

Achievement Gaps by Migration Background and the Role of Early Childhood Education and
Care:
Evidence from a Nationally Representative Irish Cohort Study

A thesis submitted in fulfilment of the requirements for the degree of PhD

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Declaration of the author

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Declaration of co-authorship

This signed declaration describes the contribution of the candidate and the co-author to each of the papers in this thesis in order to identify the candidate's independent contribution to each work.

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Paper I: Academic achievement gaps by migration background at school starting age in Ireland

Stefanie Sprong is the first author of this paper. This paper was co-authored with Dr Jan Skopek and was published in *European Societies* in June 2022. Stefanie Sprong compiled the literature review, developed the theoretical framework and conducted the analyses. Dr Jan Skopek provided advice and feedback on the theoretical framework and the statistical analyses, and assisted with the editing of the final drafts of the paper.

Paper II: The development of language achievement gaps by migration background during primary school - A path-model of educational inequalities

Stefanie Sprong is the first author of this paper. This paper was co-authored with Dr Jan Skopek. Stefanie Sprong compiled the literature review, developed the theoretical framework, conducted the statistical analyses and wrote the drafts of the paper. Dr Jan Skopek advised on and assisted with the statistical analyses, and provided advice and feedback on drafts of the paper.

Paper III: Childcare Utilisation by Migration Background - Evidence from a Nationally Representative Irish Cohort Study

Stefanie Sprong is the first author of this paper. This paper was co-authored with Dr Jan Skopek. Stefanie Sprong compiled the literature review, drafted the theoretical introduction, conducted the analyses and wrote the first draft of the paper. Dr Jan Skopek provided advice and feedback on the theoretical framework and the statistical analyses, and gave feedback on multiple drafts of the paper

Paper IV: ECEC as a potential equaliser for achievement gaps by migration background: Evidence from a quasi-experimental population-level study in Ireland

Stefanie Sprong is the first author of this paper. This paper was co-authored with Dr Jan Skopek. Stefanie Sprong developed the theoretical framework, compiled the literature review, conducted the analyses and wrote the drafts of the paper. Dr Jan Skopek contributed to the development of the theoretical model, advised on the use of propensity score methods and the interpretation of the findings, and provided feedback on drafts of the paper.

Statement by the co-author:

I hereby confirm that the doctoral candidate's described contribution to the work where I am listed as co-author is correct, and I consent to including the work in the named dissertation.

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Summary

The growing diversity associated with increased global migration has brought up important questions regarding the integration of immigrants and their descendants. While there is a large and growing literature on the educational achievement of students with a migration background, less is still known about younger age groups and more recent countries of immigration. Moreover, although early childhood education and care (ECEC) is commonly seen as an effective policy tool to mitigate educational inequalities, more research, especially at the population-level, is needed to understand if it can help to reduce disadvantages by migration background in the European context.

Drawing on longitudinal data from the Growing Up in Ireland (GUI) '08 Cohort, this thesis sets out to contribute to the large literature on the academic achievement of children of migrant origin and the impact of ECEC. The first part of the thesis, constituted of papers one and two, sheds light on educational inequalities by migration background during early and middle childhood in Ireland, a country that only became a country of net immigration relatively recently. The second part, made up by papers three and four, subsequently explores if ECEC could potentially serve as an equaliser to reduce existing achievement gaps by migration background.

The first paper sets out to estimate the size of disparities by migration background in verbal and non-verbal skills at age five and explores the causes of these gaps in Ireland. It primarily draws on data from the third wave and employs multiple linear regression models in a stepwise fashion. The results suggest that some disparities by migration background already exist at the start of school, but also that they are limited to verbal skills and vary widely across migrant groups. The child's first language is an important predictor of disadvantages by migration background in verbal skills. However, in contrast to most existing evidence from other countries, social background plays a relatively minor role.

The second paper adds a longitudinal perspective to the literature by investigating how much of the disparities in English language achievement by migration background during primary school can be attributed to inequalities that already existed before school. It mostly relies on data from the third and fifth wave and uses structural equation modelling to address the issue of regression to the mean. The results indicate that disadvantages by migration background during school can largely be attributed to gaps before school. Moreover, given earlier achievement, the effect of having a migration background is often insignificant or positive, suggesting that gaps remain relatively stable or even decrease during the period of formal schooling.

The third paper looks at the role of ECEC from a ‘selection-into-effects’ perspective. It investigates how childcare choices differ between native and immigrant households in Ireland, and how these differences can be explained. This paper primarily draws on data from the second wave, and employs several regression models as well as the Karlson-Holm-Breen decomposition technique. The results indicate that compared to children from native homes, children with a migration background are more likely to be in formal care relative to informal care. However, children from non-English speaking immigrant households are less likely to be in both informal and formal care than to be in parental care. Children from English speaking immigrant households are also slightly less likely to be in informal care relative to parental care, though there is no difference in the risk of formal care over parental care. Compositional differences play an essential role in explaining these differential childcare utilisation patterns, with the equalised household income, maternal employment prior to birth, and social support being among the most important explanatory variables.

The final paper focuses on estimating the causal effect of ECEC attendance at age three on later English language achievement, and gauges the equalisation power and potential of the ECEC system in Ireland. It mostly relies on data from the first, second and third wave and employs propensity score weighting to account for differential selection into ECEC. The findings

indicate that the Irish ECEC system helps to reduce achievement gaps by migration background for children from non-English speaking homes, despite ECEC participation not promoting English language achievement among children of native parentage nor among children migrant origin from English speaking households.

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List of abbreviations

ATE	Average Treatment Effect
ATT	Average Treatment effect among the Treated
ATNT	Average Treatment effect among the Non-Treated
CSO	Central Statistics Office
DCEDIY	Department of Children, Equality, Disability, Integration and Youth
ECCE	Early Childhood Care and Education
ECEC	Early Childhood Education and Care
ECS	Early Childcare Supplement
ESRI	Economic and Social Research Institute
EU	European Union
FIM	Family Investment Model
FIML	Full Information Maximum Likelihood
FSM	Family Stress Model
GUI	Growing Up in Ireland
IPTW	Inverse Probability Treatment Weighting
IRC	Irish Research Council
KHB	Karlson/Holm/Breen
MB	Migration Background
MICE	Multiple Imputation by Chained Equations
MNL	Multinomial Logistic Regression
OECD	Organisation for Economic Co-operation and Development
PISA	Programme for International Student Assessment
PSM	Propensity Score Methods
SEM	Structural Equation Modelling
SEP	Socio-Economic Position
SES	Socio-Economic Status
SUTVA	Stable Unit Treatment Value Assumption
UK	United Kingdom
UNICEF	Early Childhood Care and Education Programme
USA	United States of America

List of papers

Paper I

Stefanie Sprong & Jan Skopek (2022) Academic achievement gaps by migration background at school starting age in Ireland, *European Societies*, DOI: 10.1080/14616696.2022.2084558

Paper II

Stefanie Sprong & Jan Skopek, The development of language achievement gaps by migration background during primary school - A path-model of educational inequalities. *Under review*

Paper III

Stefanie Sprong & Jan Skopek, Childcare Utilisation by Migration Background - Evidence from a Nationally Representative Irish Cohort Study. *Revise and Resubmit*

Paper IV

Stefanie Sprong & Jan Skopek, ECEC as a potential equaliser for achievement gaps by migration background: Evidence from a quasi-experimental population-level study in Ireland. *Under review*

1 Introduction and theoretical framework

1.1 Education and students of migrant origin

1.1.1 Rationale for studying educational inequalities by migration background

International migration has become a major factor of contemporary global change. Never before have so many people left their home country to move to another, often in the wealthy Global North (Castles, de Haas, & Miller, 2014). In countries with long histories of net immigration, such as the USA and Canada, ethnic diversity and the presence of minority groups are long-established. However, they are a new, yet likely permanent phenomenon in most European countries (Heath & Brinbaum, 2014b). In these countries, the increased immigration flows in recent decades have substantially changed the demographic composition of the population and led to a rise in ethnic and religious diversity. Particularly the younger generations are becoming increasingly diverse, with some studies reporting that a quarter to a third of individuals of younger generations have a recent migration background (Heath & Brinbaum, 2014b; Kalter, Jonsson, van Tubergen, & Heath, 2018). Moreover, in the light of the continued disruptions to people's lives caused by the COVID-19 pandemic, climate change and war in Europe, migration will likely remain a pressing issue and continue to change populations and societies.

1.1.2 The Integration of immigrants and their descendants

The increased diversity and changed compositions of Western European societies are associated with many questions, opportunities and challenges. Many of these issues regard the integration of immigrants and their descendants. Politicians, policymakers, social scientists and the general public alike are grappling with questions such as how well immigrants and their descendants are faring compared to natives and whether they have the same opportunities. This is not surprising because the integration of immigrant minorities cannot only have major implications for the well-being of immigrants and their descendants, but also for social cohesion and intergroup relations, and economic and social progress more generally (Heath & Schneider, 2021).

Even though it widely used, integration is quite a complex and often disputed term (e.g., Penninx, 2019; Schinkel, 2018) and there is not one settled definition. This is partly because the term is politically loaded and linked to public policy concerns, as shown, for example, by the emergence of radical right parties across Europe. Another complicating factor is that the term is mainly used by European researchers whereas American scholars prefer the term assimilation, the modern meaning of which (Alba & Nee, 1997) is nearly synonymous to integration.

In this thesis, we follow the definition of Jonsson and colleagues (Jonsson, Kalter, & van Tubergen, 2018) who built on Harmut Esser's (2006) understanding of integration as something that is or becomes part of a whole. According to them integration means that:

immigrants and their children would (a) have access to or achieve things that are necessary to lead a good life, or are valued in the society they are living in, such as opportunities, resources and skills; (b) be socially accepted and embedded in larger social networks; and (c) share fundamental values and orientations with others. (Jonsson et al., 2018, p. 5)

Following this conceptualisation, studying integration can be done by looking at the degree of closeness or similarity between the migrant or minority groups, on the one hand, and the majority group in the host country, on the other hand. However, it is important to emphasise that whilst comparing means or modes across groups can tell us something about the level of integration, this does not imply that the goal should be to minimise differences.¹

Besides, it is also important to note that if minority and majority members become more similar

¹ According to more classic models of integration (or assimilation), immigrants would gradually become more similar to the majority population. More recent models often take a more nuanced approach, proposing that integration is complex process with heterogeneous outcomes. Portes and Zhou (1993), for example, put forward the idea of segmented assimilation which holds that some immigrant groups will not assimilate into "mainstream" society but instead into different parts of society. This draws attention to the idea that some groups may become marginalised or disadvantaged rather than "disappearing" into the mainstream culture.

or dissimilar over time, this can be caused by either sides since integration often works in both directions (Alba & Nee, 1997; Penninx & Garcés-Mascreñas, 2016). Thus, rather than as normative, integration can be studied as a social fact (Jonsson et al., 2018, p. 6) through which we may gain a better understanding of social injustice and inequalities and learn how to effectively tackle them.

Integration is understood to encompass different dimensions, although scholars also do not agree on number of dimensions nor what they consist of (Heath & Schneider, 2021). Jonsson and colleagues (2018) distinguish between structural, cultural and social integration. Following their distinction, structural integration refers to the degree of similarity in positions, such as in the labour market or in the educational system. Cultural integration then relates to the similarity in values, attitudes and knowledge. Finally, social integration refers to the social relations as well as the resources these relations provide. However, even though these three dimensions are often used and are arguably the most important, it is worth noting that other scholars make other distinctions. Some, for example, identify political integration as a separate dimension (e.g., Lessard-Phillips, 2015) or break down dimensions further. Moreover, the three dimensions may be separate but they are clearly not unrelated, although research is still investigating how exactly they influence each other.

1.1.3 The importance of education for integration

Education is often centre stage when it comes to studying integration. This is because education plays a crucial role in most Western societies, acting as a valuable resource for economic and societal progress and structuring the socio-economic outcomes and life chances of individuals. Moreover, educational differences or similarities are not only a measure of structural integration, but they can also influence the cultural and social integration of immigrants and particularly their descendants. That is, through education immigrants and their children can access different skills, resources and contacts, which can help them to fully participate in society

(Heath & Brinbaum, 2014a). Thus, endowing children with a migration background with equal chances to succeed in school should facilitate their integration into broader society. Hence, it is relevant to understand if educational inequalities by migration background exist, what factors are associated with them and how any disadvantages can be mitigated effectively.

Unsurprisingly, a large and mushrooming literature has examined the educational situation of children and young people of migrant origin, making significant contributions to our understanding of integration. Because first generation immigrants (i.e. those who migrated themselves) have usually completed all or the majority of their education in their country of origin, these studies typically focus on members of the second generation (i.e. those born to at least one immigrant parent in the country of destination or who migrated before they started compulsory schooling) and in some cases the so-called 1.5 generation (i.e. those that moved while they were still completing their education). More research on the third and later generations is also slowly starting to emerge in the European context with more data becoming available, yet it remains rather uncommon. While extending the investigation to more generations would undeniably be of great interest, a focus on the second generation is nevertheless meaningful because they are the first generation that completes their entire education in the country of destination and, therefore, their academic performance can provide the first proper insights into equality of opportunities.

1.1.4 Educational disadvantage by migration background

Even though equality of opportunities in school may be crucial to the structural integration of immigrants and their children, research has indicated that there are at least some reasons for concern. Studies have shown that in classic countries of immigration, such as the USA, ethnic diversity is often accompanied by ethnic stratification (e.g., Kao & Thompson, 2003). Moreover, the literature has also denoted that in European countries of immigration, such as France and Germany, children of immigrants tend to fare worse, although levels of disadvantage vary

between groups and countries. For example, in a large volume of papers focused on ethnic educational inequalities² in ten Western European countries edited by Heath and Brinbaum (2014b), the authors showed that, compared to their majority populations, students belonging to ethnic minority groups often had lower performance (grades or test scores), were at a higher risk of early school-leaving, were overrepresented in lower tracks, and had lower rates of upper secondary school completion and less success in securing tertiary qualifications. These findings may also extend to newer European countries of destination (e.g., Schnell & Azzolini, 2014), although evidence from these contexts remains relatively scarce.

Such educational inequalities by migration background already seem to be present early in the life course. Most of the extant research on educational inequalities by migration background is focused on students in their teens, partly because there is more data available for this age group. Many of the seminal cross-country studies (e.g. Andon, Thompson, & Becker, 2014; Dustmann, Frattini, & Lanzara, 2012; Levels & Dronkers, 2008) are, for example, (partly) based on PISA data, which are collected when young people are about 15 years of age. However, several studies have indicated that academic disadvantages by migration background may already arise early in childhood. For example, Højen, Bleses, Jensen and Dale (2019) found that differences in the majority language and preliteracy skills were already apparent between ages two and six among Danish children with a migration background. These early gaps are important to consider because they may be consequential for disadvantages later in the educational career (e.g. Becker & Klein, 2021; Passaretta & Skopek, 2018). Nevertheless, disadvantages likely vary depending on the type of achievement being considered, with the largest differences in early

² It is important to note that ethnicity and migration background are sometimes almost used interchangeably in the European context. This is because most of those that belong to an ethnic minority are also of migrant origin. Thus, in the European context the term ethnic inequality is often used to denote immigrants and their descendants. However, they are not the same.

childhood typically being found for language-related skills (Becker, Klein, & Biedinger, 2013; Washbrook, Waldfogel, Bradbury, Corak, & Ghangro, 2012).

1.1.5 Explanations for academic inequalities by migration background

Sociologists have not only been trying to document the extent of the educational inequalities faced by students of migrant origin, but they have also set out to understand why these patterns of disadvantage (or advantage) may exist. The answer to the latter question moves beyond a mere description of social stratification and has clear policy relevance because it can help develop adequate policies to tackle issues of social justice and equality of opportunities. Besides, it is relevant to social scientists because they may need to adapt existing theories or come up with new ones (Heath & Brinbaum, 2014b).

Social background

One of the most common explanations in the literature is the social background of students of migrant origin. Sociologists have long underlined the association between social background and educational achievement and attainment, as, for example, reflected in the classic models of status attainment (e.g. Blau & Duncan, 1967; Sewell, Haller, & Portes, 1969). Moreover, scholars have long highlighted the role of socio-economic resources, such as income or education, in parents' capacity to invest in their children's development. The family investment theory (FIM), for example, argues that the relationship between social background and educational outcomes reflects differences in parental financial, social and human investment (Conger & Donnellan, 2006), while the family stress model (FSM) hypothesises that lower levels of resources negatively affect interparental and parent-child relationships and that this, in turn, explains the association with lower academic achievement and attainment (Conger & Conger, 2002). Furthermore, Annette Lareau (2011) famously described how parents of children from more advantaged backgrounds engaged in "concerted cultivation" involving structured leisure

activities, while parents of children from less advantaged backgrounds believed more in “accomplishment of natural ground” with more unstructured activities and largely leaving the choice to the children themselves.

Immigrants more frequently find themselves in more disadvantaged positions in society than natives, and thus their children’s educational opportunities may reflect their limited socio-economic resources and not their migrant status *per se*. In several European countries, a large part of the immigrant population is formed by guest workers and their spouses and offspring. These guest workers were actively recruited to fill temporary shortages of low-skilled labour during the post-war boom and often came from relatively low social backgrounds. Moreover, more generally, immigrants’ social and human capital often have less value in the country of destination (Chiswick & Miller, 2008; Li & Heath, 2016), and may thus translate into fewer resources. Besides, due to external factors, such as employment permits, immigrants may be less likely to be employed. Altogether, there are several reasons to expect that having a migration background will be associated with having a less advantaged social background, and thus social background may be an important factor in explaining the educational inequalities by migration background. Indeed, research has suggested that the lower levels of education, lower status-jobs and lower levels of earnings explain a large part of the disadvantages faced by their descendants in education and in the labour market (e.g., Heath, Rethon, & Kilpi, 2008).

Cultural difference and language

However, social background usually does not provide the whole answer, and research typically finds that at least part of the differences by migration background remain after controlling for it (e.g. Dustmann et al., 2012; Heath & Brinbaum, 2014b). An often-discussed additional explanation is the parents’ lack of knowledge of the host society and fluency in the majority language, as, for example suggested by Heath and Brinbaum (2007). The idea behind this is that the ability of immigrant parents to support their children in their educational career is reduced

because they are less familiar with the host country's institutions and educational system and less fluent in the destination country's main language.

The role of language receives particular attention in the literature, with some studies even suggesting that the language spoken at home is one of the most important factors in explaining differences in academic achievement by migration background (e.g. Dustmann et al., 2012). This is likely because it does not only affect parents' ability to support and guide their children in their educational career, but it also directly affects their children's language acquisition.

Following the model of language acquisition by Chiswick and Miller (1995, 2001), the process of learning the destination country's language depends on three factors: exposure, efficiency and incentives. For children, especially exposure is important as they simply cannot learn a language if they are not exposed to it. Children who live in households where the majority language is not spoken have fewer opportunities to master it, and may, therefore, be less fluent in it, which will likely be reflected in their academic achievement. Efficiency and incentives are also important for children. Efficiency depends on one's cognitive skills (Esser, 2006) as well as on the age upon which someone first comes into contact with the language, with the ability to learn a new language declining as children grow older (Newport, 1990). Thus, if children with a migration background are exposed to the destination language at a younger age, they will likely be more fluent in it. Besides, a desire to participate in school and make new friends may incentivise them to put in more effort and learn the destination language more quickly (Dollmann, Rudolphi, & Parameshwaran, 2018).

Immigrant selectivity

Research has also pointed to the importance of immigrant selectivity in explaining the variation in the educational achievement of students across different places of origin and countries of destination. In most cases, immigrants are not a random sample from the population of their

country of origin. Rather, considering the high financial and personal costs that are associated with migration, immigrants tend to be positively selected³ in terms of factors, such as wealth, educational credentials, ability, motivation and effort and health and age (Borjas, 1987; Feliciano, 2005; Ichou, 2014; van de Werfhorst & Heath, 2019). However, importantly, the level of selectivity likely varies across migrant groups and receiving contexts. For example, if the costs and risks associated with migration are low, migrants are less likely to be positively selected than when migration is a more risky and expensive process. For this reason, intra-EU migrants may, for example, be less positively selected than non-European immigrants coming to Europe.

The positive or negative selection of immigrants is relevant because research has shown that it is related to their integration, including the next generation's educational achievement. In an early study, Borjas (1987), for example, showed that the positive selection of immigrants was related to higher earnings after arrival in the USA. Moreover, in a recent comparative study, van de Werfhorst and Heath (2019) found that the educational disadvantages of the second generation tended to be smaller for more positively selected migrant groups. In other words, the educational performance of the second generation likely does not only reflect their current social background but also where their parents ranked in the distribution in the country of origin.

1.2 Early Childhood Education and Care as a potential equaliser

1.2.1 *Early childhood as a critical period for child development*

³ Selectivity refers to the idea that migrants deviate from non-migrants in their country of origin. In the literature, positive selection is used to describe the phenomenon that migrants tend to come from the upper part of the distribution of factors such as income, education, skills and motivation. Negative selection then refers to migrants that were selected from the lower part of the distribution. Because selectivity is harder to study in terms of factors such as effort, many studies focus on observable characteristics such as pre-migration earnings and educational attainment. Most of the studies cited in this thesis fall into this category and thus consider positive selection in terms of education and income.

In recent decades, research has gained a much better understanding of what factors are related to child development. This increased understanding of what conditions set children up for a promising or worrisome start in life has fuelled a deeper appreciation of the importance of early life experiences for early development. Consequently, early childhood is increasingly seen as a critical period with early pathways shaping later cognitive, social and emotional well-being (Shonkoff & Phillips, 2000).

Accordingly, early childhood has emerged as a significant area for research on the production of human capital. Based on the evidence on child development from a range of disciplines, Cunha and Heckman (2007) wrote about the technology of skill formation, from which the well-known claim that “skills beget skills” derives. Following this model, some stages of child development, especially early in childhood, are more productive in producing certain skills. Moreover, skills acquired at one stage augment skills at later ages and promote greater efficiency in learning. Consequently, the authors made a case for early childhood interventions, especially for more disadvantaged children, arguing that they are the most cost-effective way of addressing ability gaps and enhancing later life outcomes.

1.2.2 *The rationale behind ECEC as an equaliser*

Early childhood education and care (ECEC) is one of the key contexts in which early development takes place. In line with the ecological or bioecological model of development (Bronfenbrenner, 1977; Bronfenbrenner & Morris, 2006), child development should not be seen in isolation but in conjunction with different environmental systems that interact with each other. While the child with their individual traits and characteristics is at the core of this model, the child is seen as nested in several environmental systems. The child’s bidirectional interactions with these systems over time (i.e. “proximal processes”) then affect their development. At the model’s periphery is the mesosystem, which includes the socio-political context, and at its core the microsystems which are the child’s direct environments. Together with the family context, ECEC

belongs to these closest systems of child development in the early years, and is thus considered as crucial to the child's learning.

Following the notion that ECEC forms one of the key contexts of child development and rooted in the belief that early childhood is a crucial period for child development with early investments harvesting the greatest returns, particularly for children from more disadvantaged homes, ECEC is often seen as a potential equaliser for educational inequalities (e.g., Magnuson & Duncan, 2016). Proponents view ECEC as a way of complementing other investments in the child or compensating for resources that are lacking in the home environment, which would be particularly relevant for children living in households where resources are more scarce. Moreover, ECEC is often put forward because it can be influenced by public policy relatively easily, whereas the home environment is typically seen as being beyond the boundaries of public powers.

However, when considering ECEC as a tool to reduce inequality in educational opportunity, it is crucial to recognise it as being embedded in the larger system of social stratification. For ECEC to be able to serve as an equaliser two principal factors need to be taken into account (Kulic, Skopek, Triventi, & Blossfeld, 2019), which are derived from more general frameworks on the role of schooling in reducing educational inequalities (Downey & Condrón, 2016; Raudenbush & Eschmann, 2015). Firstly, it is important to understand who benefits from ECEC attendance and how much, and particularly if certain groups benefit more than others (i.e. heterogeneity of ECEC effects). This is because the equalising power of ECEC relies on the ECEC gains being larger for children from more disadvantaged backgrounds. Secondly, it is important to consider who is exposed to certain benefits, and if this differs by socially relevant groups (i.e. heterogeneity in access to ECEC). If more disadvantaged groups of children are substantially less likely to be exposed to ECEC benefits, this could off-set the equalising effects of ECEC participation. It is therefore important to consider the effect of ECEC attendance both from an "effects" and a "selection into effects" perspective.

1.2.3 Heterogeneity in ECEC effects

There is a long line of research which has demonstrated the positive effects of ECEC participation on child outcomes (See for example Reynolds, Magnuson, & Ou, 2010 for an overview). Much of this evidence has come from small-scale, randomised control trials in the USA (See for example Karoly, Kilburn, & Cannon, 2005 for an overview). This is partly because the USA has a comparably rich tradition of targeted ECEC intervention programmes, such as the High/Scope Perry Preschool, but also because such experimental studies are often considered the gold standard for estimating causal effects. Nevertheless, in recent years, more larger-scale studies have come out, which have largely confirmed the positive effects of ECEC attendance, although effect sizes might be somewhat smaller (See Burger, 2010 for an international overview of quasi-experimental studies).

Not only does this large body of evidence suggest that ECEC participation can aid child development, but it also underlines that ECEC attendance may be particularly beneficial for children from more disadvantaged homes. While the results of the targeted intervention programmes cannot easily be generalised to the wider population, they provide reliable evidence that the disadvantaged groups they targeted gained from ECEC participation. Moreover, studies that include a larger part of the population also highlight that disadvantaged children benefit most from ECEC participation. In fact, while evidence on the effects of universal ECEC programmes is mixed, a recent meta-analytical review (van Huizen & Plantenga, 2018) concluded that ECEC benefits are mostly concentrated among children from lower socio-economic backgrounds. Thus, even though it is not clear if ECEC promotes better outcomes in the general population, it can still serve as an equaliser because evidence suggests that children from disadvantaged backgrounds benefit more than children from more advantaged backgrounds.

The ostensibly equalising effect of ECEC participation may be especially relevant for children with a migration background. Research on the impact of ECEC has shown that ECEC benefits are more pronounced for children of migrant origin (e.g. Berger, Panico, & Solaz, 2021), with positive associations being especially strong if a foreign language is spoken at home (Burger, 2012; Gormley, 2008; Klein & Becker, 2017; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007; Magnuson, Lahaie, & Waldfogel, 2006). On the one hand, these findings may reflect the lower social backgrounds of immigrant households. On the other hand, they may point to the unique resources and opportunities that ECEC offers to children with a migration background and their families. ECEC participation, for example, allows children of migrant origin to get greater and earlier exposure to the majority language, and may help their parents to become more familiar with the education system of the host country at an early stage. ECEC enrolment may even have benefits for immigrant households that extend beyond child development and, for example, benefit the integration of the parents (Gambaro, Neidhöfer, & Spiess, 2021).

1.2.4 Heterogeneity in ECEC access

Even though children from more disadvantaged backgrounds may benefit more from ECEC participation than their more advantaged peers, research indicates that they are typically also the least likely to be enrolled in ECEC. ECEC uptake tends to be socially stratified, with studies showing that there are Matthew effects in ECEC participation (Pavolini & Van Lancker, 2018; Van Lancker & Ghysels, 2016). Families with lower incomes are, for example, less likely to enrol their children in ECEC relative to families with higher levels of income (e.g. Van Lancker, 2013). While a myriad of factors likely influences parents' childcare choices, at least a part of these Matthew effects in ECEC uptake is due to structural constraints, such as affordability and availability (Pavolini & Van Lancker, 2018).

Research has also indicated that the use of ECEC differs by migration background, with ECEC participation rates generally being lower for children of migrant origin (e.g. Biegel, Wood,

& Neels, 2021; Van Lancker & Pavolini, 2022). Besides, there may be differences in the type of care that children with a migration background attend. They may, for example, participate in ECEC of lower quality (Stahl, Schober, & Spiess, 2018) or be in care centres with different social and ethnic compositions than children without a migration background (Becker & Schober, 2017; Leu & Schelle, 2009). These differences may partly derive from the same structural constraints faced by families with fewer socio-economic resources, but they may also arise from factors more specific to immigrant families, such as the unavailability of grandparents or unfamiliarity with the local ECEC system. This means that while children with a migration background may benefit greatly from ECEC attendance, there is reason to believe that they are less likely to be exposed to these benefits.

1.3 Some of the challenges and limitations in existing research

Despite the mushrooming literature on the educational achievement of students of migrant origin, this type of research generally has several limitations. Firstly, many (early) studies focused on the educational attainment of adult populations, particularly the first-generation. However, findings from these studies do not easily translate to second-generation, who pass through the education system of the destination country rather than the country of origin. While the number of studies looking at the outcomes of the second-generation has grown rapidly in the European context, with more data becoming available, studies in more recent European countries of net immigration continue to be more rare. This is partly because the second-generation in these countries is only coming of age now and samples were too small to warrant systematic research in the past. Secondly, research on educational inequalities by migration background has often relied on cross-sectional studies based on relatively small and unrepresentative samples, thereby hampering their ability to draw conclusions about the population at large and the development of disparities. Finally, studies have often been unable to focus on children of migrant origin at younger ages because more and higher quality data is

available for older age groups, such as teens. This means that less remains known about what happens earlier in the life course.

Similarly, there are several challenges for research on the impact of ECEC participation and ECEC's potential as an equaliser for educational inequalities. Most importantly, there is a clear trade-off between internal and external validity, which ECEC research seeks to balance. Experiments are high in internal validity but lower in external validity. Accordingly, randomised control trials from the USA have provided exceptionally reliable evidence of the positive impact of ECEC participation, but are harder to generalise to the general population. Non-experimental data from large, representative samples have higher external validity but tend to be less internally valid. Thus, (quasi-experimental) population-level studies have added considerably to the knowledge about the effect of ECEC attendance for the general population, but concerns have been raised about their ability to draw causal inference. This is particularly problematic because there are likely systematic differences between the groups of children attending different types of care. Therefore, there is a clear need for more population-level research applying robust methods, such as propensity score methods or an instrumental variable approach, which can account for omitted variable bias.

1.4 The Irish context

1.4.1 The importance of country context

Many scholars have emphasised the importance of taking into account the country context, both in relation to educational inequalities by migration background and the role of ECEC. For the integration of immigrants and their descendants, many theories (e.g. Portes & Zhou, 1993) underline the influence of contextual factors. Accordingly, research has, for example, suggested that the structure of the educational system (e.g., Griga & Hadjar, 2013; Jackson, Jonsson, & Rudolphi, 2011) and the type of integration policy (Bloemraad & Wright, 2014; Koopmans, 2010; Portes &

Zhou, 1993) can shape the outcomes of people with a migration background. Similarly, theories on the place of ECEC in child development (e.g. Bronfenbrenner & Morris, 2006) have recognised the impact of the wider socio-political context and studies have indicated that country-specific settings of ECEC may influence the distribution of benefits across different groups of children (Blossfeld, Kulic, Skopek, & Triventi, 2017). It is thus important to carefully consider the country context.

1.4.2 Migration to Ireland

Ireland presents a fascinating, new context for research on the integration of immigrants and their descendants, with a migration history that is different from many other European countries of net immigration (Castles et al., 2014). Traditionally, Ireland was a country of emigration, as reflected by the large Irish diaspora across the world. However, during the period of rapid economic growth in the late 1990s and early 2000s, the so-called Celtic Tiger era, this quickly changed. The country transformed into a popular destination for immigrants (see Figure 1.1), and, even though the inflow of migrants went down in the early years following the Great Recession, numbers have come back up in recent years.

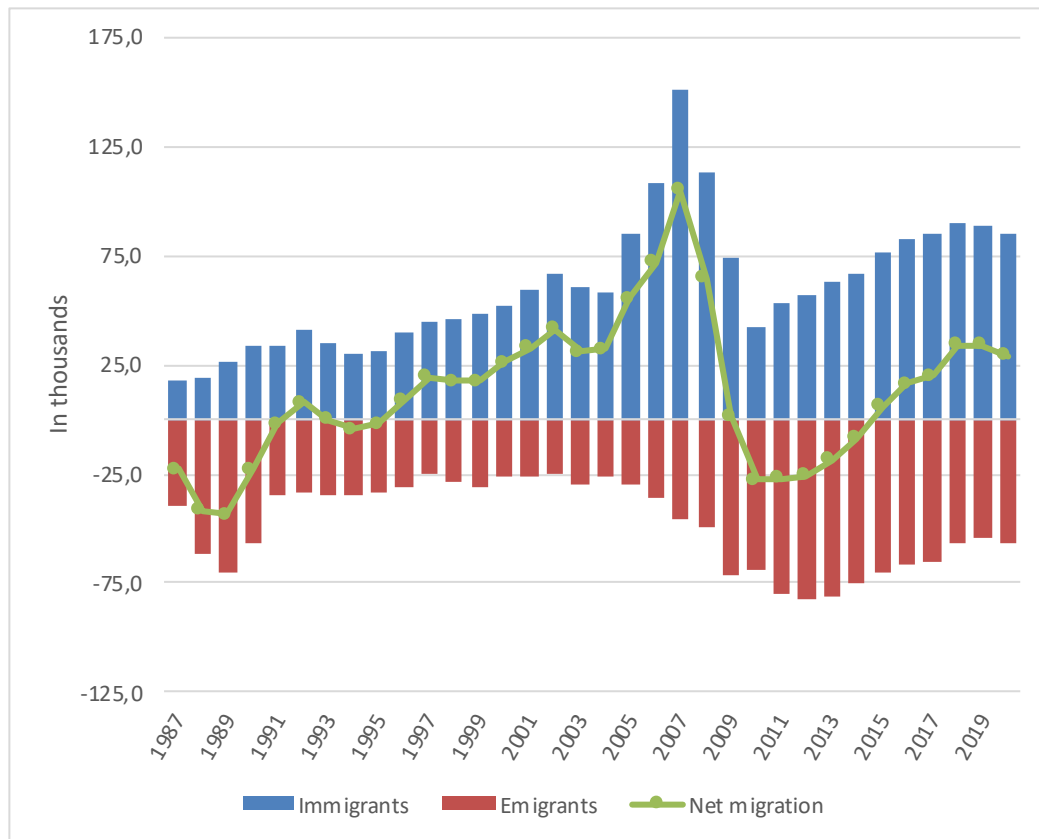


Figure 1.1 Migration to and from Ireland in the period between 1987 and 2020

Note. Based on the population and migration estimates from April 2020 provided by the Central Statistics Office Ireland (CSO).

These increased immigration flows have made Ireland considerably more diverse. It is currently estimated that about 17% of the population is foreign-born (Eurostat, 2022) and 12.5% of the population is a non-Irish national (CSO, 2021). A substantial second generation is also emerging, with almost one in four babies being born to mother that does not hold Irish nationality (CSO, 2018b).

The Irish migrant population is diverse. In the early years, most immigrants in Ireland were returning emigrants, especially from the United Kingdom (Mac Éinrí & White, 2008). However, migrants from other European countries as well as asylum seekers and non-EU migrants on work permits quickly followed. Furthermore, after the EU enlargement of 2004, Eastern Europe became one of the main regions of origin. As a result, the UK and Poland now

constitute the most important regions of origin, but the Irish immigrant population remains diverse and Ireland is host to more than a 150 different nationalities (McGinnity, Privalko, Fahey, & O'Brien, 2020).

Importantly, the Irish immigrant population also seems to be different from many other European countries in terms of social background. In particular, the Irish migrant population appears to be relatively advantaged in terms of educational attainment. Most immigrants in Ireland tend to be relatively highly educated (CSO, 2018a; Röder, 2014), which is likely partly due to a skills-focused immigration policy (Devitt, 2016), although it may also partly reflect the younger age profile of Irish immigrant population. Nevertheless, there are still some disadvantages. Immigrants in Ireland are, for example, not necessarily in better paying or higher status jobs (McGinnity, Quinn, et al., 2017; O'Connell & McGinnity, 2008), and first-generation immigrants are more likely to be unemployed than Irish nationals, with particularly immigrants from less developed economies typically faring worse in the labour market (McGinnity, Privalko, et al., 2020).

1.4.3 *Research on children of immigrants in Ireland*

Because Ireland only became a country of net immigration relatively recently, there is comparably little research on children with a migration background and their educational achievement. Although there are some important exceptions (e.g. Crotty, 2000; Devine, 2005), one of the first comprehensive studies on the situation of children of migrant origin was conducted at the height of the economic boom (See Smyth, Darmody, McGinnity, & Byrne, 2009). Nevertheless, in subsequent years more research quickly followed (e.g. Darmody, Smyth, Byrne, & McGinnity, 2012; Devine, 2011a; Kitching, 2011; Taguma, Kim, Wurzburg, & Kelly, 2009) and even though research may still be catching up with the economic, social and demographic changes from the Celtic Tiger era, an important body of literature on the educational performance of Irish students with a migration background is slowly being built.

Existing research indicates that Irish students with a migration background tend to fare relatively well. For example, in a research report, McGinnity, Darmody and Murray (2015) found that there were relatively modest differences in academic performance between children with and without a migration background after accounting for background characteristics. In another research report, Smyth (2017) found that children of migrant origin resembled their native peers in terms of their attitudes towards school and teachers, and a recent study (Sprong & Devitt, 2022) suggested that their aspirations may be similar to those of Irish students without a migration background. Additionally, drawing on national data from people in their early twenties, McGinnity and colleagues (2017) indicated that rates of early school leaving were roughly comparable for young people with and without a migration background. Nevertheless, there may also be some reasons for concern, with children with a migration background in Ireland being more likely to live in specific urban areas (Devine, 2011b, 2013) and to be concentrated in schools serving socio-economically disadvantaged groups (Byrne, McGinnity, Smyth, & Darmody, 2010). Moreover, while differences in academic achievement may be modest, these differences may add up as students move through the educational system, leading to cumulative disadvantage (Darmody, Byrne, & McGinnity, 2014).

1.4.4 *The Irish ECEC system*

Ireland also provides a compelling context for ECEC research, with comparatively little ECEC tradition and a paucity of studies on the effects of ECEC participation. Traditionally, the division of paid labour was gendered and female labour market activity low. However, female labour force participation increased rapidly during the Celtic Tiger era (Russell, McGinnity, Callan, & Keane, 2009), and with it came an increased demand for childcare. Unsurprisingly, the provision of childcare quickly became a policy priority and the government's involvement in childcare was expanded. In 2006, the Irish government, for example, introduced an Early Childcare Supplement (ECS) to offset childcare costs, and four years later, in 2010, the Early Childhood

Care and Education (ECCE) scheme, which provided a free preschool year for all children above the age of three.

The introduction of the ECCE scheme substantially increased ECEC attendance above the age of three for all groups. Research has reported that the overall uptake of this programme was very high and that heterogeneity in participation was much smaller than for younger age groups (Murray, McGinnity, & Russell, 2016). Nevertheless, the number of hours provided under the scheme is comparably low (Gromada & Richardson, 2021). Besides, the absence of an established ECEC tradition and limited state involvement remains visible for ECEC participation below the age of three. For this age group, public funding is marginal, especially compared to other countries in the Global North (OECD, 2018). Unsurprisingly, the private sector is dominant and the costs for parents are generally very high (Gromada & Richardson, 2021; OECD, 2016). Moreover, grandparents continue to play an important role in non-parental care provision (McGarrigle, Timonen, & Layte, 2018; McNally, Share, & Murray, 2014).

1.4.5 *Research on ECEC in the Irish context*

Access to ECEC in Ireland is socially stratified, especially for children below the age of three (OECD, 2016; Privalko, Maitre, Watson, & Grotti, 2019; Van Lancker & Ghysels, 2016). This likely reflects the high costs and the dominant private sector. A recent UNICEF report (Gromada & Richardson, 2021), for example, showed that participation rate in ECEC under the age of three was above 60% for high income families but below 20% for low income households. Moreover, the same report named Ireland as one of the three countries with the least affordable childcare for the middle class, with a couple of two earners of average wages needing to spend about a third of one salary to pay for two children in childcare.

There are also signs that children with a migration background are less likely to be enrolled in ECEC in Ireland. In an early study, Doyle and Timonen (2010) already pointed to the tendency of immigrant workers in Ireland to rely on informal childcare arrangements. Since

then, other studies have also shown that children of migrant origin may be less likely to be in non-parental care than children of native Irish parentage (Murray et al., 2016; Röder, Ward, & Frese, 2017), and that their parents often rely on local and transnational support networks in eliciting informal childcare (Bojarczuk & Mühlau, 2018). Furthermore, a recent international study on the immigrant-native gap in childcare use (Van Lancker & Pavolini, 2022) indicated children of migrant origin in Ireland were six percentage points less likely to be in ECEC after controlling for parental education, social class and maternal employment.

Despite the growing interest in ECEC, evidence on the impact of ECEC participation remains scarce in the Irish context. However, existing evidence suggests that the effects may be small and insignificant and, in some cases, even negative. For example, research reports have found that the relationship between ECEC participation and later educational performance was small and sometimes even statistically insignificant after controlling for social background (McGinnity, Russell, & Murray, 2015; OECD, 2017). This was also confirmed by a book chapter (McGinnity, McMullin, Murray, & Russell, 2017) and recent research article (McGinnity, Russell, Smyth, Murray, & McMullin, 2022). Moreover, contrasting most of the international evidence, some multicounty studies have even reported small negative effects of ECEC participation after controlling for a range of factors (Schütz, 2009) or when focusing on more advantaged groups of children (Dämmrich & Esping-Andersen, 2017). However, McGinnity, Russell and Murray (2015) indicated that there was a positive effect of centre-based care on later language achievement among children from non-English speaking backgrounds after controlling for a range of factors.

1.4.6 *The Growing Up in Ireland (GUI) study*

Ireland still lacks a large representative survey of the migrant population, and other data sources that include a sufficient number of people of migrant origin to warrant systematic enquiry are scarce, particularly for younger age groups and the second-generation. This makes it hard to study the integration of migrants and their descendants in the Irish context.

However, in the mid 2000s, the Irish government committed to funding a national longitudinal study of children and young people in Ireland, named the Growing Up in Ireland (GUI) study. The GUI '08 follows a group of children born between the 1st of December 2007 and the 30th of June 2008. The birth period of this cohort coincided with the peak period of migration to Ireland (see Figure 1.1) and, because the GUI sample was nationally representative, there happened to be a meaningful proportion of children of migrant descent in the GUI '08 Cohort. This means that the GUI '08 Cohort data are relatively well-suited for examining the educational achievement of Irish children with a migration background, even though the study was not designed for this purpose.

The GUI '08 Cohort members (and their caregivers) were recruited when they were infants. The sample was drawn from the Irish child benefit register, using a stratified random sampling approach (for more information see McNamara, O'Mahony, & Murray, 2020). The first round of interviews for the GUI '08 Cohort took place between September 2008 and April 2009, when the study children were nine months old (see Figure 1.2). Subsequent rounds of data collection were completed when the children were three, five, seven and nine years of age. Of the initial sample of 11,134 children (and their caregivers) who participated in Wave 1, 8032 took part in the interviews of Wave 5.

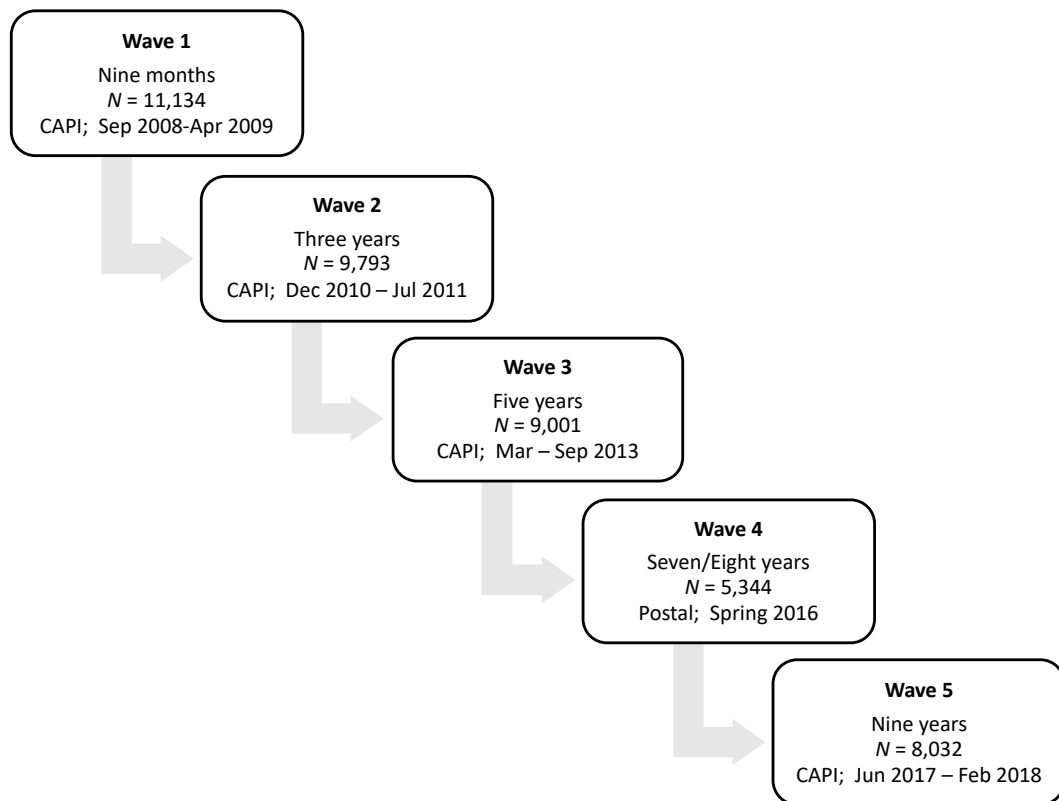


Figure 1.2 Summary of the available data of the GUI '08 Cohort

Note. CAPI = Computer-Assisted Personal Interviews; GUI = Growing Up in Ireland.

1.5 Aims and objectives of this thesis

The impressive extant literature on the educational achievement of students with a migration background is large and has made significant contributions to our understanding of integration. However, existing research is limited in that it has often not been able to draw on nationally representative samples, largely relied on cross-sectional analyses and primarily focused on older age groups. Besides, the majority of studies has investigated the educational situation of youth of migrant descent in European countries with longer histories of migration, with their position in more recent European countries of immigration remaining largely understudied.

The ECEC literature is equally imposing and has contributed to our ever-growing knowledge on the impact of ECEC attendance and ECEC's potential to reduce educational inequalities. However, the bulk of the evidence still comes from the USA and relies on smaller

samples. Thus, in order to understand if ECEC can serve as an equaliser, there is a need for more population-level research, both from an 'effects' and 'selection-into-effects' perspective.

Besides, while it is relatively clear that ECEC is most beneficial for children from socio-economically disadvantaged families, less remains known about the role of ECEC for children of migrant origin in Europe.

This thesis aims to provide new insights into inequalities in academic achievement by migration background and the potentially equalising role of ECEC in Ireland. It sets out to contribute to the literature on the academic achievements of children with a migration background and the impact of ECEC in four distinct ways. Firstly, by relying on unique data from the GUI '08 Cohort Waves 1-5, it adds an important population-level perspective as well as a longitudinal outlook. Secondly, by focusing on Ireland, it provides insights into an understudied country context with a recent history of immigration and little ECEC tradition. Thirdly, by focusing on children between the ages of nine months and nine years, it increases the understanding of educational inequalities by migration background in early and middle childhood. Finally, by looking at the heterogeneity in ECEC effects and access, it provides new insights into the potential role of ECEC as an equaliser for educational disparities by migration background.

1.6 Structure of the thesis

The remainder of this thesis is structured as follows. The first empirical part of the thesis (Chapter 2 and Chapter 3) is constituted of papers one and two and sheds light on educational inequalities by migration background during early and middle childhood. The first paper sets out to estimate the size of disparities by migration background at age five (i.e. when they start school) and explores the causes of these gaps in Ireland. It primarily draws on data from the third wave and employs multiple linear regression models in a stepwise fashion. The second paper seeks to add a longitudinal perspective by investigating how much of the disparities by

migration background found during primary school can be attributed to inequalities that already existed before school. It mostly relies on data from the third and fifth wave and uses structural equation modelling to address the issue of regression to the mean

The second empirical part of the thesis (Chapter 4 and Chapter 5) is made up by papers three and four and explores if ECEC could serve as an equaliser to reduce existing achievement gaps by migration background. The third paper looks at the role of ECEC from a 'selection-into-effects' perspective. It investigates how childcare choices differ between native and immigrant households in Ireland, and how these differences can be explained. This paper primarily draws on data from the second wave, and employs several regression models as well as the Karlson-Holm-Breen decomposition technique. The results indicate that compared to children from native homes, children with a migration background are more likely to be in formal care relative to informal care. The fourth and final paper focuses on estimating the causal effect of ECEC attendance at age three on later English language achievement and gauges the equalisation power and potential of the ECEC system in Ireland. It mostly relies on data from the first, second and third wave and employs propensity score weighting to account for differential selection into ECEC.

The final part of the thesis (Chapter 6) provides an overview of the main findings and their implications and sums up the main contributions and limitations of the thesis.

2 Paper I: Achievement gaps by migration background at age five and their causes

The peer reviewed and edited version of this article is published in European Societies with open access:

Stefanie Sprong & Jan Skopek (2022) Academic achievement gaps by migration background at school starting age in Ireland, European Societies, DOI: 10.1080/14616696.2022.2084558

2.1 Abstract

In today's increasingly diverse societies, a key question is how to foster the structural integration of immigrants and their descendants. While research indicates that migrant educational underachievement is a serious issue, relatively little is known about achievement gaps at younger ages and in relatively new immigration countries. The current study sets out to estimate the size of disparities by migration background at age five (i.e., when they start school) and explores the causes of these gaps. It does so in a context that offers a compelling but under-researched case: the Republic of Ireland. It draws on the Growing Up in Ireland (GUI) data, a national longitudinal study of children in Ireland. The results suggest that some disparities by migration background already existed at the start of primary school, but also that gaps were limited to verbal skills and differed widely across groups. Moreover, social background only played a relatively minor role in explaining the differences, whereas the child's first language was a powerful predictor of disadvantages by migration background in verbal skills.

Keywords: Early childhood; Achievement gaps; Migration Background; Growing Up in Ireland.

2.2 Introduction

Since the 1960s immigration has increased substantially (Castles et al., 2014) and as a result many European countries have become much more diverse. The increased demographic diversity has brought up questions about the integration of immigrants and their descendants. One of these questions is how to facilitate the integration of students of migrant descent into the education system and to ensure that they have equal chances to succeed. Unsurprisingly, there is a large body of literature on the educational performance of students from minority groups and of migrant origin, which typically indicates that children with a migration background may be at risk of underperforming: students with a migration background tend to have poorer primary and secondary school grades, are less likely to complete secondary school, and attend shorter and less demanding school careers (e.g., Heath & Brinbaum, 2014b).

Nevertheless, there seems to be quite a lot of variation with regards to achievement gaps by migration background. Several studies have found that such educational inequalities vary across countries. For example, looking at achievement disparities in several OECD countries, Dustmann, Frattini and Lanzara (2012) showed that the average gap in test scores between children of immigrants and natives differed widely across countries. Similarly, there is evidence that such gaps vary within countries, differing across groups and conditions. For instance, exploiting three large international datasets, Andon, Thompson and Becker (2014) found that the immigrant achievement gap is a very complex phenomenon and varies by grade and type of content (i.e., academic subject) assessed.

The variation in achievement gaps draws attention to the importance of considering the country context and looking at less researched settings. Of particular interest are more recent countries of immigration that long remained understudied because their number of second-generation students was long too small to warrant systematic research (e.g., Heath et al., 2008). More recently, researchers have started to fill this gap, investigating the achievement of students of migrant origin in contexts like Italy (e.g., Gabrielli, Longobardi, & Strozza, 2021;

Triventi, Vlach, & Pini, 2021) and Spain (e.g., Fierro, Parella, Güell, & Petroff, 2021; Vaquera & Kao, 2012; Zinovyeva, Felgueroso, & Vazquez, 2014). Such studies offer new insights into the processes that determine the educational disparities by migration background. For example, one interesting finding is that in new destination countries in Southern Europe the educational background of the parents seems to explain a smaller part of the educational disadvantages than in more established countries of immigration (Schnell & Azzolini, 2014).

The heterogeneity in achievement gaps also begs for studying a wider variety of age groups. While studies on educational inequality for older children and teenagers with a migration background are gaining momentum, research on the period prior to school and the early school years remains relatively scarce. In particular, based on school assessment data, such as PISA, it remains empirically unclear whether and to which extent gaps by migration background emerge in school or already exist at school entry. Moreover, as pointed out by Washbrook and colleagues (2012, p. 1592) looking at achievement gaps by migration background in early childhood is helpful in assessing the effect of parental background. Besides, it is during this period early in the life course that interventions are likely most powerful and effective (Heckman, 2006).

This paper adds to the literature by investigating the existence of gaps by migration background and some of the causes of these gaps in early childhood in the Republic of Ireland (hereafter, Ireland). Drawing on GUI data, a national longitudinal study of children in Ireland, this study sets out to answer the following questions:

1. Can differences in educational achievement between children with and without a migration background be observed at age five?
2. How important are differences in family social background and other theoretically relevant factors in explaining disparities by migration background in age five achievement?

2.2.1 *The Irish context*

Ireland provides an interesting context for studying immigrants and their children. The speed and scale of recent migration as well as the characteristics of its immigrant population make it different from many other Western countries. Most importantly, migration to Ireland is a relatively new phenomenon. For most of its history, Ireland was a country of emigration rather than of immigration. It was only during the economic boom of the late 1990s and early 2000s that Ireland turned into a country of net immigration. Many of those who moved to Ireland were young people looking to take advantage of the job opportunities offered by the thriving economy (Röder, 2014). As a result, there are relatively many young families with a migration background. The Irish Central Statistics Office estimated that, in 2017, only 77.3 per cent of the mothers of new-born babies were Irish nationals (CSO, 2018b). Furthermore, immigrants are, on average, higher educated than Irish natives (CSO, 2017), with 61.7% of the immigrants over 15 years of age having a third-level qualification (CSO, 2018a).

2.2.2 *Evidence from Ireland*

Research is still grappling with Ireland's newly acquired status as a destination country. While there now is a considerable body of research that focuses on the experiences of children with a migration background in Ireland (e.g., Darmody et al., 2012), research looking at the academic performance of these children is still in its infancy, although steadily increasing.

Many of these studies indicate that Irish students with a migration background may fare relatively well. For example, Irish students with a migration background seem to resemble their Irish-born peers in educational outcomes (Taguma et al., 2009), rates of early school leaving (McGinnity, Quinn, et al., 2017), and their attitudes towards school and teachers (Smyth, 2017). In terms of achievement there are also some positive signs. McGinnity, Darmody and Murray (2015) found some initial disadvantages for children of Eastern European, Western European and Asian mothers, but reported relatively modest differences in academic performance

between Irish-born and immigrant children at age nine after accounting for background characteristics. Moreover, some country-comparative studies found that first and 1.5 generation students may even outperform their native counterparts in Ireland (Levels & Dronkers, 2008; Levels, Dronkers, & Jencks, 2017). However, there are also some reasons for concern: children with a migration background in Ireland are more likely to live in specific urban areas (Devine, 2011b, 2013) and to be concentrated in schools serving socio-economically disadvantaged groups (Byrne et al., 2010).

While the existing evidence from the Irish context suggests that achievement gaps by migration background may be relatively modest, it is important to note that this is largely based on qualitative evidence, older and first-generation children as well as generations of children born before the accession of new EU member states in 2004, which significantly altered the immigrant population in Ireland (Devitt, 2016; Röder, 2014). Thus, in many regards, much remains unknown about the Irish situation. Hence, for our expectations we predominantly draw on findings from other, more traditional countries of immigration.

2.2.3 Evidence from other countries

Despite significant variation (Andon et al., 2014; Dustmann et al., 2012), many studies on the educational performance of students of migrant origin indicate that these children and young people face disadvantages and that their academic achievement is typically lower than that of their peers without a migration background (e.g., Alba, Sloan, & Sperling, 2011; Heath & Brinbaum, 2014b; Levels & Dronkers, 2008; Schnell & Azzolini, 2014). Following the notion that earlier achievement is highly predictive of later achievement (Duncan et al., 2007), we may expect such differences to be present in early childhood as well. Indeed, there is some evidence that migration-achievement gaps already manifest themselves in early in life (Becker & Klein, 2021; e.g., Becker et al., 2013; Hahn & Schöps, 2019; Magnuson et al., 2006; Washbrook et al.,

2012). Therefore, we expect that, on average, Irish 5-year-olds with a migration background will have lower test scores than their counterparts born to native parents, i.e., a raw gap (H1a).

However, considering the diversity in the Irish immigrant population, these gaps may not be the same across all migrant groups. Importantly, children with a parent from the Anglosphere may be more similar to children with Irish-born parents due to the shared historical and cultural ties of these countries. Moreover, due to restricted non-EU immigration into Ireland, some non-EU migrant groups may be more positively selected than those that could move to Ireland more easily, such as immigrant from recently acceded EU countries. This is relevant because for more positively selected migrant groups the educational disadvantages of the second generation tend to be smaller (van de Werfhorst & Heath, 2019). Thus, we expect that disadvantages will be the smallest for children with a parent from the Anglosphere and largest for those with a Polish or other Eastern European parent (H1b).

Arguably the most important migration-specific factor related to achievement is language. Children whose parents do not speak the majority language at home have fewer opportunities to master it and their lower language proficiency might hamper them in their schoolwork (Schnell & Azzolini, 2014). Moreover, speaking the majority language at home may be an indication of integration or cultural proximity, and not being fluent in the majority language may form a barrier to parental involvement at school (Turney & Kao, 2009). Correspondingly, studies looking at achievement in early childhood have sometimes found that gaps exist for verbal skills but not for non-verbal skills (Becker et al., 2013; Washbrook et al., 2012). Thus, we expect achievement gaps by migration background to be larger for verbal than for non-verbal skills (H1c). Additionally, we expect that the language spoken at home will largely explain these gaps (H2).

2.2.4 *Compositional factors*

Sociologists have long highlighted the association between social background and educational outcomes (e.g., Breen & Jonsson, 2005) and family investment theory highlights the role of socio-economic resources such as income or education for differences in parents' capacity to invest into children's development (e.g., Conger & Donnellan, 2006). Since immigrants frequently occupy the lower socio-economic strata in host societies, it may be the socio-economic resources available to migrant parents and not their migrant status *per se*, which shape their offspring's educational opportunities (e.g., Heath & Brinbaum, 2007). Therefore, we hypothesise that accounting for parental education and the household income will reduce any existing achievement gaps by migration background (H3a and H3b).

Additionally, it may be useful to consider a wider range of resources and investments than parental education and income. Coleman (1988) already pointed to the idea that the mere presence of resources (in his case human capital) does not automatically translate into the transmission to the offspring but that this requires specific investments and behaviour. Many researchers have since shown that parenting styles and practices are important in explaining learning and school success of children, and that they may be one of the main mechanisms through which the background of the parents affects children's educational success (e.g., Lareau, 2011). Therefore, we hypothesise that any disparities between children with and without a migration background can further be explained by non-monetary forms of parental resources and investments, such as educational activities (H4).

Moreover, immigrant parents may be disadvantaged in terms of mental health and social support. The migration process may be stressful and disruptive, which in line with the FSM (Conger & Conger, 2002) could negatively affect parenting and consequently the child's academic achievement. Relatedly, moving to and settling in a new country means leaving one's home country, including one's existing social networks, which makes that, unlike native parents, immigrant parents cannot easily rely on old kinship networks for support in child rearing.

Therefore, we expect that accounting for maternal mental well-being and perceived social support will further reduce any disparities by migration background (H4a and 4b).

Finally, in addition to the home environment, environments outside of the household are likely relevant to child development. A large body of literature demonstrates the positive effects of ECEC participation on child development (For reviews see for example Burger, 2010; Kulic et al., 2019). ECEC participation might be particularly beneficial to children of immigrants because it provides them with the opportunity to come in contact with the majority culture and the language (Magnuson & Waldfogel, 2005). However, research suggests that maternal work and childcare decisions differ by migration status in Ireland (Röder et al., 2017) and children with a migration background may be less likely to be in non-parental care. Hence, we expect that accounting for preschool attendance will reduce disparities by migration background (H5).

2.3 Data and Methods

2.3.1 *The Growing Up in Ireland Study*

To test our hypotheses, we drew on the GUI Infant Cohort data. We primarily focused on the third data wave of data collection, conducted when the study children were five years of age (Williams, Thornton, Murray, & Quail, 2019). This is a crucial age because primary school is commonly started at age four or five in Ireland. Moreover, the GUI study was nationally representative, drawn from the Irish Child Benefit Register, and, thus, there was a representative number of children with a migration background in the sample.

The children in the Infant Cohort were born between December 2007 and June 2008. Of the 11,134 families that were surveyed in Wave 1 (9 months), 9,793 participated in Wave 2 (age three), and 9,001 in Wave 3 (age five). In early 2013, detailed interviews for Wave 3 were conducted with the primary caregiver who, in nearly all cases, was the mother, and the secondary caregiver if resident in the household. The questionnaire included measures on

children's achievement as well as a wide range of measures on their circumstances and detailed information from their caregivers.

2.3.2 Measures

Naming Vocabulary and Picture Similarity tests

Our dependent variables were the study child's verbal and non-verbal skills at age five (Wave 3). They were assessed using two of the core scales from the Early Years Battery of the British Ability Scales (Elliott, Smith & McCullough, 1996): the Naming Vocabulary and Picture Similarity test. These tests have also been used in other large cohort studies, such as the Millennium Cohort Study, and were extensively tested in the Irish context before being used in the GUI study (Murray, McCrory, & Williams, 2014; Thornton & Williams, 2016).

Both tests were administered in the family home at the same time as the interview with the primary caregiver. In the Naming Vocabulary test, the child was shown a series of pictures of objects and was asked to name them. This served as a measure of expressive English language vocabulary (i.e., verbal skills in English⁴). In the Pictures Similarities test, the child was shown a row of pictures and was asked to identify a further congruent picture. This process served as measured for non-verbal reasoning capacity and problem-solving skills (i.e., non-verbal skills).

The raw scores (i.e., the number of correct items for each test) were converted into ability scores, considering the difficulty of the items and the ability of the child. Based on tables provided by the test authors (Elliott, Smith, & McCulloch, 1996), these were then transformed into age-adjusted standardised test scores, with a mean of 50, a standard deviation of 10, and bounded between 20 and 80.

⁴ The test only considered the child's ability in terms of verbal skills in the English language. It is important to note that the child's verbal skills in their parents' native language (if this is another language than English) may be different.

Parental region of origin

Our indicator of migration background was the parents' region of origin. Parents were asked to indicate their country of birth at Wave 1. To reduce missing values, responses to this question from later waves were used if the information was missing in Wave 1 and the respondent in the later wave was listed as a parent.

Using this information, we then created a region of origin variable for the study child. If the study child had one foreign-born parent residing in the household, the birthplace of the migrant parent was taken. If the child had two foreign-born parents that were both living in the household, the mother's birthplace was used. For anonymisation purposes, we collapsed birth countries so that ten categories remained: (1) Republic of Ireland; (2) United Kingdom (including Northern Ireland); (3) Poland; (4) Other EU – Western; (5) Other EU – Eastern; (6) Africa; (7) Indian Subcontinent; (8) Other Asia; (9) North-America, Australia, Oceania; and (10) Rest of the world.⁵

Parental level of education

A dominance approach was used to assess the highest level of parental education, recorded in Wave 3: (1) Degree or higher; (0) Non-degree or below.

Household Income

Because the household income may fluctuate over time, we used the log-transformed equivalised annual household income (in euros), averaged across the three waves. This was

⁵ The nature and the extent of educational inequalities often vary between different immigrant groups. It is therefore important to use as fine-grained categories as possible, especially because too coarse categories may hide considerable variation in the immigrant population. However, small numbers often necessitate the use of composite categories. The indicator of parental place of birth used in this paper is as detailed as the data permitted. This means that for some groups we use country of birth (e.g. Poland) whereas we use region of birth for others (e.g. Other Europe, Eastern).

based on the self-reported disposable household income (i.e., the total gross household income less statutory deductions of income tax and social insurance contributions) divided by the equivalised household size. We log-transformed the variable because the data were right-skewed.

Frequency educational activities

As one aspect of other parental resources and investments, we included a measure of the frequency educational activities. In Wave 2, parents indicated how many days per week they or anyone else did certain activities with the child, such as reading to the child or helping them learn the ABC. We combined the seven items by taking the average, meaning that scores ranged from 0 to 7 with higher scores indicating a greater frequency.

Number of books

As a second aspect of other parental resources and investments, we included a measure on the number of books the child had access to in their home at Wave 2: (1) Up to 20; (2) 21-30; (3) 30 or more.

Hours in preschool

As a measure of ECEC attendance, we included the number of hours children spent in preschool under the ECCE Scheme of the Irish government, recorded in Wave 2.

Child's first language

The primary caregiver reported the first language of the child at Wave 2: (0) English; (1) Other language than English (including Irish).⁶

Maternal mental health

For the mental well-being of the parents, we included the depression score of the primary caregiver at Wave 2, with a higher score indicating worse mental health.

Perceived social support

In Wave 2, the primary caregiver reported the overall level of support they received from family or friends outside of the household. Based on this, we created a dummy indicating whether they felt like they received (1) enough support or (0) not.

Control variables

We controlled for the age and sex of the study child, whether the study child had started school at the time of the test, the age of the mother, whether the study child lived in a single-parent household, the number of siblings in the household, and the region of residence.

2.3.3 *Sample*

After drawing on information from later waves as far as possible, information on the parental region of birth was missing for 481 children of the total sample of 9001. To avoid uncertainty in our groups of children with and without a migration background, we conditioned the sample on those children for whom we had information on their parents' region of birth ($N = 8520$).

⁶ While Irish and English are both official languages of Ireland, English is by far the most commonly spoken language. Moreover, the test assessing the study child's verbal skills is conducted in English. Therefore, we have included Irish in other language spoken at home.

The children in our final sample were between 60 and 68 months old ($M = 62.03$, $SD = 0.96$) and 49.18% was female. There was a meaningful and relatively diverse proportion of children with a migration background in our sample. More than one in four (30.72%) students had at least one parent that was foreign-born. The UK (35.58%), Africa (13.76%), and Poland (13.60%) were among the most common birth regions of foreign-born parents. A small number of children ($N = 74$) were born abroad themselves but moved to Ireland before they were nine months old. Most of them ($N = 43$) had Irish-born parents, while 31 of them had at least one parent that was also foreign-born. Detailed descriptive statistics for the key variables by parental region of birth are presented in Table 2.1.

Table 2.1 Descriptive statistics of the main explanatory variables by parental region of origin

	Ireland N = 5903		UK N = 931		Poland N = 356		EU West N = 208		EU East N = 293		Africa N = 360		Indian N = 101		Asia N = 116		Anglo N = 151		Rest N = 101		
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	
English first lang. (W2)	1.00		0.99		0.16		0.82		0.31		0.83		0.31		0.77		0.99		0.49		
Degree or higher	0.28		0.34		0.28		0.56		0.29		0.28		0.57		0.35		0.61		0.51		
Annual Household inc (log)	9.79	0.46	9.76	0.50	9.51	0.36	9.90	0.44	9.45	0.35	9.43	0.46	9.66	0.48	9.60	0.49	10.0	0	0.44	9.66	0.41
Educ. activities (W2)	4.90	1.23	4.87	1.19	4.90	1.25	4.74	1.23	4.72	1.32	4.63	1.33	4.33	1.53	4.70	1.45	4.87	1.18	4.64	1.35	
N books (W2)																					
20 or below	0.26		0.19		0.38		0.15		0.47		0.60		0.76		0.48		0.11		0.40		
21-30	0.19		0.19		0.23		0.20		0.19		0.14		0.10		0.18		0.08		0.15		
30 or more	0.56		0.63		0.40		0.65		0.34		0.26		0.14		0.34		0.81		0.45		
Enough support (W2)	0.78		0.67		0.56		0.60		0.47		0.46		0.44		0.52		0.63		0.40		
Dep. score mom (W2)	2.47		2.61		1.87		2.27		2.43		2.82		2.34		2.04		2.08		2.19		
Preschool hours (W2)	5.43		5.61		4.92		8.40		5.18		4.83		4.24		4.46		6.90		5.95		

Note. Weighted, unimputed data. Anglo = North America, Australia, Oceania. The household income was averaged across the three waves.

2.3.4 Method of analysis

We performed our analyses in three steps. In a first step, we estimated the unconditional means in verbal and non-verbal skills to assess raw gaps by parental region of birth. In a second step, we employed multiple linear regression models in a stepwise fashion. We started with regressing verbal and non-verbal skill scores on the child's migration background and the control variables, and step by step, added the other sets of variables. In a final step, we used structural equation modelling (SEM) to gauge what part of the disparities could be explained by the variables. We estimated how much of the differences by parental region of birth (i.e., the total effects) could be attributed to our explanatory variables (i.e., the indirect effects), conditioning on the study child's age and sex and the region of residence.

To deal with potential bias from attrition and sample design, we conducted all our analyses on weighted samples, using the weighting factor provided in the GUI dataset for the most complete Wave 3 sample of 9,001 families. This factor considered key socio-demographic and other dimensions, as well as inter-wave attrition.

Missing data were relatively limited and varied from 0.09% for the control variable indicating whether the child was already in school to 3.19% for the perceived social support variable. At 16.09%, the only variable with more missing values was the average equivalised household income, which was because it had between 408 and 675 missing values in each wave. To account for missing data, we performed multiple imputation to create 20 additional datasets with plausible values for missing values, using the Multivariate Imputation using Chained Equations (MICE) procedure in Stata 15 (Royston & White, 2011) with the option `augment` (White, Daniel, & Royston, 2010). The imputation model included all variables included in the regression models as well as four auxiliary variables. In the SEM, we used Full Information Maximum Likelihood (FIML). Results from the analyses using MICE and FIML were nearly identical. A replication package is available on the journal's website.

2.4 Results

2.4.1 Raw achievement gaps

Contrary to our expectations, raw (i.e., unadjusted) achievement gaps between children with Irish-born and the groups of children with foreign-born parents generally did not occur for non-verbal skills (see Figure 2.1). There were three exceptions to this. Children with a parent from Africa or the Indian subcontinent scored about a quarter of a standard deviation lower than children with parents that were born in Ireland, whereas children with a parent from the United Kingdom scored about a tenth of a standard deviation above them.

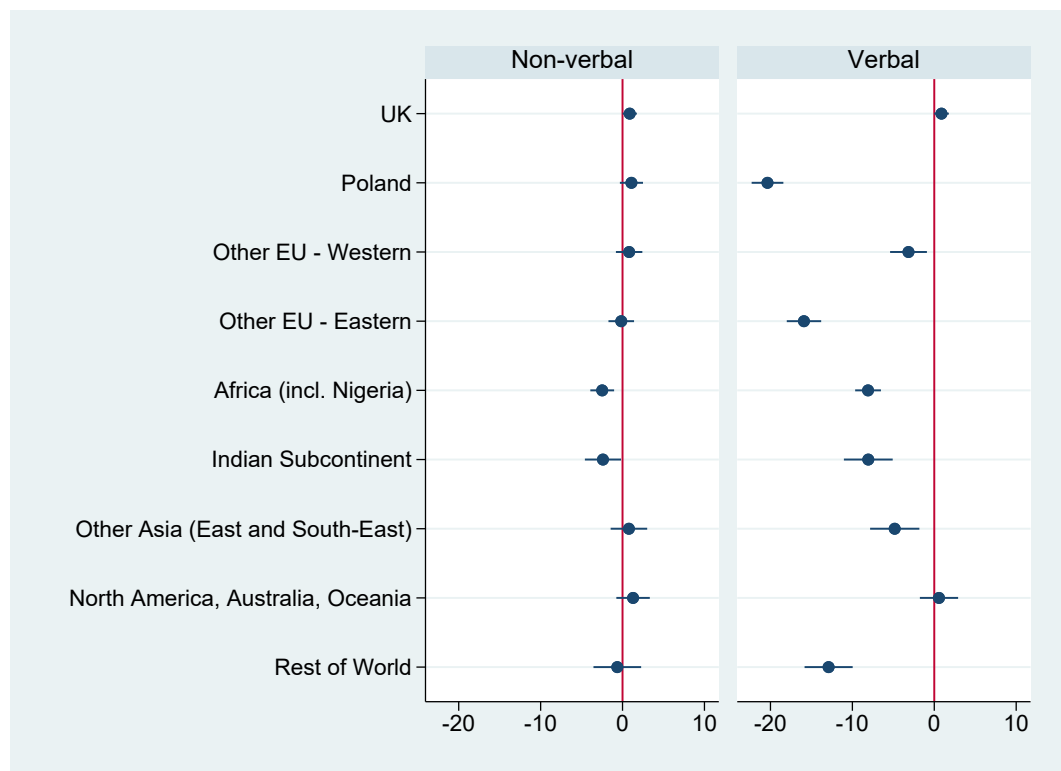


Figure 2.1 *Estimated unadjusted mean differences in verbal and non-verbal skills at age five by parental region of birth*

Note. Reference group is Ireland. Weighted data, $M=20$ imputations.

Unadjusted group differences in verbal skills were more pronounced. On average, most groups of children with a migration background had lower scores than their peers with native parents, although there were considerable differences by the birth region of the parents. Perhaps unsurprisingly, children who had a parent from a primarily English-speaking area (i.e., the UK and North America, Australia and Oceania) tended to have scores close to or slightly higher than the average. Lower than average achievement scores, on the other hand, could be observed for all other regions. Disadvantages were most severe for children with a Polish or other Eastern European background; their scores were close to two and one-and-a-half standard deviations below the mean of children with an Irish parent, respectively.

Thus, in partial support of our first hypothesis, we found raw gaps in verbal skills for most groups. As expected, the test scores of children with a parent from an Anglosphere core country were similar to children with Irish-born parents. For all other origin groups the average verbal skill scores were lower than those of children without a migration background and, as hypothesised, they were the largest for those with an Polish or Eastern European parent. Finally, in line with expectations, differences were more pronounced for verbal than non-verbal skills. In fact, there were barely any gaps by migration background in non-verbal skills. With few observed differences in non-verbal skills, there were also fewer gaps to explain, but it could be that that any migrant-specific advantages appear after taking into account theoretically relevant factors. We investigated this in the section below.

2.4.2 *Adjusted gaps by migration background*

To the base model (Table 2.2 and 2.3, M1), which only included the parental region of birth and the control variables, we added the first language of the child (M2). Having another first language than English was significantly and negatively related to verbal skills, though not to non-verbal skills. The penalty for not having English as a first language was rather large at -11.43 points, and verbal skill disadvantages were significantly reduced once differences in the child's

first language were taken into account. In some cases, the remaining gaps were only around half of their initial size. This was, for example, the case for children with a parent from Poland and other Eastern European countries. For children with a parent from Western Europe, the Indian subcontinent and other parts of Asia, the initial gap was even no longer significant.

Table 2.2 Stepwise regression models for verbal skills at age five

	M1		M2		M3		M4		M5		M6	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Parental region of birth (ref. Ireland)												
United Kingdom	0.58	0.45	0.70	0.45	0.60	0.45	0.78	0.45	0.68	0.45	0.73	0.45
Poland	-20.30***	1.01	-10.93***	1.18	-11.12***	1.17	-10.55***	1.15	-10.62***	1.15	-10.50***	1.16
Other EU, Western	-3.84**	1.20	-1.80	1.10	-2.33*	1.12	-2.15	1.11	-2.15*	1.08	-2.05	1.08
Other EU, Eastern	-15.80***	1.10	-7.97***	1.14	-8.16***	1.12	-7.40***	1.12	-7.08***	1.12	-6.91***	1.13
Africa	-7.16***	0.80	-5.25***	0.78	-5.32***	0.77	-4.55***	0.77	-3.74***	0.77	-3.60***	0.78
Indian subcontinent	-8.17***	1.48	-0.48	1.48	-1.28	1.48	-0.71	1.46	0.87	1.43	1.02	1.44
Other Asia	-5.41***	1.52	-2.84	1.60	-2.91	1.58	-2.23	1.55	-1.54	1.59	-1.45	1.59
NA, AU, OC	0.18	1.18	0.28	1.18	-0.34	1.18	-0.32	1.17	-0.48	1.16	-0.42	1.16
Rest of the world	-13.10***	1.43	-7.15***	1.24	-7.71***	1.23	-7.18***	1.25	-6.73***	1.30	-6.55***	1.31
Other first language			-11.43***	0.88	-11.28***	0.87	-10.94***	0.87	-10.58***	0.87	-10.59***	0.87
Parental education					2.47***	0.30	1.40***	0.33	1.00**	0.33	1.03**	0.33
Household income (log)							2.87***	0.40	2.39***	0.41	2.43***	0.42
Educational activities									0.75***	0.13	0.74***	0.13
Number of books												
21-30									2.14***	0.47	2.16***	0.47
30 or more									2.76***	0.39	2.79***	0.39
Hours in preschool											0.47	0.32
Depression score mom											0.01	0.04
Enough support											-0.02	0.02
Constant	44.42***	9.64	43.67***	9.56	45.50***	9.53	20.95*	10.20	17.72	10.19	16.47	10.21
R ²	0.17		0.20		0.21		0.22		0.23		0.23	

Note. NA = North America, AU = Australia, OC = Oceania. Weighted data, M=20 imputations. All analyses are controlled for the study child's sex and age, if they had started junior infants, the number of siblings, if it was a nuclear family or a single parent household, the mother's age, and the region of residence.

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 2.3 Stepwise regression models for non-verbal skills at age five

	M1		M2		M3		M4		M5		M6	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Parental region of birth (ref. Ireland)												
United Kingdom	0.68	0.44	0.68	0.44	0.62	0.44	0.76	0.44	0.69	0.44	0.73	0.44
Poland	0.79	0.73	0.21	0.94	0.10	0.94	0.55	0.94	0.52	0.94	0.57	0.95
Other EU, Western	0.49	0.83	0.36	0.84	0.06	0.83	0.20	0.84	0.14	0.83	0.24	0.84
Other EU, Eastern	-0.15	0.82	-0.64	0.92	-0.75	0.91	-0.15	0.91	-0.03	0.91	0.04	0.91
Africa	-1.90*	0.76	-2.02**	0.77	-2.06**	0.77	-1.44	0.78	-1.05	0.78	-0.98	0.79
Indian subcontinent	-2.68*	1.12	-3.16*	1.23	-3.61**	1.22	-3.16**	1.22	-2.46*	1.23	-2.43*	1.24
Other Asia	0.45	1.19	0.29	1.20	0.24	1.18	0.78	1.17	1.10	1.17	1.08	1.17
NA, AU, OC	1.16	1.00	1.16	1.00	0.80	1.01	0.82	1.00	0.65	1.00	0.68	1.00
Rest of the world	-0.92	1.48	-1.29	1.56	-1.61	1.55	-1.19	1.55	-1.03	1.56	-0.97	1.57
Other first language			0.72	0.73	0.80	0.72	1.07	0.72	1.22	0.72	1.15	0.72
Parental education					1.41***	0.29	0.56	0.32	0.37	0.32	0.40	0.32
Household income (log)							2.28***	0.39	1.99***	0.40	2.04***	0.41
Educational activities									0.10	0.12	0.08	0.12
Number of books												
21-30									0.73	0.46	0.75	0.46
30 or more									1.62***	0.38	1.64***	0.38
Hours in preschool											0.15	0.32
Depression score mom											-0.05	0.04
Enough support											-0.03	0.02
Constant	57.40***	9.62	57.45***	9.62	58.49***	9.61	38.96***	10.15	39.76***	10.20	39.36***	10.25
R ²	0.02		0.02		0.03		0.03		0.04		0.04	

Note. NA = North America, AU = Australia, OC = Oceania. Weighted data, M=20 imputations. All analyses are controlled for the study child's sex and age, if they had started junior infants, the number of siblings, if it was a nuclear family or a single parent household, the mother's age, and the region of residence.

* $p < .05$; ** $p < .01$; *** $p < .001$

In the subsequent model, we included the parental education variable (M3) followed by the household income (M4). As expected, children born to parents with higher levels of education and in more affluent households tended to do better than children whose parents held lower levels of education and whose household income was lower. However, including these variables generally did not reduce the existing achievement gaps by migration background, even not when using less crude measures of social background.⁷ If anything, considering parental education might even have enlarged some of the gaps. This was, for example, the case for children with a parent from Poland and other Western and Eastern European countries.

In the next model (M5), we entered the indicators of other parental resources and investments. Including these measures slightly decreased the existing gaps by migration background. For example, for children with an Eastern European background the gap in verbal skills reduced from -8.16 to -7.40, and for children with an African background from -5.32 to -4.55. However, the reduction in the gaps was generally small. Thus, while other familial resources and investments seemed to matter for children's achievement, they did not seem to play a major role in explaining disparities by migration background.

In the final model (M6), we added perceived social support, maternal mental health, and preschool hours. The latter two were not associated with verbal nor non-verbal skills. However, support of social networks seemed to matter, and accounting for the level of reported support reduced some of the initially observed disparities by migration background, though changes were again modest. For example, the disadvantage of children with a Polish parent only reduced from -10.62 to -10.50.

⁷ Because this is an important finding, which is at odds with much of the existing literature, we must be confident in it and make sure it is not driven by our choice to operationalise parental educational as a binary variable. Thus, we ran two additional models: One with a more detailed measure of parental education, and one with a measure of social class in addition to the more detailed parental education measure. Results were very similar to the results from the main analyses and can be found in Appendix I (Table S1a and S1b).

All in all, we found mixed support for our hypotheses. The child's first language had the most explanatory power, but this only held true for verbal skills. The household income and parents' educational credentials were associated with both verbal and non-verbal skills but typically only accounted for small parts of the differences by parental region of birth. Similarly, other resources and investments as well as perceived social support mattered but they only mildly reduced existing disparities in achievement by migration background. The number of preschool hours and maternal mental health were not related to achievement at all.

2.4.3 *Relative importance of the explanatory variables*

To further understand the role of our explanatory variables, we ran an additional analysis in which we used SEM to estimate what part of the effect of each parental region of birth could be explained by the included variables (see Table S2 in Appendix I). This allowed us to estimate what part of the disparities by migration background could be explained by the variables in our model more precisely.

The results of the SEM analysis underlined the relatively different role of social background in explaining any disadvantages by migration background compared to other countries of immigration. The household income only explained relatively small parts of the relatively large disadvantages experienced by some groups. For example, children with a Polish parent had verbal skill scores that were, on average, nearly two standard deviations below those of their peers with native Irish parents. However, only about 2% of this disadvantage could be explained by the household income. Similarly, children with an Indian background had scores that were roughly four-fifths of a standard deviation lower but only 4% of this difference was explained by the household income. Parental education, in some cases, even suppressed some of the disadvantages, suggesting that the migrant gap would be slightly larger if immigrant parents had educational credentials comparable to the Irish population. For instance, for

children with a Western European parent, the disadvantage would likely have been about 11% larger if their parents had not been as highly educated.

Finally, the SEM results also highlighted the important role of language. The child's first language was by far the most important contributor to any disadvantages (or advantages) by migration background. Overall, this variable explained between 23 and 91 per cent of the significant differences in verbal skills, with it appearing to be the most important for children of Indian and Western European origin. However, it is critical to note again that for non-verbal skills there were no substantial disparities to start with and they were not affected by the child's first language.

2.5 Discussion

Research is still catching up with Ireland's newly acquired position as a country of immigration. This study used a nationally representative sample of 5-year-olds to add to the growing literature on the educational achievement of children with a migration background in Ireland, and relatively new countries of destination more generally. It also added to the knowledge of achievement gaps by migration background at younger ages, and extended the literature, which has largely relied on cross-sectional data, by using lagged measures for several explanatory variables.

Our results indicated that disparities existed for children from some groups at the start of school in Ireland but also that they were mostly limited to verbal skills. At age five there were virtually no disparities in non-verbal skills, although there were modest disadvantages for children with a caregiver from Africa and the Indian subcontinent. For verbal skills, the picture was less rosy. At the start of primary school, children from several migrant groups had achievement scores that were substantially below those of their peers with native parents, albeit these differences varied markedly by the parental region of origin. In line with our expectations, the disadvantages were largest for students with a parent from Poland or another

Eastern European country, while differences were non-existent for children from the Anglosphere.

The difference in disparities by migration background between verbal and non-verbal skills is noteworthy and hints at the fact that it is mainly the more culturally and context-dependent skills that are of concern in early childhood. In line with findings in other Anglo-Saxon countries (Washbrook et al., 2012), Irish children with a migration background may perform on par with children without a migration background in terms of more general skills. However, they might be outperformed in terms of skills that are more specific to Ireland. This may be particularly true if a language other than English is spoken at home, which, as predicted, was found to be the most important predictor of disparities by migration background at age five in Ireland.

Considering that verbal skill gaps could already be detected at the start of primary school, increasing or expanding ECEC attendance might be a likely policy intervention, especially as it may be particularly beneficial to children who do not speak English at home (Burger, 2012; Klein & Becker, 2017). However, the current study found no support for a general effect of the time spent in preschool during the free preschool year in Ireland. This might be because the free ECEC programme started too late or was too short to have an effect on language skills. Another explanation may be that the quality of the ECEC provided through the free preschool year in Ireland was not high enough, which was not adequately captured in the relatively crude measures used in the current study. Future research should therefore include more detailed measures of ECEC attendance and explore these and other possible explanations to understand whether ECEC could function as an equaliser.

Furthermore, differences by parental birth region were pronounced and rather persistent for some groups. Notably, even after including a range of theoretically relevant factors, children with a Polish caregiver had verbal skill scores that quite were far below the Irish average. One potential explanation could be that some migrant groups choose not to assimilate

into Irish society as a whole but into a particular segment where they can preserve culture and values and utilise their ethnic capital (Portes & Rumbaut, 2001; Portes & Zhou, 1993). In such a case, the child would likely be less exposed to the majority language. While beyond the scope of the current study, it would be worthwhile to investigate the possible causes of group differences in more detail. Fruitful avenues for future research may be exploring the effect of the level of interethnic contact and the parents' level of integration on children's educational performance, as has been done in the German context (Becker et al., 2013) as well as exploring the effects of bilingualism. Furthermore, it would be useful to consider the role of educational selectivity of the migrant population, which may be an important potential source of differences among migrant groups and has been shown to be related to educational outcomes of the second generation (van de Werfhorst & Heath, 2019).

The current results underline findings by earlier studies that the role of socio-economic factors varies markedly across countries (Marks, 2005), while also highlighting the distinctive role that parental background may play in relatively new countries of immigration. Social background only accounted for a relatively small part of the lower performance of Irish children of some migrant groups. Particularly parental education was a weak predictor of the disadvantages by migration background. In fact, if Irish migrant parents would have had the same levels of education as Irish-born parents, the gaps may have been larger. While the household income had some more predictive power, it could still only explain a modest part of the gaps by migration background. This is at odds with most of the existing literature from more established countries of immigrant as well as the findings of Schnell and Azzolini (2014) from Southern Europe which highlighted the relative importance of 'economic' family resources. More research on role of social background in the achievement of students of migrant descent in newer countries of immigration is thus warranted.

Finally, while the present study added an important early childhood perspective to the literature, it only offered a snapshot of achievement at age five and was limited to two outcome

measures. The findings suggested that language-related gaps found by studies in other European contexts at later ages might find their roots in early childhood. However, as Heath, Rotheron and Kilpi (2008, p. 229) noted, patterns of disadvantage differ at various stages of the educational career and tend to be most evident with test scores early in the school career. It remains an open question how these gaps will develop and what patterns look like for other outcomes.

Conclusion

This study offered insights into early disparities by migration background in a unique study context. From a country of emigration, Ireland has become a country of immigration and the resulting diversity is reflected in its schools. Our results suggest that some achievement differences by migration background already exist at the start of primary school, although they might be limited to verbal skills and differ widely by the group under study. Moreover, social background only seems to explain a relatively minor part of these differences, which is at variance with much of the existing literature. Further research looking at the educational trajectory of these children is needed to better understand why these gaps exist, how they develop, and if they might be prevented.

3 Paper II: The development of achievement gaps into primary school

3.1 Abstract

Education is key to the structural integration of immigrants and their children. While research indicates that educational inequalities by migration background are a serious issue, relatively little is known about when, how and why they develop. The current paper adds to the literature by investigating to what extent achievement gaps by migration background develop during the primary school period. Drawing on data from a national longitudinal study of children in Ireland ($N = 7,577$) and using structural equation modelling, it presents a path model of language achievement. The results indicate that a large part of the disadvantages in English language achievement by migration background during primary school could be attributed to achievement gaps that already existed before school. Moreover, given earlier achievement, the effect of having a migration background was often insignificant or even positive, suggesting that gaps remain relatively stable or even decrease during the period of formal schooling.

Keywords: Achievement Gaps; Migration Background; Longitudinal; Growing Up in Ireland; SEM.

3.2 Introduction

In recent decades, international migration has increased substantially and acted as a force of social transformation (Castles et al., 2014). Consequently, most Western European countries have seen the arrival of a large number of immigrants, making their populations more diverse and bringing up important questions about the integration of immigrants and their descendants. Unsurprisingly, there has been a growing scholarly interest in achievement gaps by migration background and the school careers of students of migrant origin. This strain of literature has made significant contributions to our understanding of the educational situation of young people of migrant descent (See for example, Crul et al., 2012; Heath & Brinbaum, 2014b; Heath et al., 2008; Levels & Dronkers, 2008).

However, hitherto, most of the knowledge on inequalities in educational achievement derives from studies looking at a particular life-course stage, and longitudinal research on achievement gaps is relatively scarce. The lack of knowledge on longitudinal trends regarding academic inequalities is unfortunate because it leaves crucial questions unanswered. One of these open questions is: When do educational inequalities by migration background emerge, and how do they develop over individuals' life courses? This is a substantive question because its answer can help to gain a better understanding of the causes of achievement gaps by migration background and inform policy about when to intervene to reduce disparities.

The current study examines the development of inequalities by migration background in English language achievement among children in Ireland, and contributes to the literature in two significant ways. Firstly, by drawing on recent and nationally representative data from the GUI study, this study is able to examine the educational achievement of children of migrant origin in a relevant but understudied context. In contrast to the more traditional European immigration countries, Ireland only became a country of net immigration relatively recently, and its migrant population is young, diverse and comparatively highly educated, making it a fascinating study context to add to the literature. Secondly, by exploiting the longitudinal nature of the GUI, the

current study can test to what extent early educational disparities play a role in explaining achievement gaps during school. This means that this study adds a more dynamic perspective to the literature on academic disparities by migration background, which can account for the potentially path-dependent nature of educational inequalities.

3.2.1 Academic achievement gaps by migration background

A plethora of studies has examined the educational performance of children with a migration background. These studies offer fascinating snapshots of the disparities by migration background at different ages and in a variety of contexts and outcomes. While there is notable variation in the size of gaps by migration background across different country contexts, groups and subjects (e.g. Andon et al., 2014; Dustmann et al., 2012; Levels & Dronkers, 2008), the extant body of research generally agrees that some inequalities exist and that socio-economic differences often explain a substantial part of them (e.g. Heath & Brinbaum, 2014b; Heath et al., 2008).

While most studies focus on students of migrant origin in secondary school, existing evidence suggests that differences in academic achievement by migration background are already present at a young age, especially for language-related skills. As an example, a recent Danish study (Hojen et al., 2019) found that differences by migration background in the majority language and preliteracy skills could already be detected early in childhood. Several other studies have reported similar findings with regards to language and other country-specific skills, although differences are usually much smaller or even non-existent for more general skills (Becker et al., 2013; Washbrook et al., 2012).

However, how and when achievement gaps by migration background develop is a question that remains largely understudied. Due to data limitations, most previous research has not only investigated achievement gaps in older children and teens, but also at a particular point in time rather than longitudinally. This is unfortunate because studying the emergence and

development of academic achievement gaps by migration background can be incredibly helpful in understanding when, how and why these gaps develop. In particular, in order to effectively reduce educational inequalities, it is important to know whether disparities are mostly attributable to processes and events that take place before children start school or whether it is through mechanisms that operate during school life. Notably, if the largest part of the academic inequalities by migration background at later ages can be attributed to the inequalities that were already present during the period before school, scholars and policymakers may want to focus their efforts on early childhood. Conversely, if most of the differences in academic achievement develop during school, then the school period should arguably be the main focus.

3.2.2

While achievement gaps by migration background may already exist before children start primary school, especially in the language domain, how these gaps subsequently develop remains unclear. However, it is likely that early achievement plays an important role in later educational inequalities by migration background. Several studies have highlighted the highly predictive nature of earlier achievement for later achievement (Duncan et al., 2007), which also seems to be true for students of migrant origin (Becker & Klein, 2021). This suggests that achievement gaps from the period before school would, at least partly, be carried into primary school.

In studying the development of achievement gaps by migration background, it is thus crucial to take a dynamic perspective, which can account for this potentially path-dependent nature of educational inequalities. Such an approach has, for example, been taken in work related to educational inequalities by social background (e.g. Passaretta, Skopek, & van Huizen, 2022). In this paper, we, therefore, conceptualise the development of disparities in language achievement by migration background as a path model (see Figure 3.1).

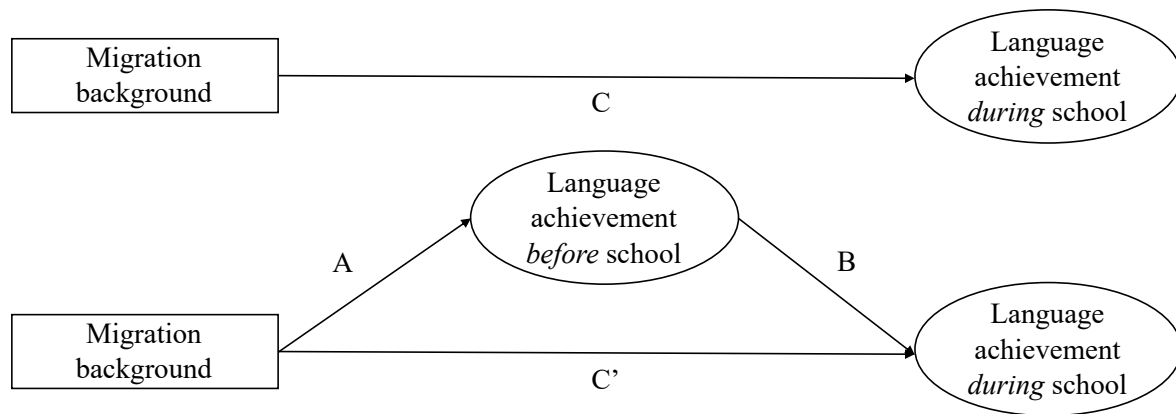


Figure 3.1 *Conceptual model: the development of educational inequalities by migration background during primary school*

Theoretically, achievement gaps by migration background could follow three different trajectories. A first option is that achievement gaps are reasonably stable over time and that disadvantages that already existed before school are simply carried forward. If this is the case, the effect of having a migration background on language achievement *during* school (i.e. path C in Figure 3.1) will mostly operate through the indirect channel via language achievement *before* school (i.e. path AB), while there is little additional effect of having a migration background on language achievement *during* school (i.e. path C'). A second option is that achievement gaps grow over time and that students with lower initial achievement fall further behind after starting school. If this is the case, their achievement during school (i.e. path C) will be lower than would be expected based on their earlier achievement (i.e. path AB) and there will be a negative effect of having a migration background net of earlier achievement (i.e. path C'). The third option is that achievement gaps narrow over time and that students with lower initial achievement catch up with their peers over time. If this is the case, their achievement during school (i.e. path C) will be higher than would have been expected based on their earlier achievement (i.e. path AB) and there will be a positive effect of having a migration background net of earlier achievement (i.e. path C').

There is some reason to believe that achievement trajectories by migration background will follow a stable or divergent trajectory (i.e. path C' is close to zero or negative). That is, ideas such as that even small initial disadvantages add up to substantial gaps over time (i.e. cumulative disadvantage; DiPrete & Eirich, 2006) and that skills created in the early years make it easier to acquire new skills in later years (i.e. skills beget skills; Heckman, 2000) suggest that early disparities may be persistent throughout the educational career and may even grow over time.

However, there are also reasons to believe that achievement gaps may become smaller during the school period (i.e. path C' is positive). In early childhood, the child's household plays a crucial role in their development, but over time, environments outside the family home, and especially the school environment, become increasingly relevant to their learning. While there are likely differences between schools, compared to home environments, schools typically provide more equal, organised and standardised learning environments. Consequently, children from more disadvantaged homes may benefit most from attending school because the difference between the home and the school environment is largest for them (Downey & Condrón, 2016; Raudenbush & Eschmann, 2015), and, thus, schooling may operate as an 'equaliser' (e.g. von Hippel, Workman, & Downey, 2018).

For children with a migration background, being in school-based environments and instructional settings may be particularly beneficial. Not only may they have a lower social background and thus benefit more from schooling for this reason, but being in school also presents them with an opportunity to learn the host country's main language. According to models of language acquisition (Chiswick & Miller, 1995, 2001; Esser, 2006), exposure is crucial to the process of learning a language. If children have little or no exposure to the majority language, they simply cannot learn it well. Considering that children of migrant origin are more likely to have parents who are not fluent in the majority language or who do not speak it at home, reduced exposure may (partly) explain why they lag behind their peers in terms of

language achievement. Attending school, however, directly exposes them to the host country's main language through classroom and peer interaction and teacher support. This increased exposure might thus give them opportunities to improve their English language skills and catch up with their peers. Besides, the wish to do well academically or to participate in the school's social life may provide additional motivation to learn the language.

In support of the idea that achievement gaps by migration background will become smaller during school, some studies from the USA have found that even though children of migrant origin enter school with lower levels of English, they tend to improve their language skills over time (e.g., Reardon & Galindo, 2009). Some evidence from the European context is also consistent with this. In the UK, Hoffmann (2018) showed that while some initial differences may have been present, all minority groups were on positive trajectories and gaps narrowed significantly over time. Similarly, also looking at the UK, Sullivan, Ketende and Joshi (2013) showed that students with an Indian, Pakistani or Bangladeshi or 'other ethnic' background made greater progress than white majority students between the ages of five and seven. Finally, in the German context, Becker, Biedinger and Klein (2013) found that German language disadvantages decreased for children of migrant origin between ages three and six.

However, not all migrant groups will face the same level of initial disadvantage and the learning opportunity provided by school might be more relevant for some migrant groups than for others. For example, children with a migration background from households with greater socio-economic resources and little linguistic distance might not benefit to the same extent as children from socio-economically disadvantaged households with greater linguistic distance because the difference between the home and the school environment is smaller for them. The catching up effect may, therefore, be limited to groups that experience disadvantages in academic achievement at the start of school.

3.2.3 *The Irish context*

Ireland provides an interesting context to study the academic achievement of children of immigrants because its migration history is different from many other Western European countries. While Ireland was long seen as a country of emigration, it rapidly transformed into a country of net immigration during the economic boom of the late 1990s and early 2000s. These days, the Irish migrant population is sizeable, with about one in eight Irish residents being a non-Irish national (CSO, 2020) and almost one in four babies born in Ireland being born to mothers of non-Irish nationality (CSO, 2019). The UK and Poland are the two most important places of origin, but immigrants in Ireland come from a wide range of social, cultural and ethnic backgrounds and tend to be relatively highly educated, although some groups are struggling in the labour market (McGinnity, Enright, et al., 2020).

Research on achievement gaps by migration background in Ireland is still in its infancy. However, the small body of research looking at the educational situation of children of migrant origin in Ireland seems to indicate that Irish children with a migration background fare relatively well (McGinnity, Quinn, et al., 2017; Taguma et al., 2009). Nevertheless, some disadvantages in language achievement have been found to exist during primary school (McGinnity, Darmody, et al., 2015).

3.2.4 *The current study*

In short, research that examines the development of achievement gaps by migration background is still scarce, especially in the European context. For Ireland, characterised by a young, diverse and comparably highly educated migrant population, there is no study at all. The current paper aims to fill this gap by providing a dynamic and longitudinal analysis of inequalities in English language achievement by migration background among children growing up in Ireland. We focus on English language achievement because proficiency in the dominant host language forms the foundation for learning in other domains, and is crucial for children's social and academic integration. We use a SEM approach to address the issue of measurement error and regression

to the mean (Jerrim & Vignoles, 2013), and set out to answer one central question: To what extent are any differences in English language achievement by migration background during primary school attributable to achievement differences before school?

Considering the disadvantages that were found at school starting age for this cohort (see Paper I, Chapter 2) and during school for an older cohort (McGinnity, Darmody, et al., 2015), we expect to find some disparities by migration background in English language achievement during school (i.e. a negative total effect/ path C; H1a). However, we also expect that the size of the gap will vary between regions of origin (i.e. heterogeneity in the total effect/path C; H1b), with the largest disadvantages being present for less positively selected migrant groups with greater linguistic distance, such as children of Polish immigrants, and the smallest differences existing for migrants groups that are linguistically and culturally similar to Ireland, such as children with parents from the UK.

Because of the potentially path-dependent nature of educational inequalities, we anticipate that a large part of the disadvantages found during school will be attributable to the indirect effect of having a migration background through achievement before school (i.e. a negative indirect effect/path AB; H2). Furthermore, considering that the school environment may offer unique benefits to students of migrant origin, particularly in terms of language exposure, we expect that achievement gaps by migration background will decrease during school. Thus, we hypothesise that students of migrant origin will hold an advantage in English language achievement when compared to their peers who had similar levels of English before school (i.e. a positive direct effect/path C'; H3a). However, we also expect that this catching up effect will mainly be relevant for children from migrant groups that had lower than average achievement before school (i.e. heterogeneity in the direct effect/path C'; H3b).

3.3 Data and Methods

3.3.1 *The Growing Up in Ireland study*

For our analyses, we drew on data from the infant cohort of the GUI, a national longitudinal study of children in Ireland. The GUI study contains high-quality data on children's cognitive and educational development as well as socio-economic, demographic, and cultural characteristics of the children's families. Crucially, standardised language-based tests and teacher measures are available for ages five (i.e. before school) and nine (i.e. during school). Moreover, the study is nationally representative, drawn from the Child Benefit Register, and, as such, includes both children with and without a migration background (Thornton, Williams, McCrory, Murray, & Quail, 2013).

3.3.2 Sample

The children in the Infant Cohort were born between December 2007 and June 2008. Of the 11,134 families that were surveyed in Wave 1 (9 months), 9,793 participated in Wave 2 (age 3), 9,001 in Wave 3 (age 5), 5,344 in Wave 4 (age 7/8) which was a short postal survey and finally 8,032 in Wave 5 (age 9). We selected the 7700 children who participated at both Wave 3 and Wave 5 because our main variables of interest were measured in these waves.

To avoid uncertainty in the groups of children with and without a migration background, we conditioned the sample on those children for whom we had valid information on their parents' place of birth. Since information on the parental country of birth is time-invariant, we drew on information from later waves as far as possible. After doing so, information on the parental region of origin was missing for 123 children of the sample of 7700. This resulted in a final sample of 7,577 children, of which slightly more than a quarter (27.61%) had a migration background. The most common parental region of birth was the UK (39.01%), followed by Africa (12.57%) and Poland (11.09%).

3.3.3 Measures

English before school

To assess the study child's level of English at school starting age, we used a combination of a standardised expressive English language vocabulary test and teacher reports on reading, writing and listening, and speaking, collected during Wave 3.

The standardised test was the Naming Vocabulary test, which is a core scale from the Early Years Battery of the British Ability Scales and which was tested extensively in the Irish context prior to incorporation into the GUI study (Williams et al., 2019). The test was administered in the family home at the time of the interview with the primary caregiver. We used the child's test score, which was based on tables provided by the test authors and which takes into account item difficulty and the child's age (Elliott et al., 1996). We transformed the test scores into z-scores with a mean of 0 and a standard deviation of 1.

For the teacher-reported level of English, we used three items relating to how well the study child did in speaking and listening, reading, and writing in English. The teacher rated the study child's abilities in relation to all children of their age on a scale from (1) well above average to (5) well below average. We reverse-coded these items so that a higher score would indicate higher achievement.

English during school

The study child's level of English during school was also measured using a combination of a standardised test and teacher reports. Both the standardised test and teacher reports were collected during Wave 5.

The standardised test was the Vocabulary test from the revised Drumcondra Primary Reading Test (DPRT-R), which was specifically designed to suit the Irish context (McNamara et al., 2020) and was administered in the family home. We used the logit scores provided in the GUI data, which take into account difficulty and discrimination for each item used in the test. We again transformed the scores into z-scores.

For the teacher-reported level of English, the same three items and scales as in Wave 3 were used, and answers were again reverse-coded.

Parental region of origin

The indicator of the study child's migration background was the parental region of birth. This variable was created using the information on the parents' country of birth, which was self-reported at Wave 1 (and subsequent waves). If the study child had one foreign-born parent residing in the household, the birthplace of the migrant parent was taken. If the child had two foreign-born parents living in the home, the mother's birthplace was used. For anonymisation purposes, the parental countries of birth were combined to create ten sufficiently large categories: (1) Republic of Ireland; (2) United Kingdom; (3) Poland; (4) Other EU – Western; (5) Other EU – Eastern; (6) Africa; (7) Indian Subcontinent; (8) Other Asia; (9) North-America, Australia, Oceania; and (10) Rest of the world.⁸

Parental level of education

The parent's highest level of education was recorded at the two respective waves and combined using a dominance approach: (1) Lower secondary education or less; (2) Upper secondary education; (3) non-degree and (4) Degree or up.

Household income

The measure of the household income was based on the self-reported disposable household income (i.e. the total gross household income less statutory deductions of income tax and social insurance contributions) divided by the equivalised household size based on the Irish

⁸ For the rationale behind these categories please see footnote 5 in Chapter 2 (i.e. paper I).

equivalence scale. This figure was then divided into quintiles, with the highest (fifth) category representing the highest level of income at the respective wave (i.e. Wave 3 or Wave 5).

Control variables

We controlled for the age at the time of the respective test, whether the child had started Junior Infants when the Naming Vocabulary test was administered⁹, and the sex of the study child.

3.3.4 Method of analysis

To test the hypotheses, we used SEM, which has the advantage that it integrates measurement and structural models in one estimation framework (Kline, 2016). Within our SEM framework, we measured English language achievement through a latent variable that is assumed to cause observable scores on multiple manifest (i.e. observable) indicators. Hence, rather than relying on a single “noisy” indicator of language achievement, the SEM approach provides a way of estimating language achievement with more conceptual and statistical precision. Thus, SEM allowed us to construct more well-rounded measures of language achievement which suffered less from measurement error. This is important because it helped to address the issue of regression to the mean which may wrongly suggest that achievement gaps widen over time (Jerrim & Vignoles, 2013).

We performed our analyses in two steps. In a first step, we built a measurement model for English language achievement and established configural invariance for English achievement at the two different time points.¹⁰ We freed the residual covariance between the three pairs of

⁹ At the time of the Naming Vocabulary test, which was taken during the home interview with the primary caregiver, about a quarter of the sample had not entered primary school yet. At the time of the teacher questionnaire some months later, virtually all children in the sample had started school.

¹⁰ We established configural invariance for our English achievement variables across the two waves. All loadings were in the same direction and roughly had the same size. We did not find any higher levels of measurement invariance, and thus cannot directly compare the size of the gaps because they are not

teacher reports items at each time point because we assumed that these items would have more in common with each other than with the standardised test items. The model with two latent factors and the freed residual covariances had a good fit to the data, $\chi(13) = 455.694$, $p < .001$, CFI = .986, TLI = .970. The composite scale reliability of each latent variable was also satisfactory ($\rho = .66$ for English before school; $\rho = .86$ English during school). Furthermore, the degree of stability between the measures of English before and after school appeared to be high, with a strong positive zero-order correlation between English at ages five and nine ($r = .91$, $p < .001$)¹¹.

In a second step, building on the measurement model, we fitted two structural models, which included all the main variables and paths. In the first structural model, we looked at the development of the gaps as they would be observed without accounting for social background. This meant that English during school was regressed on English before school, the parental region of birth and the control variables, while English before school was regressed on the parental region of birth and the control variables. In the second structural model, we then added parental education and the household income to predict both English language achievement before and during school.

To deal with potential bias from attrition and sample design, we conducted all our analyses on weighted samples, using the weighting factor provided in the GUI dataset for the

measured on exactly the same scale even though we are measuring the same constructs. However, the rejection of higher levels of invariance was mostly based on the chi-square test, which is very sensitive to sample size, and the other indicators suggested that models with more constraints only fit slightly worse than the unconstrained model. Hence, as a robustness check, we performed our analyses with the item loadings and intercepts and teacher item error covariances constrained to be equal over time. The results were very similar to our main analysis (See Table A2 in Appendix II).

¹¹ The inter-wave correlations of the four individual items were substantially lower (ranging from .25 to .46) than the correlation between our two latent variables (See Table A1 in Appendix II). This suggests that our SEM model did a good job at dealing with measurement error and reducing potential bias in the estimates.

most complete nine-year-old sample. Our estimation employed FIML to account for missing values, assuming that missing values were missing at random.

3.4 Results

3.4.1 *A group-focused perspective*

In a first step, we considered the development of language achievement gaps by migration background as they would be observed without accounting for the social inequalities that might be related to the disparities by migration background. This means that we adopted a group-focused perspective aimed at describing the average language achievement of children of different migrant groups, which are characterised by varying socio-economic compositions.

In accordance with previous findings in the Irish context, disadvantages in English language achievement were present for children from most regions of origin before school (see the total effects on English language achievement before school in Table 3.1, Column A). At age five, English language achievement was significantly lower than the Irish average for children of all migrant groups, except for those with a parent from Western Europe, the UK and other Anglo-Saxon regions, who had scores similar to children with Irish parents. The greatest disadvantage was found for children of Polish origin at 2.06 of a standard deviation, but differences were also substantial for children with parents from other parts of Eastern Europe and the rest of the world at 1.37 and 1.48 of a standard deviation, respectively.

Table 3.1 Path coefficients and standard errors for the mediation model predicting English language achievement during school (y-standardised)

	A				B			
	English before school		English during school		English before school		English during school	
	b	SE	b	SE	b	SE	b	SE
Region of origin (ref. Ireland)								
United Kingdom								
Total effect	0.09	(0.06)	0.11*	(0.05)	0.05	(0.05)	0.06	(0.05)
Direct effect			-0.01	(0.05)			0.01	(0.05)
Indirect effect			0.09	(0.06)			0.05	(0.05)
Poland								
Total effect	-2.06***	(0.15)	-0.54***	(0.10)	-2.04***	(0.15)	-0.56***	(0.09)
Direct effect			1.68***	(0.16)			1.47***	(0.15)
Indirect effect			-2.22***	(0.19)			-2.02***	(0.17)
Other EU, Western								
Total effect	-0.08	(0.16)	0.15	(0.11)	-0.22	(0.13)	-0.01	(0.08)
Direct effect			0.24	(0.13)			0.20	(0.12)
Indirect effect			-0.09	(0.17)			-0.22	(0.13)
Other EU, Eastern								
Total effect	-1.37***	(0.17)	-0.32***	(0.08)	-1.29***	(0.16)	-0.27**	(0.08)
Direct effect			1.15***	(0.16)			1.02***	(0.14)
Indirect effect			-1.47***	(0.19)			-1.29***	(0.18)
Africa (incl. Nigeria)								
Total effect	-0.86***	(0.12)	-0.35***	(0.10)	-0.75***	(0.11)	-0.24**	(0.09)
Direct effect			0.58***	(0.12)			0.51***	(0.11)
Indirect effect			-0.93***	(0.14)			-0.75***	(0.12)
Indian subcontinent								
Total effect	-1.00***	(0.26)	-0.08	(0.15)	-1.02***	(0.21)	-0.14	(0.14)
Direct effect			0.99***	(0.24)			0.89***	(0.22)
Indirect effect			-1.08***	(0.28)			-1.02***	(0.22)
Other Asia (East and South-East)								
Total effect	-0.48**	(0.19)	0.03	(0.16)	-0.45**	(0.16)	0.05	(0.14)
Direct effect			0.55***	(0.16)			0.50***	(0.15)
Indirect effect			-0.52**	(0.20)			-0.45**	(0.17)

North America, Australia, Oceania								
Total effect	0.26	(0.16)	0.46**	(0.13)	0.03	(0.16)	0.20	(0.13)
Direct effect			0.18	(0.14)			0.17	(0.13)
Indirect effect			0.28	(0.18)			0.03	(0.16)
Rest of the world								
Total effect	-1.48***	(0.23)	-0.28	(0.17)	-1.54***	(0.23)	-0.39*	(0.16)
Direct effect			1.32***	(0.21)			1.15***	(0.19)
Indirect effect			-1.60***	(0.25)			-1.54***	(0.24)

Note. *b* = regression coefficient; *SE* = standard error. All analyses are weighted and controlled for age and sex and whether the child had started Junior Infants. Column A = excluding social background; column B = including social background.

p* < .05; *p* < .01; ****p* < .001

In line with hypotheses 1a and 1b, some disparities in English language achievement by migration background were also present during school and the gaps again varied between the different regions of origin, although they were typically smaller than they were before school (see the total effects on English language achievement during school in Table 3.1, column A and Figure 3.2). There was a significantly negative total effect on achievement during school for children of African, Polish and other Eastern European descent, ranging from -0.32 to -0.54 of a standard deviation. However, the effect was significantly positive for children with parents from the UK and other Anglo-Saxon regions, and insignificant for all the other groups.

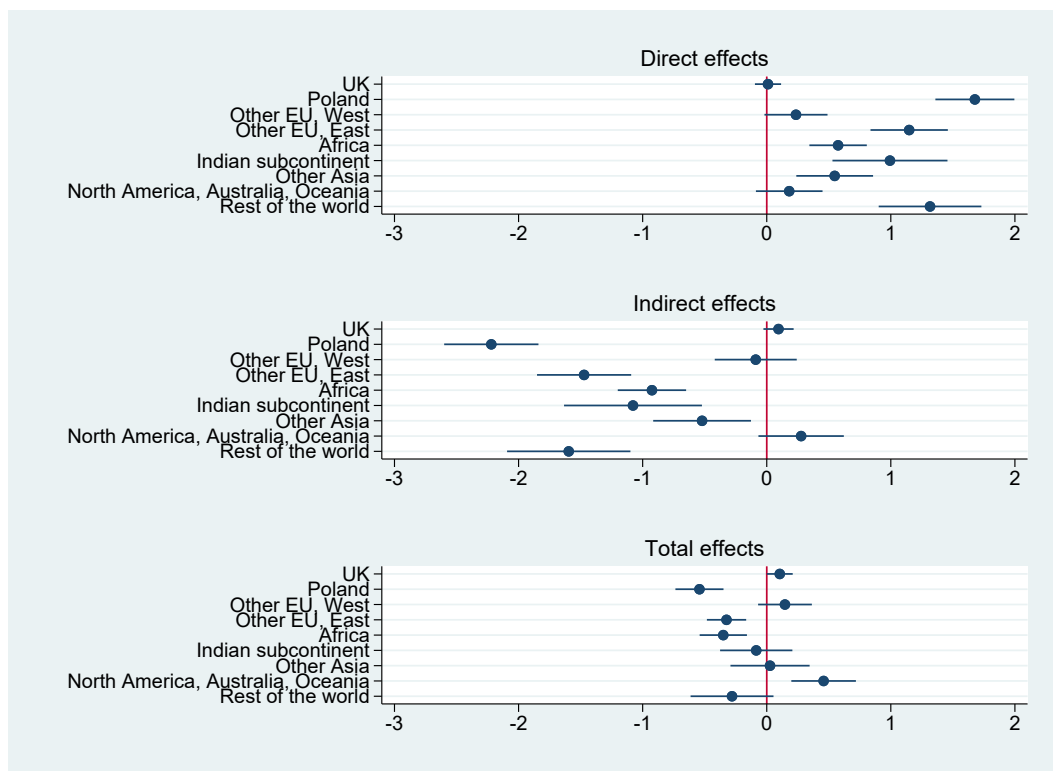


Figure 3.2 *The direct, indirect and total effects of the migration background variables on language achievement during school*

In support of the second hypothesis, a large part of the disadvantages in English language achievement by migration background during school was attributable to the indirect effect of having a migration background through English language achievement before school

(see the indirect effects in Table 3.1, column A and Figure 3.2). There were significantly negative indirect effects for all regions of origin, except for the UK, other Anglo-Saxon regions and Western Europe. The significantly negative indirect effects ranged from -0.52 of a standard deviation for the group with an Asian background to -2.22 for the group of children of Polish origin. These large indirect effects highlight the potentially path-dependent nature of educational inequalities and show how initial disadvantages may be carried forward.

Finally, supporting hypotheses 3a and 3b, children with a migration background were doing better during school compared to peers who had similar levels of English language achievement before school, and this catch-up effect was most pronounced for groups that faced larger initial disadvantages (see the direct effects in Table 3.1, column A and Figure 3.2). There were significantly positive direct effects for all regions of origin, except for the UK, other Anglo-Saxon regions and Western Europe. Children of Polish origin had faced the largest disadvantage in English language achievement before school, and the positive direct effect on English language achievement during school was indeed strongest for them at 1.68 of a standard deviation.

3.4.2 *An attribute-focused perspective*

In a second step, we then considered the development of English language achievement gaps by migration background whilst accounting for the varying socio-economic compositions of the migrant groups. This means that we adopted a more attribute-based perspective in which migration background is seen as an individual characteristic in addition to socio-economic attributes. Hence, this perspective is somewhat less descriptive and helps to understand to what extent the observed patterns might be driven by differences in social background rather than reflecting the effect of having a migration background per se.

The results of the second structural model, which included parental education and the household income, were similar to the results of the structural model without social

background¹², although effect sizes were generally somewhat reduced (see Table 3.1, column B and Figure 3.3). The total effect remained significantly negative for the groups of children of African, Polish and other Eastern European descent, and even gained significance for the group of children with parents from the rest of the world. However, the positive total effects for children with parents from the UK or other Anglo-Saxon regions were no longer significant, indicating that their advantage relative to children of Irish origin reflected their more socially advantaged backgrounds. The indirect effects that were significantly negative before remained significant and negative after controlling for social background, although they were typically slightly smaller. This suggests that social background played a role in the initial disadvantages that were carried forward, albeit a comparatively small one. Similarly, the direct effects that were significantly positive previously were still significant and positive after accounting for social background, although these effects also became slightly smaller.

¹² Even when we additionally control for the household's occupational class the results remain similar. We did not do so in the main analysis because of potential endogeneity concerns, but results are available upon request.

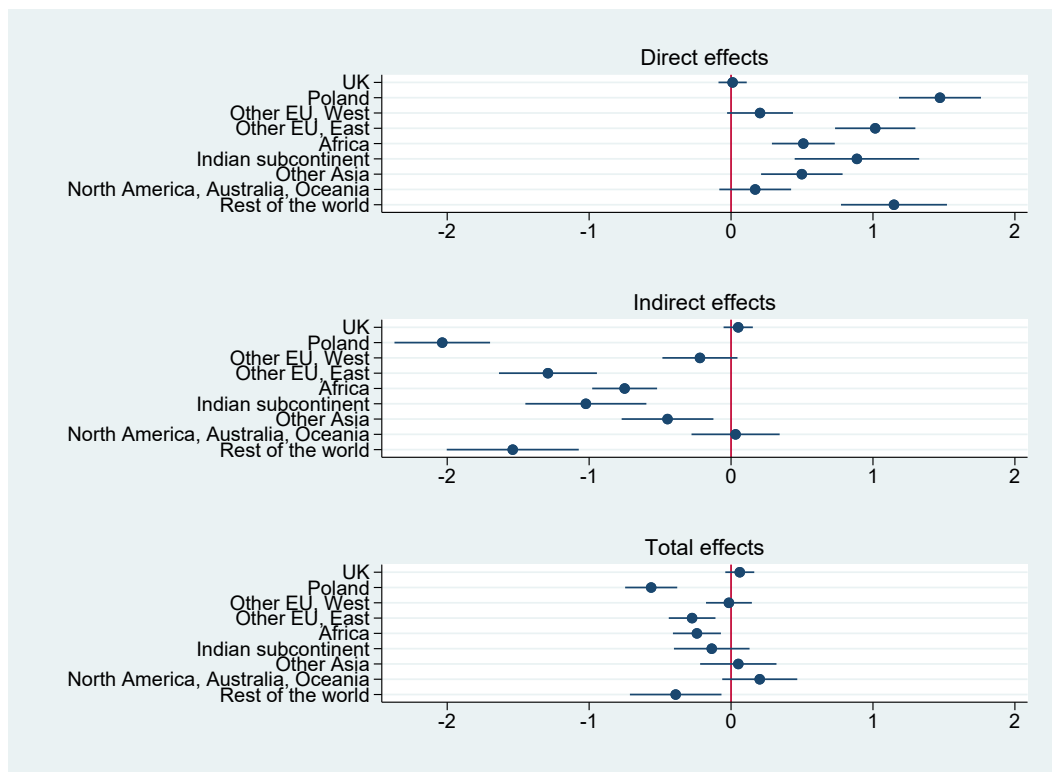


Figure 3.3 *The direct, indirect and total effects of the migration background variables on language achievement during school, controlling for social background*

3.5 Discussion

While a plethora of research offers interesting insights into the educational performance of children with a migration background, many studies do so cross-sectionally and focus on older age groups (e.g. Heath & Brinbaum, 2014b; Levels & Dronkers, 2008). The current paper conceptualised the development of achievement gaps by migration background as a path model and used data from a nationally representative Irish cohort study to examine how much of the disparities during primary school could be attributed to inequalities that already existed before school. As such, it added a more dynamic perspective to the literature and contributed to the understanding of the emergence and development of achievement gaps by migration background.

In line with previous evidence from the Irish context (McGinnity, Darmody, et al., 2015), the findings showed that some disadvantages in English language achievement by migration

background existed during school, although the size of the gaps varied markedly by region of origin. Moreover, the disadvantages during school could largely be attributed to disadvantages in English language achievement that were already present before school. This suggests that initial disparities were carried forward, thereby highlighting the potentially path-dependent nature of educational inequalities. However, at the same time, disparities appeared to grow smaller over time. Students of migrant origin often held an advantage in English language achievement during school relative to their peers who had similar levels of English language achievement to them at the start of primary school. This seemed to be particularly true for groups that experienced the greatest initial disadvantages, with the effects being the strongest for children of Polish descent. Finally, in line with other recent research in the Irish context but in contrast to much of the evidence from other European countries (e.g. Heath et al., 2008), social background only explained a small part of the disparities by migration background.

The findings give reasons for cautious optimism because they suggest that language achievement gaps do not grow during the school period but are relatively stable or even decrease over time, as has also been suggested by some earlier studies (e.g. Becker et al., 2013). However, they also indicate that early disparities in language achievement are carried forward into primary school, thereby highlighting the importance of focusing on early childhood, especially as research has suggested that early disadvantages may affect transitions later in the educational career (Becker & Klein, 2021). The findings thus encourage scholars and policymakers to pay special attention to the period before formal schooling for ensuring that children with a migration background have equal chances to succeed in school.

While the current findings can only show how achievement gaps by migration background developed during the school period and should thus not be interpreted as the effect of schooling, ECEC could be explored as a potential equaliser. Increased ECEC participation would provide children with a migration background with an early opportunity to learn the majority language through increased exposure, which seems particularly important because

children's ability to learn a new language declines with age (Newport, 1990). Besides, a large body of literature has shown the potentially beneficial effects of ECEC, particularly for children from disadvantaged groups (Kulic et al., 2019; van Huizen & Plantenga, 2018) and from households where a foreign language is spoken (e.g. Burger, 2012).

It is important to acknowledge that our work holds several limitations, inviting further research. Firstly, the second generation is only coming of age now in Ireland (Röder, 2014) and while we drew on the most recent available data, this inevitably meant that we could only look at a particular period in children's lives and that our time points were limited. Future research would do well to extend this. Particularly, starting earlier and following children for a more extended period of time would allow an investigation into how early gaps can be detected and whether they disappear later in childhood. Besides, bearing in mind that the current research is more associational in nature, further longitudinal studies could try to establish causality. Secondly, we studied to what extent achievement gaps by migration background during school could be attributed to gaps that already existed before school but did not explore what mechanisms underlie these disparities and their development. Future research should, thus, further investigate what processes and events that take place before the start of school contribute to the development of gaps. In this regard, it is particularly important to examine what exactly underlies the group differences, which may be related to the previous language exposure, level of interethnic contact and the parents' level of integration (e.g. Becker et al., 2013). Finally, while the language domain is an important one, the current findings might not readily apply to other outcomes, such as behavioural difficulties or academic achievement in other subjects, such as science and maths. In fact, as Becker, Klein and Biedinger (2013) found in the German context, achievement gaps may depend on the outcome measure. Hence, it is important to extend this study by looking at other outcomes, especially those that might be less country-specific than host language achievement.

3.5.1 Conclusion

To conclude, using a path-model of educational achievement in primary school, we set out to answer the question to what extent achievement gaps develop during the period of formal schooling. Our results indicate that gaps in English language achievement by migration background can largely be attributed to disadvantages that already existed before school, after which they appear to be relatively stable or even decrease. This implies that researchers and policymakers may want to focus their efforts on the period preceding primary school.

4 Paper III: Differential childcare utilisation patterns by migration background

4.1 Abstract

Many scholars highlight the potentially equalising effects of early childhood education and care (ECEC), which may be particularly relevant for children with a migration background. To properly understand the effects, it is crucial to consider which children are more likely to experience certain types of care. Drawing on recent, nationally representative, longitudinal data (N= 7,516), this paper presents new evidence on how childcare choices differ between native and immigrant households in Ireland, and how these differences may be explained. The results indicate that compared to children from native homes, children with a migration background were more likely to be in formal care relative to informal care. However, children from non-English speaking immigrant households were less likely to be in both informal and formal care compared to parental care. Children from English speaking immigrant households were also slightly less likely to be in informal care than parental care, though there was no difference in the risk of formal care over parental care. Using the Karlson-Holm-Breen (KHB) decomposition technique, we further showed that compositional differences played an essential role in explaining these differential childcare utilisation patterns, with the equalised household income, maternal employment prior to birth, and social support being among the most important explanatory variables.

Keywords: Childcare utilisation patterns; Migration background; Republic of Ireland; Decomposition.

4.2 Introduction

An impressive body of research has shown the beneficial effects of ECEC on child development and later life outcomes (Reynolds et al., 2010; Ruhm & Waldfogel, 2011), particularly for children from more disadvantaged homes (Burger, 2010; Raudenbush & Eschmann, 2015; van Huizen & Plantenga, 2018). Unsurprisingly, ECEC is often seen as a cost-effective equaliser with the potential to reduce educational disadvantage and promote social mobility (e.g. Cebolla-Boado, Radl, & Salazar, 2016; Geoffroy et al., 2010; Heckman, 2006; Leseman & Slot, 2014), especially because it can be amended by public policy whereas many other factors that are related to child development cannot.

The ostensibly equalising effect of ECEC participation may be particularly relevant for children with a migration background because their parents may not only have a lower socio-economic status (SES) but also differ from native parents in terms of other resources. They may, for example, have less knowledge of the local educational system or not be fluent in the receiving country's majority language(s). Hence, there may be additional ECEC benefits that are unique to children with a migration background. ECEC participation may, for instance, help children of migrant origin to adapt to the socio-cultural environment and their parents to learn how to navigate the educational system. Empirical evidence indicates that children with a migration background indeed benefit more from ECEC attendance than their peers without a migration background (e.g., Cornelissen, Dustmann, Raute, & Schönberg, 2018) and that these effects may be particularly strong for students whose parents do not speak the majority language at home (Burger, 2012; Gormley, 2008; Klein & Becker, 2017; Loeb et al., 2007; Magnuson et al., 2006).

However, to fully understand if increased ECEC attendance could help to reduce migration-related disparities, it is crucial to consider who is exposed to these effects. That is, to get a grasp of the role of ECEC and its potential as an equaliser, researchers should not only estimate the impact of attending ECEC, but also examine which groups of children are more

likely to be enrolled in different types of childcare (Kulic et al., 2019). In particular, if native families are much more likely to use ECEC and reap its benefits than non-native families, ECEC might not mitigate any gaps at the population level, despite the anticipated benefits of ECEC enrolment for children with a migration background.

In fact, the literature suggests that children who could benefit most from ECEC participation are typically the least likely to attend such programmes. Families with lower levels of income and education are more likely to depend on informal childcare arrangements and less likely to use ECEC¹³ (e.g., Alexandersen, Zachrisson, Wilhelmsen, Wang, & Brandlistuen, 2021; Bainbridge, Meyers, Tanaka, & Waldfogel, 2005; Cornelissen et al., 2018; Pavolini & Van Lancker, 2018; Petitclerc et al., 2017; Sylva, Stein, Leach, Barnes, & Malmberg, 2007). Moreover, several studies have indicated that children from immigrant families tend to have lower ECEC participation rates (e.g., Kachi, Kato, & Kawachi, 2020; Karoly & Gonzalez, 2011; O'Connor et al., 2016; Zachrisson, Janson, & Nærde, 2013). Even when they attend ECEC, children with a migration background may be in lower quality settings (Stahl, Schober, & Spiess, 2018) or in care environments with different social and ethnic compositions than children without a migration background (Becker & Schober, 2017; Leu & Schelle, 2009).

While research on childcare utilisation gaps between native and immigrant households is growing in the European context (e.g., Biegel et al., 2021; Röder et al., 2017; Schober & Spiess, 2013; Van Lancker & Pavolini, 2022), the number of studies is still limited. This is unfortunate considering that national contexts can influence childcare decisions. For example, government involvement in the availability, affordability and quality of childcare provision is related to lower levels of inequality in childcare use (Van Lancker & Ghysels, 2016) and may make maternal

¹³ While ECEC might also be provided by childminders in the child's home, in this study, we confine the term ECEC to formalised settings of childcare and early education. We thus regard all forms of care that take place in the child's or the carer's home as informal care, in line with our definitions in the next section.

characteristics more or less relevant (Krapf, 2014). Moreover, research from the USA indicates that lower usage of ECEC by immigrant parents is not always found, particularly after accounting for demographic differences (e.g., Kahn & Greenberg, 2010).

It is also not entirely clear what factors drive differential childcare utilisation patterns by migration background, even though there is an increasing number of studies, mostly from the USA, that look at migration-specific predictors of childcare use (See for example Johnson, Padilla, & Votruba-Drzal, 2017; Miller, Votruba-Drzal, & Coley, 2013; Wolf, Broekhuizen, Moser, Erekly-Stevens, & Anders, 2020). In some cases, differences in childcare use by migration background or ethnicity might simply reflect other related dimensions of disadvantage, such as low income. That is, it might not be having a migration background *per se* that makes these children less likely to participate in ECEC, but rather the compositional differences between native and immigrant families. However, even though some research points to the importance of socio-demographic factors and family circumstances (e.g., Biegel et al., 2021; Crosnoe, 2007) or even suggests that compositional differences may mediate any observed disparities in childcare use by migration background (Kahn & Greenberg, 2010), studies that directly test this are scarce.

This article contributes to the literature by examining how childcare utilisation patterns differ between native and immigrant households in an understudied context, Ireland, and by directly testing to what extent theoretically relevant factors can account for any differences. Using a nationally representative sample of Irish three-year-olds, it investigates if childcare participation differs by migration background and explores to what extent any differential patterns can be explained by compositional factors, employing the Karlson-Holm-Breen (KHB) decomposition technique (Breen, Karlson, & Holm, 2013).

4.2.1 *Factors associated with childcare utilisation*

Following common definitions in literature (Blossfeld et al., 2017), we distinguish parental care from non-parental care in informal and formal care settings. Parental care is care provided by

the child's parents either in the home environment or outside the home. Informal care is provided by someone other than the parents but can be unpaid (e.g., grandparents, other relatives, or neighbours) or paid (e.g., au-pairs, nannies, or babysitters) and can be based in the child's or the carer's home. Formal care, on the other hand, is provided by qualified staff within an institutional setting and can take different forms, such as day care, kindergarten, preschool, or playgroups.

Parental choices for these types of care are likely a function of resources, needs, availability, costs, and preferences within a given macro context. Socio-demographic characteristics, child characteristics, parental beliefs and different contextual factors can all shape the parents' choice of care (Miller et al., 2013; Pungello & Kurtz-Costes, 1999; Sylva et al., 2007). The literature suggests that family SES is strongly associated with childcare use (Kulic et al., 2019). Especially in contexts with low levels of public funding of ECEC and high childcare costs, such as the United States, income tends to be a powerful predictor of childcare choices, with lower income families being less likely to enrol their children in centre-based care (Bainbridge et al., 2005; Duncan & Brooks-Gunn, 2000). In addition to income, parental education is an important predictor of childcare decisions. Children with higher educated parents are more likely to be in formal childcare, even when controlling for other factors (Augustine, Cavanagh, & Crosnoe, 2009; Greenberg, 2011; Ressler, Ackert, Ansari, & Crosnoe, 2020; Vandenbroeck, De Visscher, Van Nuffel, & Ferla, 2008).

Besides income and parental education, several other factors may influence the availability, affordability, accessibility of and need for childcare. Among such theoretically relevant factors are the area of residence, household size and type, parental health, maternal employment, and kinship and support networks. Living in an urban rather than rural area may increase the number of available childcare options, especially centre-based care, and thereby increase the likelihood of a child being enrolled in formal care. Non-parental childcare may be more critical for single parents, and they may be more likely to receive assistance to afford it,

thereby increasing the likelihood of children living in single-parent households being in formal care. Similarly, poorer parental health and maternal employment may increase the need for non-parental care and thus increase the likelihood of being in non-parental care. In contrast, having multiple children tends to increase childcare costs, which makes parental care a more affordable and attractive option. Likewise, the availability of kinship and support networks may decrease the likelihood a child being in sole parental care but also reduce the odds of it being enrolled in formal care.

4.2.2 *Explaining Differential Childcare Utilisation Patterns by Migration Background*

Several of the factors that may influence childcare choices may be differently distributed in the immigrant population. Firstly, households with an immigrant parent may be less likely to be able to bear the costs of childcare. Compared to native homes, immigrant households more frequently find themselves in socio-economically more disadvantaged positions. They tend to have lower levels of education, hold lower-status jobs and earn less, which may explain a large part of the disadvantages faced by their descendants in education and in the labour market (Heath et al., 2008). On top of that, the social and human capital that immigrant parents acquired prior to migration may have less value in their country of destination (Chiswick & Miller, 2008; Li & Heath, 2016), and therefore not translate into higher status and income in the way they do for native parents. Moreover, due to factors such as employment permits, immigrant parents may be more likely than native parents to be unemployed and work fewer hours, which may help to explain variation in childcare uptake (Biegel et al., 2021). Altogether, immigrant household may be less likely to be in a position to afford formal childcare and to need it.

Secondly, immigrant parents may not have the same informal non-parental care options available to them as native parents. Extended kin, in particular grandparents, represent a major source of informal childcare in many countries (Hank & Buber, 2008; Leopold & Skopek, 2014).

However, despite conditions that facilitate contact between immigrants and their families, such as modern technology, freedom of movement in the EU and the availability of cheap flights, family and particularly grandparental support may not be directly available to immigrant parents due to distance between them and their families (e.g., Bojarczuk & Mühlau, 2018). Besides, the migration process may have a disruptive effect on existing social ties. Consequently, immigrant parents may have smaller and less supportive social networks to rely on for care for their children. Hence, for some immigrant households, availing of informal care may not be an option, which may increase the need for formal care and make sole parental care more likely.

Thirdly, immigrants may differ from natives in several other demographics, such as mental and physical health. Immigrants are likely not a random sample from the population of their country of origin. Indeed, given the high financial and personal costs of migration, they are likely to be positively (self-)selected from their home country's population in terms of wealth, educational credentials, ability, motivation and effort and health and age (Borjas, 1987; Feliciano, 2005; Ichou, 2014; van de Werfhorst & Heath, 2019). Even though the socio-economic resources they had in their country of origin might not readily translate into a better position in their country of destination, they are likely to be younger and healthier, which is sometimes referred to as the healthy immigrant effect (e.g., Ichou & Wallace, 2019). However, at the same time, they may be at a higher risk of mental health problems (Bas-Sarmiento, Saucedo-Moreno, Fernández-Gutiérrez, & Poza-Méndez, 2017), possibly due to the migration process and the stress suffered. Thus, immigrant parents might be different from native parents in several demographics, such as health, which, in turn, may shape their childcare decisions.

Finally, immigrant households may be less able to access childcare. Most of all, they may be less familiar with the educational system and know less about the existing options or how to avail of them. Language barriers may play a role in this as well as a disconnection from networks with good information about the childcare market and the education system in the country of destination (e.g., Karoly & Gonzalez, 2011; Miller et al., 2013; Seibel, 2021), which may be

particularly true for immigrants whose social network primarily consists of other immigrants who do not use formal childcare. Moreover, immigrants may be more likely to be relatively new to the area, which may put them at a disadvantage regarding matters that require planning and time, such as enrolling in childcare with waiting lists. Hence, even if immigrant parents want to avail of formal childcare and can afford it, they may struggle to access it due to a lack of knowledge of the local system and other barriers, such as waiting lists.

In sum, considering that there are reasons to believe that variables that are relevant for childcare choice may be distributed differently in the migrant population, it may not be having a non-native parent *per se* that drives most of the differences in childcare enrolment by migration background. Instead, compositional differences may explain observed differences in the use of different childcare types by migration background. Thus, drawing from the theoretical model that was put forward by Pungello and Kurtz-Costes (1999) and subsequently adapted and used by other scholars (e.g., Miller et al., 2013; Sylva et al., 2007), we postulate that differences in socio-demographic and other relevant characteristics between households with and without a resident immigrant parent mediate differences in the usage of different childcare types (See Figure 4.1).

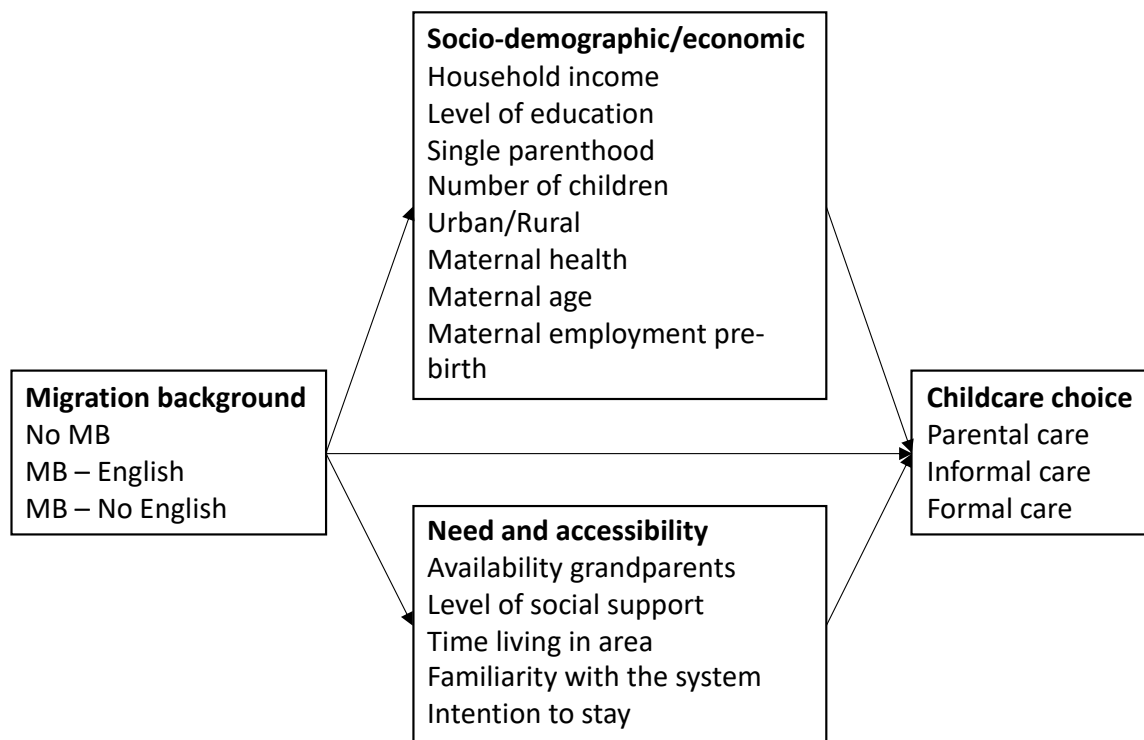


Figure 4.1 *Conceptual model: Relationship between Migration Background and Main Childcare Type.*

Note. MB = Migration Background.

4.2.3 The Irish Context

Ireland provides an interesting context for studying immigrants and their children. The timing, speed and scale of recent migration as well as the characteristics of its migrant population make it different from many other Western countries (Castles et al., 2014). For most of its history, Ireland witnessed high levels of emigration and migration to Ireland only really started during the economic boom of the late 1990s and early 2000s. Initially, many of the immigrants in Ireland were returning Irish emigrants, particularly from the UK (Mac Éinrí & White, 2008). However, they were quickly followed by migrants from other countries, and after the EU enlargement of 2004, Eastern Europe became one of the main regions of origin.

These increased migration flows have brought an increased diversity to the Irish shores. These days about one in eight people is estimated to be a non-Irish national (CSO, 2021), and

this number may be even higher for the younger part of the population, with almost one in four babies being born to mother that does not hold Irish nationality (CSO, 2018b). While the UK and Poland are dominant regions of origin, the Irish immigrant population is diverse (McGinnity, Privalko, et al., 2020). Moreover, partly due to a skills-focused migration immigration policy, immigrants in Ireland tend to be relatively highly educated (CSO, 2018a; Devitt, 2016; Röder, 2014). However, they may not be in better paying or higher status jobs (McGinnity, Quinn, et al., 2017; O'Connell & McGinnity, 2008). Besides, first-generation immigrants are more likely to be unemployed than Irish nationals, with particularly immigrants from less developed economies generally faring worse in the labour market (McGinnity, Privalko, et al., 2020).

The Irish context is also interesting in terms of its childcare provision. In recent years, Ireland has seen substantial growth in formal care, with the introduction of the free preschool year for children above the age of three in 2010. However, the country has little formal care tradition, and public investment is comparatively low (OECD, 2018, p. 170). Therefore, formal care provision in Ireland may best be described as unregulated and ad hoc, with a dominant private sector. Not surprisingly, Irish below-age-three participation rates are relatively low, and there is a strong social gradient in formal care use, likely resulting from structural constraints such as the high costs (Murray et al., 2016; OECD, 2016; Pavolini & Van Lancker, 2018; Privalko et al., 2019; Russell, McGinnity, Fahey, & Kenny, 2018; Van Lancker & Ghysels, 2016). Moreover, in light of the high costs of formal care, grandparents represent an important resource for childcare for young children in Ireland (McNally et al., 2014).

In addition to SES differences and a reliance on informal care, there are indications of differences in care enrolment by migration background. Immigrant workers in Ireland tend to rely on informal childcare arrangements (Doyle & Timonen, 2010) and children with a primary caregiver of non-Irish ethnicity are less likely to be in regular non-parental care than those with an Irish primary caregiver, even though they are more likely to be in formal care if their mother is employed (Murray et al., 2016). Additionally, families with young children from the accession

countries seemingly have little access to non-parental childcare (Röder et al., 2017) and often rely on local and transnational support networks in eliciting informal childcare (Bojarczuk & Mühlau, 2018). Moreover, a recent study (Van Lancker & Pavolini, 2022), which explored the immigrant-native gap in childcare use in several European countries, found that this gap amounted to six percentage points in Ireland after accounting for parental education, social class and maternal employment.

4.2.4 Expectations

Because low levels of English proficiency may make it harder for parents to access non-parental care, and higher levels of language proficiency have been linked to greater use of formal care (Miller et al., 2013), we distinguish between immigrant households that speak English at home and those that do not. This is also important because the use of English at home may indicate a greater level of integration and less cultural distance, and because students from an English speaking immigrant background have been shown to be more similar to their Irish peers than students from non-English speaking immigrant households (McGinnity, Enright, et al., 2020).

Given the findings of existing studies in the Irish context and beyond, we hypothesise that, compared to native households, non-English speaking immigrant households will be more likely to use parental care as their main care type (H1a) while the use of parental care by English speaking immigrant households will be more similar to that of native households (H1b).

Additionally, we expect that non-English speaking immigrant households will rely more on informal than formal care arrangements (H2a), whereas children from English speaking immigrant households will be more likely to be in formal care relative to informal care compared to children from native households (H2b).

In line with our conceptual model, we expect that compositional differences will largely account for these differential childcare utilisation patterns (H3). Particularly, considering the high costs of childcare in Ireland and the important role of grandparents, we posit that the

household income and the availability of grandparents and other support networks will explain the largest parts of the difference in the choice of formal care relative to informal care (H4).

4.3 Data and Methods

4.3.1 *The Growing Up in Ireland Study*

We used data from the infant ('08) cohort of the GUI, a national longitudinal study of children in Ireland, which includes a wide range of measures on children's circumstances and development as well as detailed information from their caregivers. Importantly, the GUI recorded the main childcare type at age three, as well as a variety of factors that may be related to the childcare choices (McCrary, Williams, Murray, Quail, & Thornton, 2013). Moreover, the GUI study is nationally representative, drawn from the Irish Child Benefit Register, and, thus, there was a representative sample of children with a migration background in the sample.

4.3.2 *Sample*

The study children of the GUI infant cohort were born between December 2007 and June 2008. A total of 11,134 households were interviewed at Wave 1 (nine months), of which 9,793 (88%) subsequently participated in Wave 2 (age three). Data collection for the second wave took place between December 2010 and July 2011. Very few children were older than three years and three months at the time of the interview, and hence, most were not yet eligible for the free preschool year scheme, which would entitle them to receive free preschool provision of between two and three hours per day. To ensure that the results were not reflecting differences resulting from the free preschool year, we removed the 271 children and their households that were already availing of the scheme at the time of the interview from the analytical sample. We then conditioned the sample on those children for whom we had valid information on the key variables. This resulted in a final sample of 7,516 of which 1,655 came from an English speaking

immigrant household and 657 from a non-English speaking immigrant home. More information on missing values and descriptive statistics can be found in Appendix III (See Table A1).

4.3.3 Measures

Migration Background

We considered a child to have a migration background if at least one resident parent was foreign-born.¹⁴ For this purpose, we used a question asking the caregivers if they had been born in Ireland or not, which was recorded both at Wave 1 and 2. We then split the sample of children with a migration background in two based on information on the study child's first language.

This resulted in a migration background variable with three categories: (0) No migration background; (1) Migration background, English at home; (2) Migration background, no English at home.¹⁵

Main Childcare Type

¹⁴ It is important to note that by study design all children in our sample were either born in Ireland or moved to Ireland as a young infant, and thus belong to the second generation. This also means that their caregivers had lived in Ireland for a minimum of 2.5 years at the time of Wave 2, when childcare use was assessed.

¹⁵ Research on the integration of immigrants and their descendants often emphasises how outcomes differ between different migrant groups and favours the use of country of origin over larger composite categories. This type of information is available in the GUI though restricted researcher micro data, but case numbers are relatively small for most migrant groups. Moreover, a decomposition analysis is nearly impossible to handle with a large number of groups. Therefore, we only distinguish between households with a resident migrant parent where English is the main language and those where it is not. However, it is important to note that this classification likely picks up on other associated differences, including the parental place of birth. Immigrants from the UK will, for example, nearly always fall into the first category. In Table A2 in Appendix III, we present more details on the composition of the two migrant groups in our study.

As mentioned above, we distinguish parental care from non-parental care in informal and formal care settings. This distinction between parental, informal and formal care extends previous literature which often relied on discrete variables, only distinguishing between parental and non-parental care or formal care and all other forms of care. This is important because examining the trade-offs between these three types of care can reveal patterns that would be missed by focusing dichotomies. For example, it could be the case that there is no difference by migration background in the shares of children that attend parental and non-parental care generally, but that, if they attend non-parental care, children with a migration background are more likely to be in informal care than informal care compared to children from native households.

Nevertheless, it is crucial to recognise that our measure still has limitations. In reality, children attend care settings of varying quality, for different amounts of time and can be in more than one type of care. These factors are important because they likely shape the child's care experience and affect child development. However, the data at hand is limited in terms of sample size and available measures, and thus do not allow for an investigation into the quality and quantity of care. However, in Table A3 in Appendix III, we present more details on the small group of children that attended multiple types of non-parental care and provide more detail on how many hours children spent in their main type of care.¹⁶

Our dependent variable was derived from information on the childcare arrangements as reported by the study child's main caregiver when the study child was three years old. The primary caregiver was asked if their child was being minded by someone other than them or their resident partner for eight hours or more per week during the day, and if so, what type of childcare the child was in. If the primary caregiver reported more than one type of childcare, we took the type that they reported as the main type. To obtain large enough and meaningful

¹⁶ Overall, only six per cent of our sample was both in informal and formal care. Coding these children as receiving mixed care instead of their main care type does not change our main conclusions.

categories, we combined all informal types of care (i.e. care by a relative or non-relative in the child's home or that person's home). This resulted in a main childcare type variable with three categories: (0) Sole parental care; (1) Informal care; (2) Formal (i.e. centre-based) care.

Household Income

For the household income, we used the log-transformed equivalised household income, averaged across the two waves. This was based on the self-reported disposable household income (i.e. the total gross household income less statutory deductions of income tax and social insurance contributions) divided by the equivalised household size. The equivalised disposable household income in our data was anonymised and had a lower limit of 5,000 and an upper limit of 60.000 euros. We log-transformed the variable because the data were right-skewed.

Parental Education

We took the highest level of education of both caregivers (if both were present), assessed at Wave 2, using a dominance approach. There were 13 categories, which we subsequently combined into three meaningful categories: (1) Non-degree or below; (2) Degree; (3) Postgraduate degree or above.

Household Type

We included two dummies with information on the type of household the child lived in. The first dummy indicated whether they lived in a (1) one-parent or (0) two-parent household. The second dummy held information on how many children lived in the household: (0) One or two; (1) Three or more.

Residential Area

We included a dummy indicating whether the study child and their household lived in a (0) rural or (1) urban area.

Maternal Health

As a proxy of the health of the mother, we used a question which asked if they had (1) any ongoing chronic physical or mental health problem, illness or disability or (0) not.

Maternal Age

The age of the primary caregiver was available as a variable with three categories: (1) 18-29 years; (2) 30-39 years; (3) 40 years or older.

Maternal Employment pre-birth

Because childcare choices and maternal employment are likely to be endogenously determined, we used a question on the mother's work status prior to giving birth to the study child, which was asked at Wave 1. Mothers were asked if they worked before getting pregnant with the baby. Answers were coded as: (0) Not at all; (1) Part-time; (2) Full-time.

Grandparental Contact

As a proxy for the availability of grandparental support with childcare, we used information on contact with the grandparents from Wave 1. The primary caregiver was asked if they had regular contact with the study child's grandparents, and answers were categorised as (0) No (including unavailable grandparents due to decease or living abroad); (1) Yes.¹⁷

¹⁷ This variable is a proxy for grandparental support being available. However, having regular contact with grandparents does not necessarily mean that they meet their grandchildren on a regular basis or that assist in the parents with childcare. Of the households that was in regular contact with the study child's grandparents, 85% indicated that the grandparents had spent at least some time with the child (in the form of babysitting, having the baby stay overnight or taking the baby out) in the first nine months.

Perceived Social Support

As an indicator of supportive social capital, we used a question answered by the primary caregiver in a general section on parenting with regards to the overall level of support they received from family or friends outside of the household: (1) I don't get enough or any help; (2) I get enough help; (3) I don't need any help. To reduce endogeneity concerns, this variable was also lagged (i.e. we used the answer from Wave 1).

Time Living in the Area

We used a dummy to indicate whether the household had moved to the local area (1) in the past year or (0) had lived there for a year or longer.

Familiarity With the System

As a proxy for familiarity with the Irish childcare system, we used a question on the caregiver's plans to avail of the free preschool year. If the primary caregiver indicated they had never heard of the preschool scheme, we coded them as being (1) less familiar with the system as compared to (0) those who indicated they had heard of the system.

Intention to Stay

The primary caregiver was asked if they intended to continue living in Ireland: (0) Yes; (1) No.

Control Variables

We controlled for the study child's gender (male/female) and whether the child had a longstanding illness, disability, or condition (yes/no).

4.3.4 *Analytical Strategy*

In line with the paths represented in our model (see Figure 4.1), we performed our analyses in four steps. All analyses were run on weighted samples to account for potential bias caused by attrition and sample design.

In a first step, we looked at childcare type patterns by migration background. For this purpose, we used a multinomial logistic regression (MNL) model that only included the migration background variables and adjusted for the control variables. Based on this model, we first estimated the absolute predicted probabilities to get a sense of how migration background was related to the three childcare types. We subsequently looked at the relative probabilities or relative 'risk ratios' to gain an understanding of how migration background was associated with childcare choices (i.e. the probability of being in one type of care divided by the probability of being in another type of care). This meant that we looked at three contrasts or care type 'trade-offs': (1) informal care versus parental care; (2) formal care versus parental care; (3) formal versus informal care.

In a second step, we investigated if and how immigrant households differed from households without a resident immigrant parent in their composition. We estimated the adjusted mean differences in the childcare choice predictors by migration background, using regression models for each compositional factor with migration background as the main predictor while adjusting for the control variables.

In a third step, we investigated the association between the compositional factors and the three childcare type comparisons, holding migration background constant. This meant that we extended the MNL from the first step by adding all compositional factors from the second step as covariates.

In a fourth and final step, we built on steps two and three and examined to what extent the compositional variables could explain the statistical association between migration background and relative childcare choices. We employed decomposition models using the KHB method (Breen et al., 2013; Karlson & Holm, 2011) in Stata (Kohler, Karlson, & Holm, 2011). In

these models, the effects of having a migration background on relative childcare type choice (total effect/reduced model) were decomposed into a part explained by the compositional factors (indirect effect/diff) and an unexplained residual part (direct effect/diff). Such decomposition analyses could not be done with traditional mediation analyses because our main model was a non-linear probability model in which coefficients and error variance are not separately identified.

4.4 Results

4.4.1 *Main Childcare Type by Migration Background*

We started by exploring differences in main childcare type by migration background. Figure 4.2 plots the predicted probabilities of the main childcare types (adjusted for the control variables). At age three, sole parental care was the prevalent primary care type for all groups. However, the predicted probability of being in sole parental care was notably higher for children with a migration background from English speaking homes (.70) than for children without a migration background (.47). For children with a migration background from English speaking households (predicted probability of .49), on the other hand, it was nearly identical to those with native parents. Thus, the absolute probabilities indicated that, compared to children from native households, children with a migration background from non-English speaking homes had higher absolute levels of parental care, whereas this was not the case for children from English speaking immigrant households.

Children from native households who were not in sole parental care were almost equally as likely to attend formal care as informal care (predicted probabilities of .27 and .26, respectively). For children with a migration background, the split was less equal, and most of those who were not in sole parental care were in formal care rather than in informal care. The predicted probability of informal care being the main childcare type was relatively low for both groups at 0.19 for English speaking immigrant households and 0.11 for non-English speaking

ones. Formal care, on the other hand, was a comparatively common care type for the former at 0.32, although not for the latter at .19. Altogether, this suggests that differences in informal and formal care usage existed for both migrant groups.

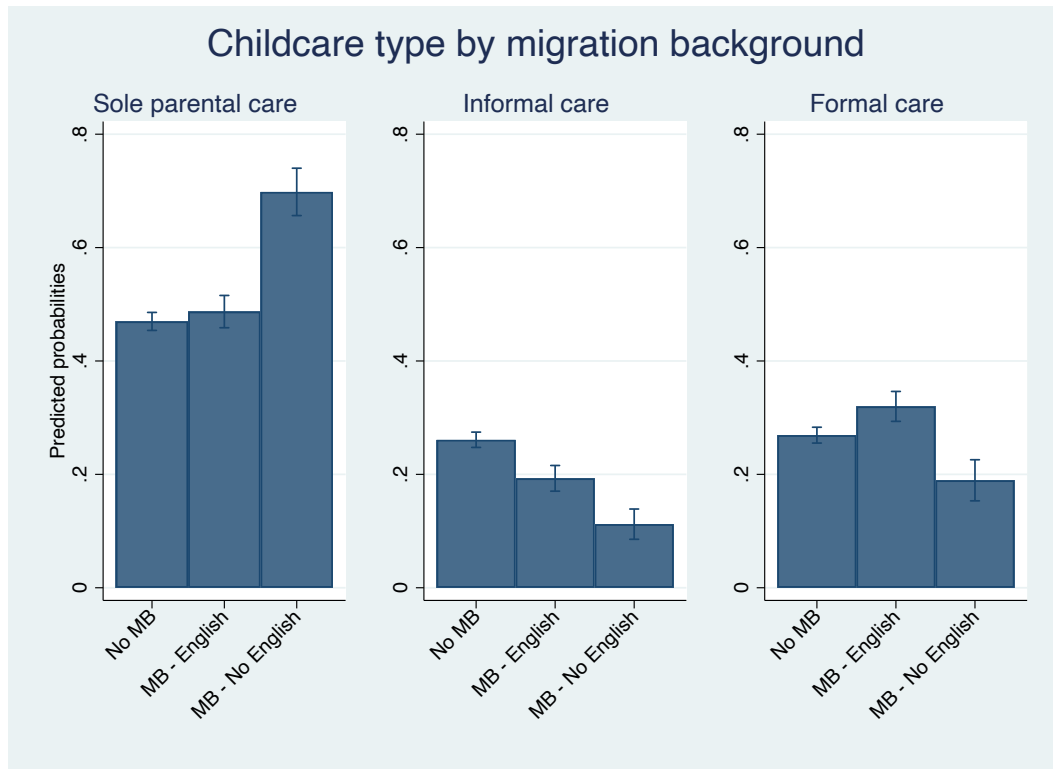


Figure 4.2 Predicted Probabilities for Main Childcare Type by Migration Background

Note. Predictions based on multinomial logit models, adjusted for the study child’s gender, and health. All analyses are weighted. MB = Migration background.

Relative risk ratios revealed that there were differences in the trade-off between informal and formal care by migration background (also see Table A4 in Appendix III). As expected, compared to children from native households, children from English speaking immigrant households were relatively more likely to be in formal care rather than informal care. Compared to native households, their relative risk of formal care relative to informal care was higher by a factor of 1.6 (relative risk ratio = $(.32/.19)/(.27/.26) = 1.6$). In fact, their tendency to choose for formal care rather than informal care meant that, compared to native households,

their relative risk of informal care relative to sole parental care was decreased by a factor of .71, even though there was no significant difference in the relative risk of formal relative to sole parental care.

Contrary to our expectations, non-English speaking immigrant households were not more likely to rely more on informal than on formal care arrangements. Instead, for non-English speaking immigrant households compared to native households, the relative risk of formal over informal care was also higher by a factor of 1.6. Nevertheless, the relative risks of informal and formal care relative to sole parental care were lower by factors of .29 and .47, respectively, for non-English speaking immigrant households compared to native households.

Thus, we found partial support for hypotheses 1a, 1b, 2a and 2b. Children from non-English speaking immigrant homes were more likely to be in sole parental care than children from native households, but this was not the case for children from English-speaking immigrant households. Nevertheless, both migrant groups were more likely to use formal care relative to informal care.

4.4.2 *Compositional Factors by Migration Background*

In a second step, we looked at the association between living in a home with at least one immigrant parent and the mediators. In line with our expectations, native and immigrant households were differentially composed in terms of the factors that may be associated with childcare choices. Table 4.1 presents these differences as the average marginal effects of having a migration background on the compositional factors.

Table 4.1 Associations between migration background and the compositional variables
(adjusted mean differences)

Mediator	MB – English vs. Native		MB – No English vs. Native	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Equivalised Household Income (log)	-0.03*	(0.02)	-0.34***	(0.02)
Parental education				
Non-degree or below	-0.09***	(0.01)	0.00	(0.02)
Degree	0.00**	(0.00)	-0.00	(0.00)
Postgrad degree or up	0.09***	(0.01)	-0.00	(0.02)
Single parent	-0.06***	(0.01)	0.01	(0.02)
Three+ kids	0.02	(0.01)	-0.18***	(0.02)
Urban area	0.06***	(0.02)	0.21***	(0.02)
Health issue	-0.01	(0.01)	-0.05***	(0.02)
Maternal age				
18-29	-0.06***	(0.01)	0.19***	(0.02)
30-39	-0.00	(0.00)	-0.11***	(0.02)
40 and up	0.06***	(0.01)	-0.08***	(0.01)
Maternal employment pre-birth				
Did not work	0.02*	(0.01)	0.08***	(0.02)
Part-time	-0.00	(0.00)	-0.11***	(0.02)
Full-time	0.06***	(0.01)	-0.08***	(0.01)
Grandparent contact	-0.12***	(0.01)	-0.48***	(0.02)
Perceived social support				
No/not enough help	0.18***	(0.01)	0.37***	(0.02)
Enough help	-0.20***	(0.02)	-0.42***	(0.02)
No need for help	0.01*	(0.01)	0.05***	(0.02)
Recently moved	0.00	(0.01)	0.08***	(0.02)
Familiar w/t system	-0.01**	(0.00)	-0.05***	(0.01)
Intention to stay	-0.03***	(0.01)	-0.04***	(0.01)

Note. Estimated are differences in means of childcare predictors by migration background (with no migration background as the reference group), adjusted for the study child's gender and health through ordinary least squares regression. All predictor variables are dummy coded variables (0/1) except for the equivalised and log-transformed household income. All data are weighted. MB = Migration background.

*** p<0.01. ** p<0.05. * p<0.1

Children with a migration background that lived in a non-English speaking household tended to live in households with a log equivalised household income that was about 28% ($\exp(-0.34) = 0.72$) lower than that of native households, and while their parents had similar levels of education to native parents, their mothers tended to be less active in the labour market prior to giving birth. Besides, on average, they were more likely to live in smaller households (i.e. 18

percentage points less likely to live in a household with three or more kids), in an urban area and with a younger and healthier mother.

Compared to children without a migration background, children from English speaking immigrant homes were more likely to live in more highly educated households with incomes that were slightly below the incomes of native households. Interestingly, their mothers were more likely to have been employed full-time pre-birth while also being slightly more likely not to have worked at all. Furthermore, compared to children from native households, children from English speaking immigrant backgrounds were more likely to live in a two-parent household and an urban area. Their mothers were as healthy as native mothers, but they tended to be somewhat older.

Group differences by migration background could also be observed for the variables related to the need for and accessibility of childcare. Children with a migration background and their caregivers were less likely to be in contact with the grandparents. Their caregivers were also more likely to have reported that they received no or not enough support from family and friends outside of the household. Additionally, both migrant groups were less likely than native households to intend to continue living in Ireland and to have heard of the ECCE scheme. Finally, children living in non-English speaking immigrant homes were significantly more likely than children without a migration background to have moved to the local area in the last 12 months, although this was not the case for children from English speaking immigrant homes.

In short, children with a migration background were likely to live in households that were differently composed than the households of children without a migration background. There were differences in nearly all variables that are typically related to childcare choices, and this seemed true both for English speaking and non-English speaking households, though differences may have been more pronounced for the latter. In some respects, such as the household income, grandparent contact, and social support, these groups may have been

disadvantaged as compared to children without a migration background. In other respects, such as parental education or single parenthood, they may have held an advantage.

4.4.3 *Compositional Factors and Childcare Type*

In a third step, we estimated how the compositional factors were related to the three childcare trade-offs. As expected, many of the compositional variables were associated with the relative risks of being in one type of care versus another. Table 4.2 presents these covariate effects of the compositional factors on the relative childcare ‘choices’.¹⁸ The effects are shown as anti-logged logit coefficients, based on a full multinomial logistic regression model, and should be interpreted in terms of ratio effects on the relative risks of utilising one care type over another.

Despite some differences, the effects of the compositional variables on the choice for formal care relative to sole parental care were fairly similar to those for informal care relative to sole parental care. A higher household income was one of the most important predictors of an increased relative risk of non-parental care. *Ceteris paribus*, the relative risks of informal and formal care relative to sole parental care would be expected to increase by a factor of 6.38 and 5.30, respectively, for each unit increase in the average equivalised household income (log). However, the household income was not related to changes in the relative choice for formal care over informal care ($5.30/6.38 = 0.83$, n.s.). Like the household income, the mother’s normal work situation before giving birth was an important factor in the choice for non-parental care. Conditional on the other factors, households with mothers that were employed full-time or part-

¹⁸ For convenience, the table shows relative risks and inferential statistics across all outcomes although one set is redundant. For example, the relative risks of formal versus informal care is just the relative risk of formal versus parental care divided by the relative risk of informal versus parental care. Importantly, relative risks (i.e. the ratio of outcome probabilities) and absolute risks (i.e. the probability of an outcome) must not be confused. In this section, we focus on the effects of the compositional factors on the relative risks (i.e. the ratio of outcome probabilities), which can be seen as the relative ‘choices’ between childcare alternatives. However, for completeness, we present the results as average marginal effects in Table S3 in Appendix I.

time pre-birth had substantially higher relative risks of formal and informal care over parental care compared to households with mothers that were not employed prior to birth.

Together, the abovementioned findings indicate that the need for childcare and the ability to afford it are important drivers of the choice for non-parental care in Ireland. In addition, three other factors were associated with a greater risk of choosing non-parental care; Living in a single parent household, with fewer children, and not having moved recently were also all associated with increased relative risks for informal and formal care relative to sole parental care.

Table 4.2 *Predicting relative probabilities of care types (multinomial logistic regression)*

Variable	Informal vs. Parental		Formal vs. Parental		Formal vs. Informal	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Equivalised Household Income (log)	6.38***	(0.70)	5.30***	(0.60)	0.83	(0.09)
Parental education						
Degree	0.92	(0.10)	1.04	(0.10)	1.13	(0.13)
Postgrad degree or up	1.03	(0.12)	1.36***	(0.15)	1.32**	(0.16)
Single parent	2.56***	(0.36)	2.48***	(0.33)	0.97	(0.14)
Three+ kids	0.64***	(0.06)	0.59***	(0.06)	0.93	(0.09)
Urban area	0.68***	(0.05)	1.55***	(0.11)	2.27***	(0.18)
Health issue	0.80*	(0.09)	0.97	(0.10)	1.21	(0.14)
Maternal age						
30-39	0.98	(0.12)	0.99	(0.11)	1.01	(0.13)
40 and up	0.94	(0.14)	0.99	(0.14)	1.06	(0.17)
Maternal employment pre-birth						
Part-time	5.90***	(0.96)	2.13***	(0.26)	0.36***	(0.07)
Full-time	6.64***	(1.03)	2.61***	(0.29)	0.39***	(0.07)
Grandparent contact	1.50	(0.37)	1.04	(0.16)	0.69	(0.17)
Perceived social support						
Enough help	1.40***	(0.15)	0.88	(0.08)	0.62***	(0.07)
No need for help	0.79	(0.16)	0.72**	(0.12)	0.91	(0.20)
Recently moved	0.53***	(0.10)	0.66**	(0.12)	1.25	(0.25)
Familiar w/t system	1.72	(0.88)	1.59	(0.62)	0.92	(0.55)
Intention to stay	1.15	(0.28)	0.90	(0.19)	0.79	(0.20)
Migration background						
English	0.92	(0.09)	1.23**	(0.11)	1.33***	(0.13)
No English	0.76	(0.15)	0.65***	(0.10)	0.85	(0.18)

Note. Coefficients as relative risk ratios. Standard errors in parentheses. The effects of migration background show the residual differences (i.e., the ‘direct effects’) after accounting for the compositional factors. Analyses controlled for the study child’s gender and health (coefficients not presented). All data weighted.

*** p<0.001. ** p<0.01. * p<0.05

Even though many of the effects of the compositional variables appeared to be similar for the choices of formal and informal care relative to parental care, there were also some important differences in what factors were related to greater relative risks of formal care relative to informal or parental care, and what factors were linked to increased risks of informal care relative to parental care. While the level of parental education did not substantially change the relative risk of informal care relative to parental care, having at least one parent with a

postgraduate degree was associated with increased relative risks of formal care relative to both parental and informal care. Furthermore, whereas living in an urban area lowered the relative risk of informal care relative to parental care by a factor of .68, the relative risk of formal care relative to both informal and parental care was higher for households living in an urban area compared to a rural area. Furthermore, households that felt they received enough social support had a higher relative risk of informal care over parental care and a lower risk of formal over informal care. Reporting no need for social support was associated with an increased relative risk of formal care relative to parental care.

Interestingly, if the child had a mother that was active in the labour market prior to giving birth, the relative risks of informal and formal care relative to parental care were higher, but the relative risk of formal relative to informal care was lower. That is because, in absolute terms, children with a mother that worked prior to their birth had a higher probability of being in formal and informal care compared to children whose mother did not work (see Table A5 in Appendix III). However, the increase in probability associated with having an previously employed mother was greater for informal care than for formal care, explaining the lower relative risk of formal care relative to informal care for children with a mother that was active in the labour market before birth.

In short, many but not all of the compositional variables were associated with relative childcare choices (i.e. the risk of one type of main care relative to another). Many factors worked in the same direction for the relative risks of informal and formal care relative to parental care, with a higher household income and a mother that was previously active in the labour market being very powerful predictors of being in non-parental care. Nevertheless, there were also some important differences in what seemed to drive the choice for informal and formal care, for example, in terms of the parental level of education, the household's area of residence and the availability of support networks.

4.4.4 Decomposition Model

In a final step, we combined steps two and three and turned to the question of whether the differences in the compositional variables could explain the different childcare utilisation patterns by migration background. Tables 4.3 and 4.4 present the decomposition results. They are shown as the log-relative risks rather than relative risk ratios because log-representation coefficients for direct and indirect effects are additive, while relative risk ratios would be multiplicative and thus harder to interpret in the context of a decomposition model.

As indicated by the first step of our analysis, differences in relative childcare choices by migration background existed (total effect/reduced model). *Ceteris paribus*, children from non-English speaking immigrant homes were less likely to be in both informal and formal care relative to parental care, with the multinomial logits relative to native households being 1.59 and 0.96 units lower, respectively (see Table 4.4). This corresponds to relative risk ratios of .20 ($=\exp(-1.59)$) and .38 ($=\exp(-.96)$). Children with a migration background from English speaking homes, on the other hand, were more similar to native households. The multinomial logit for English speaking immigrant households relative to native households was 0.42 units lower for being in informal care relative to parental care, but there was no significant effect for formal care relative to parental care (see Table 4.3). Nevertheless, both migrant groups seemed inclined to use formal care over informal care, with the multinomial logits being 0.55 and .63 higher for formal care relative to informal care.

Table 4.3 *KHB Decomposition of the Effect (Multinomial Log-Odds) of Migration Background – English on relative childcare choices*

MB -English	Informal vs. Parental		Formal vs. Parental		Formal vs. Informal	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Total effect (reduced)	-0.42***	(0.10)	0.13	(0.08)	0.55***	(0.10)
Direct effect (full)	-0.08	(0.10)	0.21*	(0.09)	0.29**	(0.10)
Indirect effect (diff)	-0.34***	(0.10)	-0.08	(0.07)	0.27***	(0.06)
% of total of explained	81.49		-60.25		47.96	
Individual components (%)						
Household Income	13.41		-38.92		1.03	
Parental education	(-0.29)		(20.13)		(4.54)	
Degree	0.28		0.49		0.33	
Postgrad degree or up	-0.57		19.63*		4.21*	
Single parent	13.12***		-40.91***		0.34	
Three+ kids	1.88		-6.98		-0.21	
Urban area	5.55**		20.42**		9.07***	
Health issue	-0.31		0.13		-0.21	
Maternal age	(0.88)		(-0.23)		(0.61)	
30-39	-0.03		0.05		-0.01	
40 and up	0.91		-0.28		0.63	
Maternal employment pre-birth	(16.62)		(-25.38)		(6.68)	
Part-time	6.87		-9.46		3.01	
Full-time	9.75		-15.92		3.67	
Grandparent contact	11.37		-3.28		7.91	
Perceived social support	(16.42)		(16.54)		(16.45)	
Enough help	15.71**		19.79		16.67***	
No need for help	0.71		-3.25		-0.22	
Recently moved	0.51		-1.07		0.13	
Familiar w/t system	1.22		-3.37		0.13	
Intention to stay	1.12		2.67		1.49	

Note. Results from a KHB decomposition model based on the multinomial regression model in Table 2. Coefficients presented in relative log-risk ratios (rather than risk ratios). All data weighted and all analyses controlled for the study child's gender and health. MB = Migration background. *** p<0.001. ** p<0.01. * p<0.05

Table 4.4 *KHB Decomposition of the Effect (Multinomial Log-Odds) of Migration Background – No English on relative childcare choices*

MB -No English	Informal vs. Parental		Formal vs. Parental		Formal vs. Informal	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Total effect (reduced)	-1.59***	(0.15)	-0.96***	(0.14)	0.63***	(0.17)
Direct effect (full)	-0.27	(0.20)	-0.43**	(0.16)	-0.16	(0.21)
Indirect effect (diff)	-1.32***	(0.16)	-0.53***	(0.11)	0.78***	(0.15)
% of total explained	82.87		55.28		125.07	
Individual components (%)						
Household Income	39.69***		59.02***		10.11	
Parental education	(-0.01)		(0.03)		(-0.08)	
Degree	-0.02		0.01		-0.06	
Postgrad degree or up	0.00		0.01		-0.02	
Single parent	-0.46		-0.73		-0.04	
Three+ kids	-5.23***		-9.93***		1.97	
Urban area	5.07***		-9.56***		27.46***	
Health issue	-0.72		-0.16		-1.59	
Maternal age	(-0.48)		(-0.15)		(-0.99)	
30-39	-0.13		-0.09		-0.18	
40 and up	-0.35		-0.06		-0.81	
Maternal employment pre-birth	(17.65)		(13.40)		(24.17)	
Part-time	10.51***		7.42***		15.24***	
Full-time	7.14*		5.98*		8.92*	
Grandparent contact	12.36		1.83		28.48	
Perceived social support	(9.78)		(-3.92)		(30.74)	
Enough help	8.98**		-5.80		31.58***	
No need for help	0.80		1.88		-0.84	
Recently moved	3.07**		3.33*		2.67	
Familiar w/t system	1.80		2.55		0.66	
Intention to stay	0.34		-0.42		1.51	

Note. Results from a KHB decomposition model based on the multinomial regression model in Table 2. Coefficients presented in relative log-risk ratios (rather than risk ratios). All data weighted and all analyses controlled for the study child's gender and health. MB = Migration background. *** p<0.001. ** p<0.01. * p<0.05

The different compositions of the migrant groups compared to the native group largely accounted for these differences in relative childcare choices (indirect effect/diff), although the amount explained differed between the care contrasts and migrant groups. For English speaking immigrant households, the part of the total effect that was explained by the compositional factors (i.e. the indirect effects as percentage of the total effect) ranged from -60.25% for formal

care relative to parental care (albeit insignificant) to 81.49% for informal care relative to parental care. For non-English speaking immigrant households, the least of the total effect was explained for formal care relative to parental care (55.28%) and the most for formal care relative to informal care (125.07%).

Considering that one overall percentage was negative, it is important to mention that while most compositional factors reduced the differences in childcare uptake by migration background, some factors did the opposite. As already suggested by the results of the second step of our analysis, households with at least one resident migrant were advantaged in some ways compared to native households. For example, children with a migration background were less likely to live with a single parent than children without a migration background, and single parenthood was, in turn, associated with increased risks of informal and formal care relative to parental care. This partly explained their lower likelihood of being in informal care relative to parental care, possibly because the parents can share the care responsibility and do not need non-parental care.

Thus, whereas some factors explained the differences in childcare use by migration background, other factors suppressed the total effect or even increased it. Indeed, looking at the choice for formal care relative to parental care for children living in English speaking immigrant households, the indirect effect was negative while the direct effect was positive, meaning that the total positive effect was reduced. In other words, if English speaking immigrant households did not differ from native households on the compositional factors, their children would be expected to be slightly more likely to attend formal care relative to parental care than their native peers (i.e. there was suppression).

The compositional factors also differed rather markedly in terms of how much of the difference in relative choices with native households they explained and they were not all significant. The household income generally had a lot of explanatory power, especially for non-English speaking immigrant households. For example, the indirect effect through the household

income explained about 40 per cent of the total effect of living in a non-English speaking immigrant home on the logit of informal care relative to parental care. Other important explanatory factors were maternal employment prior to the birth of the study child and perceived social support. It thus appeared that immigrants were less likely to choose informal care relative to parental care because were less able to afford it, had different needs because of their different levels of employment, and could not rely on help from friends and family to the same extent as native households.

Taken together, childcare utilisation patterns differed by migration background in the Irish context, and, in line with H3, compositional differences largely accounted for them. Moreover, in partial support of H4, the household income and social support were generally important factors in explaining the choice of formal care over informal care for immigrant households. However, although there were differences in the level of grandparent contact between immigrant and native households, these differences did not explain differences in childcare choices. Finally, some compositional factors, such as the area of residence and single parenthood, worked in the opposite way of the total effect, thereby possibly concealing some of the differences caused by other factors.

4.5 Discussion

Many studies have highlighted the potentially equalising effects of ECEC (Reynolds et al., 2010; Ruhm & Waldfogel, 2011), which may be particularly relevant for children with a migration background (e.g., Cornelissen et al., 2018). However, to properly understand these effects, it is important to consider which children are more likely to experience certain types of care (Kulic et al., 2019). It is thus crucial to carefully describe differences in childcare use and shed light on the factors that are related to parental choices for one type of care over another.

The current study used a nationally representative sample of three-year-olds to contribute to the burgeoning body of literature investigating differential childcare utilisation

patterns by migration background. It did so in an understudied country context and distinguished between three different childcare choices rather than only comparing parental care to non-parental care. Moreover, it extended the literature by using an advanced decomposition technique to directly test if compositional factors mediated any observed differences in childcare use by migration background rather than only controlling for them.

The results indicate that differences by migration background in the choice of main childcare type could be observed in the Irish context. Compared to children from native households, children with a migration background were more likely to be in formal care relative to informal care. However, children from non-English speaking immigrant households were less likely to be in both informal and formal care compared to parental care, which is in line with their tendency to opt for parental care, as suggested by some earlier studies in the Irish context (Murray et al., 2016; Röder et al., 2017). Children from English speaking immigrant households were also slightly less likely to be in informal care relative to parental care, though there was no difference for formal care relative to parental care.

Altogether, these findings suggest that at least a part of the children with a migration background, namely those from non-English speaking homes, may not reap the potential benefits of formal care participation. It is thus worth exploring how the participation rate could be increased among this group. This seems especially important considering that the benefits for children from non-English speaking homes may be particularly strong (Burger, 2012; Gormley, 2008; Klein & Becker, 2017) and that formal care attendance might even benefit their parents' level of integration (Gambaro et al., 2021).

Using the KHB decomposition technique, we further found that compositional differences played an important role in explaining these differential childcare utilisation patterns. While the household income was generally the most critical factor in explaining differences, maternal employment pre-birth and social support were two other important indicators. Overall, these findings indicate that, at least to some extent, it is not having a

migration background per se that makes some children less likely to participate in certain types of care over others, but rather the compositional differences between native and immigrant households. Moreover, in line with other studies that have highlighted the primacy of socio-economic factors for the childcare enrolment of children with a migration background (e.g., Pastan Greenberg & Kahn, 2011), our findings tentatively suggest that providing additional financial support may be a viable way of increasing the participation of children with a migration background in non-parental care. This may be particularly true for the formal care participation of children from non-English speaking immigrant homes.

The current study has at least three important limitations, which may also provide interesting avenues for future research. Firstly, even though we used some lagged variables, the current study was largely cross-sectional, and the used measures were not always ideal due to data limitations. Future studies would do well to use more specific information on having a migration background, such as region of origin, and to include immigrant-specific characteristics, such as English proficiency, which may be relevant to the childcare choices of immigrant families (Miller et al., 2013; Miller, Votruba-Drzal, Levine Coley, & Koury, 2014). Besides, it remains important to ascertain the causal direction of the relationships. Secondly, we tried to understand the social stratification in childcare choices and identify relevant compositional factors that are associated with these parental decisions. However, because adequate measures were not available in our data, we did not consider parental attitudes towards different care types, even though these may differ between immigrant and native parents (Seibel & Hedegaard, 2017) and shape their choices. Future studies could thus work towards unpacking the parental decision-making process and the role of preferences therein. Thirdly, even though there is currently no more recent, high quality data available, it is important to acknowledge that the data in this study are nearly a decade old, and that the findings should be interpreted accordingly. It is particularly worth emphasising that the early years of the children in this cohort study were characterised by a period of unprecedented economic contraction, which may have

dampened the demand for non-parental care. Moreover, since this cohort was in childcare, there have been significant changes to the Irish childcare policy landscape and the migration context. It thus remains an open question to what extent these findings hold for newer cohorts.

4.5.1 Conclusion

Immigration continues to change societies, and understanding how we can ensure that all children have equal chances to succeed in life remains a challenge. Interventions early in the life course are likely most powerful and cost-effective (Heckman, 2006), making childcare an interesting policy tool. However, childcare can only contribute to reducing inequalities by migration background if it can reach a large enough group of children with a migration background. This study examined childcare utilisation patterns by migration background in an understudied context, and investigated to what extent theoretically relevant factors could account for any differences in childcare usage. The findings indicated that differences existed and that they partly reflected other related dimensions of disadvantage, such as a lower income and less social support. It may thus be helpful to provide additional support to immigrant families to ensure that children with a migration background benefit from formal care not only in theory but also in practice.

5 Paper IV: Early Childhood Education and Care as a potential equaliser

5.1 Abstract

Children of migrant origin often face inequalities in academic opportunities, with research suggesting that achievement gaps are present even early in the life course. Early childhood education and care (ECEC) is often put forward as a possible equaliser. However, there is a need for more population-level studies as well as more research in the European context, especially in more recent countries of immigration. In this research article, we draw on data from a nationally representative Irish cohort study ($N = 7,781$) and use propensity score methods to account for differential selection into ECEC. We estimate the causal effect of ECEC attendance on later English language achievement and gauge the equalisation power and potential of the system. The findings indicate that the Irish ECEC system helped to reduce achievement gaps by migration background for children from non-English speaking homes, despite it not promoting English language achievement amongst other groups.

Keywords: Propensity Score Methods; Growing Up in Ireland; Early Childhood Education and Care; English Language Achievement; Educational Inequalities; Migration Background.

5.2 Introduction

Increased immigration has made most countries in the Global North much more diverse, bringing up important questions regarding the integration of immigrants and their descendants. The large and constantly growing literature on the educational achievement of children of migrant origin indicates that these students may be at a disadvantage (e.g. Heath & Brinbaum, 2014b), and that achievement gaps by migration background may already be present early in the life course, particularly for language-related skills (e.g. Washbrook et al., 2012). Such disadvantages amongst a segment of the population are concerning because they indicate that not all children have equal chances to succeed in life. Hence, policymakers and researchers have long tried to identify ways to reduce achievement and opportunity gaps by migration background.

ECEC is often proposed as an effective policy tool with the potential to mitigate educational inequalities. This is because it can be amended by public policy relatively easily and since there is mounting evidence that ECEC can positively affect child development and later life outcomes, particularly for children from more disadvantaged backgrounds (For reviews, see for example Burger, 2010; van Huizen & Plantenga, 2018). Besides, researchers have argued that there may be unique benefits for children of migrant descent (e.g. Magnuson et al., 2006). Empirical evidence indicates that this may indeed be the case (e.g. Cornelissen et al., 2018), and that positive effects are particularly marked for children from households where another language than the majority language is spoken (e.g. Burger, 2012).

Despite the promising signs, more research is needed to understand if ECEC can serve as an equaliser to reduce educational disparities by migration background. A substantial part of the evidence comes from the USA and the UK, leaving it an open question of how these findings translate to the broader European context, and especially to countries with shorter histories of immigration. Besides, because the ECEC literature is primarily based on intervention studies, which take place in specific contexts and target specific groups of children, there is a need for

more population-level research to assess the impact of ECEC on educational inequality on a societal level (Kulic et al., 2019).

The current study contributes to the literature by producing new evidence on the potentially equalising effects of ECEC for academic achievement gaps by migration background, using propensity score methods to account for the differential selection into ECEC. It focuses on Ireland, which only became a country of net immigration relatively recently and in which there is comparatively little ECEC tradition. Drawing on data from the GUI '08 Cohort, a nationally representative longitudinal study of children in Ireland, it addresses the following two research questions:

1. Does ECEC attendance at age three promote greater language achievement at age five for children with and without a migration background?
2. What is the equalisation power and potential of the Irish ECEC system with regards to disparities by migration background?

5.2.1 *The benefits of ECEC*

Following Heckman's (2006, 2008) pertinent work, early childhood is a critical time which directly influences economic, health and social outcomes, and early investments, especially for disadvantaged children, are the most efficient and effective way to promote better outcomes for individuals and society. Accordingly, investing in ECEC is a cost-effective strategy to improve children's later life outcomes.

In line with Heckman's arguments, a plethora of studies has shown the beneficial impact of attending ECEC. Many of these studies come from the USA and are based on randomised intervention programmes (See for example Karoly et al., 2005 for an overview), such as the High/Scope Perry Preschool (e.g. Heckman, Moon, Pinto, Savelyev, & Yavitz, 2010). These studies provide exceptionally reliable evidence of the causal effects of ECEC on child development and later life outcomes. Yet, they are harder to generalise to the general population, especially

because they are often generously funded and target particular, often disadvantaged, groups (Kulic et al., 2019).

Though effect sizes are typically smaller, larger-scale quasi-experimental studies generally also report positive effects of ECEC on child outcomes. For example, in an extensive international review of quasi-experimental studies, Burger (2010) found that vast majority of ECEC programmes had positive effects on cognitive development and that children from socio-economically disadvantaged families made relatively more progress than their peers from more advantaged backgrounds. Nevertheless, the effect of universal ECEC programmes on child development remains somewhat unclear. Crucially, in a meta-analytical review of research on the effects of universal ECEC programmes on children's outcomes, van Huizen and Plantenga (2018) concluded that the evidence is mixed and that estimates of the effect of universal ECEC do not always reach significance. However, they also noted that ECEC benefits are mostly concentrated among children from lower socio-economic backgrounds. Thus, while universal ECEC may not promote better outcomes in the overall population, it may still reduce achievement gaps.

Children with a migration background are likely to benefit considerably from ECEC participation. On the one hand, their parents may be more likely to have a lower socio-economic position (SEP) than native parents, and they may thus gain more from ECEC participation for this reason. On the other hand, despite possessing many strengths (e.g. less single parenthood), immigrant families may lack certain resources, such as fluency in the majority language and knowledge of the local education system, and ECEC may help them to overcome some of these disadvantages. ECEC may, for example, help children of migrant descent and their parents become familiar with the local educational environment and offer an early opportunity to learn the receiving country's majority language through increased exposure. Accordingly, research suggests that the positive impact of ECEC may be stronger for children with a migration background than for children born to native parents (e.g. Berger et al., 2021). Moreover, the

positive associations may be particularly concentrated among children whose parents do not speak the majority language at home (Burger, 2012; Gormley, 2008; Klein & Becker, 2017; Loeb et al., 2007; Magnuson et al., 2006). This is not surprising given that spending time in ECEC provides them with exposure to the majority language that they otherwise likely would not have gotten.

5.2.2 A potential outcome approach

Following the investment paradigm of Heckman (2006) and others, ECEC can be seen as a treatment which is received by some children but not by others. The treatment effect can then be understood through a potential outcomes framework, sometimes referred to as the Rubin Causal Model (Rubin, 1974). In this counterfactual model, there are an outcome and two potential treatment states. In the context of this paper, the outcome is English language achievement, and the two possible treatments are ECEC attendance versus absence of ECEC (i.e. informal care or the home environment). Table 5.1 summarises the treatment states and the potential outcomes.

Table 5.1 *Overview of the treatment states and potential outcomes of the counterfactual model used to understand the effect of ECEC*

Treatment state	Potential outcomes	
	Under ECEC	Under no ECEC
Children who attend ECEC ("treated")	a	b
Children who do not attend ECEC ("non-treated")	c	d

Note. One outcome is the observed state, and one outcome is the counterfactual. In the table, the bold letters denote these observed states. The non-bold letters indicate counterfactuals, which can be established by pseudo-experimental treatment effect estimation frameworks.

For each child, the effect of ECEC is defined as the difference between the outcome under ECEC treatment and the outcome under no ECEC treatment. The average treatment effect

(ATE) is the mean outcome difference between the two treatment states for children that are treated and non-treated. The average treatment effect for the treated (ATT) is defined as the mean difference between the outcome under treatment and the outcome under non-treatment for children that are not attending ECEC (Table 5.1: outcome a – outcome b). Conversely, the average treatment effect for the non-treated (ATNT) is the mean difference between the outcomes under the two treatments for children that are attending ECEC (Table 5.1: outcome c – outcome d).

While there are two potential treatment states, in reality, a child can only receive one: they either attend ECEC or not. Nevertheless, in a randomised control trial estimating the treatment effect is relatively straightforward. Because subjects are randomly assigned to an experimental condition, treatment status is not confounded with any child or family characteristics. Therefore, the ATE, ATT and ATNT coincide, and the treatment effect is simply the difference in the means of the outcomes between the treated and untreated group. However, although randomised controlled trials may be considered the gold standard, they tend to be more expensive than observational studies, and are not always feasible in the context of ECEC. Besides, they provide little evidence of the effectiveness of ECEC services as they are implemented in the real world.

In observational studies estimating the treatment effect is more complicated because treatment is not assigned by randomisation, and it is likely that the treated group differs systematically from the non-treated group. It is thus essential to account for selection bias. A common way of addressing this problem is through the inclusion of control variables in regression modelling. However, arguably, a better approach is the use of methods based on the propensity score (Rosenbaum & Rubin, 1983), which, in this context, is the propensity of a child to attend ECEC conditional on the included covariates. Importantly, conditional on this propensity score, the treated group no longer systematically differs from the non-treated group. Some of the main advantages of propensity score methods are that they are similar to RCTs,

separating the study design and analysis, and are easier to specify correctly than a regression model (Austin, 2011).

5.2.3 Gauging the equalising power of the system

The three different treatment effects (i.e. the ATE, ATT and ATNT), estimated through propensity score methods, can be used to answer related but different questions. The ATE considers the question of what difference in English language achievement would be expected if all children had enrolled in ECEC, compared to if all of them had not been in ECEC. The ATT looks at the question of what difference in English language achievement would be expected if all children who attended ECEC had instead received no ECEC. The ATNT is relevant for the question of what difference in English language achievement would be expected if all children who did not attend ECEC had instead been in ECEC. By comparing these treatment effects across different groups, they can also be used to gauge the equalising power and potential of the ECEC system.

The equalising power of the current system can be gauged through comparing the size of the ATT between the disadvantaged group and the more advantaged group. More specifically, if the ATT of attending ECEC on English language achievement is greater for children with a migration background than for children without a migration background, the current system works towards the equalisation of disadvantages by migration background amongst those who participate. In contrast, if the ATT is smaller for children of migrant descent than for children born to native parents, the current system exacerbates inequalities by migration background amongst those who are enrolled in ECEC. If there is no difference in the ATT, the current system does not change any migrant disadvantages among those who participate.

The equalising potential of the system can be measured by the ATNT. If the ATNT is larger for children with a migration background than for those without, increasing ECEC participation amongst those that are currently not participating would contribute to a reduction of educational disadvantages by migration background. If the ATNT is smaller for children of

migrant origin than for children of native parentage, expanding the system would increase existing disparities. If there is no difference in the ATNT between the groups, then increasing ECEC participation would not mitigate educational disparities but also not increase them.

The total equalising power or the overall effectiveness of the system can be understood through the ATE, which is the weighted combination of the ATT and ATNT. Again, if the ATE is larger for children with a migration background than for children without a migration background, then the total system works towards the equalisation of educational inequalities by migration background. Conversely, if the ATE is the largest for those without a migration background, then the total system works towards the exacerbation of educational disparities. If the ATE is the same for children with and without a migration background, the system does not change existing educational disadvantages.

5.2.4 *Childcare in Ireland: context and research*

Unlike other Anglophone countries, such as the USA and the UK, there is very little research on the effects of ECEC participation in the Irish context. This is partially due to the fact Ireland has relatively little ECEC tradition. Until the end of the 20th century, the male breadwinner model was common and female labour market activity low. This changed rapidly during the economic boom of the late 1990s and early 2000s, the so-called Celtic Tiger era, when Ireland witnessed major demographic shifts, including an increase in female labour force participation (Russell et al., 2009). Consequently, the demand for childcare increased and the provision of childcare became a policy priority, as reflected, for example, by the introduction of the ECS in 2006, which set out to offset childcare costs, and the ECCE scheme in 2010, which provided a free preschool year for all children above the age of three.

Despite the increased interest in ECEC, Irish public expenditure on pre-primary education remains comparatively low and private institutions are dominant (OECD, 2017). While the ECCE scheme made ECEC participation much more common in the three- to five-year age

group, childcare below the age of three is mainly market-based and extremely expensive (Russell et al., 2018). Unsurprisingly, parental care remains relatively common, and grandparents provide an important resource for non-parental care (McGarrigle et al., 2018; McNally et al., 2014). Moreover, ECEC usage is characterised by a strong social gradient, likely partly reflecting the high financial costs (OECD, 2016; Privalko et al., 2019; Van Lancker & Ghysels, 2016). Besides, research has indicated that children with a migration background are less likely to be enrolled in non-parental care (Röder et al., 2017)

Existing evidence regarding the effects of ECEC in the Irish context mostly comes from research reports (McGinnity, Russell, et al., 2015; OECD, 2017) and some cross-national studies (Dämmrich & Esping-Andersen, 2017; Schütz, 2009). The findings generally suggest that the effects are small or non-existent, and in some cases even negative. Based on PISA 2012 data, an Organisation for Economic Co-operation and Development (OECD) report concluded that the association between attending pre-primary education and later mathematics performance in Ireland was smaller than the OECD average, and not statistically significant after controlling for parental SEP (OECD, 2017). Similarly, researchers from the Economic and Social Research Institute (ESRI) found that the relationship between ECEC attendance and cognitive outcomes was small, particularly after controlling for other factors (McGinnity, Russell, et al., 2015). However, among children from non-English speaking backgrounds, there was a small positive effect of centre-based care at age three on vocabulary at age five, *ceteris paribus*. In a large multi-country study on the effect of pre-primary participation on secondary school performance, based on PISA data from 2003, Schütz (2009) found a negative association between attendance for more than one year and PISA test scores of Irish students in the most comprehensive model specification. Finally, a more recent cross-national study (Dämmrich & Esping-Andersen, 2017) found no statistically significant relationship between early preschool attendance and reading competencies in primary and secondary school in Ireland, although preschool attendance was

negatively related negatively related to reading competencies for children of higher educated parents ($p < 0.1$).

The abovementioned studies provide important insights into the effects of ECEC on cognitive outcomes in Ireland. However, they are largely based on older data which predate the significant changes to the Irish childcare system. For example, students that participated in PISA 2012 were of preschool age in the late 1990s. Furthermore, these studies statistically adjust for relevant control variables, but often the number of available variables is limited and the included variables are relatively rough indicators, such as the number of books at home as a measure of SEP. Moreover, they do not use robust statistical methods, such as instrumental variables regression or propensity score matching, to address the non-experimental nature of their data. Altogether, this limits their ability to estimate causal effects and weakens the validity of their findings. In the current study we aim to address these shortcomings by using more recent data and by applying propensity score methods.

5.2.5 Migration to Ireland: context and research

In addition to increased female employment and childcare demands, Ireland also went through other significant social and demographic changes during the Celtic Tiger era. While Ireland traditionally experienced high levels of emigration, it quickly became a popular destination for migrants during the period of economic prosperity in the late 1990s and early 2000s. These increased immigration flows have made Ireland considerably more diverse, and it is currently estimated that about 12.5% of its population is a non-Irish national (CSO, 2021). The UK and Poland constitute the most important regions of origin, but the Irish immigrant population is diverse (McGinnity, Privalko, et al., 2020).

Because Ireland's migration history and context are so different from most other Western countries, it provides an interesting context for research on immigrants and their children. However, research is still catching up with the economic, social and demographic

changes, and the extant body of literature on the educational performance of Irish students with a migration background is relatively small. Several studies suggest that students of migrant origin fare comparatively well in Ireland (McGinnity, Quinn, et al., 2017; Taguma et al., 2009), though concerns have also been raised over the potential accumulation of educational disadvantage over time (Darmody et al., 2014). Moreover, there are indications that at least some differences in English language achievement by migration background exist in primary school (McGinnity, Darmody, et al., 2015). Thus, identifying if ECEC might help to reduce educational disadvantages by migration background is relevant.

5.2.6 *The current study and hypotheses*

The current study contributes to the literature by providing new, population-level evidence on the effect of ECEC on language development and its potential role as an equaliser of achievement differences by migration background. It does so in a novel study context with a relatively short history of large-scale migration and little ECEC tradition. Below, we summarise our expectations based on the counterfactual model summarised in Table 5.1, which we will test using propensity score methods to account for the differential selection into ECEC.

Following the large international literature, we expect that attending ECEC will be associated with greater later English language achievement, yet taking into account the previous findings in the Irish context, we anticipate that this effect may be small. Thus, we hypothesise that there will be a small but positive general effect of ECEC attendance for children without a migration background, i.e. a small but positive ATE (H1a). However, considering the childcare high costs and the strong social gradient in ECEC use in Ireland, it is likely that there is negative selection into the treatment where those who would benefit the least from ECEC are the most likely to get the ECEC treatment. Hence, we hypothesise that for Irish children without a migration background there will be no effect of attending ECEC on English language achievement at age five and nine amongst the “treated”, i.e. no significant ATT (H1b). However, since the

children who would benefit the most from ECEC tend to be the least likely to get the ECEC treatment, there may be hidden equalisation potential in further ECEC expansion. Thus, we expect a positive treatment effect amongst the “non-treated” children without a migration background, i.e. a positive ATNT (H1c).

In line with the large body of evidence that suggests that the positive effects of ECEC are particularly strong for children from more disadvantaged backgrounds, including for children of migrant origin from homes where the majority language is not spoken, we anticipate there will be positive treatment effects for the groups of children of migrant origin and that the Irish ECEC system will have some equalisation power with regards to disparities by migration background. Accordingly, we hypothesise that the current system of ECEC enrolment tends to equalise inequality by migration background amongst the “treated”, i.e. $ATT_{MIG} > ATT_{NAT}$ (H2a). Moreover, we anticipate that the potential expansion of ECEC enrolment would contribute to a further equalisation of disadvantages by migration background, i.e. $ATNT_{MIG} > ATNT_{NAT}$ (H2b). Finally, we expect that the system works towards the equalisation of disadvantages by migration background overall, i.e. $ATE_{MIG} > ATE_{NAT}$ (H2c).

5.3 Data and Methods

5.3.1 Data

For this study, we draw on data from the GUI Cohort '08 (Infant Cohort), a national longitudinal study of children in Ireland born in late 2007 and early 2008. One of the key objectives of the GUI was to track the lives and development of young people in Ireland and to identify factors that help or hinder them. Therefore, the study includes a battery of questions regarding the children’s situation and development as well as detailed information on their household and caregivers (McCrory et al., 2013). The data is particularly well suited for this study because it includes information on the childcare arrangements at age three and the child’s English language skills at later ages. Moreover, there is a plethora of information on factors that may be related to

childcare usage, recorded during the first wave and, thus, before the ECEC “treatment”. This is important because propensity score methods require the inclusion of baseline covariates.

5.3.2 Measures

ECEC exposure

At Wave 2, the primary caregiver reported if their child was being minded by someone other than them or their resident partner, and if so, what type of childcare the child was in and for how many hours per week. Based on this information, we constructed a binary variable that indicated if the child had received ECEC (1) or not (0). We considered a child to have been “treated” if their primary caregiver indicated they were in centre-based care for more than eight hours a week. Children who were in sole parental care, informal care or attended centre-based care for eight or less were coded as “non-treated”.

Later English language achievement

Our outcome variable was English language achievement at age five, for which we relied on the Naming Vocabulary test. The Naming Vocabulary test is one of the core scales of the Early Years Battery of the British Ability Scales and serves as a measure of expressive language vocabulary (Elliott et al., 1996). It has been used widely in other large-scale studies, such as the Millennium Cohort Study, and was tested thoroughly in the Irish context before being implemented in the GUI study (Thornton & Williams, 2016; Williams et al., 2019).

The Naming Vocabulary test was administered in the child’s home during the interview with the primary caregiver at Wave 3 (age five). During the process, the study child was shown a series of pictures of objects and then asked to name them. Afterwards, the raw scores (i.e. the number of correct items) were converted into ability scores, taking into account the items’ difficulty and the child’s ability. These ability scores were then transformed into age-adjusted standardised test scores based on tables provided by the test authors (Elliott, Smith and

McCulloch, 1996). These scores had a mean of 50, a standard deviation of 10, and were bounded between 20 and 80 (Williams et al., 2019).

Migration background

We considered a child to have a migration background if at least one resident parent was born outside of Ireland, and, within this group, we distinguished between children that lived in a household where another language than English (or Irish) was spoken and those where no other language was spoken. This meant that our migration background variable had three categories: (0) No migration background; (1) Migration background, English at home; (2) Migration background, no English at home.

Baseline covariates

Selection bias and omitted variable bias are serious concerns when estimating the effect of ECEC attendance on later language achievement. We, therefore, used a rich set of control variables for our propensity score model. These 26 covariates relate to the study child, the primary caregiver (the mother in nearly all cases) and the household (see Table 5.2). All covariates were measured at Wave 1.

Table 5.2 Overview of covariates used to construct the propensity score

<i>Child</i>	
Sex	Male = 1; Female = 0
Premature birth	Baby born before 37 weeks of gestation = 1; Else = 0
Breastfed	Baby was ever breastfed = 1; Never breastfed = 0
Fully vaccinated	Baby received all vaccinations and attended six-week check-up = 1; Other = 0
Early communication skills	Passed the communication test of the adapted version of the Ages and Stages Questionnaire (ASQ) for eight month olds = 1; Did not pass = 0
Early social/personal skills	Passed the personal/social skills test of the adapted version of the Ages and Stages Questionnaire (ASQ) for eight month olds = 1; Did not pass = 0
Prior care arrangement	In ECEC previously = 1; No ECEC experience = 0
<i>Mother</i>	
Age at birth	Mothers age at the first interview in years
Normal employment pre-birth	Normal work situation before giving birth to the study child: Full-time = 1; Part-time = 2; Not at all = 3
Future care intentions	Sole parental care = 1; Part-time non-parental care = 2; Full-time non-parental care
Reason for care type choice	N/A: Child in sole parental care = 0; Practical = 1; Quality = 2; Other = 3
Speech to or with baby	Mother always or often talks to the baby while they are busy doing other things = 1; Other = 0
Perceived level of social support	The mother reported if they felt they received enough help from family/friends outside of the household: No/not enough help = 0; Enough help = 1; No need for help = 2
Partner present	Partner present in the household = 1; No = 0
Religion	Roman Catholic = 1; Other = 0
Level of English*	Can fill out forms in English: Yes = 1; No = 0
Irish citizenship*	Citizen of Ireland = 1; Not an Irish citizen = 0
<i>Household</i>	
Parental education	Degree or higher = 1; Other = 0
Household income	Equivalised household annual income in quintiles, plus a category for those without any income information
Occupational class	Professional/managerial and technical = 1; Other = 0
Early childcare supplement	Household received supplement = 1; No = 0
Smoking during pregnancy	Someone in the household smoked = 1; No one = 0
Medical card	Family is covered by a medical card = 1; Not covered = 0
Other young children present	Other children below the age of nine living in the household = 1; None = 0
Urbanicity	Urban = 1; Rural = 0
Accommodation occupancy	Owner occupied = 1; Else = 0

Note. All variables measured at Wave 1.*These variables were only used for the migrant samples.

5.3.3 Sample

The GUI Cohort '08 (infant cohort) was drawn from the Irish Child Benefit Register, and the sample represented approximately one-third of all births in Ireland over the field period, which took place between September 2008 and April 2009. At Wave 1 (nine months), interviews were completed with the households of 11,134 infants. Of the initial sample, 9,793 (88%) participated in Wave 2 (2010/2011, age three) and 9001 in Wave 3 (2013, age five).

For our analysis, we used the balanced sample of 8,712 children who participated in all three waves. We removed 618 children for whom we did not have valid information on the baseline covariates, including their migration background, and a further 109 children because they did not have valid information on their ECEC attendance at age three or English language achievement at age five. Finally, to make sure that ECEC participation was not confused with participation in the free preschool year, the 204 children and their households that were already availing of the scheme at the time of the second interview were removed from the analytical sample. This resulted in a final sample of 7781, of which 28% attended ECEC for more than eight hours per week. Slightly over 30 per cent of the children in the sample had a migration background, with most of those living in an English speaking household ($N = 1251$) and a somewhat smaller proportion in a non-English speaking home ($N = 1115$).

5.3.4 Analytical strategy

Our analytical strategy could be divided into two parts, imitating a randomised control trial in which the design and the analysis of a study are separate. In the first part, we specified three propensity score models to calculate the propensity score for each of our groups (i.e. no migration background, English speaking migration background and non-English speaking migration background) and then evaluated if they had been specified adequately.

The propensity score is a single score that represent the probability being treated (i.e. attending ECEC) conditional on the included baseline covariates (Rosenbaum & Rubin, 1983):

$$e_i = \Pr (Z_i = 1|X_i)$$

Where Z is the treatment status of each child (1 for treatment; 0 for non-treatment) and X the set of observed baseline covariates. Following Rosenbaum and Rubin (1983), children who attended ECEC and those who did not should have the same distribution of the observed baseline characteristics conditional on this propensity score if two conditions hold. Firstly, there should be no unmeasured confounders, and, secondly, all children have a non-zero probability of attending ECEC. It is important to note, however, that the first assumption underlies all regression-based analyses but is explicitly discussed in the context of propensity score methods (Austin, 2011).

Because the true propensity score is not known for observational studies, we relied on balance diagnostics to assess if the three propensity models had been specified correctly (Austin, 2011; Garrido et al., 2014; Lanza, Moore, & Butera, 2013). We took three steps in this first part of our analysis. In a first step, we estimated an initial propensity score model based on all our baseline covariates described in Table 5.2. The included covariates were plausible predictors of the outcome (i.e. English language achievement) or both the outcome and the treatment (i.e. ECEC attendance), and we, therefore, wanted to create balance on these variables using the propensity score. We included a relatively large range of potential confounders since we had a sufficiently large dataset (Garrido et al., 2014).

In a second step, we assessed the degree to which the distribution of propensity score estimates overlapped between the two treatment groups. Crucially, there needs to be sufficient overlap in the range of propensity scores between both groups (i.e. the region of common support) so as to ensure that inferences about treatment can be made. Overlapping distributions indicate that there are children in the treatment group who are similar to those in the control group on the baseline covariates (Lanza et al., 2013).

In a third step, we then evaluated the balance of the individual covariates between the treated and untreated groups before and after taking into account the propensity score. For this purpose, we calculated the raw and weighted standardised differences and variance ratios. Although there is no hard criterion for a threshold for standardised differences, we followed the recommendation that a standardised difference should at least be smaller than 0.25 (Garrido et al., 2014) and ideally below 0.10 (Austin, 2011). A variance ratio should be close to one. Additionally, we conducted a formal test for covariate balance in which we tested the hypothesis that the weights constructed from the propensity model created balance in the covariates.

In the second part of the analysis, we built on the propensity score model to estimate the treatment effect of ECEC attendance on later English language achievement. We applied inverse probability of treatment weighting (IPTW) using the propensity scores to remove the effects of confounding. We chose IPTW over propensity score matching because it allowed us to retain a larger number of observations, which important with regards to the external validity (Guo, Fraser, & Chen, 2020).

IPTW uses weights based on the propensity score to create a synthetic sample in which the distribution of the observed baseline characteristics is independent of treatment status (Austin, 2011). For the ATE the weight is calculated as follows:

$$w_{i,ATE} = \frac{Z_i}{e_i} + \frac{(1 - Z_i)}{1 - e_i}$$

This means that each child that attended ECEC receives a weight that is equal to the inverse of the propensity score, and each comparison child that did not attend ECEC receives a weight equal to the inverse of one minus the propensity score. The above formula can also be adapted to estimate the ATT:

$$w_{i,ATT} = Z_i + \frac{(1 - Z_i)e_i}{1 - e_i}$$

This means that the weight for a treated child becomes one, while the weight for an untreated child is equal to the propensity of receiving treatment divided the inverse of the propensity. Likewise, the formula can be modified to estimate the treatment effect among the non-treated (ATNT):

$$w_{i,ATNT} = (1 - Z_i) + \frac{Z_i(1 - e_i)}{e_i}$$

Finally, we compared the estimates from our three models (i.e. no migration background, English speaking migration background and non-English speaking migration background) using standard two-sample t-tests.

5.4 Results

5.4.1 Study 'design'

As expected, selection into ECEC treatment was not random. Across all three groups, children who attended ECEC differed from children who did not attend ECEC in the baseline covariates (see Table 5.3). Compared to 'non-treated' children, 'treated' children were, for example, much more likely to have a mother that was employed prior to giving birth and to live in a household with a higher income level. Thus, it was important to create balance on these baseline covariates using the propensity score.

Table 5.3 Descriptive statistics by treatment groups before inverse probability weighting

	No MB		MB – English		MB – No English	
	ECEC N=1531	No ECEC N=3884	ECEC N=387	No ECEC N=864	ECEC N=294	No ECEC N=821
<i>Child</i>	M	M	M	M	M	M
Study child male	0.52	0.51	0.52	0.52	0.53	0.46
Premature birth	0.06	0.06	0.05	0.06	0.06	0.07
Prior ECEC experience	0.33	0.04	0.33	0.05	0.21	0.01
Early communication skills	0.98	0.98	0.98	0.98	0.98	0.97
Early social/personal	0.99	0.99	0.98	0.99	0.99	0.99
Fully vaccinated	0.93	0.91	0.93	0.88	0.96	0.94
Breastfed	0.62	0.50	0.76	0.68	0.91	0.91
<i>Mother</i>						
Age at birth	32.30	31.94	33.85	33.03	32.04	30.43
Employment pre-birth						
Worked full-time	0.71	0.55	0.66	0.46	0.68	0.53
Worked part-time	0.20	0.25	0.22	0.25	0.16	0.16
Not at all	0.09	0.21	0.12	0.28	0.16	0.31
Future care intentions						
Sole parental care	0.13	0.31	0.17	0.38	0.17	0.40
Part-time non-parental	0.57	0.52	0.50	0.49	0.50	0.42
Full-time non-parental	0.30	0.16	0.32	0.13	0.33	0.17
Reason care choice						
N/A	0.42	0.58	0.49	0.67	0.59	0.79
Practical	0.14	0.08	0.11	0.07	0.16	0.08
Quality	0.39	0.30	0.34	0.23	0.22	0.11
Other	0.06	0.04	0.06	0.03	0.03	0.03
Mother talks to the baby	0.92	0.90	0.89	0.91	0.87	0.87
Perceived social support						
No/Not enough help	0.16	0.14	0.32	0.26	0.54	0.48
Enough help	0.80	0.81	0.63	0.69	0.40	0.43
No help needed	0.04	0.05	0.05	0.05	0.05	0.08
Partner present	0.88	0.89	0.95	0.93	0.90	0.93
Level of English	-	-	0.77	0.76	0.26	0.16
Irish citizenship	-	-	0.98	0.98	0.97	0.88
<i>Household</i>						
Other young kids present	0.46	0.61	0.58	0.67	0.43	0.48
Household income						
No income information	0.06	0.07	0.05	0.06	0.07	0.07
Lowest quintile	0.10	0.16	0.11	0.21	0.23	0.31

We estimated the three propensity score models using the covariates described in Table 5.2. The distributions of the estimated propensity scores (see Figure 5.1) showed a satisfactory overlap of the propensity scores of children who attended ECEC for more than eight hours at age three and those who did not. In other words, the area of common support between the two treatment groups was sufficiently large in all three samples, meaning that for all children in the ECEC group there was child in the non-ECEC group with a similar propensity score, and vice versa. Moreover, after weighting by the inverse of the probability of treatment, the distributions of the estimated propensity scores became very similar for the groups that attended ECEC and the groups that did not.

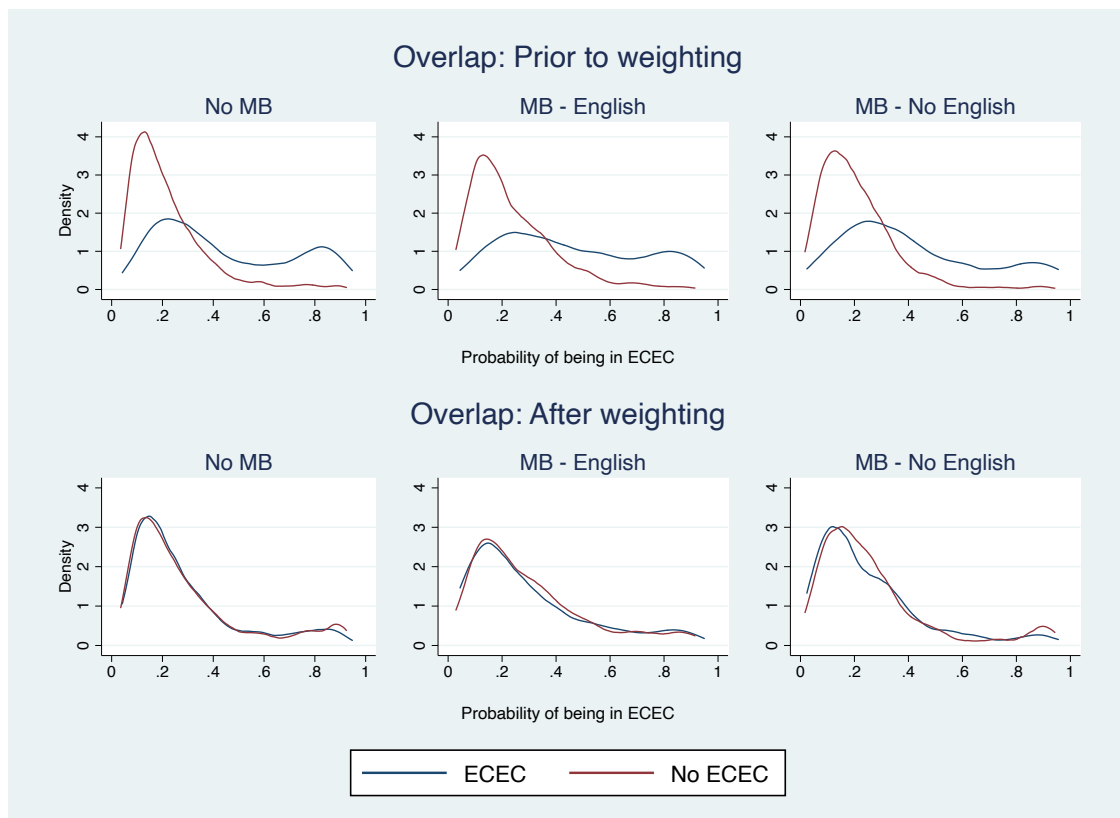


Figure 5.1 *Estimated propensity score distributions for the two treatment groups across the three samples.*

Note. MB = Migration Background

Conditional on the propensity score, the group of children who attended ECEC no longer systematically differed from the group that did not attend ECEC for more than eight hours per week at age three. After weighting by the inverse of probability treatment, all standardised differences were below 0.25 and the variance ratios were close to one (see Table 5.4). In fact, only one of the weighted standardised differences was larger than 0.10 (i.e. maternal age at birth for the English speaking migrant group). Altogether, this indicates that the propensity score models were well specified and that they created balance on the baseline covariates between the treated and untreated groups.

Table 5.4 Balance statistics for three samples before and after inverse probability weighting

	No MB				MB – English				MB – No English			
	Std difference		Variance ratio		Std difference		Variance ratio		Std difference		Variance ratio	
	Raw	Wghtd	Raw	Wghtd	Raw	Wghtd	Raw	Wghtd	Raw	Wghtd	Raw	Wghtd
<i>Child</i>												
Sex	0.02	0.00	1.00	1.00	0.01	0.01	1.00	1.00	0.13	-0.02	1.00	1.00
Premature birth	0.01	0.01	1.05	1.03	-0.05	-0.02	0.82	0.92	-0.03	-0.02	0.89	0.93
Prior ECEC experience	0.80	-0.02	5.78	0.96	0.75	0.01	4.31	1.01	0.64	-0.05	11.44	0.84
Early comm. skills	-0.02	0.02	1.13	0.89	0.00	0.01	1.01	0.94	0.04	-0.03	0.77	1.18
Early social skills	0.00	0.01	0.99	0.91	-0.07	0.01	1.77	0.90	-0.04	0.01	1.39	0.92
Fully vaccinated	0.05	0.00	0.85	0.99	0.16	0.04	0.65	0.89	0.09	0.02	0.69	0.93
Breastfed	0.24	-0.02	0.94	1.00	0.20	-0.03	0.82	1.02	-0.01	0.00	1.02	1.00
<i>Mother</i>												
Age at birth	0.07	-0.04	0.94	1.05	0.17	-0.11	0.77	1.12	0.34	0.01	0.80	0.86
Employment pre-birth (ref. full-time)												
Part-time	-0.11	-0.01	0.87	0.99	-0.09	0.04	0.90	1.05	0.00	0.02	1.01	1.05
Not at all	-0.33	0.02	0.51	1.04	-0.41	-0.02	0.53	0.98	-0.36	0.08	0.63	1.08
Future care intentions (ref. sole parental care)												
Part-time non-parental	0.10	0.02	0.98	1.00	0.03	-0.02	1.00	1.00	0.16	0.00	1.03	1.00
Full-time non-parental	0.33	0.00	1.54	1.01	0.49	-0.01	2.00	0.98	0.36	-0.06	1.54	0.92
Reason care choice (ref. N/A: Sole parental care)												
Practical	0.18	0.00	1.58	0.99	0.12	-0.01	1.42	0.96	0.24	0.00	1.79	0.99
Quality	0.18	0.00	1.13	1.00	0.25	0.05	1.27	1.06	0.31	-0.02	1.82	0.96
Other	0.08	0.00	1.40	1.02	0.17	-0.01	2.16	0.96	0.04	-0.06	1.26	0.74
Mother talks to the baby	0.08	-0.02	0.80	1.05	-0.07	0.03	1.22	0.93	0.01	-0.10	0.99	1.24
Perceived social support (ref. No/not enough help)												
Enough help	-0.02	-0.01	1.04	1.01	-0.11	0.00	1.08	1.00	-0.06	-0.02	0.98	0.99
No help needed	-0.03	-0.01	0.86	0.98	-0.04	-0.05	0.86	0.79	-0.12	0.02	0.67	1.08
Partner present	-0.03	-0.03	1.07	1.09	0.07	-0.05	0.76	1.17	-0.08	-0.01	1.26	1.04
Level of English					0.02	-0.01	0.98	1.01	0.25	-0.08	1.44	0.87
Irish citizenship					0.00	0.02	1.03	0.88	0.34	-0.08	0.31	1.22

<i>Household</i>												
Other young kids present	-0.30	-0.01	1.05	1.00	-0.18	-0.03	1.10	1.01	-0.12	0.04	0.98	1.00
Household income (ref. Highest income quintile)												
No income information	-0.04	0.03	0.85	1.10	-0.02	0.01	0.94	1.03	0.01	0.03	1.03	1.11
Lowest quintile	-0.17	-0.01	0.68	0.98	-0.26	0.11	0.60	1.18	-0.18	0.01	0.83	1.01
Second quintile	-0.18	0.02	0.67	1.04	-0.10	-0.02	0.82	0.96	-0.27	0.07	0.69	1.08
Third quintile	-0.15	0.01	0.76	1.01	-0.13	-0.05	0.82	0.93	-0.05	-0.06	0.93	0.91
Fourth quintile	-0.03	0.00	0.97	1.00	0.00	-0.03	1.00	0.95	0.20	-0.03	1.50	0.92
Parental education	0.37	0.00	1.03	1.00	0.42	-0.04	0.92	1.00	0.38	-0.07	0.87	1.01
Occupational class	0.35	0.00	0.88	1.00	0.38	-0.05	0.84	1.01	0.49	-0.02	1.11	0.99
Urbanicity	0.41	0.01	1.11	1.00	0.46	-0.02	1.09	0.99	0.17	-0.06	0.91	1.02
Medical card	-0.16	0.03	0.79	1.04	-0.19	0.08	0.81	1.08	-0.30	0.11	0.86	1.03
Owner occupied	0.02	-0.04	0.97	1.05	0.18	-0.09	0.82	1.08	0.34	-0.01	1.19	0.99
Early childcare supplement	-0.02	0.00	1.06	1.01	0.00	-0.01	1.01	1.02	0.12	0.02	0.76	0.97
Household smoked	-0.16	0.02	0.88	1.01	-0.09	0.02	0.93	1.01	-0.22	-0.02	0.81	0.99
Catholic	-0.05	0.01	1.14	0.98	-0.06	-0.06	1.06	1.06	-0.01	0.05	1.00	1.00
Overidentification test (p-value)		.269				0.735				0.815		

Note. MB =Migration Background. The null hypothesis of overidentification test is that the inverse probability weighted model balanced all the baseline covariates that were included in the model.

5.4.2 Study analysis

Building on the propensity score models, we estimated the relevant treatment models (see Table 5.5). We expected that there would be a small but positive ATE and ATNT (H1a and H1c) though no substantial ATT (H1b) for the group without a migration background. However, contrary to our expectations, none of the treatment effects were significant for this group, suggesting that ECEC attendance does not have a positive impact on later English language skills for children of native parentage.

Table 5.5 *Treatment effects of ECEC exposure at age three on English language achievement at age five*

	No MB		MB - English			MB - No English		
	B	SE	B	SE	$\Delta_{\text{MB-no MB}}$	B	SE	$\Delta_{\text{MB-no MB}}$
ATE	-0.32	0.40	-0.79	0.87	-0.47	2.65*	1.34	2.97*
ATT	-0.23	0.48	-0.32	0.88	-0.09	2.24*	1.13	2.47*
ATNT	-0.35	0.43	-0.99	0.98	-0.64	2.86	1.53	3.21*

Note. MB = Migration Background; ATE = Average Treatment Effect; ATT = Average Treatment Effect for the Treated; ATNT = Average Treatment Effect for the Non-Treated.

* $p < 0.05$

We further argued that ECEC attendance should be particularly beneficial for children with a migration background and thus expected that there would be positive effects of ECEC attendance for children of migrant origin. This appeared to be partially true. For the children with a migration background from English speaking homes, the results were similar to those for children without a migration background. For them, the treatment effects were very small and negative but insignificant. However, for children with a migration background from non-English speaking households, ECEC attendance at age three was linked to greater English language achievement at age five. For this group, the ATE and ATT were positive and significant, and the ATNT was also positive, although only statistically significant at the 0.10 level ($b = 2.86$, $p = 0.062$). For example, considering that the English language achievement variable was calculated

to have a standard deviation of 10, the ATE estimate of 2.65 suggests that the average language benefit gained from attending ECEC amounts to 26.5% of a standard deviation. Thus, the results indicate that ECEC attendance positively affects English language achievement for children with a migration background but only if they live in non-English speaking homes.

Following the argument that ECEC treatment effects would be larger for children with a migration background, we anticipated that the Irish ECEC system would hold at least some equalisation power with regards to achievement gaps by migration background, but we only found partial support for this. The ATE, ATT and ATNT for the children from English speaking migrant households were not significantly different from the treatment effects for the group without a migration background. This suggests that for children from English speaking migration backgrounds, the Irish ECEC system did not change any existing differences amongst the treated (H2a) nor overall (H2c) and that expansion of ECEC enrolment would likely make little difference to the English language achievement of this group compared to the group of children without a migration background (H2b).

However, the ECEC system did seem to hold some equalisation power and potential for children from non-English speaking migrant homes. For them, the current system of ECEC enrolment tended to reduce inequalities amongst those that actually attended ECEC (i.e. $ATT_{MIG} > ATT_{NAT}$; H2a). The achievement gap to children of native parentage was about 24.7% smaller than it would have been if these children from non-English speaking migrant homes had not attended ECEC. Moreover, increasing ECEC attendance would likely enhance English language achievement amongst children from non-English speaking migrant homes that were not in ECEC to a greater extent than amongst children without a migration background who did not attend ECEC (i.e. $ATNT_{MIG} > ATNT_{NAT}$; H2b). If ECEC enrolment were to be expanded, this would likely contribute to a reduction of nearly a third of a standard deviation in disadvantages in English language achievement by migration background. Finally, the ATE for the non-English speaking migrant group was also significantly larger than the ATE for the group without a migration

background. This indicates that the ECEC system worked towards the equalisation of disadvantages by migration background overall (i.e. $ATE_{MIG} > ATE_{NAT}$; H2c).

5.4.3 Additional analysis: treatment effects at age nine

For the current paper, we focused on estimating the effects of ECEC exposure at age three on English language achievement at age five. Age five is a crucial age because children in Ireland typically start primary school at age four or five. Being sufficiently proficient in English at this age is thus important because it allows children to engage fully with the primary school curriculum and to connect with their peers and make friends. This may also prevent them from falling further behind and from accumulating disadvantage. Nevertheless, it is relevant to understand if the positive impact of ECEC attendance on English language achievement fades out over time or if it remains even when children are in primary school. To shed some light on this, we ran an additional analysis in which we replicated our main analysis but focused on English language achievement at age nine instead of age five (See Appendix IV, Section A).

Overall, the results of the additional analysis were very similar to the results of the main analysis. ECEC attendance did not have an effect on English language achievement during primary school (at age nine) for children of native parentage nor for children from English speaking migrant homes, and the treatment effects for these groups were not significantly different from each other. However, for children with a migration background from non-English speaking homes, the ATE, ATT and ATNT were positive and significant, suggesting the beneficial effects of ECEC persist at least into third class. Moreover, the treatment effects for this group were again significantly larger than those for children without a migration background. This indicates that the ECEC system contributed to the equalisation of disparities by migration background even when considering achievement at later ages, and that a potential expansion of the system would likely help to reduce existing disadvantages in primary school.

5.4.4 Sensitivity analyses

Besides running an additional analysis, in which we explored the medium-term effects of ECEC attendance on English language achievement, we also conducted two sensitivity checks. These checks indicated that our results were robust to a change in the number of hours of ECEC exposure as well as to a different ECEC quality criterion (See Appendix IV, Section B for more details).

5.5 Discussion

The current study adds a small but important piece to the complex puzzle of how ECEC might serve as an equaliser for children with a migration background. Drawing on a nationally representative cohort study and using propensity score methods to account for the differential selection into ECEC, this article produced new and more robust evidence on the effect of ECEC attendance on language achievement in Ireland, a country that has received little international attention until now. Moreover, by comparing treatment effects between groups of children with and without a migration background, this study provided new insights into the equalisation power and potential of the ECEC system for children with a migration background.

The results showed that ECEC attendance did not result in greater English language achievement for children of native parentage nor for children with a migration background from English speaking homes, but that it did promote English language achievement among children of migrant origin from non-English speaking households. While the null findings are at variance with the impressive body of evidence from randomised intervention programmes that demonstrates the positive impact of ECEC, they are in line with earlier findings in the Irish context which suggested that ECEC effects were small or non-existent and in some cases even negative (See Dämmrich & Esping-Andersen, 2017; McGinnity, Russell, et al., 2015; OECD, 2017; Schütz, 2009). Moreover, they fit into the mixed body of evidence of the effect of universal ECEC (van Huizen & Plantenga, 2018) and support the idea that ECEC benefits are mostly concentrated

among more disadvantaged children (Heckman, 2006). Besides, they underline the relevance of ECEC exposure for children with a migration background that are not exposed to the majority language at home as also found by some prior studies (e.g. Burger, 2012).

Despite the fact that the ECEC system may not have promoted better language outcomes in the overall population, the findings of this study suggest that it still helped to reduce achievement gaps by migration background. That is, the treatment effects for children with a migration background from non-English speaking homes were significantly larger than those for children without a migration background, indicating that the ECEC system contributed to the equalisation of disparities by migration background and that a potential expansion of the system would likely help to further mitigate existing disadvantages. These findings are of particular interest to policymakers who seek to identify effective policy tools that can help reduce achievement and opportunity gaps by migration background. This is especially true because the estimates showed that increasing ECEC participation among children that are currently not attending ECEC could reduce gaps by almost a third of a standard deviation.

Nevertheless, it is important to mention that this research holds four notable limitations, some of which provide important directions for future research. Firstly, while propensity score methods offer a vital tool for producing strong evidence of the effectiveness of ECEC services as they are implemented in the real world, they still rely on the assumption there are no unmeasured confounders, which cannot be proven. Thus, it remains crucial to compliment this type of research with experimental evidence and evidence based on other robust methods, such as an instrumental variable regression.

Secondly, the impact of ECEC likely varies by the age at which it is started and the quality and intensity of the programme. Moreover, the effect depends on the counterfactual. While this is beyond the scope of the current study, especially as the data used are limited in terms of

sample size and available measures¹⁹, future studies should further investigate how these factors shape child outcomes and influence the equalisation power and potential of ECEC systems. In this regard, it is important to note that the absence of positive treatment effects for children of native parentage and from English speaking migration backgrounds may be related to lower ECEC quality in the Irish context (Blossfeld et al., 2017).

Thirdly, the estimated hidden equalisation potential for further ECEC expansion hinges on the stable unit treatment value assumption (SUTVA) which implies that potential outcomes are invariant to the treatment status of others. This is unlikely to be completely true in reality. For example, if ECEC attendance is increased among children that are currently not in ECEC, this may change the care setting and the quality, thereby changing the outcomes for children that were already in ECEC. Thus, the estimated hidden equalisation potential of the ECEC system should be interpreted with care.

Finally, while this study draws on the most recent and high quality data that is currently available in Ireland, the children in this study were in ECEC about a decade ago and findings should be placed within this historical context. It will thus be crucial to replicate this study with more recent data to understand if the current findings extend to new generations of children.

5.5.1 Conclusion

In short, this study focused on the role of ECEC as a potential equaliser for achievement gaps by migration background. It contributed to the literature by adding a new country context and a population-level perspective. Using propensity score methods, it estimated the effect of ECEC attendance on later English language achievement and gauged the equalisation power and

¹⁹ As also discussed in Chapter 4 (i.e. paper III), the number of children attending ECEC was small, especially among children with a migration background. This makes it difficult to make further distinction based on ECEC quantity and quality. Besides, the GUI only included limited measures of care quality, which is a complex and hard to capture concept.

potential of the system. The findings indicate that the Irish ECEC system helped to reduce achievement gaps by migration background for children from non-English speaking homes, despite it not promoting English language achievement among children of native parentage and of migrant origin from English speaking households.

6 Discussion

6.1 Overview

This thesis was concerned with the nature and the extent of achievement gaps by migration background in early childhood in Ireland and explored if ECEC could serve as an equaliser to help to reduce existing educational inequalities. The first part of the thesis zoomed in on differences in academic achievement in early childhood and their causes, and investigated their subsequent development into middle childhood. The second part then focused on the role of ECEC as an equaliser by investigating both heterogeneity in ECEC access and effects.

The first paper estimated to which extent there were differences in verbal and non-verbal skills by migration background at the start of primary school and considered several factors that might explain these differences. It primarily relied on the third wave of the GUI '08 Cohort, which was collected when the study children were five years of age, and employed multiple linear regression models in a stepwise fashion. The results of the analyses indicated that some disparities by migration background already existed at the start of school. However, there was considerable heterogeneity in the size of the gap by region of origin. Besides, differences were generally limited to verbal skills. The child's first language had substantial explanatory power, but social background only played a relatively minor role in explaining the differences by migration background.

The second paper added an important longitudinal perspective, and directly built on the first paper by investigating how much of the disparities by migration background found during primary school could be attributed to inequalities that already existed before school. It mostly drew on the third and fifth wave of the GUI '08 Cohort and used SEM, which was important because it provided a way of dealing with the issue of regression to the mean. While effects again varied by region of origin, the results suggested that differences in English language achievement by migration background during school could largely be attributed to achievement

gaps that already existed before school, and that they remained relatively stable or even decreased thereafter.

The third paper was the first paper to explore the role of ECEC as an equaliser for educational inequalities by migration background, and focused on heterogeneity in ECEC access. It investigated how choices for parental, informal and formal childcare differed between native and immigrant households in Ireland, and subsequently explored what compositional factors may underlie these differences. The paper primarily relied on the second wave of the GUI '08 cohort and employed several regression models as well as the KHB decomposition technique. The results showed that childcare utilisation differed by migration background. Compared to children from native homes, children with a migration background were more likely to be in formal care relative to informal care. However, children from non-English speaking immigrant households were less likely to be in informal and formal care than parental care. Children from English speaking immigrant households were also somewhat less likely to be in informal care than to be in parental care, although there was no difference in the risk of formal care over parental care. Finally, the decomposition results demonstrated that compositional differences played an essential role in explaining these differential childcare utilisation patterns. Among the most important explanatory variables were the equalised household income, maternal employment prior to birth, and perceived social support.

The fourth paper also focused on the role of ECEC, but looked at heterogeneity in ECEC effects. It estimated the causal effect of ECEC attendance at age three on later English language achievement. Moreover, it gauged the equalisation power and potential of the Irish ECEC system. The paper mostly drew on the first, second and third wave of the GUI '08 Cohort, although it also extended the analysis to the fifth wave. It employed propensity score weighting to account for differential selection into ECEC participation. The findings strongly suggested that the Irish ECEC system helped to reduce achievement gaps by migration background for children from non-English speaking homes, even though it did not promote English language

achievement among children of native parentage nor among children of migrant origin from English speaking households.

In sum, this thesis provided new evidence on the nature and extent of achievement gaps by migration background in early childhood in Ireland. Moreover, it investigated how ECEC might be able to reduce such educational inequalities. The findings from the four papers indicated that disadvantages in English language achievement already existed for several groups at the start of primary school. The child's first language appeared to play an important role in this, but, surprisingly, social background could only explain a minor part of the disparities. While English language achievement gaps did not seem to increase during the primary school period and may even have decreased, they did not completely close for a number of groups. ECEC may be able to mitigate these disadvantages in English language achievement by migration background, with the Irish ECEC system holding at least some equalising power and potential for children of migrant origin from non-English speaking households. However, children with a migration background from non-English speaking households were also substantially less likely to be in formal care, possibly due to lower levels of income and social support. Thus, ECEC may only be able to ameliorate early achievement gaps by migration in Ireland if ECEC participation is increased for this group.

6.2 Contribution to the literature

This thesis sought to advance the understanding of inequalities in academic achievement by migration background and the role of ECEC as a potential equaliser in Ireland. It added to the larger scientific literature by providing new evidence of educational inequalities by migration background in early childhood in a recent country of immigration and by producing population-level evidence of the potentially equalising role of ECEC in the European context. It consisted of four individual papers, which each contributed to the literature in their own way.

Building on previous research on the performance of older students of migrant origin in the European context (e.g. Heath & Brinbaum, 2014b), the first paper of the thesis contributed to the comparably limited knowledge of achievement gaps by migration background at younger ages and in more recent countries of immigration. In line with findings from other Anglophone countries (Washbrook et al., 2012), the results showed that disparities in language achievement by migration background were already present before the start of primary school. However, it was also found that social background played a smaller role in explaining these differences in Ireland than in other European countries (e.g. Heath et al., 2008). This findings bears significance as they indicate that findings from European countries with longer histories of net immigration cannot be directly translated to newer countries of immigration, especially because the profile of the immigrant population in these countries might be quite different.

The second paper added to the literature on the academic achievement of students of migrant origin, which largely consists of cross-sectional studies, by presenting a path model in which inequalities in middle childhood were traced back to the period before school. Moreover, by using SEM, it highlighted a way of dealing with the issue of regression to the mean (Jerrim & Vignoles, 2013) which can be used in future studies. In line with other recent findings (Becker & Klein, 2021), the results demonstrated that a large part of the inequalities at age nine could be attributed to inequalities that existed at age five. Besides, it appeared that achievement inequalities by migration background were relatively stable over time and may even have decreased during the early primary school years. This suggests that schooling and early childhood are as important for the study of educational inequalities by migration background as they are for inequalities by social background (Downey & Condrón, 2016; Heckman, 2006; Raudenbush & Eschmann, 2015). However, it remains important to replicate these findings in other countries, with different immigrant populations and educational systems.

The third paper contributed to the small, but growing body of evidence on the differential selection into childcare by migration background in the European context (See for

example Biegel et al., 2021; Van Lancker & Pavolini, 2022). It provided evidence that there were substantial differences in childcare utilisation by migration background and that structural factors may have played an important role in this. It thereby highlighted the importance of heterogeneity in access when discussing ECEC as a tool to reduce educational inequalities by migration background, as previously noted by Kulic and colleagues (2019) in relation to social inequalities. Additionally, it is likely that the finding that differences in socio-demographic and other relevant characteristics played an essential role in explaining the differential childcare utilisation patterns also applies to other countries, though these structural factors may be more important in context with low levels of public funding of ECEC and high childcare costs, such as Ireland.

The fourth paper contributed to the large literature regarding the effects of ECEC participation on child development (e.g. Burger, 2010; Reynolds et al., 2010; van Huizen & Plantenga, 2018). It provided new and much needed population-level evidence (Duncan, 2008; Kulic et al., 2019) from an understudied context. Besides, by estimating the treatment effects separately for children with and without a migration background, it provided a comprehensive framework for gauging the equalising power and potential of the ECEC system, grounded in the potential outcomes framework of Rubin (1974). The results showed that ECEC participation may have little impact on English language achievement among children of native parentage and among children of migrant origin from English speaking homes. Yet, it did promote significantly greater language achievement among children with a migration background from non-English speaking households. Thus, in line with the conclusions from a large meta-analysis on the effect of the public provision of ECEC (van Huizen & Plantenga, 2018), these findings highlight that ECEC can act as an equaliser, even in contexts where ECEC participation may have no significantly positive effect for the overall population. Thus, while these findings are unique to the Irish context, characterised by low levels of public funding of ECEC for children under the age of three and high childcare costs, they may extend to other policy contexts and potentially be

stronger and more positive in countries with greater levels of government involvement in the availability, affordability and quality of childcare provision. Future research using appropriate data sources and applying robust methods is needed to confirm this.

6.3 Policy implications

Several of the findings of the thesis may be of interest to policymakers, particularly those in Ireland. There are at least three aspects that could inform policy. Firstly, the finding that disadvantages by migration background were already present at a young age clearly suggests that not all children have equal opportunities. This signals that additional support may be required to ensure that all children and young people can achieve their full potential. However, in taking action, it is important to carefully consider which groups need the most support because the findings also showed that achievement gaps varied widely by region of origin and that the language spoken at home played an important role in explaining disadvantages. Besides, it is equally important to consider what areas of learning require the greatest support since the results suggested that children with a migration background needed more support in developing more culturally and context-dependent skills than in building more general skills.

Secondly, the findings did not only show that differences in language achievement already existed in early childhood, but they also suggested that these early achievement gaps could explain a substantial part of the disadvantages found in middle childhood. The idea that academic disparities by migration background are largely attributable to processes and events that take place before the start of formal schooling indicates that policy interventions aimed at reducing such inequalities should target early childhood. Besides, it tentatively suggests that schooling does not substantially contribute to achievement gaps by migration background and may even help reduce them. Thus, it might be helpful to consider ways to extend the period of formal schooling.

Thirdly, the results showed that the Irish ECEC system helped to reduce achievement gaps by migration background for children from non-English speaking homes, despite it not promoting English language achievement amongst other groups. These findings hint at the fact that ECEC can indeed be used as a possible policy tool to reduce educational inequalities by migration background. Moreover, the models indicated that differences in English language achievement by migration background would be expected to be smaller if all children who did not attend ECEC had instead been in ECEC. In other words, policies aimed at increasing ECEC attendance below the age of three may further ameliorate some of the disadvantages faced by children of migrant origin from non-English speaking homes. However, the results also showed that ECEC enrolment rates were considerably lower for this group than for children without a migration background. Policymakers should thus carefully consider how to increase participation among groups of children that are currently not in ECEC yet would benefit significantly from ECEC attendance. Providing additional financial support may provide part of the answer of how to do so.

6.4 Limitations and directions for future research

It is important to acknowledge that this thesis also holds several limitations, which may, in turn, point to important directions for future research. Firstly, this thesis relied on relatively broad categorisations of having a migration background, even though this likely does not reflect the diversity within these groups. Although many studies have relied on relatively simple definitions, for example only distinguishing immigrants from natives (e.g. Marks, 2005), research has long underlined that the educational situation of the second generation varies greatly across migrant groups and that too broad categorisations can thus be misleading (Heath & Brinbaum, 2014b; Heath et al., 2008). Due to the relatively small sample sizes in the GUI, the papers in this thesis, nevertheless, used composite categories. The first two papers were, for example, based on regions of origin rather than countries of origin, and the final two papers distinguished between

children of migrant origin that did or did not speak English at home. While the findings provide important insights into the educational situation of children with a migration background in Ireland, it would, therefore, be important to replicate these studies in samples with larger numbers of students of migrant origin, which would allow for distinguishing between more groups. Besides, it is important to investigate if there are disparities along ethnic, religious and racial lines, which may represent distinct areas of disadvantage, though often related to migration, especially in the Irish context.²⁰

Secondly, the results indeed suggested that there was significant variation in the size of achievement gaps by migration background and their subsequent development, but it remains to be understood what exactly underlies these differences. For example, the language achievement of children with a Polish background was substantially lower than the achievement of most other groups, even after controlling for a range of relevant factors, while the same group also seemed to catch up most during the school period. Segmented assimilation (Portes & Rumbaut, 2001; Portes & Zhou, 1993) and immigrant selectivity (e.g., Feliciano, 2005) were discussed among possible explanations. However, it was beyond the scope of this thesis to explore these explanations in more detail. Nevertheless, these findings and possible explanations point at fruitful avenues for future research. Future studies should, for example, investigate the role of social background in the achievement of students of migrant descent in newer countries of immigration. Moreover, it may be insightful to explore the effect of the level of interethnic contact and the parents' level of integration on children's educational performance in the Irish context. It may also be fruitful to examine the role of the home learning environment, which has been shown to be relevant in the Irish context (McGinnity, McMullin, et al., 2017) and may differ between native and immigrant households.

²⁰ Until relatively recently, Ireland was a comparably homogeneous country, but the increased migration flows have made the population considerably more diverse. This means that (at the moment) ethnic, religious and racial diversity often overlaps with being of migrant origin.

Thirdly, due to data limitations, the thesis could also not explore all explanations for other findings. Importantly, the third paper focused on the stratification in childcare choices and tried to identify factors that were associated with the differential childcare utilisation patterns. However, the GUI data did not include information on parental preferences for or attitudes towards different care types. These factors could thus not be considered, even though they likely shape care choices and there are indications that they differ between immigrant and native parents (Seibel & Hedegaard, 2017). Likewise, no immigrant-specific characteristics, such as English proficiency, could be accounted for, even though research in the USA has indicated they are relevant to the childcare choices of immigrant families (Miller et al., 2013, 2014). Future studies should thus further unpack the parental decision-making processes and investigate the role of preferences and immigrant-specific factors.

Fourthly, it is hard to draw strong conclusions about the ECEC effects and to make hard policy recommendations regarding the ECEC system. Any (proposed) changes to the ECEC system should not be seen in isolation, and it is important to carefully examine how a change to one aspect would affect the functioning of the system. Changes to subsidy schemes may, for example, change the behaviour of households as well as providers. Moreover, while the results strongly suggest that ECEC can help to mitigate educational inequalities by migration background, there are important open questions with regard to the effects of ECEC quality and quantity. Further research on how these factors shape the impact and equalisation power of the ECEC system in Ireland is thus warranted. Such research may also be able to shed light on the reasons for the absence of positive treatment effects for children of native parentage and from English speaking migration backgrounds, which has been speculated to be due to the lower quality of ECEC in Ireland (Blossfeld et al., 2017).

Fifthly, this thesis was mainly concerned with inequalities in language achievement in early and middle childhood. However, many scholars acknowledge that patterns of educational inequalities differ between the various stages of the educational career (e.g. Heath et al., 2008)

and depend on the outcome studied (e.g. Becker et al., 2013). It is thus important to extend the current research by looking at other outcomes, such as socio-emotional development, and to continue to monitor how they develop over time. Moreover, as more data from the GUI '08 cohort will become available, it will be possible to see how ECEC affects child development and educational inequalities by migration background in the longer term.

Sixthly, it is important to note that even though this thesis used the best data and methods at hand, they still have limitations. Even high quality data sets, such as the GUI, can be subject to bias, and statistical and theoretical models only present a simplified version of reality. Besides, while the chosen statistical methods may have been the most suitable for the research questions and data used for this thesis, they also have weaknesses. Propensity score methods, for example, offer a unique way of using non-experimental data to produce evidence on the impact of ECEC as it is implemented in the real world. However, these methods still rely on the assumption there are no unmeasured confounders, and they present weaker evidence than randomised control trials. Therefore, it remains important to compliment the research presented in this thesis with other types of studies, using different data sources and methods.

Finally, this thesis should be placed within the historical context of the period of data collection. The GUI '08 Cohort was born during the onset of the Great Recession, which hit Ireland particularly hard, with the unemployment rate nearly doubling between 2008 and 2009 (Eurostat, n.d.). Their early years were thus characterised by a period of deep economic decline. This may have negatively impacted their educational achievement (Layte, 2022) and reduced the demand for non-parental care in this cohort. Moreover, while this thesis drew on the most recent and high quality data that is currently available, the children in the GUI' 08 Cohort were in ECEC more than ten years ago and there have been important changes to the Irish childcare policy landscape in this period. Since then, the National Childcare Scheme was, for example, introduced, which sought to address the high costs of childcare (Doorley, McTague, Regan, & Tuda, 2021). Besides, Ireland's migration landscape is still constantly changing. For example, in

2008, immigrants from the accession countries were estimated to be the most largest incoming group at 48%, but in 2022 they were only the fourth largest group at 10%. Conversely, immigrants from outside the EU and UK were only 16% of the incoming migrants in 2008, but in 2020, they had become the dominant incoming group at 52% (CSO, 2022). It will thus be crucial to replicate this research with more recent data, when it becomes available, to understand if the findings extend to new generations of children.

6.5 Conclusion

Drawing on data from the GUI '08 cohort, this thesis investigated the nature and the extent of achievement gaps by migration background in early childhood and explored if ECEC could to help to reduce existing educational inequalities. The first part of the thesis showed that disadvantages in English language achievement existed for several groups in Ireland and that inequalities later in childhood could largely be attributed to these early disparities. The second part of the thesis demonstrated that ECEC may indeed ameliorate part of the disadvantages faced by children of migrant origin, but it also became clear that children with a migration background were less likely to attend ECEC. All in all, the results indicate that Irish children with a migration background may not have equal opportunities at the start of life and that ECEC could provide part of the answer to the question of how to foster their structural integration.

7 Research Ethics Statement

The studies in this thesis are based on the GUI '08/infant cohort. Work in the waves of the infant cohort was carried out under ethical approval granted by a dedicated and independent Research Ethics Committee convened by the Department of Health and Children (which became the Department of Children and Youth Affairs, and now is the DCEDIY), especially for GUI study.

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7

9 Appendices

9.1 Appendix paper I

9.1.1 Robustness checks

Table S1a.

Robustness checks with different operationalisations of social background for verbal skills.

	M4 – Main model		M4 – Robustness 1		M4 – Robustness 2	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Parental region of birth (ref. Ireland)						
United Kingdom	0.78	0.45	0.73	0.45	0.73	0.45
Poland	-10.55***	1.15	-11.04***	1.15	-11.07***	1.15
Other EU, Western	-2.15	1.11	-2.25*	1.10	-2.32*	1.10
Other EU, Eastern	-7.40***	1.12	-7.53***	1.13	-7.49***	1.12
Africa	-4.55***	0.77	-4.74***	0.77	-4.44***	0.77
Indian subcontinent	-0.71	1.46	-1.04	1.49	-1.32	1.49
Other Asia	-2.23	1.55	-2.22	1.54	-2.27	1.54
NA, AU, OC	-0.32	1.17	-0.49	1.17	-0.51	1.17
Rest of the world	-7.18***	1.25	-7.44***	1.36	-7.49***	1.36
Other first language	-10.94***	0.87	-10.85***	0.88	-10.82***	0.88
Parental education	1.40***	0.33				
Secondary education or less						
Non-degree			1.43**	0.45	1.16*	0.46
Degree			2.27***	0.54	1.83**	0.56
Postgraduate degree or up			3.28***	0.60	2.87***	0.62
Household income (log)	2.87***	0.40	2.60***	0.41	2.05***	0.44
Parental occupational class						
Professional/managerial						
Other non-manual/skilled-manual					-0.68	0.37
Semi-skilled/unskilled manual					-1.10	0.60
Never worked at all - no class					-2.81***	0.70
Constant	20.95*	10.20	21.51*	10.21	29.00**	10.30

Note. NA = North America, AU = Australia, OC = Oceania. Weighted data, M=20 imputations. All analyses are controlled for the study child's sex and age, if they had started junior infants, the number of siblings, if it was a nuclear family or a single parent household, the mother's age, and the region of residence.

Main model = parental educational as a dummy: degree or up versus all else.

Robustness check 1 = More parental education categories (ref. secondary education or less).

Robustness check 2 = More parental education categories as well as parental occupational class (ref. Professional/managerial).

* $p < .05$; ** $p < .01$; *** $p < .001$

Table S1b.

Robustness checks with different operationalisations of social background for non-verbal skills.

	M4 – Main model		M4 – Robustness 1		M4 – Robustness 2	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Parental region of birth (ref. Ireland)						
United Kingdom	0.76	0.44	0.73	0.44	0.73	0.44
Poland	0.55	0.94	0.42	0.93	0.43	0.93
Other EU, Western	0.20	0.84	0.15	0.84	0.10	0.84
Other EU, Eastern	-0.15	0.91	-0.15	0.92	-0.11	0.92
Africa	-1.44	0.78	-1.52*	0.77	-1.38	0.78
Indian subcontinent	-3.16**	1.22	-3.16**	1.22	-3.29**	1.22
Other Asia	0.78	1.17	0.78	1.16	0.76	1.16
NA, AU, OC	0.82	1.00	0.75	0.99	0.72	0.99
Rest of the world	-1.19	1.55	-1.26	1.54	-1.28	1.54
Other first language	1.07	0.72	1.11	0.72	1.14	0.72
Parental education	0.56	0.32				
Secondary education or less						
Non-degree			0.72	0.46	0.56	0.46
Degree			1.07*	0.54	0.71	0.55
Postgraduate degree or up			1.30*	0.59	0.94	0.60
Household income (log)	2.28***	0.39	2.21***	0.41	1.82***	0.44
Parental occupational class						
Professional/managerial						
Other non-manual/skilled-manual					-0.85*	0.37
Semi-skilled/unskilled manual					-0.59	0.58
Never worked at all - no class					-1.70*	0.70
Constant	38.96***	10.15	38.23***	10.05	43.50***	10.37

Note. NA = North America, AU = Australia, OC = Oceania. Weighted data, M=20 imputations. All analyses are controlled for the study child's sex and age, if they had started junior infants, the number of siblings, if it was a nuclear family or a single parent household, the mother's age, and the region of residence.

Main model = parental educational as a dummy: degree or up versus all else.

Robustness check 1 = More parental education categories (ref. secondary education or less).

Robustness check 2 = More parental education categories as well as parental occupational class (ref. Professional/managerial).

* $p < .05$; ** $p < .01$; *** $p < .001$

9.1.2 Additional analysis: SEM

The results of the regression models indicated that social background was an important factor in predicting achievement scores but perhaps less relevant in explaining the gaps by migration background in the Irish context. The first language of the study child seemed to do a better job at explaining any differences by migration background. To further understand the role of these and other variables, we ran an additional analysis in which we used structural equation modelling (SEM) to estimate what part of the effect of the parental region of birth could be explained by the included variables.

This meant that we took Model 6 of the stepwise linear regressions and, using SEM, we calculated what part of the total effect of the parental region of birth ran through the variables that were added in the stepwise regressions (i.e., the indirect effects), conditioning on the study child's age and sex and the living area. Put differently, technically, we reformulated the full linear regression model in a structural equation modelling (SEM) context and added paths from the migration variables to the explanatory variables. This procedure provides a straightforward way to decompose the total effect of migration variables into an indirect effect (further split into parts for the several explanatory variables) and a residual direct effect that is left unexplained by the model.

The results of the SEM analysis confirmed our earlier findings which suggested that a large part of the inequalities at age nine could be attributed to inequalities that existed at age five and that achievement inequalities by migration background were relatively stable over time and may even have decreased during the early primary school years. They are presented in Table S2. Please note that, while helpful in seeing what part of the gap can be explained, percentages are very high in the cases where the total effect is very small. This is because a small total effect translates into a small denominator, thereby blowing up the percentage.

Table S2.

Decomposition results based on the SEM models

	Naming vocabulary			Picture similarity		
	<i>B</i>	<i>SE</i>	%	<i>B</i>	<i>SE</i>	%
UK						
Total	0.84	0.46	100%	0.87*	0.44	100%
Direct (unexplained)	0.68	0.45	81%	0.73	0.44	84%
Indirect (explained)	0.16	0.15	19%	0.14	0.10	16%
Number of siblings	-0.06	0.04	-7%	-0.04	0.03	-5%
Single parent	0.06	0.03	7%	0.09*	0.04	10%
Mother's age	0.06	0.04	7%	-0.00	0.04	0%
Started Junior Infants	0.02	0.04	2%	0.01	0.03	1%
Child's first language	-0.08	0.05	-10%	0.01	0.01	1%
Parental education	0.09**	0.03	11%	0.04	0.02	5%
Household income	-0.02	0.04	-2%	-0.02	0.04	-2%
Educational activities	-0.03	0.04	-4%	-0.00	0.01	0%
Number of books	0.18**	0.06	21%	0.11**	0.04	13%
Perceived social support	-0.05	0.04	-6%	-0.02	0.04	-2%
Maternal depression score	-0.00	0.01	0%	-0.01	0.01	-1%
Preschool hours	-0.00	0.01	0%	-0.01	0.01	-1%
Poland						
Total	-19.72***	0.98	100%	1.35	0.71	100%
Direct (unexplained)	-10.44***	1.15	53%	0.72	0.93	53%
Indirect (explained)	-9.28***	0.79	47%	0.63	0.62	47%
Number of siblings	0.45***	0.10	-2%	0.32***	0.09	24%
Single parent	0.08	0.05	0%	0.12*	0.05	9%
Mother's age	-0.13	0.09	1%	0.01	0.09	1%
Started Junior Infants	-0.02	0.06	0%	-0.02	0.05	-1%
Child's first language	-8.80***	0.76	45%	0.84	0.59	62%
Parental education	0.01	0.04	0%	0.01	0.02	1%
Household income	-0.46***	0.11	2%	-0.45***	0.11	-33%
Educational activities	-0.03	0.06	0%	-0.00	0.01	0%
Number of books	-0.30**	0.10	2%	-0.21**	0.07	-16%
Perceived social support	-0.10	0.07	1%	-0.04	0.07	-3%
Maternal depression score	0.00	0.03	0%	0.04	0.03	3%
Preschool hours	0.01	0.01	0%	0.02	0.02	1%
Other EU, West						
Total	-2.98**	1.14	100%	1.03	0.82	100%
Direct (unexplained)	-2.07	1.09	69%	0.22	0.84	21%
Indirect (explained)	-0.92	0.50	31%	0.81***	0.24	79%
Number of siblings	0.16**	0.06	-5%	0.11*	0.05	11%
Single parent	0.12	0.07	-4%	0.17*	0.07	17%
Mother's age	0.09	0.06	-3%	-0.00	0.06	0%
Started Junior Infants	0.01	0.08	0%	0.01	0.06	1%
Child's first language	-1.86***	0.38	62%	0.18	0.13	17%
Parental education	0.33**	0.10	-11%	0.13	0.08	13%
Household income	0.15*	0.08	-5%	0.15	0.08	15%
Educational activities	-0.11	0.08	4%	-0.01	0.02	-1%

Number of books	0.29**	0.10	-10%	0.16*	0.07	16%
Perceived social support	-0.08	0.06	3%	-0.03	0.05	-3%
Maternal depression score	0.00	0.01	0%	0.01	0.02	1%
Preschool hours	-0.03	0.06	1%	-0.08	0.06	-8%
Other EU, East						
Total	-15.32***	1.10	100%	0.19	0.80	100%
Direct (unexplained)	-6.86***	1.16	45%	0.19	0.91	100%
Indirect (explained)	-8.47***	0.75	55%	-0.00	0.53	0%
Number of siblings	0.46***	0.10	-3%	0.32***	0.10	168%
Single parent	-0.01	0.04	0%	-0.02	0.05	-11%
Mother's age	-0.11	0.08	1%	0.01	0.08	5%
Started Junior Infants	0.01	0.07	0%	0.01	0.05	5%
Child's first language	-7.32***	0.69	48%	0.70	0.49	368%
Parental education	0.01	0.04	0%	0.00	0.02	0%
Household income	-0.65***	0.15	4%	-0.63***	0.14	-332%
Educational activities	-0.17*	0.08	1%	-0.02	0.03	-11%
Number of books	-0.55***	0.13	4%	-0.34***	0.09	-179%
Perceived social support	-0.14	0.10	1%	-0.06	0.10	-32%
Maternal depression score	0.00	0.01	0%	0.01	0.02	5%
Preschool hours	0.01	0.01	0%	0.01	0.02	5%
Africa						
Total	-7.71***	0.82	100%	-2.27**	0.75	100%
Direct (unexplained)	-3.72***	0.78	48%	-0.95	0.79	42%
Indirect (explained)	-3.99***	0.44	52%	-1.32***	0.27	58%
Number of siblings	-0.52***	0.12	7%	-0.36**	0.11	16%
Single parent	-0.04	0.04	1%	-0.06	0.05	3%
Mother's age	0.01	0.02	0%	-0.00	0.01	0%
Started Junior Infants	0.32***	0.07	-4%	0.24***	0.06	-11%
Child's first language	-1.76***	0.30	23%	0.17	0.12	-7%
Parental education	-0.01	0.04	0%	-0.01	0.02	0%
Household income	-0.73***	0.17	9%	-0.72***	0.16	32%
Educational activities	-0.23**	0.08	3%	-0.03	0.04	1%
Number of books	-0.88***	0.15	11%	-0.51***	0.13	22%
Perceived social support	-0.14	0.10	2%	-0.06	0.10	3%
Maternal depression score	-0.00	0.01	0%	-0.01	0.02	0%
Preschool hours	0.01	0.02	0%	0.03	0.02	-1%
Indian subcontinent						
Total	-7.94***	1.48	100%	-2.12	1.14	100%
Direct (unexplained)	0.80	1.43	-10%	-2.35	1.24	111%
Indirect (explained)	-8.74***	1.05	110%	0.23	0.58	-11%
Number of siblings	-0.04	0.08	1%	-0.03	0.06	1%
Single parent	0.19*	0.09	-2%	0.28**	0.09	-13%
Mother's age	-0.10	0.07	1%	0.01	0.07	0%
Started Junior Infants	0.35***	0.09	-4%	0.27***	0.08	-13%
Child's first language	-7.24***	0.85	91%	0.69	0.49	-33%
Parental education	0.35**	0.11	-4%	0.14	0.09	-7%
Household income	-0.31*	0.14	4%	-0.31*	0.14	15%
Educational activities	-0.47**	0.17	6%	-0.05	0.08	2%

Number of books	-1.34***	0.22	17%	-0.77***	0.20	36%
Perceived social support	-0.16	0.11	2%	-0.06	0.11	3%
Maternal depression						
score	0.00	0.01	0%	0.02	0.03	-1%
Preschool hours	0.02	0.04	0%	0.05	0.04	-2%
Other Asia						
Total	-4.82**	1.60	100%	0.89	1.19	100%
Direct (unexplained)	-1.57	1.60	33%	1.13	1.17	127%
Indirect (explained)	-3.25***	0.69	67%	-0.23	0.34	-26%
Number of siblings	0.06	0.09	-1%	0.04	0.07	4%
Single parent	0.07	0.05	-1%	0.10	0.07	11%
Mother's age	0.06	0.05	-1%	-0.00	0.04	0%
Started Junior Infants	0.24**	0.08	-5%	0.19**	0.07	21%
Child's first language	-2.37***	0.52	49%	0.23	0.16	26%
Parental education	0.06	0.06	-1%	0.02	0.03	2%
Household income	-0.45*	0.17	9%	-0.44**	0.17	-49%
Educational activities	-0.19	0.13	4%	-0.02	0.03	-2%
Number of books	-0.63***	0.17	13%	-0.37**	0.12	-42%
Perceived social support	-0.12	0.08	2%	-0.05	0.08	-6%
Maternal depression						
score	0.00	0.02	0%	0.03	0.03	3%
Preschool hours	0.02	0.03	0%	0.04	0.03	4%
North America, Australia, Oceania						
Total	0.64	1.19	100%	1.45	1.03	100%
Direct (unexplained)	-0.51	1.16	-80%	0.58	0.99	40%
Indirect (explained)	1.15***	0.28	180%	0.87***	0.19	60%
Number of siblings	-0.03	0.07	-5%	-0.02	0.05	-1%
Single parent	0.12*	0.06	19%	0.17**	0.06	12%
Mother's age	0.11	0.07	17%	-0.01	0.07	-1%
Started Junior Infants	-0.12	0.10	-19%	-0.09	0.07	-6%
Child's first language	-0.03	0.07	-5%	0.00	0.01	0%
Parental education	0.40***	0.11	63%	0.16	0.10	11%
Household income	0.38**	0.12	59%	0.37**	0.11	26%
Educational activities	-0.02	0.09	-3%	-0.00	0.01	0%
Number of books	0.44***	0.12	69%	0.32***	0.09	22%
Perceived social support	-0.07	0.05	-11%	-0.03	0.05	-2%
Maternal depression						
score	0.00	0.01	0%	0.02	0.02	1%
Preschool hours	-0.02	0.03	-3%	-0.04	0.03	-3%
Rest of the world						
Total	-12.50***	1.46	100%	-0.46	1.47	100%
Direct (unexplained)	-6.57***	1.27	53%	-0.90	1.57	196%
Indirect (explained)	-5.93***	0.87	47%	0.44	0.45	-96%
Number of siblings	0.18**	0.07	-1%	0.12*	0.05	-26%
Single parent	0.14*	0.07	-1%	0.20**	0.08	-43%
Mother's age	-0.07	0.05	1%	0.00	0.05	0%
Started Junior Infants	0.06	0.09	0%	0.04	0.07	-9%
Child's first language	-5.42***	0.79	43%	0.52	0.37	-113%
Parental education	0.26*	0.10	-2%	0.11	0.07	-24%
Household income	-0.30**	0.11	2%	-0.29**	0.11	63%

Educational activities	-0.23	0.13	2%	-0.02	0.04	4%
Number of books	-0.38*	0.17	3%	-0.21*	0.11	46%
Perceived social support	-0.17	0.12	1%	-0.07	0.11	15%
Maternal depression						
score	0.00	0.02	0%	0.02	0.02	-4%
Preschool hours	0.00	0.01	0%	0.00	0.03	0%

Note. Weighted data. Decompositions controlled for the study child's age, sex and living area.

* $p < .05$; ** $p < .01$; *** $p < .001$

9.2 Appendix paper II

Table A1

Descriptive statistics of the individual items used for the latent variables

			English before school (age 5)				English during school (age 9)			
	M	SD	1	2	3	4	5	6	7	8
English before school (age 5)										
1.Vocabulary Test (BAS)	0.00	1.00	1							
2.Teacher report – Writing	3.21	0.96	0.27***	1						
3. Teacher report – Reading	3.05	0.91	0.24***	0.76***	1					
4.Teacher report – Listening & speaking	3.37	0.99	0.36***	0.70***	0.64***	1				
English during school (age 9)										
5.Vocabulary Test (Drumcondra)	0.01	1.00	0.41***	0.43***	0.38***	0.42***	1			
6.Teacher report – Writing	3.55	1.06	0.30***	0.46***	0.41***	0.42***	0.60***	1		
7.Teacher report – Reading	3.31	1.05	0.25***	0.44***	0.42***	0.41***	0.55***	0.82***	1	
8.Teacher report – Listening & speaking	3.66	0.99	0.30***	0.40***	0.37***	0.42***	0.52***	0.79***	0.74***	1

Note. Weighted data.

*** $p < .001$

Table A2*Unstandardised coefficients from the constrained and unconstrained SEM model.*

	English before school		English during school	
	Constrained	Unconstrained	Constrained	Unconstrained
	<i>B/SE</i>	<i>B/SE</i>	<i>B/SE</i>	<i>B/SE</i>
English before school			1.36***	1.39***
			(0.05)	(0.06)
UK	0.03	0.03	0.01	0.01
	(0.03)	(0.03)	(0.04)	(0.04)
Poland	-1.20***	-1.22***	1.15***	1.23***
	(0.08)	(0.09)	(0.11)	(0.12)
Other EU West	-0.13	-0.13	0.16	0.17
	(0.08)	(0.08)	(0.09)	(0.10)
Other EU East	-0.75***	-0.78***	0.78***	0.85***
	(0.09)	(0.10)	(0.11)	(0.12)
Africa	-0.44***	-0.45***	0.39***	0.43***
	(0.07)	(0.07)	(0.09)	(0.09)
India	-0.59***	-0.61***	0.68***	0.74***
	(0.12)	(0.12)	(0.17)	(0.17)
Other Asia	-0.20*	-0.27**	0.30*	0.42***
	(0.10)	(0.10)	(0.12)	(0.12)
Anglosaxan	0.02	0.02	0.15	0.14
	(0.10)	(0.10)	(0.10)	(0.11)
Rest of the world	-0.89***	-0.92***	0.87***	0.96***
	(0.13)	(0.13)	(0.15)	(0.15)

Note. Weighted data.* $p < .05$; ** $p < .01$; *** $p < .001$

9.3 Appendix paper III

Table A1

Descriptive statistics for the full sample and by migration background

Variable	Overall			No MB			MB – English			MB – No English		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Childcare type			9136			6152			2077			907
Sole parental care	0.50			0.48			0.50			0.71		
Informal care	0.23			0.26			0.18			0.12		
Formal care	0.27			0.27			0.31			0.17		
Household income (log)	9.78	0.48	8160	9.81	0.47	5541	9.77	0.50	1858	9.46	0.40	761
Parental education			8529			5850			1882			797
Non-degree or below	0.36			0.38			0.28			0.37		
Degree or higher	0.36			0.36			0.37			0.35		
Postgraduate degree	0.28			0.26			0.35			0.28		
Household type			9142			6158			2077			907
Single parent	0.15			0.17			0.10			0.14		
3(+) children	0.79			0.79			0.82			0.63		
Urban area	0.45		9097	0.42		6125	0.49		2071	0.61		901
Maternal health issue	0.15		9140	0.15		6156	0.15		2077	0.10		907
Maternal age			9142			6158			2077			907
18-29	0.20			0.20			0.14			0.41		
30-39	0.63			0.64			0.65			0.54		
40 and up	0.16			0.16			0.21			0.05		
Maternal employment pre-birth (W1)			9135			6155			2074			906
Did not work	0.22			0.20			0.25			0.35		
Part-time	0.22			0.23			0.22			0.14		
Full-time	0.55			0.56			0.54			0.51		
Contact grandparents (W1)	0.92		9139	0.98		6158	0.85		2077	0.49		904
Social support (W1)			9131			6154			2075			902
No/not enough help	0.21			0.14			0.34			0.48		
Enough help	0.74			0.81			0.60			0.41		

No need for help	0.05		0.04		0.05			
Recently moved	0.05	9115	0.04	6145	0.05	2068	0.12	902
Familiar with the system	0.99	9138	0.99	6156	0.98	2075	0.94	907
Plan to stay in Ireland	0.97	9070	0.98	6132	0.95	2053	0.95	885
Study child male	0.52	9142	0.52	6158	0.51	2077	0.49	907
Health issue study child	0.16	9137	0.16	6155	0.16	2076	0.11	906

Note. All data weighted. MB = Migration background. All variables measured at Wave 2 unless otherwise indicated. Income is averaged across the two waves.

Table A2*Characteristics of the two migrant groups*

	MB – English	MB – No English
	Proportion	Proportion
Native (Irish-born) parent resident in the household	0.72	0.08
Native English speaking parent resident in the household	0.88	0.11
Time since arrival*		
0-5 years	0.23	0.78
5-10 years	0.28	0.19
More than 10 years	0.49	0.04
Parent without Irish citizenship resident in the household	0.56	0.94
Study child had Irish citizenship at nine months	0.98	0.68

Note. *If both parents were foreign-born, we used the information on the most recently arrived parent. Based on the analytical sample. Data weighted. MB = Migration Background.

Table A3*Details on non-parental care use*

	Main care type: Informal care	Main care type: Formal care
	Proportion	Proportion
Hours per week in main type of care		
8 or less	0.06	0.05
9-16	0.24	0.34
17-24	0.23	0.25
25-32	0.21	0.14
33-40	0.19	0.15
More than 40	0.06	0.07
Both in informal and formal care	0.13	0.11
Hours per week in other non-parental care type*		
8 or less	0.46	0.44
9-16	0.46	0.39
17-24	0.08	0.15
25-32	0.00	0.01
33-40	0.00	0.01
More than 40	0.00	0.00

Note. *if attending multiple types of care. Weighted data.

Table A4*Relative probabilities of care types based on a multinomial logistic regression*

Variable	Informal vs. Parental		Formal vs. Parental		Formal vs. Informal	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Migration background						
English	0.71***	(0.06)	1.15*	(0.09)	1.61***	(0.15)
No English	0.29***	(0.04)	0.47***	(0.06)	1.64***	(0.28)

Note. Coefficients as relative risk ratios. Standard errors in parentheses. Analyses controlled for the study child's gender and health (coefficients not presented). All data weighted

*** p<0.001. * p<0.05

Table A5

Average marginal effects of the compositional variables on different types of care, based on a multinomial logistic regression

	Parental care		Informal care		Formal care	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Migration background						
English	-0.02	(0.02)	-0.03**	(0.01)	0.04***	(0.01)
No English	0.07**	(0.03)	-0.01	(0.03)	-0.05**	(0.02)
Equivalised Household Income (log)	-0.34***	(0.02)	0.17***	(0.01)	0.16***	(0.02)
Parental education						
Degree	0.00	(0.02)	-0.02	(0.02)	0.01	(0.02)
Postgrad degree or up	-0.04*	(0.02)	-0.02	(0.02)	0.05***	(0.02)
Single parent	-0.17***	(0.02)	0.08***	(0.02)	0.09***	(0.02)
Three+ kids	0.09***	(0.02)	-0.03**	(0.01)	-0.06***	(0.02)
Urban area	-0.01	(0.01)	-0.09***	(0.01)	0.11***	(0.01)
Health issue	0.02	(0.02)	-0.03**	(0.02)	0.01	(0.02)
Maternal age						
30-39	0.00	(0.02)	-0.00	(0.02)	-0.00	(0.02)
40 and up	0.01	(0.02)	-0.01	(0.02)	0.00	(0.02)
Maternal employment pre-birth						
Part-time	-0.23***	(0.02)	0.19***	(0.02)	0.05**	(0.02)
Full-time	-0.27***	(0.02)	0.19***	(0.01)	0.08***	(0.02)
Grandparent contact	-0.04	(0.03)	0.06*	(0.03)	-0.02	(0.03)
Perceived social support						
Enough help	-0.01	(0.02)	0.06***	(0.01)	-0.05***	(0.02)
No need for help	0.06**	(0.03)	-0.01	(0.03)	-0.05	(0.03)
Recently moved	0.10***	(0.03)	-0.07***	(0.02)	-0.03	(0.03)
Familiar w/t system	-0.10	(0.06)	0.05	(0.07)	0.04	(0.06)
Intention to stay	-0.00	(0.04)	0.03	(0.03)	-0.03	(0.04)

Note. All data weighted and analyses controlled for the study child's gender and health. All variables are categorical variables except for the equivalised household income which is log-transformed. MB = Migration background.

*** p<0.01, ** p<0.05, * p<0.1

9.4 Appendix paper IV

9.4.1 Section A : Additional analysis

To shed some light on whether the impact of ECEC attendance at age three persists beyond age five, we ran an additional analysis in which we replicated our main analysis but focused on English language achievement at age nine instead of age five. Thus, instead of using relying on the Naming Vocabulary test from the Early Years Battery of the British Ability Scale, we used the Drumcondra test reading test which was collected at Wave 5 when the study children were nine years old. The Drumcondra reading test is an academic assessment test specifically developed for Irish school children and is thus well suited to the Irish context, especially as it is linked to the national curriculum. We use the logit scores, provided in the GUI data set, which consider the difficulty and discrimination of each test item and allow for comparing pupils across classes. This score had a mean of .36 and a standard deviation of .90 overall.

We again started by estimating the propensity score models. There was sufficient overlap in the range of propensity scores between the two treatment groups across all three samples (see Figure A1). Moreover, the balance statistics indicated that the propensity score models created balance on the baseline covariates between the treated and untreated groups. Conditional on the propensity score, the standardised differences were below 0.25 and the variance ratios were close to one (see Table A1).

Building on the propensity score models, we then estimated the relevant treatment models in which we looked the effect of ECEC attendance at age three on English language achievement at age nine (see Table A2). Similar to the results of our main analysis, the ATE, ATT and ATNT were small and insignificant for the groups of children without a migration background and with an English speaking migration background. These results again indicate that ECEC attendance did not result in better English language skills later in childhood for children of native parentage nor for children living in English speaking household where at least one foreign born parent was present.

In contrast, for children with a migration background from non-English speaking homes, the ATE, ATT and ATNT were positive and significant, suggesting the beneficial effects of ECEC persist at least into third class. For example, the average treatment effect was 0.24, indicating that their English language achievement would be expected to have been about 27% ($0.24/0.90=0.27$) higher if all children with a migration background from non-English speaking homes had enrolled in ECEC compared to if all of them had not been in ECEC. Moreover, the treatment effects were again significantly larger than those for children without a migration background. This indicates that the ECEC system contributes the equalisation of disparities by migration background even when considering achievement at later ages and that a potential expansion of the system would likely help to further reduce existing disadvantages in primary school.

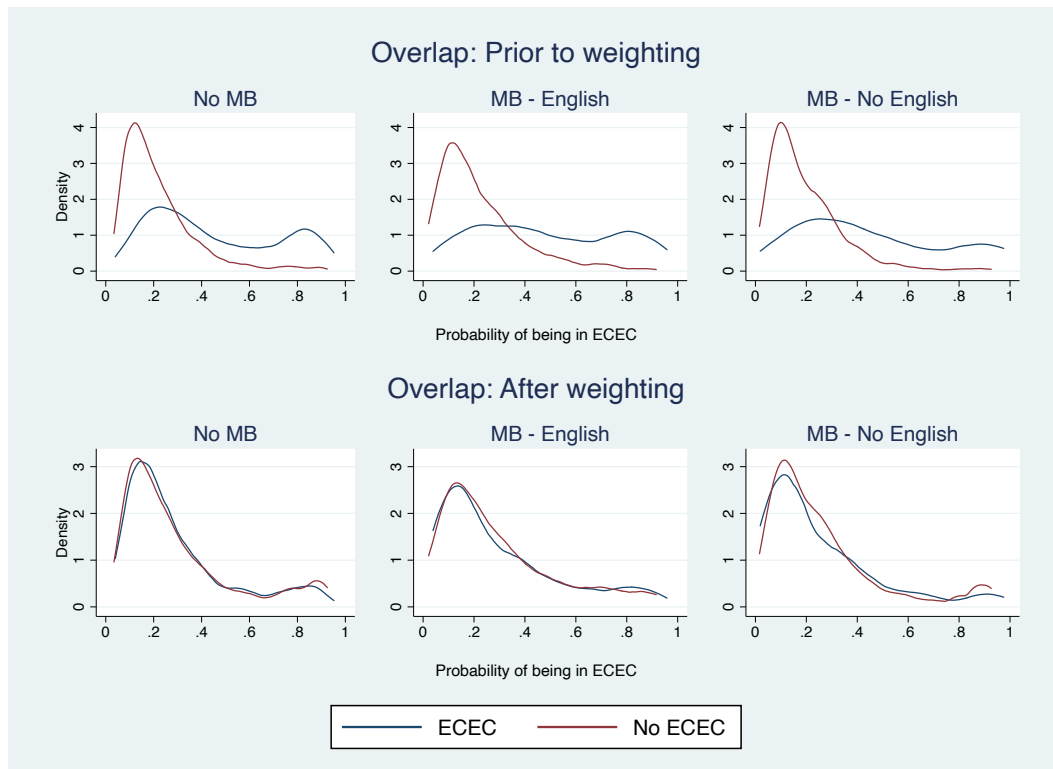


Figure A1. Estimated propensity score distributions for the two treatment groups across the three samples.

Note. MB = Migration Background

Table A1*Balance statistics for three samples before and after weighting*

	No MB				MB – English				MB – No English			
	Std difference		Variance ratio		Std difference		Variance ratio		Std difference		Variance ratio	
	Raw	Wghtd	Raw	Wghtd	Raw	Wghtd	Raw	Wghtd	Raw	Wghtd	Raw	Wghtd
<i>Child</i>												
Sex	0.01	0.01	1.00	1.00	0.03	0.03	1.00	1.00	0.16	-0.05	0.99	0.99
Premature birth	0.00	0.01	1.00	1.03	-0.06	-0.03	0.78	0.90	-0.02	-0.10	0.95	0.66
Prior ECEC experience	0.82	-0.02	5.65	0.96	0.81	0.01	4.50	1.02	0.72	-0.03	14.13	0.91
Early comm. skills	-0.02	0.01	1.11	0.91	-0.06	0.01	1.47	0.92	-0.01	0.06	1.06	0.62
Early social skills	-0.01	0.01	1.13	0.95	-0.10	0.00	2,02	0.98	-0.01	0.03	1.11	0.68
Fully vaccinated	0.01	0.00	0.96	1.00	0.18	-0.01	0.61	1.01	0.08	0.00	0.72	1.02
Breastfed	0.27	-0.02	0.92	1.00	0.16	0.01	0.85	0.99	0.00	-0.04	1.01	1.12
<i>Mother</i>												
Age at birth	0.08	-0.04	0.93	1.05	0.16	-0.11	0.77	1.11	0.41	0.00	0.78	0.88
Employment pre-birth (ref. full-time)												
Part-time	-0.10	-0.01	0.88	0.98	-0.04	0.06	0.96	1.06	-0.03	0.01	0.96	1.01
Not at all	-0.32	0.02	0.48	1.05	-0.44	-0.07	0.47	0.90	-0.39	0.11	0.58	1.12
Future care intentions (ref. sole parental care)												
Part-time non-parental	0.09	0.02	0.98	1.00	0.04	0.03	1.00	1.00	0.15	-0.08	1.01	0.99
Full-time non-parental	0.32	0.00	1.49	1.01	0.50	-0.01	2,01	0.98	0.39	-0.02	1.60	0.98
Reason care choice (ref. N/A: Sole parental care)												
Practical	0.18	-0.02	1.58	0.95	0.10	0.01	1.36	1.02	0.25	-0.05	1.82	0.89
Quality	0.18	0.00	1.12	1.00	0.24	0.06	1.24	1.06	0.28	-0.03	1.71	0.93
Other	0.08	0.01	1.42	1.03	0.18	0.02	2,21	1.08	0.07	0.03	1.45	1.16
Mother talks to the baby	0.07	-0.01	0.82	1.03	-0.09	0.04	1.28	0.89	0.03	-0.13	0.94	1.28

Perceived social support (ref. No/not enough help)												
Enough help	-0.05	-0.02	1.08	1.03	-0.07	-0.03	1.06	1.02	-0.07	-0.09	0.98	0.98
No help needed	-0.01	0.00	0.95	1.00	-0.04	-0.05	0.84	0.79	-0.10	0.00	0.71	0.99
Partner present	-0.03	-0.03	1.10	1.09	0.06	-0.02	0.76	1.07	-0.10	0.02	1.38	0.93
<i>Household</i>												
Other young kids present	-0.29	-0.01	1.05	1.00	-0.16	-0.02	1.09	1.01	-0.13	0.11	0.98	1.00
Household income (ref. Highest income quintile)												
No income information	-0.05	0.02	0.83	1.09	-0.01	0.01	0.96	1.05	0.03	0.08	1.10	1.29
Lowest quintile	-0.19	0.00	0.63	0.99	-0.31	0.06	0.49	1.11	-0.20	-0.03	0.80	0.97
Second quintile	-0.18	0.01	0.66	1.02	-0.06	-0.03	0.88	0.95	-0.32	0.07	0.63	1.08
Third quintile	-0.16	0.00	0.75	1.00	-0.12	-0.02	0.84	0.96	0.01	-0.08	1.02	0.86
Fourth quintile	-0.05	0.00	0.95	1.00	-0.03	0.00	0.96	1.00	0.15	-0.01	1.35	0.97
Parental education	0.39	0.00	0.99	1.00	0.42	-0.04	0.89	1.00	0.42	-0.01	0.85	1.00
Occupational class	0.38	-0.01	0.84	1.00	0.40	-0.05	0.80	1.01	0.50	0.00	1.07	1.00
Urbanicity	0.41	0.01	1.11	1.00	0.46	-0.01	1.12	0.99	0.19	-0.03	0.91	1.01
Medical card	-0.15	0.03	0.77	1.05	-0.21	0.02	0.75	1.03	-0.37	0.12	0.80	1.04
Owner occupied	0.03	-0.04	0.95	1.06	0.21	-0.02	0.75	1.03	0.36	-0.02	1.14	0.99
Early childcare supplement	-0.02	0.00	1.04	1.00	0.01	0.00	0.97	0.99	0.08	0.07	0.84	0.86
Household smoked	-0.16	0.01	0.87	1.01	-0.04	0.05	0.96	1.04	-0.16	-0.03	0.85	0.97
Catholic	-0.05	0.00	1.15	1.00	-0.03	-0.09	1.04	1.10	-0.06	0.06	1.00	1.00
Overidentification test (p-value)			.689				0.911				0.766	

Note. MB =Migration Background. The null hypothesis of overidentification test is that the inverse probability weighted model balanced all the baseline covariates that were included in the model.

Table A2*Effects of ECEC exposure at age three on English language achievement at age nine*

	No MB		MB - English			MB - No English		
	B	SE	B	SE	$\Delta_{\text{MB-no MB}}$	B	SE	$\Delta_{\text{MB-no MB}}$
ATE	0.04	0.04	0.05	0.10	0.02	0.24**	0.07	0.21**
ATT	-0.02	0.04	0.17	0.11	0.19	0.24*	0.10	0.26**
ATNT	0.06	0.04	0.01	0.11	-0.06	0.25**	0.08	0.19*

Note. MB = Migration Background; ATE = Average Treatment Effect; ATT = Average Treatment Effect for the Treated; ATNT = Average Treatment Effect for the Non-Treated.

** $p < 0.01$; * $p < 0.05$

9.4.2 *Section B: Sensitivity Analyses*

In our main analysis we considered children as having received ECEC ‘treatment’ if they were in any type of centre-based care for more than eight hours per week. In the two sensitivity checks described below we made adjustments to this definition to check if the results would change if we had operationalised ECEC treatment slightly differently.

Any number of hours of ECEC exposure

In a first sensitivity check, we investigated if our results would change if we lowered the number of hours of ECEC exposure that were required to be seen as ‘treated’. That meant instead of only considering children who attended ECEC for at least eight hours per week (i.e. the equivalent of one full work day) as treated, we included all children that had any ECEC exposure in the treatment group, even if they were only in centre-based care for a couple of hours per week. The results are presented in Table B1 below and were very similar to the results of the main analysis. This indicates that our choice to only count children who had considerable ECEC exposure as treated did not affect the results. In fact, the results tentatively suggest that any ECEC exposure, even if only a few hours per week, could help to mitigate achievement gaps by migration background.

Table B1

*Treatment effects of ECEC exposure at age three on English language achievement at age five
(Sensitivity check 1)*

	No MB		MB - English			MB - No English		
	B	SE	B	SE	$\Delta_{\text{MB-no MB}}$	B	SE	$\Delta_{\text{MB-no MB}}$
ATE	-0.42	0.38	-0.98	0.85	-0.56	2.85**	1.28	3.27**
ATT	-0.44	0.48	-0.80	0.89	-0.35	2.45**	1.13	2.90**
ATNT	-0.40	0.41	-1.06	0.97	-0.66	3.06**	1.47	3.46*

Note. MB = Migration Background; ATE = Average Treatment Effect; ATT = Average Treatment Effect for the Treated; ATNT = Average Treatment Effect for the Non-Treated.

* $p < 0.05$

Only including those in decent quality care

In a second sensitivity analysis, we explored if our results would be different if we used a stricter definition of ECEC which also considered the care quality. Rather than counting all children who were in any type of centre-based care as treated, we only included children who were in good quality centre-based care (i.e. with a staff-child ration of 1:10 or better) for more than eight hours in the treatment group. The results of this analysis are presented in Table B2.

The treatment effects were similar to those estimated in the main analysis. However, the ATE and ATT for children with a migration background from non-English speaking homes were no longer significant at the 0.05 level. This was likely the result of the overall reduced sample size due to missing values on the staff-child ratio variable and the small number of children in the treatment group. Nevertheless, the ATE, ATT and ATNT for non-English speaking migrant were still significantly larger than those for children without a migration background. Thus, our main conclusion that the ECEC system equalisation power and potential for children with a migration background that do not speak English at home remained unchanged.

Table B2

*Treatment effects of ECEC exposure at age three on English language achievement at age five
(Sensitivity check 2)*

	No MB		MB - English			MB - No English		
	B	SE	B	SE	$\Delta_{\text{MB-no MB}}$	B	SE	$\Delta_{\text{MB-no MB}}$
ATE	-0.51	0.41	-1.13	0.84	-0.63	2.58	1.50	3.09*
ATT	-0.35	0.44	-0.52	0.85	-0.18	2.07	1.14	2.42*
ATNT	-0.57	0.46	-1.37	0.93	-0.81	2.79	1.72	3.36*

Note. MB = Migration Background; ATE = Average Treatment Effect; ATT = Average Treatment Effect for the Treated; ATNT = Average Treatment Effect for the Non-Treated.

* $p < 0.05$