

Segregation in a Universal Child Care System: Descriptive Findings from Norway

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Abstract

In a universal child care system with low or no parental co-payments, parents of advantaged socioeconomic backgrounds can improve the opportunities of their own children if they are better at identifying and occupying the high-quality centres, relegating children from disadvantaged backgrounds to centres of lower quality. To avoid such segregation, the generously publicly funded universal child care system in Norway is based on strict regulations of access, quality and co-payment. Still, using administrative data covering every child in Oslo over a decade, we document substantial segregation, with indications that children from advantaged families cluster in higher-quality centres. The segregation stems from parents of similar socioeconomic backgrounds applying to the same centres, and partly from private centres ‘cherry-picking’ advantaged children. Though parental application behaviour can to some extent be explained by residential segregation, we show that reallocating children across centres only 500 metres from their homes could substantially reduce segregation by immigrant background. We conclude that a child care system with almost universal participation and strict quality standards may not be sufficient to reduce social inequality and improve opportunities of disadvantaged children.

Introduction

Inequality begins early. Long before starting school, children from disadvantaged families face compromised environments and parenting that inadequately support learning and child exploration (Schjølberg *et al.*, 2008; Duncan and Magnuson, 2011; Lareau, 2011; Heckman and Mosso, 2014; Kalil, 2014). A main goal for public investments in child care is to provide children from various family backgrounds with equal opportunities, and high-quality early-childhood interventions directed at children from disadvantaged backgrounds have

shown beneficial effects on both cognitive and non-cognitive skills (Heckman, 2006; Almond and Currie, 2011; Heckman and Kautz, 2014; Hoynes and Schanzenbach, 2018; Heckman and Karapakula, 2019). This has spurred hopes that publicly subsidized universal expansions of high-quality child care can improve opportunities of children from disadvantaged families and reduce social inequality.

Many countries have tried to construct child care systems that combat social inequality and segregation by socioeconomic background. Van Lancker and Ghysels (2016) (see also Van Lancker 2018 and Pavolini and

Van Lancker 2018) study characteristics of child care systems associated with socioeconomic segregation in child care participation across OECD countries, and they find several important predictors of low inequality in participation, including legal right to centre-based care, generous supply-side public subsidies, low and limited parental co-payment and strict quality standards. These are the exact core components of the universal child care system in Norway, and, accordingly, almost all children in Norway have been enrolled in formal child care before starting school. But low segregation in participation may not imply low segregation in child care if parents of advantaged socioeconomic backgrounds manage to enrol their children in centres of higher quality. In this paper, we explore such segregation in the publicly funded universal child care system of Norway, with a particular focus on children of immigrants.

Theories of cultural capital, developed by e.g. Bourdieu (1986), provide influential explanations of how privileged parents ensure better education for their children compared to other groups of parents. Children from different classes hold underlying and long-lasting skills, habits, and styles that they are socialized into and learn from their families and peers, and teachers are likely to respond more favourably to behaviours typical of middle-class rather than working-class children (Farkas, 2018; Thompson, 2019). Moreover, the network of parents from lower socioeconomic or non-dominant groups, like immigrants, may encounter constraints that result in unequal access to institutional resources, like high-quality child care (Schneider *et al.*, 1997; McPherson, Smith-Lovin and Cook, 2001; Lareau, 2011). Drawing on interviews of parents in suburban areas in the United States, Lareau (2014) underlines the importance of social networks in parents' school-choice decisions. She concludes that the stratified nature of parents' social worlds facilitates a rapid and seamless reproduction of inequality. Based on these theories, our *first hypothesis* is that children from disadvantaged families participate less in formal child care and that their school performance is weaker. Our *second hypothesis* is that there is socioeconomic segregation across child care centres, and our *third hypothesis* is that children from disadvantaged families attend centres of lower quality.

Using detailed administrative register data covering every child in Oslo over a decade, we reproduce findings of previous studies that children from disadvantaged family backgrounds are less likely to participate in formal child care (Van Lancker and Ghysels, 2012; Van Lancker, 2013; Drange and Telle, 2015), though Van Lancker and Ghysels (2016) show that inequality in

participation is relatively low in Norway compared to other European countries. We also reproduce findings that children who have attended formal child care perform better in school (Cebolla-Boado, Radl and Salazar, 2017; Cornelissen *et al.*, 2018; Drange and Havnes, 2019). Indeed, we add to the current literature by documenting strong segregation by socioeconomic background in child care centres, and, concerning, that disadvantaged children cluster in centres that seem to score weaker on rough indicators of centre quality.¹ This suggests that even when a universal and publicly funded child care system succeeds in reducing socioeconomic segregation with respect to participation, segregation may reshape from segregation in *participation* to segregation in the *quality* of the child care attended.

A further contribution of the current paper is to explore empirically how segregation can prevail in the Norwegian system with its exceptionally strict regulations of equal access and structural centre quality. One source of segregation could stem from differences in parents' preferences and choices, which could be related to their cultural capital.² There is a substantial literature on how parental decisions may contribute to maintain social inequality (Lareau, 2011; Lareau and Goyette, 2014; Böhlmark, Holmlund and Lindahl, 2016). While parents' residential choice can impose important constraints on their choice of child care centre (Lareau and Goyette, 2014; Böhlmark, Holmlund and Lindahl, 2016), and low-income parents may be more concerned than others by distance from home to the educational institution (Kleitzi *et al.*, 2000), parents across most socioeconomic backgrounds tend to state that their strongest preference is for academic quality, though their stated preferences do not always line up with their actual choices (Austin and Berends, 2018). Social networks is a major source of information for evaluating and choosing school (Lareau, 2011; Schneider *et al.*, 1997; Lareau and Goyette, 2014), and homophily in social networks (McPherson, Smith-Lovin and Cook, 2001), especially in ethnicity, education, and occupation, may thus perpetuate segregation in child care centres. There are, for example, indications that minority parents favour schools where their child would be in the racial majority (Dougherty *et al.*, 2013). Our *fourth hypothesis* is thus that the observed segregation in child care centres stems largely from similar segregation in parental application behaviour. We also hypothesize that the observed segregation in child care centres exceeds what follows from residential segregation.

Finally, a source of segregation could be that child care centres aim to raise incomes, restrict costs, or secure the quality of current children's peers by recruiting children from advantaged backgrounds. To achieve this,

centres may, for example, target information and promotion campaigns to selected neighbourhoods or parents, or undertake a more accommodating attitude towards such parents (see Bauhoff, 2012, for an example about health insurers). They may also offer amenities particularly appreciated by resourceful parents (Aizer, Lleras-Muney and Stabile, 2005), like geographic location (e.g. in advantaged neighbourhoods), outdoor-activities, particularly healthy food or structured learning. If legally possible, centres can undertake supply-side selection by ‘cherry picking’ applicants. Indeed, centres establishing a reputation of high quality, may over time attract an increasing share of children from advantaged families, and maybe also better teachers (Pop-Eleches and Urquiola, 2013), generating selection dynamics that relegate children from disadvantaged families to child care centres of lower and lower quality (MacLeod and Urquiola, 2015). Our *fifth hypothesis* is thus that privately owned child care centres ‘cherry pick’ children from advantaged families.

To examine the hypotheses empirically we use detailed administrative data covering every child in Oslo over a decade—with data from both parents’ applications and from the centre actually attended. Individual demographic and socioeconomic data are merged on from population registries maintained by Statistics Norway, and we have data on exact geographic location of centres and children’s homes that we use to calculate distance from each child’s home to each centre. We go on to illustrate impacts of hypothetical policy changes, by simulating how segregation of children from immigrant families could change if children are reallocating across centres close to their homes.

In the large literature of how social class status of the parents affects the education of their children, socioeconomic status is operationalized in a number of ways (Farkas, 2018; Thompson, 2019), and we rely on several related measures, like education, employment status, welfare dependency, and immigrant background. An important rationale for publicly funding child care in European cities, including Oslo (Drange and Telle, 2015), has been to stimulate language proficiency of children from immigrant families to improve their educational prospects. We thus pay particular attention to this group in our analysis.³

Institutional Background

Child Care in Norway

While Norwegian child care services fell short of central criteria of universalism compared to especially Denmark

at the beginning of the century (Rauch, 2007), centre-based child care in Norway is now practically universal. In 2009, a policy introduced the legal right to a publicly funded and certified child care slot if the child was born prior to September the previous year.

Child care institutions (both public and private) are strictly regulated, with provisions on staff qualifications, number of children per adult and per teacher, size of play area, and to some extent educational content. Institutions should be headed by an educated child care teacher responsible for management and educational activities. The child care teacher education is a 3-year college degree, including supervised practice in a child care centre. National child care regulations during the period we study specified that there should be at least one educated child care teacher per 10 children aged below three, and one per 18 children aged 3–5. In addition, municipal regulations in Oslo specified that there should be one adult per three children below three, and one adult per six children above three. There were no educational requirements for the additional staff.

Parental co-payment is capped since 2003 (at around 2,400 NOK, approximately 400 US\$ per month) by national regulations, and low-income families face lower or no co-payment.

As a result of an expansion of child care slots and lower maximum co-payments, the share of children enrolled in centres rose sharply over the last decade. This was particularly true for the youngest children. In 2012, more than 90 per cent of children aged 1–5 attended child care, and about 98 per cent of the children starting school in Norway have attended a child care centre (SSB, 2020). This is high by international standards (Van Lancker and Ghysels, 2016; Ho and Kao, 2018).

Child Care Supply in Oslo

In Oslo, about 60 per cent of child care institutions are operated by the municipality, while the remaining are private. Private centres can be both for-profit and not-for-profit. Both types of institutions require municipal approval and supervision to be entitled to governmental subsidies that cover around 80 per cent of costs (the rest is covered by nationally set maximum parental co-payments). The very generous subsidies imply that it is not worthwhile for wealthy parents to try to set up alternative private child care arrangements of higher quality, since the quality of the publicly subsidized centres is already very high and since violations of the maximum co-payment, including pecuniary or in-kind side-payments and donations, would disqualify the centre from public

subsidies.⁴ Centres receive some extra funding when enrolling children with an immigrant background to secure that these children were allocated additional teacher resources to develop proficiency in Norwegian. This should facilitate similar quality across care institutions.

During the years our data cover (2005–2013), the main allocation of child care slots in Oslo took place in a centralized application round in March to May. Parents could rank up to seven child care centres in their city district when applying, and their ranking would include both municipal and privately run centres. In municipal centres, priority was given to children with a sibling in a ranked centre, children of single mothers, children from families with special needs, disabled children, and occasionally children with immigrant background. Private centres were only obliged to give priority to disabled children, so in other respects they had full discretion over their admissions as long as they recruited from the applicant lists (provided to them from the municipal administration). After prioritized children had been assigned to a centre, municipal centres used a lottery to offer slots prior to 2008, and birth date in subsequent years. Private centre admission rules were unchanged over the period. All in all, among children born 2004–2007, 17 per cent were given priority in their first application. About one-third of children applying for the first time, got an offer from their first-ranked centre. If parents did not accept the slot they were offered, they were out of the assignment process and would have to apply all over again.

Data and Methods

Data Sources and Variables

We have access to data from the Municipality of Oslo containing records with individual information on applications for and enrolments in virtually all child care institutions in Oslo for the years 2005–2013, including both public and private centres. Applications, enrolment and offers are recorded for each child with date of receipt, date of first attendance, and date the offer was made. Since the dataset includes the unique personal identifier of every child, we can link with the administrative registries of the full resident population of Norway maintained by Statistics Norway (see [Akselsen, Lien and Siverstol, 2007](#)), obtaining information about the child (birth year, sex, country of birth), the parents (birth year, sex, country of birth, geographic location of residency, identifier of every child, education, employment status, income, drawing of disability pensions, and

social assistance) and all employees in the child care centres (sex, country of birth, and education).

Furthermore, we have access to Oslo municipality's database on test scores at school entry for every child in Oslo. This provides information about scores on performance tests in Norwegian language, conducted in April of first grade. The tests are designed nationally, and are intended to help identify under-performing children, enabling schools to allocate resources to these children.

Operationalization of Variables and Measures of Segregation

Being interested in of how the social class status of the parents affect the education of their children, we focus on segregation by several variables of socioeconomic background. While occupation has received a lot of attention in the general sociological literature on social reproduction and class, it is also underlined that 'in modern industrialized societies, educational attainment determines occupation attainment' ([Farkas, 2018](#): p. 3). Socioeconomic status of the parents is operationalized in a number of ways in the literature ([Farkas, 2018](#); [Thompson, 2019](#)), and we rely on several measures, like education, employment status, welfare dependency, and immigrant background (we do not have access to data on occupation).

More specifically we define *children from immigrant families* (*children with immigrant background* is sometimes used synonymously) as children (i) who immigrated to Norway, (ii) whose mother *and* father immigrated to Norway, or (iii) whose four grandparents were born outside Norway. Welfare dependence is captured by parental drawing of the Norwegian disability pension, for which all Norwegian residents with permanently and severely reduced work capacity because of long-lasting health impairments (certified by medical doctors) are eligible. We also include dependence of means-tested social assistance, which is the Norwegian welfare state's provision of last resort to poor families. To capture educational background, we use paternal high-school dropout. There is a substantial share of mothers with missing information on education, especially among immigrants, and hence we focus on fathers. We also include a measure for maternal non-employment. Although fathers' non-employment may also influence the decision to take a child to the child care centre, the employment rates of the fathers are substantially higher than for mothers, especially in immigrant families (see [Drange and Telle \(2015\)](#) for more on this), and there is thus little variation across families. As

expected, since these variables capture related aspects of social class background, they are significantly correlated (see Supplementary Table SA7).

To measure the extent of segregation, we will mainly rely on simple ratios and plots of the full distributions or of values from lower/upper deciles for the child care centres.⁵

Indicators of Centre Quality

It is inherently hard to capture child care quality (see e.g. Ladd and Loeb, 2013, for a discussion on measures of school quality). In principle, we would like to capture the centre's ability—including possible peer effects—to improve the development of the child. Indeed, since the needs of children differ with individual characteristics and development stage, what constitutes high quality for one child may not be beneficial for another. In the school literature, characteristics of the peers are a common quality indicator, supported by a growing body of research using randomized and natural experiments to address the endogeneity of peer group formation (Neidell and Waldfogel, 2010; Chetty *et al.*, 2011), and several studies suggest that *parents* from different socioeconomic backgrounds use schools' race and socioeconomic composition as indicator for school quality (Saporito and Lareau, 1999; Dougherty *et al.*, 2013).

The share of educated teachers has been and still is perceived to be a sign of quality, although the evidence for the importance of the staff's education in the child care sector is scarce, and, if anything, suggests that teacher education is not a good predictor of child development (Walters, 2015; Drange and Ronning, 2020). Still, we will briefly present some data on the number of college educated teachers per child, and the share of employees that are non-immigrants (a likely unreliable indicator of staff-language skills). Drange and Ronning (2020) rely on random assignment of children across centres, and find that the share of male employees in the centres is the best variable to capture latent centre quality, and we thus include that variable. Finally, we include the share of children with non-concerningly low score on test in Norwegian in first grade at school, though the latter may obviously be endogenous. Clearly, neither of these measures capture quality in a comprehensive and satisfactory way, and our empirical investigations will focus mainly on describing segregation.

Sample Definitions

We have arranged the data into five analytic samples. To explore the *first hypothesis*, i.e. that children from disadvantaged families participate less in formal child

care and that their school performance is weaker, we define our *first analytic sample* using information at the child level. Here, we are interested in the characteristics of the children who do and do not attend child care before school-starting age. We identify children who could have been attending child care (using complete and dated records of all residents in Oslo) and children who did attend. To know whether children attended before school start, we can only use children born before 2008 (since they start school in August 2013, which is the last calendar year we can observe child care attendance in our data). Thus, we use birth cohorts 2004–2007 and capture attendance over the calendar years 2004–2013. This dataset includes 27,544 children.

To explore the *second hypothesis*, i.e. that there is socioeconomic segregation across child care centres, we define our *second analytic sample* using information at the child care centre level. In this dataset, we include all children attending a child care centre in Oslo as of 1 January 2011. This implies that we include children born 2005–2010. By linking on information of the children in the centre at 1 January 2011, we can describe the characteristics of their families using data (like family income) from 2010. We will use this dataset to study differences across the centres with respect to characteristics of the children attending the centre. We have excluded child care institutions with less than 10 children, as smaller centres often are family-run day care of more varying quality.⁶ This also ensures that our results are more robust to outliers. This dataset includes 653 child care centres.

To explore the *third hypothesis*, i.e. that children from disadvantaged families attend centres of lower quality, we define our *third analytic sample* as a subset of the second analytic sample, i.e. the subset of centres that we are able to uniquely identify in the employer–employee data. In addition to allowing us to collect individual information on the employees of each centre, these data also include exact geographic location of each centre. Since we know the exact geographic residential location of all the children's homes, we can calculate the distance from everyone's home to each centre. The dataset includes 440 child care centres, but we manually uniquely identified the geographic location of 79 more centres, leaving us with a sample of 519 centres for the analysis of distance to the centres in Minimizing Center Segregation within Neighbourhoods section.

To explore the *fourth hypothesis*, i.e. that the observed segregation in child care centres stems largely from similar segregation in parental application behaviour, we define our *fourth analytic sample* which is also at the centre level, and includes the children who applied

for a child care slot in a particular centre. The sample includes first time applications submitted for the birth cohorts 2004–2007 over the calendar years 2004–2013, and the parents' first-ranked centre.⁷ We will use this dataset to study differences across the centres with respect to characteristics of the children *applying* for the centre. Again, we exclude centres with less than 10 applying children. This dataset includes 529 centres.

To explore the *fifth hypothesis*, i.e. that privately owned child care centres 'cherry pick' children from advantaged families, we define our *fifth analytic sample* at the child level. This dataset is used to explore if the children *attending* a child care centre differ systematically from the children who *applied* (first rank) to the centre. To do so, we need to identify children who attended the centre of first rank in their application. We start with the first application (available 2004–2013) of all children born 2004–2007, which comprises 34,723 children. We go on to identify the centre that this child attended at 1 January in the calendar year after the calendar year of application (or the next calendar year), which is available for the subset of 28,706 children. We can then compare the centre that the child applied for with the centre that the child ended up attending, given that the child did in fact start in a centre in Oslo.

Empirical Findings

Participation and Segregation

Participation in child care by socioeconomic background

Our *first hypothesis* is that children from disadvantaged families participate less in formal child care and that their school performance is weaker than that of advantaged families. Using the first analytic sample, i.e. all children in birth cohorts 2004–2007, who resided in Oslo at the entry of the calendar year they turned 6 (i.e. January of the calendar year in which they start school in August), we see from [Figure 1](#) that about 95 per cent had participated in child care (in Oslo) before school start. The average rate hides the fact that participation rose considerably in this period, it was 87 per cent for the 2004 cohort, 91 per cent for the 2005 cohort, and 95 per cent for the 2006 cohort. From the figure, we observe that children from disadvantaged backgrounds unsurprisingly have somewhat lower participation rates, as measured along a number of dimensions. The participation rates are particularly low for children from immigrant families (about 90 per cent) and children of a disabled parent (about 86 per cent).⁸

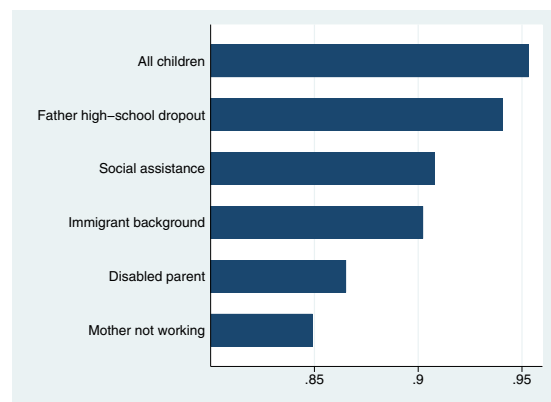


Figure 1. Participation rates of children

Note: Fraction of children in cohorts 2004–2007 living in Oslo at the beginning of the calendar year they start school (in August), who had been to child care in Oslo before school start. Participation rates within given groups.

In [Figure 2](#), we show the number of years a child has been enrolled in child care (in Oslo) before school start. On average, a child is enrolled close to 4 years. Again, we see that children from more disadvantaged backgrounds tend to spend less time in child care than their more advantaged peers. In particular, children with immigrant background spend about a year less in child care before school start compared to the average child. Children with a mother not working are enrolled in child care less than 3 years. This is perhaps not surprising, as the perceived need may be lower and the costs noteworthy for a family with only one income. This pattern could also indicate that some families prefer or can afford to have one parent—typically the mother ([Andresen and Havnes, 2019](#))—staying at home with the child, but we observe that the correlation between *mother not working* and the other measures of disadvantaged is high (Supplementary Table SA7).

We turn now to the second part of our *first hypothesis*, and explore whether these socioeconomic differences in child care participation correlates with later school performance. We confirm this in [Figure 3](#), where we see that among children with more child care experience, a lower share scored concerningly low on the language test in first grade. We would not only expect socioeconomic differences between observable categories (e.g. between children from immigrant families and other children), but also within such categories. For example, among children from immigrant families, we would expect the most advantaged to attend child care more and earlier than the disadvantaged. In [Table 1](#), we have regressed test scores on the number of years in

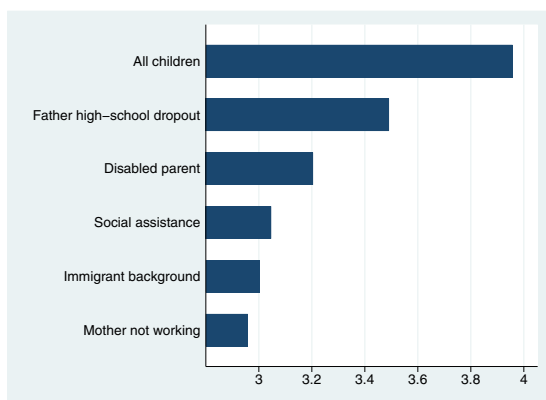


Figure 2. Years in child care before school start

Note: Years in child care before school start for children in cohorts 2004–2007 living in Oslo at the beginning of the calendar year they start school (in August), including only children who had been to child care before school start. Time within given groups.

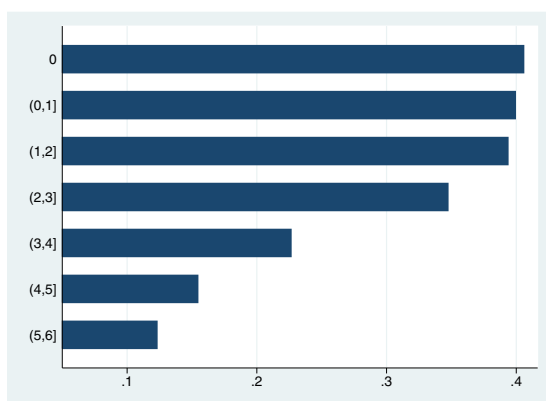


Figure 3. Years in child care and concerning low score in Norwegian in school

Note: Fraction of children in cohorts 2004–2007 living in Oslo at the beginning of the calendar year they start school (in August), who score concerning low on a test in Norwegian in first grade. Fractions given by number of years in child care in Oslo before school start.

child care before school for each indicated socioeconomic category separately. The general picture confirms our expectation: Within each category, those who attended child care longer are less likely to score concerning low on the test. Though the latter result could also reflect a causal effect of attending child care, there are clearly important selection processes determining child care participation.

Socioeconomic segregation across centres

Our *second hypothesis* is that there is socioeconomic segregation across child care centres. Using the second analytic

Table 1. Concerningly low score in Norwegian in school

	Coefficient	(Standard error)	N
All children ^a	−0.07**	(0.002)	22,911
Immigrant background	−0.04**	(0.004)	7,570
Mother not working	−0.05**	(0.005)	4,778
Father high-school dropout	−0.06**	(0.004)	5,763
Social assistance	−0.05**	(0.007)	2,227
Disabled parent	−0.07**	(0.015)	462

Note: Regression results for the association between years in child care and the likelihood of obtaining a concerning low test score in Norwegian in first grade. Each line represents the results from a separate (linear) regression (no controls unless otherwise noted). Sample of children in cohorts 2004–2007 who lived in Oslo at the beginning of the calendar year they turned 6.

**Significance at the 5 and 1 per cent level (two-sided *t*-test).

^aInstead of running separate regressions within each socioeconomic category, in this regression we have included the socioeconomic categories as control variables (without interactions).

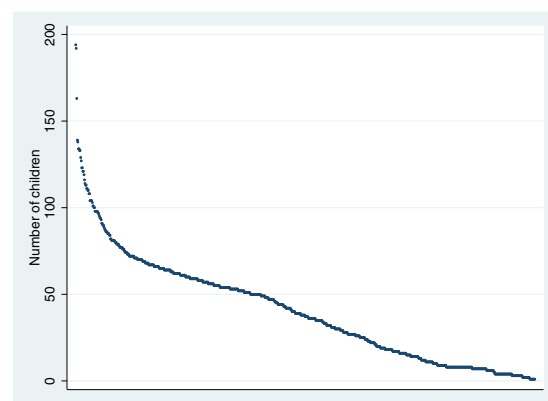


Figure 4. Number of enrolled children in each child care centre

Note: Each point represents one child care centre, and the 805 centres are ordered by their number of enrolled children in 2011.

sample (i.e. all children enrolled in publicly subsidized child care in Oslo in 2011), we see from Figure 4 that there are a few very large centres with more than 100 children, and many smaller. In the following plots and analyses, we have only included centres with at least 10 children.

In Figure 5, we see that children from immigrant families clearly are unevenly distributed across centres. In about 15 per cent of the centres, there are no children from immigrant families, while in the 10 per cent centres with the highest share of children from immigrant families, about 80 per cent have such background.

In Figure 6, we show the rate of the mean of the given variable for the top and bottom decile of centres. It is evident that disadvantaged and advantaged children

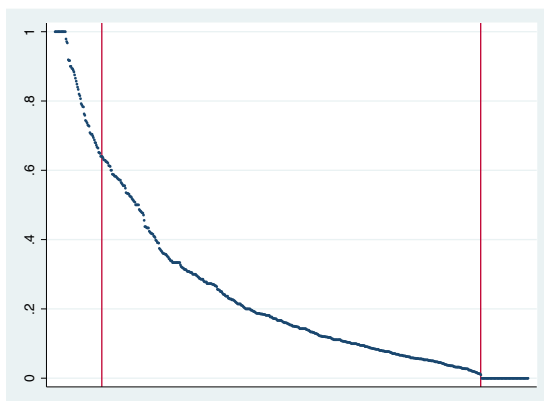


Figure 5. Distribution of child care centres by enrolled children with immigrant background

Note: Each point represents one child care centre, and the 653 centres are ordered by the share of children with immigrant background that are enrolled. Centres with less than 10 children excluded.

are clustered in different centres. Starting with children of immigrant ancestry, findings from Figure 5 are confirmed: In the upper decile of centres, more than 80 per cent of the children have immigrant background, with the mean in the lower decile being zero. Proceeding to the share of children with mothers not working, we see that in the highest decile of child care centres almost 60 per cent of children are from families where the mother does not work. In the lowest decile, the corresponding figure is less than 10 per cent. We see a similar segregation across all background characteristics, and note that while none of the children come from families on welfare in the lowest decile, almost 30 per cent have this background in the highest decile of child care centres.

In Figure 7, we see that the test scores of the children in first grade differ remarkably for children across centres. Note that this might not only reflect selection into centres, but could also reflect the centres' ability to enhance child development.

From Figure 8, we observe that there tend to be a significantly higher share of advantaged children in private compared to municipal centres. For example, the share of children with immigrant background is 13 per cent in private centres and 31 per cent in municipal centres. We note from Table 2 that the share of children in municipal centres who score concerningly low on tests in first grade is significantly higher than in private centres. Household income of families enrolled in municipal centres is considerably lower than in private centres, and, on average, fathers have about 1.6 years less schooling. Overall, there is a clear tendency of considerable socioeconomic segregation across the centres.

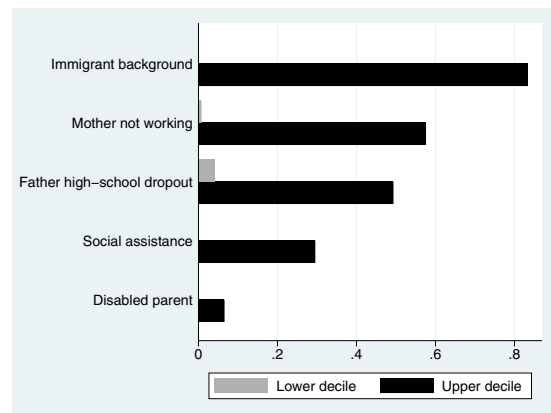


Figure 6. Family background inequality for enrolled children across child care centres

Note: Share of children with a certain background in the lower and upper decile (of that certain characteristic) of child care centres (in 2011).

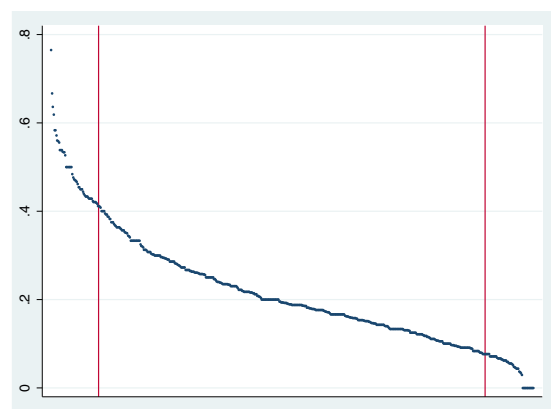


Figure 7. Fraction of children in child care centre with concerningly low score on test in first grade

Note: Each point represents one child care centre, and the 611 centres are ordered by their fraction of children (in 2011) with a concerningly low test score in Norwegian in first grade (in 2010, 2011, or 2012). Centres with less than 10 children excluded.

Does this segregation imply that advantaged children occupy the centres of higher quality, as suggested by our *third hypothesis*? As already noted in Indicators of Center Quality section, it is hard to measure quality of educational institutions (Ladd and Loeb, 2013), so we are only able to look at very rough indicators of centre quality (using the third analytic sample). In Table 3, we present the correlations between these indicators and the indicators of family background applied above, and results are largely as expected. For example, children from immigrant families tend to be in centres with fewer

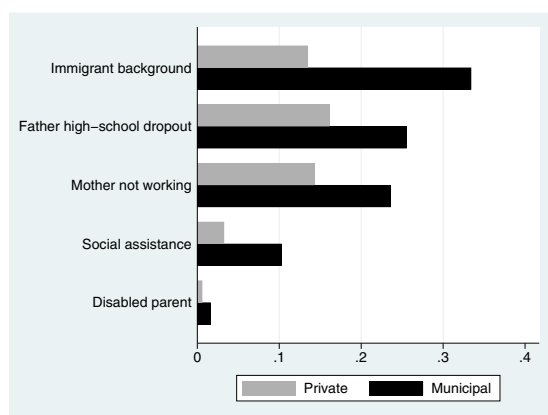


Figure 8. Family background differences across private and municipal child care centres

Note: Share of children with a certain family background enrolled in municipal vs private child care centres.

Table 2. Differences across private and municipal child care centres

	Mean		Difference
	Municipal	Private	
Family income	921,087	1,231,602	−310,515**
Boy	0.52	0.50	0.02*
Concerningly low score			
Norwegian	0.25	0.18	0.07**
Maths	0.14	0.09	0.05**
Number of children	57	40	17**
Immigrant background	0.33	0.14	0.20**
Fathers' years of education	12.7	14.3	−1.6**
Number of centres	366	287	

Note: For 2011, difference over centres (centres are unit of analysis).

***Significance at the 5 and 1 per cent level (two-sided *t*-test).

male adults, fewer college educated adults per child, more immigrant employees and in centres where the children score weaker on tests scores in first grade. Similar associations are present for the other indicators of disadvantage. Though clearly not conclusive, these findings are consistent with the conjecture that children from advantaged families are not only clustering in the same centres, but that they are clustering in centres of superior quality.

Parental Application Behaviour

We have seen that there is considerable segregation in child care centres in Oslo. We now proceed by exploring our *fourth hypothesis*, i.e. that the observed segregation

in child care centres stems largely from similar segregation in parental application behaviour. Using the fourth analytic sample (i.e. all children applying for the first time to publicly subsidized child care in Oslo over 2004–2013), we see from [Figure 9](#) that there are excessive differences in characteristics of children across applications to child care centres. Applications of children from immigrant families are unevenly distributed across centres. For the lowest decile (measured as the share of children with immigrant background) of the centres, there are about 1 per cent of children from immigrant families applying, while in the 10 per cent centres with the highest share of children from immigrant families applying, 86 per cent have such background. It seems clear that parents with and without immigrant background apply for different child care centres. This is also the case for other socioeconomic characteristics (see [Figure 9](#)) and overall, these patterns correspond to what we found in [Figure 6](#) and implies that the socioeconomic segregation of enrolled children, can largely be explained by parental application behaviour.

In [Figure 10](#), we see how parental background is associated with applications for municipal vs. private child care centres. For example, it is clear that families with an immigrant background have a higher likelihood of applying for a municipal child care centre than a private one. Other socioeconomic characteristics such as low parental education, non-working mother or welfare dependency also predict a higher likelihood of applying to municipal centres.

All in all, it seems like an important source of segregation appears due to parental application behaviour (of both parents from advantaged and disadvantaged backgrounds). Thus, it is not mainly that the advantaged parents are better at having their child allocated to their first choice, but more that parents with different backgrounds choose differently.

Do Private Centres 'Cherry Pick' Children?

Our *fifth hypothesis* is that private child care centres 'cherry pick' children from advantaged families. Above we showed that children in private centres are generally from more advantaged families than children in municipal centres, which might be an indication of 'cherry picking' but it could also reflect parental preferences or residential segregation. To investigate this, we use our fifth analytic sample to check whether the children who *attend* private centres differ systematically from the children who *applied* to private centres, and similarly for municipal centres. [Figure 11](#) displays the share of

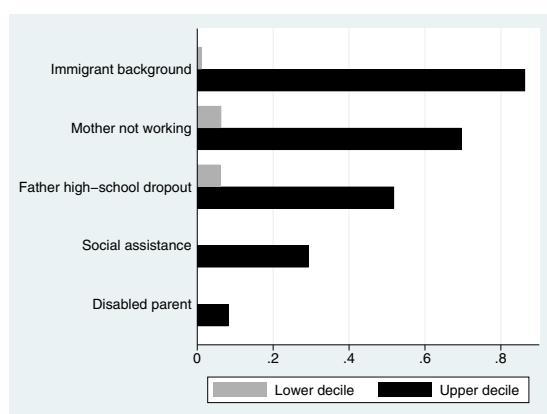
Table 3. Correlation between rough indicators of centre quality and family background

Indicator of centre quality:	Share of male employees	College educated employees per child	Share of non-immigrant employees	Share with non-concerning score in first grade ^a
Indicator of family background				
Immigrant background	-0.26*	-0.23*	-0.29*	-0.55*
Mother not working	-0.13*	-0.11*	-0.27*	-0.54*
Father high-school dropout	-0.19*	-0.17*	-0.26*	-0.47*
Social assistance	-0.08	-0.08	-0.28*	-0.42*
Disabled parent	-0.12*	-0.01	-0.09	-0.21*

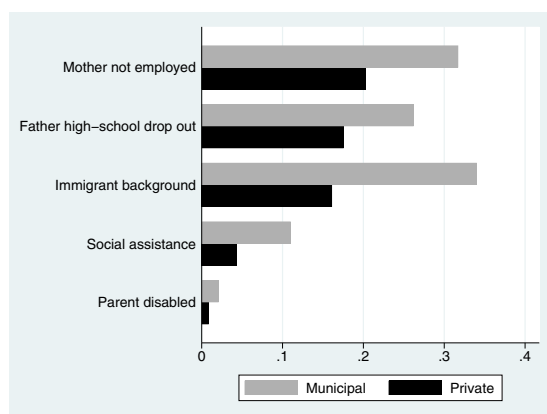
Note: Bivariate correlations (Pearson) across child care centres in the *third analytic sample*.

*Significance at the 5 per cent level.

^aShare of children in the centre without concerning low score in Norwegian in first grade, based on the 611 centres in the *second analytic sample* for which we had observations on children's test scores in first grade.

**Figure 9.** Family background differences across applicants to child care centres

Note: Share of children with a certain family background applying for a slot, lowest vs highest decile.

**Figure 10.** Share of children who applied for a slot in public vs private child care centres

Note: Share of children with a certain family background applying for a slot in municipal vs private child care centres.

children with the given background characteristic who applied and attended private vs. municipal centres, and the figure suggests some ‘cherry picking’. For example, we see that while 34 per cent of the children applying to municipal centres had an immigrant background, an even higher share of children who ended up attending a municipal centre had such background (37 per cent). For private centres, however, the share of children with an immigrant background applying was 16 per cent, while the rate attending was 14 per cent. Thus, municipal centres enrol 3 percentage points *more* children with immigrant background than those applying, while private centres enrol 2 percentage points *fewer* children with immigrant background than those who applied. This is in line with a hypothesis that private centres enrol dis-proportionally fewer children with an immigrant background than the mean of their application pool, and indicates that the ‘cherry picking’ of private child care centres contribute to the segregation in child care.

Ultimately, the contribution to the overall observed segregation that may stem from private centres’ ‘cherry picking’ children, seems limited compared with the contribution from parental application behaviour.

Simulations

One reason to subsidize child care in many OECD countries, including Norway, has been to improve the language skills of children from immigrant families. In this section, we thus focus on segregation by immigrant background.

Segregation would also occur with random allocation of children across centres, in which case policies to reduce segregation should be possible without raising costs in the form of e.g. increased travel distances. But

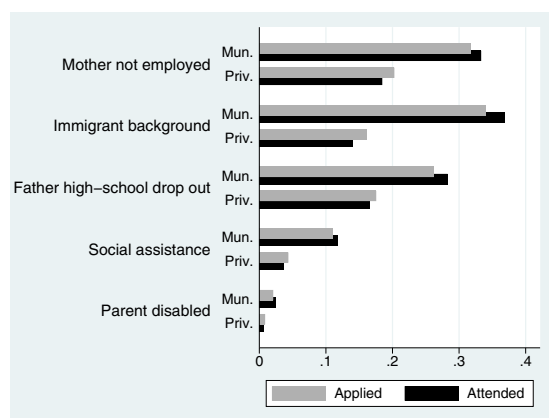


Figure 11. Share of children who applied for and attended public vs private child care centres

Note: Share of children with a certain family background applying for/attending a municipal vs private child care centre (fourth analytic sample).

segregation may also be a result of residential segregation and associated travel distances from home to centres (Lareau and Goyette, 2014), or parental application behaviour based on e.g. matches between the child's needs and characteristics of the centre, in which case policies to reduce segregation can be controversial. In such cases, policymakers should weigh the possible costs of restricting parental choices and the possible costs of segregation.

In this section, we undertake simulations to compare actual enrolment in child care centres with random enrolment and with the enrolment that minimizes segregation given that travel distance from home to the centre should not exceed 500 metres. The simulations yield hypothetical outcomes that are only feasible if not counteracted by e.g. parental behaviour. However, since child care in Norway is generously subsidized, heavily regulated and of high quality, there exists no alternative in the fully private market. In fact, except for postponing entry by some months, applying for transfer to another centre (Drange and Havnes, 2019) or residential relocation (Lareau and Goyette, 2014), opting out of the system would come with high costs. The outcome of the simulated policies may thus be a reasonable estimate of what could potentially be achieved by changes in the assignment rules in this context.

Randomly Allocating Children to Centres

Since children in Oslo primarily will be assigned a child care slot in the city district where they live, residential segregation will carry over to segregation in child care centres. To look closer into how much of the observed

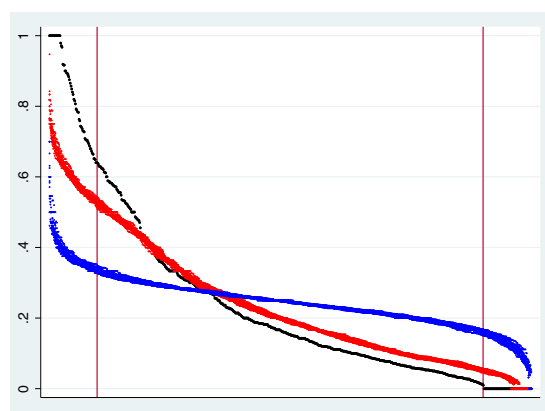


Figure 12. Simulation of a random draw: enrolment of children with an immigrant background

Note: Black dots display observed differences in share of children from immigrant families across centres (as given in Figure 5); intermediate area of dots displays the same differences resulting from us randomly assigning the children to centres within the child's city district of residence; whereas the lower left (upper right) area of dots displays the same differences resulting from us randomly assigning the children to any centre in Oslo.

segregation in child care centres that may and may not be explained by residential segregation, we have simulated two sets of random draws (obeying the actual number of children in each centre) displayed in Figure 12 (based on the second analytic sample). In one set, we randomly assign children to centres across the entire city independent of their city district of residence (lower left/upper right area of dots). As expected from well-known socioeconomic residential segregation in most bigger Western cities, we see that this generates much smaller segregation by immigrant background in the child care centres than the actual differences shown in black dots in Figure 5. In another set of random draws, we assign children randomly to a child care centre within the child's city district of residence (intermediate area of dots). As expected, this generates more segregation than in the case where we randomly assign children to any child care centre in Oslo, but it is still considerably lower than the segregation we actually observe (black dots).

Minimizing Centre Segregation within Neighbourhoods

To further explore the role of residential segregation in explaining the clustering by immigrant background, we calculate the shortest distance (straight line) in metres between the family home and the child care centre that the child actually attended (in the third analytic sample). For the actual allocation of children, the mean and

median distance is 1,338 and 595 metres. First, we study how segregation by immigrant background changes if we let two children switch centre if such a switch reduces (weakly) the travel distance of both of them.⁹ From the intermediate dots in Figure 13, we see that pairwise reallocating children to reduce the travel distance from home to the centre for both of them, do reduce the segregation of children with immigrant background in the centres somewhat. This suggests that allocating children to their nearest child care centre, like is common for schools in Oslo, could reduce segregation.

Second, from the lower left/upper right dots in the same figure, we see that segregation by immigrant background is reduced further if we reallocate children to minimize segregation by immigrant background *given* that the travel distance from the home of each child to the centre cannot exceed 500 metres or increase. Doing so results in an allocation where the share of children with immigrant background in the 10 per cent most segregated child care centres declines from the actual 68 per cent (black dots) to 50 per cent (lower left/upper right dots). Interestingly, the rate of children with immigrant background drops from above 90 to below 60 per cent in the five most segregated centres. Similarly, the

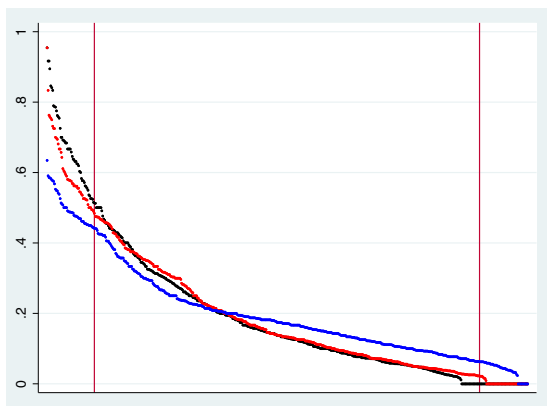


Figure 13. Segregation in centres when simulating a reassignment of children: minimizing travel distance from home to centre and share of children with an immigrant background

Note: Black dots display observed differences in share of children from immigrant families across centres (i.e. *third analytic sample* which is a subset of centres in Figure 5); intermediate dots display the same difference resulting from simulation where pairs of children switch centre if doing so reduces the travel distance from home for each of them; whereas the lower left/upper right dots display the same differences resulting from simulation where pairs of children switch centre if doing so reduces the difference between the share of children with immigrant background in the two centres *given* that the distance from home to the centre declines or becomes no more than 500 metres for either of them.

share of centres with no children from immigrant families drops from 14 per cent (black dots) to 2 per cent (lower left/upper right dots). The simulation illustrates that it would be possible to reduce segregation by immigrant background in child care centres substantially by making relatively modest changes in the assignment rules. Whether possible assimilation gains from such a change in assignment rules are sufficient to justify the accompanying restrictions to parents' choice of centre is ultimately a question of political preferences.

Concluding Discussion

We have studied the allocation of publicly funded child care in a country with a very extensive and right-based provision of universal care, and with a system that is designed to provide uniform and high-quality child care for all children. Compared to many other countries, there is little segregation in participation in Norwegian child care, with almost all children having attended formal child care before starting school (Van Lancker and Ghysels, 2016). Moreover, the strict regulations of structural quality apply to all centres and the maximum co-payment of parents is low and decided by the national government. These features should limit advantaged parents' ability to utilize high income or valuable networks to dis-proportionally occupy care of higher quality—reasons often put forth to explain perpetuating social inequalities in educational choices and outcomes (Lareau, 2014; Austin and Berends, 2018; Farkas, 2018; Thompson, 2019).

Still, we describe excessive segregation of children by socioeconomic background across centres. We find some signs that private centres take advantage of their discretion with respect to whom to admit by enrolling dis-proportionally more advantaged children than those who applied. The impact of this on the overall segregation is, however, limited.

Our main finding is that the excessive segregation of children by socioeconomic background across centres in Oslo stems from parental application behaviour, and that this application behaviour extends far beyond what would follow from residential segregation. The segregating parental behaviour may be explained by different parental preferences across social class status, in line with theories of cultural capital (Farkas, 2018) and previous empirical studies of parents' school choices (Austin and Berends, 2018). Another explanation may be that preferences are similar, but that advantaged parents have better access to networks with more reliable and relevant information (Schneider *et al.*, 1997; McPherson, Smith-Lovin and Cook, 2001; Lareau,

2014). At least in the latter case, policymakers may want to undertake compensatory measures to secure the opportunities of children from disadvantaged backgrounds, for example by providing information and guiding to disadvantaged parents about characteristics of child care centres that may benefit their children the most. Furthermore, since the segregation from parental application behaviour by far exceeds residential segregation, our simulation results suggest that policymakers can reduce segregation substantially by making relatively modest changes in the assignment rules.

Previous studies have found that generous and high-quality public child care targeted exclusively at disadvantaged children can improve their development and reduce social inequality in childhood and beyond (Heckman and Karapakula, 2019). This has spurred hopes that publicly subsidized universal expansions of high-quality child care can improve opportunities of children from disadvantaged families and reduce social inequality. But universal child care is not targeted exclusively at children from disadvantaged families, and we may fear that parental behavioural responses can undermine many of the potential benefits of universal child care expansions (Van Lancker, 2013; Van Lancker and Van Mechelen, 2015). Our findings suggest that such fears may not be unwarranted. Even in a child care system with almost universal participation and where parents' ability to utilize high income or networks to disproportionately occupy care of higher quality is limited, substantial segregation may prevail in the quality of child care. This implies that universal child care systems may not be able to fully counter-act inequalities in other spheres of life, unless deliberate policy action is undertaken. Information and guiding to disadvantaged parents about characteristics of child care centres that may benefit their children the most, and assignment rules that reduce segregation, may be necessary to secure the opportunities of all families and children alike.

Notes

- 1 These indicators of quality are admittedly unsatisfactory, but they are the best ones available to us. And we are not aware of other studies using clearly better indicators of quality of educational institutions for young children in quantitative analyses (Drange and Ronning, 2020, for example, use similar measures as we do). See Ladd and Loeb (2013) for a discussion of how hard it is to measure quality in educational institutions.
- 2 In the Norwegian system, the ability for economic capital to obtain high-quality child care is largely

unavailable due to regulations (see below), with the exception of residential location. Though policymakers may state that regulations limit the scope for cultural or social capital (Bourdieu, 1986; Coleman, 1988) to obtain high-quality child care, this is intrinsically difficult. Indeed, the regulations themselves may reproduce privilege, and there is a long tradition in the sociology of education arguing that 'education tends to express and reaffirm existing inequalities far more than it acts to change them' (Giddens, 1997: p. 420).

- 3 Several studies suggest that parents from different socioeconomic backgrounds use schools' race and socioeconomic composition as indicator for school quality (Saporito and Lareau, 1999; Dougherty *et al.*, 2013). Theory on language development of children learning a second language emphasizes the importance of learning from native-speaking-peers (Fillmore, 1991). However, peer interaction is not seen as a sufficient means to promote language learning, according to Genesee *et al.* (2005), who also emphasize the design of the activities children engage in. Qualitative evidence from child care centres in Oslo has found that parents of children enrolled in child care centres with a high concentration of immigrant peers, believed that the development of their child's native language proficiency was weak (Nergård, 2002). A study from the United States considering bilingual preschool programmes found that in classrooms dominated by majority language speaking children, interactions with these children was a factor in the minority's acquisition of the majority language (Chesterfield *et al.*, 1983). To our knowledge, few studies have investigated empirically how children with an immigrant background may influence the language environment in the child care centre in a causal design. However, there is a more mature literature on immigrant peers in the classroom. In Norway, Hermansen and Birkelund (2015) utilize differences in the number of immigrant classmates across cohorts in schools to estimate effects of marginal changes in exposure to immigrant peers on educational outcomes. They find modest positive effects on educational attainment, especially for immigrant students. Hardoy and Schøne (2013) exploit variation in the number of immigrants in schools over time, and tend to find negative peer effects for native students (not considering immigrant children), while Hardoy, Mastekaasa and Schøne (2018) find no effects of immigrant concentration in schools. For Denmark, Jensen and Rasmussen (2011) find that both native and immigrant children perform poorer

if the share of immigrants in the classroom is high, although estimates are more pronounced for native children. Ohinata and van Ours (2013) and Geay, McNally and Telhaj (2013) find no effects on native children (they do not consider immigrant children) from the share of immigrant peers in the classroom in the Netherlands and England.

- 4 Centres were allowed to cover their costs for the food (not preparation of food) provided the children. We do not have data on the variation in food payments at the time our data covers, but today it varies between 175 NOK (about 20 USD) per month in public centres in Oslo, and up to 1,100 (about 120 USD) in certain private centres.
- 5 We have also calculated common indexes of segregation (Massey and Denton, 1988) to ensure that our findings are robust to related ways of measuring segregation. Since the results for these indexes line up well with the ratios and plots, we have relegated them to Supplementary Appendix SA.
- 6 The family-owned child care centres cater for the youngest (below 3), and typically enrolls 3–5 children. About 0.5 per cent of children in our sample are enrolled in a centre with 5 or fewer children in 2011, and about 3 per cent are enrolled in a centre with less than 10 children.
- 7 Due to a restrictive storage policy in the municipality, data on children born in January and February 2004 were deleted from the application database before we got access to it. We are therefore not able to include these children in our sample.
- 8 Splitting by immigrant background, participation rates were 77 per cent for first generation, 93 per cent for second generation, and 98 per cent for other children. To compare, according to Ho and Kao (2018), the share of children in the United States enrolled as 3–5 year olds (school starters in 2014) by background was 41 per cent for Whites, 40 per cent for Asians, 39 per cent for Blacks, 32 per cent for Hispanics, and 31 per cent for American Indians/Alaska Natives.
- 9 We did this simulation by randomly sorting all the children, and change the child care centre of the two first children if the travel distance declined (weakly) for both of them, change the child care centre for the two next children if travel distance declined (weakly) for both of them, and so on for all pairs of children in the dataset. We repeated this procedure 5,000 times, and though more such swaps exist, the results tended to change little after about thousand repetitions.

Supplementary Data

Supplementary data are available at ESR online.

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