman 2006). From a sociological life course view, however, we do not address the long run consequences of early investments alone, we 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 in order 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 expanding ECEC in terms of social mobility and inequality in educational opportunity. As we shall show, evidence from ECEC intervention studies is not sufficient to allow generalizations on the role of ECEC as an 'equalizer' across modern societies. Rather, our literature review will demonstrate why children's participation in ECEC institutions and the benefits they might gain from them tend to be strongly related to their parents' socio-economic 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 must even be considered as a 'de-equalizer'. Moreover, much of 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 view on early childhood education and care, our review broadens our understanding of how different nation-wide settings of ECEC may influence the distribution of benefits for different children (e.g., Blossfeld et al. 2017). Indeed, not only does 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, while in Anglophone countries early childhood education 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: (1) What are the theoretical mechanisms underpinning the influences of family social background on the skill development of children? (2) How can ECEC be an ‘equalizer’? (3) Is ECEC attendance beneficial for children’s cognitive skills and are there children who benefit more than others from ECEC attendance? (4) Who has the opportunity to participate in ECEC at all? and, (5) 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 nation-wide 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*

Decades of social science research demonstrated a strong link between children's academic achievement and the socio-economic position of their families (SES). 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 .30 (Sirin 2005). Recent trend studies revealed that SES gaps in achievement have been on the rise over the past 50 years in the US and in many other countries in the world (Chmielewski 2017, Reardon 2011). Large-scale international student assessment studies such as PISA, PIRLS or TIMSS have documented substantial SES gaps in students' academic achievement in primary and secondary education (see review by Van de Werfhorst & Mijs 2010).

Recent longitudinal research has provided evidence that inequality of achievement is rooted very early in children's lives. While cognitive gaps in post-birth abilities among babies from different social background 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 & Werfhorst 2017).

Taken together, SES inequality in cognitive and academic achievement is not only substantial; it also 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 (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, as well as 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., taking time, being involved in children's lives, or the provision of support, guidance, warmth, and love) are conceived as two fundamental forms of parental investment (Longo et al. 2017). For example, more affluent families can afford better home material, higher-quality care, or better early childhood institutions. Recent studies on parental spending in 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). Higher 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 in 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-genes interaction, with higher SES promoting the genetic influence on achievement. This could be explained by the fact the high SES children's have higher opportunities to experience a learning quality that is in line with their genetically influenced motivation to learn (Tucker-Drob & Harden 2012). Thus, particularly early investment is considered more efficient and to promise greater returns in the long run (Heckman 2006). On the level of socio-economic 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, non-supportive, 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 hazard, and other childhood adversities can impair children's cognitive and physical development (McEwen & McEwen 2017).

Third, *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 more likely to succeed in educational institutions (Lareau 2003). Earlier socialisation research has shown 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).

Finally, 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 social gaps in skills that could grow even larger in absence of formal schooling (Downey & Condrón 2016; Raudenbush & Eschmann 2015), initial allocation of children to educationally differentiated environments based on ability has already powerful consequences for later social inequality (Domina et al. 2017). Sorting to heterogeneous schools and classrooms may not only create differential experiences in relation to curriculum, school resources, instructional quality and pace; it may also reinforce peer effects (van Ewijk & Sleegers 2010) or self-fulfilling prophecy effects through teachers’ expectations, labelling, and teacher-student interactions (Eder 1981). Some examples of these processes are ability grouping in primary school (Condrón 2008) or tracking of students in secondary education (Blossfeld et al. 2016). Yet, family SES may shape students educational experience also 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 transit 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 education*

The provision of early childhood education and care (ECEC) has gained significant attention at the cross-roads 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 a diversity of labels for contemporary childcare services challenges clear-cut terminological distinctions. Most generally, non-parental 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 interaction (Blossfeld et al. 2017, Hansen & Hawkes 2009). Examples of formal care include crèches, day care centers, play groups, kindergartens, and other pre-‘school’ 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. The availability of ECEC may facilitate maternal employment, 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 non-cognitive 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 socio-economically disadvantaged families 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 for educational inequality (Downey & Condron 2016, Raudenbush & Eschmann 2015), which suggests 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 in a population of children results from an interplay of SES specific 'effects' and 'exposure' to those effects.

*Who benefits from ECEC 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 to the (potential) skill outcome in the absence of the ECEC treatment (e.g., the home environment). The direction and magnitude of the treatment effect is thereby a function 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 instructions which may depend on prior skills (principle of 'skills beget skills'). As Panel I in Figure 1 illustrates,

lower SES children are more likely to experience gains in instructional quality by ECEC participation (Cascio 2015). Similar to schooling in general (Downey & Condrón 2016), one could argue that inequality across ECEC institutions is likely to be smaller than inequality across family environments. 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 Panel II in Figure 1). Accordingly, the equalizing effect of ECEC can be expected to be greater at younger ages when skill gaps are smaller. Below, we will review the experimental and quasi-experimental literature on the treatment effects of ECEC interventions and the variability in effects along social lines.

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*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. 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 on how families make early educational choices, which we will cover further below.

## BENEFITS OF EARLY EDUCATION

### *Experimental research on targeted ECEC interventions*

Studies evaluating the outcomes of targeted ECEC interventions loom large in research on ECEC effectiveness. That is not only for the comparably long tradition of ECEC intervention research, especially in the United States. It is also for 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-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, *High/Scope Perry Preschool* stands out as one of the most illustrious 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 for a post-birth, day-care intervention program that aimed at improving the cognitive and non-cognitive skills of new born children in economically disadvantaged families (Campbell et al. 2002). The federally funded and nation-wide *Head Start* program in the US lifted targeted preschool interventions up to a large scale. Although *Head Start* enrolment was found to yield positive effects on

disadvantaged children, the gains appeared to be generally smaller compared to those found by 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 U.S. (at age three to five), Camilli and colleagues (2010) report average treatment effects from preschool age to adulthood of .23 SD on cognitive achievement such as IQ and test scores, and .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 (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 Nores & Barnett’s (2010) survey of 30 interventions in 23 mostly low-income countries, which reported effect sizes generally larger than for the US. Characteristics of individual programs partly explain impact variability; while entry age, intensity or 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 non-cognitive outcomes such as socio-emotional skills, health, and well-being, our review limits to children’s gains in cognitive skills and educational outcomes. At the same time, however, findings

obtained from research that evaluates the effectiveness of targeted interventions is inconclusive regarding the role 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 ECEC: findings from observational studies*

These limitations can be addressed using observational studies that analyse the effects of ECEC participation based on samples that are representative for larger populations of children. Obviously, studying ECEC effects in uncontrolled, 'real-world' settings imposes validity challenges to causal inference, since children might select to 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 the positive and statistically significant effects of ECEC on child outcomes, effect sizes in studies on the general population of children (e.g., EPPE, pre-Cool study, NCDS, SOEP, NEPS) 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-two, three-

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, research reports improved cognitive and language development in children after attending ECEC for children below the age of two (Melhuish et al. 2015), in the US (Bassok et al. 2018), as well as 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 yet more conclusive for children aged three-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 cut-offs in the US (e.g., Barnett et al. 2007, Gormley et al. 2008), studies exploiting the expansion over time in public preschool education in European countries (see review 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, even if this is not always the case (Gregg et al. 2005, Waldfogel et al. 2002), while a starting age at preschool of two to three years old is the most beneficial for children (Barnett & Lamy 2006, NICHD 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 attendance at 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 environment, is usually more important than structural quality for children aged zero to two. Cognitive stimulation and instructional quality, instead, appear to be particularly important for children's cognitive outcomes and school achievement in the age span 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 socio-economic 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 (see reviews by 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 non-experimental 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 & Corsaniti 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). Contrary 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 & Platenga (2018) studied the effects of universal ECEC on child development. Surprisingly, just a third of estimates indicated positive and statistically significant effects, while a half were non-significant and a sixth were significantly negative effects. However, their findings clearly indicated that gains from universal ECEC were concentrated mostly among children from lower SES family backgrounds.

#### *Cross-national studies on ECEC*

The last 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 pre-harmonized data from large scale international surveys such as PISA or PIRLS to analyse the relationship between pre-school attendance and children’s competencies (Cebolla-Boado et al. 2017, Dammrich & Esping-Andersen 2017, Montie et al. 2006, Schütz 2009). Although suffering 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 makes it possible to study how the contextual features of ECEC systems in countries shape ECEC effectiveness.

In one of the seminal papers, Schütz (2009) used data on 38 countries from the 2003 round of the PISA survey, finding that the structural quality of pre-primary education is associated with increased mathematics test scores among 15 year olds and that the cross-country variation in the effects of pre-primary 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) analyses 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 the larger is the share of children with high intensity preschool attendance. 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-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 the 2011 PIRLS survey, 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 analysing 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 IEA Pre-Primary Project, a longitudinal cross-national study of pre-primary care and education in ten countries (Monti et al. 2006); it collected data in the early 1990s but has not been followed up since with similar research.

## SOCIO-ECONOMIC STRATIFICATION OF ECEC PARTICIPATION

Nearly all Western societies 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 the age group three to five exceed 60 per cent, reaching nearly 100 per cent coverage in European countries such as Italy, Germany or France. Among the younger age group of zero to two ECEC utilization varies more strongly, from 24 per cent in Italy, 28 per cent in Finland and in the United States, up to 66 per cent 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.

--- Figure 2 ---

In our theoretical discussion on the role of ECEC in social inequality in children's intellectual achievement we argued that analyzing how socio-economic 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 (un)equal access to ECEC institutions must be evaluated from both sides of *demand* (the situation of families) and *supply* (costs and availability). In nation-wide ECEC contexts, demand and supply can interact in complex ways to create social and regional 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: SES and families’ choices in relation to ECEC*

Nationally representative survey studies almost univocally demonstrate that the dimensions of family SES are associated with ECEC participation. In the US, 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 was found to be 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, plurality and the quality of childcare 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 non-linear (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 a high quality, leaving aside a bulk of medium income families whose children benefit from neither of these (Phillips et al. 1994). Finally,

Hynes & Habasevich-Brooks (2008) found that two thirds of all children experience variation in childcare quality over their childhood, and that higher educated parent 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 profound too (Mamolo et al. 2011, Sylva et al. 2011, Vandebroek et al. 2008). However, the national contexts of ECEC matter to a significant extent (Zachrisson et al. 2013). For example, Brilli et al. (2017) found 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 & Zofie-Duvander 2017) or of public childcare of infants in Norway (Zachrisson et al. 2013) have shown. Furthermore, Vandebroek 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, Vandebroek 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 might be that higher 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 higher educated mothers attend formal childcare more frequently, independently of a child's age and across all countries (Brilli et al. 2017, Hofferth et al. 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 but also of better access, which depends on neighborhood characteristics, state support, information and knowledge, and costs (Pungello & Kurtz 1999, Fram & Kim 2007). 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 socio-economic context of the family shapes parents' motivation and capacity to enroll their children in ECEC institutions (Early & Burchinal 2001, Fram & Kim 2007). Consequently, social policy can play a decisive role in reducing socio-economic 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 last 20 years, childcare subsidies and state and federal funded programs were introduced in the US 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 applied for informal care or expenses other than center-based childcare, Ertas & Shields (2012) find that American families that rely on subsidies were more likely to enroll their children in center-based childcare, and this pattern was 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 homecare or formal care, attributable to a strong preference for home providers in some states (Fuller et al. 2002, Meyers et al. 2001). Hirshberg and colleagues (2004) further show that better educated and wealthier subsidy users 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). However, the evidence is more conclusive 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*, 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 from 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 of 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 enrolment in center care (Bainbridge et al. 2005, Magnuson et al. 2007a, Smith 2000). The inequality of access, however, is most pronounced at an earlier age, because opportunities for lower class children are more restricted (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 socio-economically 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 Lisbon strategy targets (European 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 of a better quality (Skopek et al. 2017). Welfare state policies may be more or less 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 towards the low SES families.

In this regard, the selection criteria in deciding who gets priority are first policy tools (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 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 (Del Boca et al. 2016, Abrassart & Bonoli 2015, Felfe & Lalive 2012) or comparative work (Van Lancker & Ghysels 2012, 2016, Pavolini & Van Lancker 2018). 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 best effects of ECEC on lowering SES achievement gaps are observed when the criteria prioritized 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 of 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 advantage across groups. Yet, Van Lancker (2013) claims that ECEC in Europe in its current state creates a ‘Matthew effect’ as the current tariffs and limited availability contribute to inequality rather than reducing it (Pavolini & Van Lancker 2018). Therefore, even though it is recognized that low income families are in most need for early education (Karoly et al. 1998, Esping-Andersen et al. 2002), childcare policies in Europe – in their design of costs, availability and redistribution of resources – might still favor socio-economically advantaged families, failing to redistribute the opportunities towards 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 specific contexts and are mostly limited to very specific populations of the most disadvantaged children. Therefore, the results of these studies are difficult to extrapolate 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 nation-wide settings of ECEC – affect human behavior.

The benefits of early education are widespread for the whole population of children that growingly rely on it. In this review we propose that two major stratifiers, notably families and institutions, need to be considered in order to place the effects of early intervention in a broader context. While well-targeted educational programs may lower achievement gaps, a disproportionate use of early education by privileged families that consider early education as

an investment, may offset the positive effects of early intervention at the population level. Also, the stratification patterns we observe in many of the currently designed childcare systems across Europe and the US, as our review suggests, further contribute to widening gaps in children's achievements.

*Families.* In the context of the high expansion of educational services for the early years, investment in children also encompasses the decision of on which early education to rely. The decision making of parents in education is known to be driven by socio-economic conditions (Breen & Goldthorpe 1997) and cultural capital (Bourdieu 1977). In the case of early education, the differences in the propensity to invest across socio-economic groups are likely to be larger than in primary and secondary education, since in many countries pre-primary education is not mandatory. The findings are consistent across Europe and the USA that more educated mothers and wealthier parents are more likely to enroll children in ECEC, contributing to diverging destinies from the early start (Augustine et al. 2009, Krapf 2014, Van Lancker & Ghysels 2016). Here we aimed to highlight that the 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 socio-economic inequalities in access to formal care and children's cognitive achievement: a plurality of arrangements in the ECEC systems makes 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 re-enforce 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 services with a high quality, while coverage needs to be widespread if inequalities have to be substantially 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 inter-connected characteristics of country contexts that co-vary with ECEC characteristics or are moderated by them: the organization of the labor market in which discrimination for (low educated) women 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 showed 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.

## REFERENCES

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