

Even in preschools: analysing the preschool and neighbourhood segregation gap in Swedish municipalities

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Preschool segregation has not been the focus of research efforts to the same extent as compulsory school segregation. This is at least in part a consequence of the lack of large-scale, registry-based data sources on where children live and where they attend preschool. This paper presents a full-population account of discrepancies between preschool segregation and neighbourhood segregation covering the Swedish population. Data includes preschool children as well as their parents' income, education, ethnic background, and place of residence. Findings indicate that while preschool segregation does not differ from neighbourhood segregation to the same extent as previous research has shown for school segregation, there are systematic differences affecting the level of segregation across Sweden and in various types of municipalities. Studies on school level show segregation by foreign background and income to be most prominent, whilst preschool segregation mostly concerns parents' educational attainment. Furthermore, the findings show that the geographical distribution of private and public preschools affects levels of segregation. This conclusion supports the general argument that the free-choice reform in the Swedish school system tends to raise levels of school segregation above the levels of residential segregation—even in preschools.

Introduction

In Sweden, school segregation has increased over the last decade and become a topic of policy debates. Sweden is not alone here; school segregation has been the focus of numerous research efforts across many national contexts (for ethnic segregation in the United States, e.g. [Reardon, Yun and Eitle, 2000](#); in the United Kingdom, e.g. [Burgess and Wilson, 2005](#); in Sweden, e.g. [Hansen and Gustafsson, 2016](#); socioeconomic segregation, e.g. [Böhlmark, Holmlund and Lindahl, 2016](#)). However, much less is known about how these findings are applicable at the preschool level, even in Sweden which has a long history of private actors at this level of the educational system. This paper provides one of the first large-scale analyses of socioeconomic and ethnic segregation across preschools based on a total population of children and their parents in a country. Furthermore, an analysis of the publicly funded Swedish preschool system can yield valuable insights into early school segregation in a welfare state.

Preschool segregation has several important implications. For example, language skills seem to be affected by segregation, especially for preschoolers with a high share of peers from non-native-speaking families and socioeconomically weaker groups (US studies include [Reid, 2016](#)). Another implication is that racial awareness begins as early as infancy and continues throughout childhood ([Bar-Haim et al., 2006](#); [Cristol and Gimbert, 2008](#); [Lam et al., 2011](#)). Research also shows how children can perceive and judge social class by the attributes of people in their social context at an early age ([Lignier, 2019](#); [Vandebroek, 2021](#)). This calls for the educational system to actively work for social and ethnic mixing in not only schools but also preschools. There are many positive effects of having a well established and inclusive preschool system. For instance, research has found that preschool has a positive effect on children's health, later results in school, and even future salary development ([The Public Health Agency of Sweden, 2017](#); [Dietrichson, Lykke Kristiansen and](#)

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C. V. Nielsen, 2018). Furthermore, parents often hear about elementary (compulsory) school-choice alternatives from other parents at their children's preschool (Karsten et al., 2003), and hence preschool contributes at an early stage to forming parents' choices about their children's future schooling. In light of these findings, it is clear that further knowledge concerning various types of segregation in preschools is needed.

In this paper, we provide a snapshot of segregation by various background characteristics in Swedish preschools, aiming to contribute knowledge about equality in the schooling of young children. To do so, we use large-scale, individual-level data on all children attending preschools in Sweden, examining the occurrence of segregation on preschool level and the extent to which it reflects the social and ethnic composition of the neighbourhoods where the children live. Furthermore, we inquire how preschool segregation is related to market initiatives that enable parents to choose between different providers. Drawing on literature addressing school choice and school segregation, we focus on three aspects of school enrolment that may also have an impact on preschool segregation: (i) competition between private and public providers, (ii) levels of residential segregation, and (iii) the educational background of parents. We further elaborate on these aspects of preschool enrolment in the literature review, and develop and test three hypotheses.

We begin by providing a brief description of the Swedish case and then turn to the literature review. Given the small number of studies on preschool segregation, much of the literature discussed concerns the compulsory school system. The literature review is followed by a section on data and methods, in which we discuss our data sources and analytical strategy. We then present our empirical material and analyses. In the concluding section, we discuss the findings and offer some policy recommendations and topics for future research.

The Swedish case

Early Childhood Education and Care (ECEC) in Sweden consists of preschools¹ that follow a national curriculum and accept children between the ages of one and five. Within this publicly funded system, the majority of preschools are municipally run. However, private providers such as corporations, cooperatives, and foundations are also allowed to establish preschools. Both private and public providers are allocated economic means through a voucher system administered by the municipalities. All children of parents who work or study are entitled to a place in preschool. From the age of three, children have the legal right to receive a minimum of 525 h of childcare per year, regardless

of their parents' employment status (*Education Act* (2010:800)).

Unlike with formal schooling, parents in Sweden have to pay to place their children in preschool. However, the fees are heavily subsidized, and all types of preschool providers are regulated by a system of maximum fees stipulated by *The Education Act*, which states that costs should be reasonable. The fees might differ somewhat across the country, as each municipality sets costs individually, but all municipalities follow the guidelines for setting a maximum fee. This is calculated as 3 per cent of the household's monthly income (up to 4,900 EUR/month), which means the monthly preschool fee cannot exceed 150 EUR. The cost is reduced to 2 per cent for a second child in preschool, and 1 per cent for a third child. Preschools are not allowed to charge any further costs beyond this fee. Furthermore, the fees are reduced by approximately 25 per cent from the time the child turns three and is entitled to 525 h of free childcare. At the same time, all parents in Sweden receive universal child support for each child, with an additional supplement for large families, which is congruent with the preschool fee (117 EUR per month and child).

Sweden has favourable parental leave conditions. Benefits are paid for 480 days per child, 390 of which are compensated based on income. *The Education Act* states that when a child turns 1 year old, the municipality should offer a place in a preschool close to the child's residence within 4 months after application. Hence, municipal admission systems customarily require that parents stand in a queue by ranking their preschool choices 4 months ahead of enrolment. Admission to preschools differs between municipalities, but the following oversubscription criteria are often used: special needs, priority to older children, priority to siblings, and time in the admission system.

Parents are free to choose between public and private preschool providers within their municipality of residence. Admission is determined by either the municipality or the private provider. In more urban areas, municipalities often have a central admissions system that includes both public and private providers. However, not all private providers are necessarily included in the admission system; they sometimes have their own application system to which interested parents must apply directly. It is not known to what extent private providers outside the municipal admission system follow the above-mentioned oversubscription criteria. Regarding the choice of preschool, municipalities often provide a joint website with general information about public and private preschools, usually produced by the preschools themselves. On request, parents typically have an opportunity to visit different preschools before applying. Whilst all parents have the right to

apply, and the distribution of places follows the municipalities' guidelines for admission, the existence of multiple application paths requires parents to navigate the system.

Choosing a preschool has become an important first step in families' educational strategies, enabling them to choose a desirable social context for their children. Thus, the choice of preschool has a crucial impact on the social structuring of children's upbringing in Sweden. Official data for 2017 shows that 509,784 children (about 85% of all 1–5 year-olds) attended preschool in Sweden, divided among the 9,791 preschools. If one inspects the share of 5-year-olds attending preschool, the number is 95 per cent. In 2017, 80 per cent attended a public provider, 10.9 per cent a for-profit provider, 5.4 per cent a non-profit private provider, and 3.7 per cent a parent cooperative. In addition, about 5,000 children under the age of six are enrolled with childminders. Childminders' operations are governed by the school law, but it is not compulsory for them to follow the preschool curriculum.

According to [The Swedish National Agency for Education \(2018\)](#), children with foreign background—born abroad or with two parents born abroad—are enrolled in preschool to a lesser extent than children with Swedish background. Children with foreign background constitute 23 per cent of all children in Sweden, and among them children from newly immigrated families are overrepresented among the 3–5 year-olds who are not enrolled in preschool. In 2016, 94 per cent of 3–5 year-olds with Swedish background were enrolled in preschool, while the corresponding figure for children with foreign background was 89 per cent. Economic and educational background also reflects preschool enrolment. Almost 64 per cent of foreign-born 3–5 year-olds lived in households with a low economic standard in 2016. The corresponding share for children born in Sweden was 19 per cent. Furthermore, children of parents with a high educational level are enrolled in preschool to a greater extent than children of parents with less education. In 2016, 94 per cent of all children (3–5 year-olds) of parents with post-secondary education were enrolled in preschool, whilst the corresponding figure for parents with compulsory education was 87 per cent.

School choice and segregation: a literature review

It is reasonable to assume that choosing a preschool has become more important for parents due to the increasing formalization of preschool curricula and the growing role of preschools in the Swedish school system. Given the lack of large-scale surveys on preschool choice, this section mainly deals with school

segregation in more general terms to provide theoretical background for discussing preschool segregation. However, we argue that many of the negative effects of segregation in schools also apply to preschools.

Families whose children commute to other schools than the closest one often have higher socioeconomic status (SES) than those who opt for the closest school ([Levin, 1998](#); [Andersson, Malmberg and Östh, 2012](#)); there is also evidence that so-called white flight occurs when the share of minority students increases (e.g. [Card, Mas and Rothstein, 2008](#)). Findings also suggest that the student composition of schools is affected by the private options available; having more private actors in the school market increases the concentration of high-SES students in some private-sector schools ([Ladd and Fiske, 2001](#); [Hsieh and Urquiola, 2006](#); [Trumberg, 2011](#)). Another strand of research, focussing on the effects of free school choice, suggests that it increases socioeconomic and ethnic segregation in schools (e.g. [Söderström and Uusitalo, 2010](#)), while some studies find relatively limited impact ([Böhlmark, Holmlund and Lindahl, 2016](#)). In the context of free school choice, segregation may occur through parents' skill in navigating the school market and preferences regarding the types or locations of schools. Findings from earlier research suggest that well-informed parents have an advantage when it comes to selecting schools and placing their children on waiting lists to increase their chances of admission to desirable schools. This is not possible for parents with less information, and it may be especially difficult for parents with foreign background. The importance of lack of information and knowledge should not be underestimated, nor should that of peer-group choices and preferences. In addition to parents' choices, residential segregation and schools' selection of students are also of importance ([Jenkins, Micklewright and Schnepf, 2008](#)). Using detailed individual-level data, it has been shown how neighbourhood demographic composition and individual-level attributes affect the choice of preschools (for Norway, see [Drange and Telle, 2020](#)) and compulsory schools (for Sweden, see [Malmberg, Andersson and Bergsten, 2014](#)).

The link between school segregation and residential segregation is relatively straightforward. If the catchment areas of schools determine who attends them, residential segregation patterns will be reflected in the schools. An increase or decrease in school segregation is then linked to parents' choice of neighbourhood. In a system of free school choice, school segregation and residential segregation may be closely tied, but may increase further if parents opt out of geographically close schools and send their children to socially or ethnically more homogeneous schools in other areas.

Jenkins, Micklewright and Schnepf (2008) further propose that the potential selection of students for admission to a particular school is a factor influencing segregation levels (compare Drange and Telle (2020) for preschools). Since there are no tuition fees in Swedish compulsory school, and preschool fees are heavily subsidized, various other aspects could affect choice. It is possible that schools select their students, but also that some information only reaches certain groups. In the case of preschools, some private preschool alternatives may cater to middle-class families that can take part in the everyday preschool activities. Parents who choose these alternatives may have flexible jobs enabling them to engage in more or less compulsory activities.

It is unclear what the possible effects of preschool segregation could be. Some studies show better results in compulsory school after the free-choice reform, as free choice stimulates competition (e.g. Ahlin, 2003). Others, however, show that this is not the case (Hennerdal, Malmberg and Andersson, 2018), and clustering of high-performing students and grade inflation are instead found to drive better grades in areas with high competition between schools. Since grading does not exist in preschools, such clear indicators of segregation effects are lacking. In discussing the effects of preschool segregation, it is important to consider the possibility that information about compulsory schooling alternatives is informally or formally disseminated at the preschool level (Karsten et al., 2003). Hence, access to such information, together with parents' educational, ethnic and socioeconomic background, could affect future choices. It should be noted that in many municipalities, parents' choices of preschools for their children are constrained by the lack of available preschool places. Sometimes they must simply accept the first slot that becomes available, which affects where their children attend preschool.

The importance of mixed groups in preschools is emphasized in many countries (for the United States, see Frankenberg, Garces and Hopkins, 2016). Preschool segregation undermines such goals. However, preschool is rarely compulsory, and there is probably a selection into preschools of children whose parents have a certain socioeconomic background.

Earlier research on preschool segregation has found that high shares of children with a minority background coincide with higher levels of children from low-income households. Such segregation affects language skills and could increase racial prejudice (Reid, 2016). Mixing population groups in preschool enhances language ability, not only for minority children but also for those from socioeconomically weaker households (Schechter and Bye, 2007). Further, Drange and Havnes (2019) show positive effects on cognitive development for children enrolled in childcare at an early age. This

is especially the case for children from more disadvantaged backgrounds. In the previously mentioned study from Norway, Drange and Telle (2020) show that preschool segregation is driven by advantaged groups who cluster in higher-quality preschools. In a recent study of the Greater Stockholm region, Fjellborg and Forsberg (2022) show that commuting to preschool is more common among children with highly educated parents, which accords with results from compulsory school (Andersson, Malmberg and Östh, 2012). This is especially common among children with foreign-born parents with high education. The authors conclude that educational capital is important for navigating the preschool market. However, differences between Swedish and foreign-born parents are attributed to the varying possibilities these groups have to choose where to live in the city. Foreign-born parents with high levels of education need to have their children commute to the preschools they prefer. These preschools are more often located closer to where socioeconomically stronger Swedish-born parents live.

Having reviewed the literature on school segregation and preschools, we arrive at three hypotheses that will be tested in the following empirical section. First, (i) in municipalities with a high share of private preschools, the segregation of children with highly educated, high-income parents is higher in the preschools than in the neighbourhood. Second, compulsory schools in neighbourhoods with a large share of children with foreign background usually have lower levels of children with Swedish background than would be anticipated based on the neighbourhood composition. Therefore, we hypothesize that (ii) municipalities with a high share of foreign-background children experience higher preschool segregation than neighbourhood segregation. Lastly, parents' educational level is important for school choice, and hence high education is a factor for the clustering of children; therefore (iii) we anticipate higher preschool segregation than neighbourhood segregation for children of highly educated parents.

Data and methods

In this paper, we make use of a unique dataset compiled by Statistics Sweden (SCB) that includes information on all children enrolled in any type of preschool in 2017.² The dataset includes each child's age and home neighbourhood, as well as the age, income, educational level, occupation, and birth country of the parents. Lastly, information on the preschools includes geographical location and whether each preschool is publicly (municipal) or privately (cooperative or for-profit) run and how many children are enrolled. The descriptive statistics and definitions of individual-level variables are found in Table 1. The data allows for a variety

Table 1 Key descriptive statistics of preschool children in Sweden, 2017

		N	%
Parents' educational background	Low education (Primary/Upper sec. education)	186,604	36.4
	Mid Education (Post-secondary education/ Higher education <4 years)	113,350	22.1
	High Education (Higher education >3 years)	199,829	39.0
	Missing educational information	12,319	2.4
Disposable income	Low income (disposable income decile 1–3)	153,538	30.0
	Mid income (disposable income decile 4–7)	204,877	40.0
	High income (disposable income decile 8–10)	153,627	30.0
	Missing income data	60	0.0
Ethnic background	Foreign background (foreign-born or born in Sweden with two foreign-born parents)	115,229	22.5
	Swedish background (born in Sweden with at least one Swedish-born parent)	396,873	77.5
Gender	Boys	263,932	51.5
	Girls	248,170	48.5
Age	1–2 years	168,350	32.9
	3–6 years	343,752	67.1
	Total N	512,102	100.0

Source: Authors' calculations using data from Statistic Sweden.

of studies to be conducted. Since this is the first study to use this dataset and is also the first large-scale systematic study of segregation in Swedish preschools, we limit the analysis to making comparisons between preschool and residential segregation at the municipality level. We compare the segregation levels in neighbourhoods and preschools in municipalities and investigate aspects correlating with the segregation gap between these two entities.

One drawback with using this data source is that we only have information on preschool children and their parents. We do not know the geographical distribution of other demographic groups (single households, couples without children or with only school-aged children, or children not attending preschool). Therefore, this research is unsuitable for drawing far-reaching conclusions on residential segregation in general. It does, however, show the distribution of younger children and their parents, as well as the peer composition of the neighbourhoods and preschools where these children spend a large part of their daily life.

The second caveat of this dataset pertains to geography. Some neighbourhoods where children live do not have a preschool, which makes it problematic to

make paired comparisons of neighbourhoods and the preschools located within them. Since the administrative unit for preschools is the municipality, and this is the level where decisions are taken on preschool provision, it is reasonable to take the municipal level as a starting point. We use Statistics Sweden's neighbourhood delineation demographic statistical output areas (DeSO) to define neighbourhoods. These are relatively new ([Statistics Sweden, 2018](#)), but have been shown to be useful proxies for neighbourhoods in earlier studies ([Alm Fjellborg, 2018](#)). The neighbourhood definition DeSO comprises 5,985 areas with total populations ranging from about 700 to 2,700 individuals. As with all geographical aggregations, the modifiable area unit problem needs to be considered ([Openshaw, 1984](#)). The borders of any spatial unit may be seen as more or less arbitrary in relation to each individual's life world, and these borders affect the calculation of segregation indices. Segregation tends to increase with smaller spatial scales because they allow for more variation. The rather large size of DeSO areas in rural municipalities, combined with the similar size of preschools across all municipality types, should accordingly yield larger

preschool-to-neighbourhood segregation differences in rural municipalities, because fewer DeSO areas capture a larger part of the municipal population; and indeed we do find such patterns. Segregation is higher in metropolitan neighbourhoods, in part because the DeSO areas are smaller due to higher population density. Preschool units' populations tend to be smaller and have smaller variation in rural areas, while the standard deviation of preschool populations is higher in metropolitan and large city municipalities. Nevertheless, we have concluded that these neighbourhood proxies are useful for the type of analysis intended, namely to describe the potential segregation gap between preschools and neighbourhoods comparing different types of municipalities.

Analytical strategy

We use the isolation index (I)³ to measure segregation (Massey and Denton, 1985) and to compare residential and preschool segregation levels. The isolation index measures the likelihood of meeting a peer from the same subpopulation group in the neighbourhood of residence or the preschool. There is one single measure for the entire municipality, and we calculate this measure for preschools and neighbourhoods in each municipality. The isolation index is easily confused with the exposure index, which measures the likelihood of an individual from a minority group meeting someone from the majority group in the entity studied (e.g. preschool or neighbourhood). We opt for the isolation index and thus measure the probability of each child meeting a peer from the same group (by parents' level of income, education, or foreign background). The isolation index is not symmetric, meaning that the probability of a child with high-income parents meeting another child with a similar background is not the inverse of a child with low-income parents meeting a peer with a similar background. We make use of three levels of income and education to identify low- and high-SES background children. We exclude the mid education and income levels from the analysis. This is mainly to streamline the presentation by focussing on groups with high or low levels of economic and social capital.

To exemplify this, our findings show that in Metropolitan municipalities the isolation index for children with low educational background is 0.38 in preschools and 0.39 in neighbourhoods. This means that the probability of a child with low-educated parents meeting a child with similarly low-educated parents is 0.38 in preschools and 0.39 in the neighbourhood. This indicates that children with low educational background are less isolated in preschools than in neighbourhoods.

Isolation indices (I) are calculated for high and low educational background, high and low-income and for the foreign background group (definitions in Table 1) using all neighbourhoods with more than 10 children in them, and only using preschools (thus excluding childminders). In the empirical section, we start with descriptive statistics of the isolation indices in different types of municipalities using the Swedish Association of Local Authorities and Regions' municipality typology (2016). We aggregate the isolation indices from each municipality to the municipality-type level. This measure thus displays the average isolation experienced by individuals in each type of municipality. The typology is based on population density, population count, labour market structure, commuting, and geographical location. Key descriptive statistics at the municipality-type level are presented below. The different municipality types are metropolitan municipalities (i.e. Stockholm, Gothenburg, and Malmö municipalities), suburban municipalities surrounding these metropolitan municipalities, large city municipalities (i.e. larger cities), large city commuter municipalities (i.e. municipalities adjacent to larger cities with considerable commuting to the larger city), small city municipalities (with semi-rural adjacent municipalities), and rural municipalities.

We use a *segregation ratio* (the isolation index for preschools divided by the index for neighbourhoods) to display the difference between preschool and neighbourhood segregation. We subtract one from the segregation ratios, thus letting zero indicate no difference between preschools and neighbourhoods. A positive segregation ratio accordingly means higher segregation in preschools than neighbourhoods. The different segregation ratios are used as dependent variables in regression models to analyse the correlation between municipality-level characteristics and the difference between preschool and neighbourhood segregation (following (Burgess et al., 2007)). This analysis aims to reveal the main correlations between the segregation ratio and municipal and preschool market characteristics; here we use one observation of the segregation ratio for each of the 290 municipalities.

Segregation levels by municipality type

When examining the descriptive, large-scale patterns of population and preschool characteristics across municipality types (Table 2), it becomes clear that the shares of foreign-background residents, high-income earners and high-education parts of the population are higher in metropolitan, suburban, and larger city municipalities. It is also noteworthy that independent preschools make up a larger proportion of preschools in metropolitan and suburban municipalities than in other parts of Sweden.

Table 2 Descriptive statistics for preschools and preschoolers, number of children in each category, across municipality types in Sweden, 2017

		Metropolitan		Suburban		Large city		Close to large city		Small city		Rural	
		N	%	N	%	N	%	N	%	N	%	N	%
Preschool type	Parental cooperative	4,194	4	4,688	5	4,247	3	2,126	3	1,847	3	1,267	2
	Staff Cooperative	1,633	2	2,054	2	2,472	2	1,123	2	1,406	2	935	2
	Other	19,071	20	24,174	23	14,449	12	6,414	9	5,151	8	3,120	6
	Municipal (public)	72,713	74	72,648	70	101,638	83	62,341	87	53,225	86	49,165	90
	Total	97,611	100	103,564	100	122,806	100	72,004	100	61,629	100	54,487	100
Preschool provider	Municipal (public)	71,494	73	71,134	69	100,609	82	61,682	86	52,906	86	49,032	90
	Independent (private)	26,117	27	32,430	31	22,197	18	10,322	14	8,723	14	5,455	10
Childcare type	Preschool	95,910	98	100,976	98	120,443	98	70,308	98	60,669	98	53,292	98
	Childminder	1,701	2	2,588	2	2,363	2	1,696	2	960	2	1,195	2
Preschoolers and households	Foreign background	29,160	30	21,178	20	30,189	25	13,441	19	10,635	17	10,626	20
	Swedish background	68,451	70	82,386	80	92,617	75	58,563	81	50,994	83	43,861	80
	Boys	50,148	51	53,523	52	63,343	52	37,113	52	31,735	51	28,070	52
	Girls	47,463	49	50,041	48	59,463	48	34,891	48	29,894	49	26,417	48
	Low income	24,357	25	30,700	30	42,448	35	34,490	48	26,242	43	28,366	52
	High income	37,927	39	46,431	45	33,006	27	14,454	20	13,298	22	8,511	16
	Low education	24,357	25	30,700	30	42,448	35	34,490	48	26,242	43	28,366	52
	High Education	46,327	47	45,942	44	52,036	42	20,669	29	21,167	34	13,688	25

Source: Authors' calculations using SCB data.

Table 3 Isolation indices for neighbourhoods and preschools across municipality types

	Metropolitan		Suburban		Larger city		Close to large city		Small city		Rural	
	n:hood	Preschool	n:hood	Preschool	n:hood	Preschool	n:hood	Preschool	n:hood	Preschool	n:hood	Preschool
Low education	0.39	0.38	0.36	0.37	0.42	0.43	0.53	0.51	0.47	0.47	0.56	0.54
High education	0.57	0.59	0.5	0.5	0.5	0.49	0.33	0.36	0.39	0.4	0.28	0.33
Low income	0.46	0.44	0.3	0.3	0.46	0.43	0.4	0.4	0.4	0.38	0.42	0.42
High income	0.55	0.55	0.53	0.52	0.37	0.36	0.24	0.27	0.27	0.28	0.18	0.23
Foreign background	0.52	0.53	0.31	0.32	0.46	0.45	0.32	0.32	0.33	0.33	0.3	0.32

Source: Author's calculations using data from Statistic Sweden.

The isolation indices for neighbourhoods and preschools across municipality types in Table 3 show that the isolation of children with highly educated parents

in metropolitan areas is quite high compared to other municipalities; the same holds for foreign background and income isolation.

The isolation indices of neighbourhoods and preschools are correlated. However, there is a variation that needs to be addressed. In some municipality types, the isolation index of low-educated groups tends to be greater in preschools than at the neighbourhood level. A child with low-educated parents in suburban and large city municipalities is more likely to meet another child with a similar background at preschool than in the neighbourhood. In other types of municipalities, this is not the case. Notably, the segregation of children from low-income households is lower in preschools than in the neighbourhoods. Finally, the isolation index for children with foreign background is higher in preschools than in neighbourhoods in metropolitan and suburban municipalities, which is not the case in other municipality types.

In Figure 1 the isolation indices have been transformed into segregation ratios to better display the differences between preschool and neighbourhood segregation (excluding rural municipalities from the figure to enhance readability).

The most striking result is that the segregation ratios for high and low education tend to be higher in more urban settings, while the segregation ratio for income is negative, indicating that the level of segregation by income in preschools is lower than in neighbourhoods. In large and small city municipalities, the segregation ratio of children with highly educated parents corresponds with that of children with a high-income

background. This is not the case in metropolitan and suburban municipalities with high levels of residential segregation. This implies that in these contexts, preschool choice is important for understanding the dynamics of preschool segregation. At the same time, a higher segregation ratio for educational background in metropolitan and suburban municipalities is not correlated with a higher segregation ratio for income. Instead, income segregation tends to be lower in preschools. These results are conspicuous, since income and educational-background variables are usually highly correlated.

The above analysis has also been run for younger and older preschool children separately. Since the fee for attending preschool is reduced at age three in Sweden, the below analysis separates children aged 1–2 from children aged 3–5 and measures the segregation ratios for each age group. Even if the stratification by age is not an analysis of the age of enrolment, the outcome is interesting in relation to previous research showing that early entry into preschool has positive effects on language and mathematics skills (Drange and Havnes, 2019). In Figure 2, the segregation ratios are displayed. We make use of the total population of children to calculate the residential isolation index (the same as in Table 3 and Figure 1, thus using this as the denominator when calculating the segregation ratio).

The segregation ratio for low-income children below the age of three is positive in metropolitan

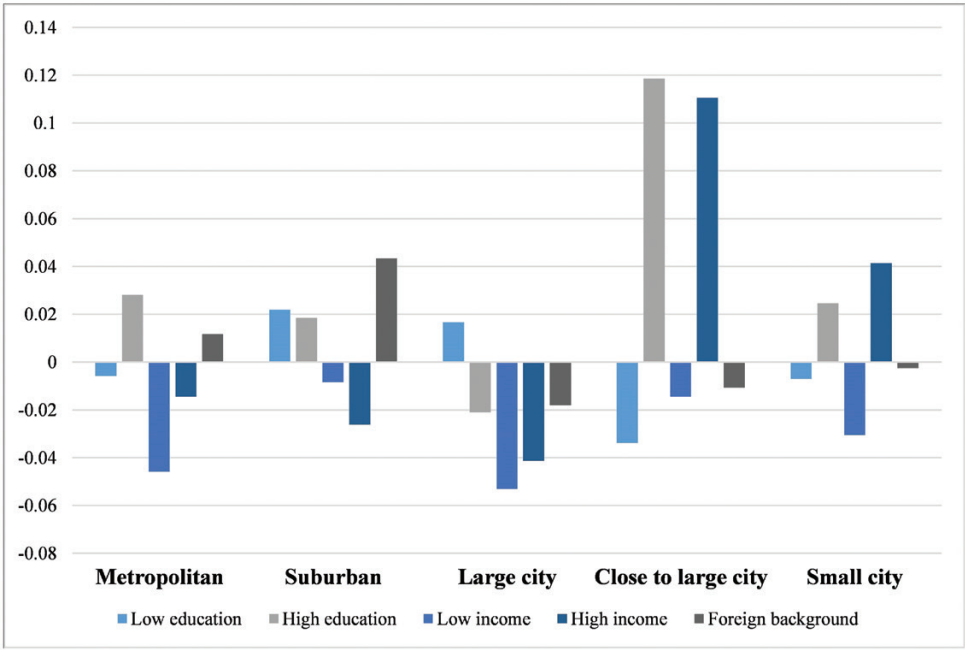


Figure 1 Segregation ratios by municipality types in Sweden, 2017.

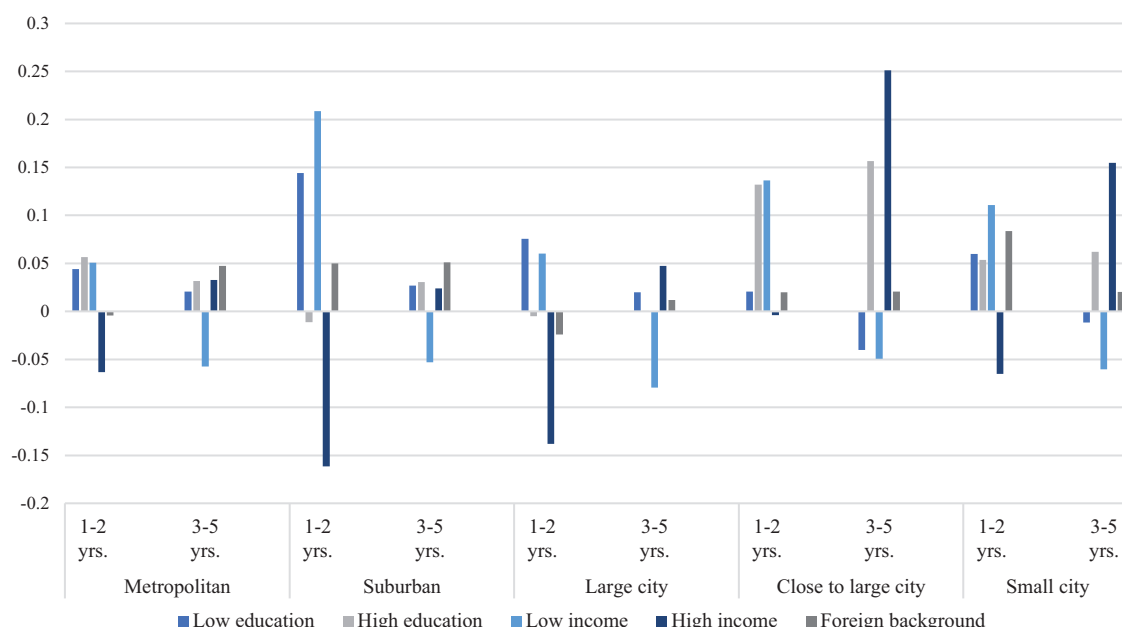


Figure 2 Segregation ratios for children under 3 years old and over 2 years old respectively, by municipality types in Sweden, 2017.

municipalities, while the opposite is found in the older age group. There is also a higher segregation ratio for educational background for the younger group in metropolitan areas, even if both age groups exhibit positive segregation ratios. The segregation ratio for high income is higher for older children, while the low-income segregation ratio is higher for younger children. Stratification by age shows that the segregation ratio for low education is more pronounced for younger children, while the high-income segregation ratio is more pronounced in the older age group; this is consistent across municipality types. The segregation ratio for low income and low education is higher among younger children, while the segregation ratio for low income is lower among older children. This may be an effect of the necessity to place children in preschools at an earlier age when parents have low education and/or low income. It should be noted that this is not an analysis of differences in age of enrolment. Instead, the analysis provides a snapshot of isolation by age in Swedish preschools in 2017. However, it is still notable that the segregation ratios of younger children (often more recently enrolled) with low income and educational background show positive values.

Discrepancies at the municipal level between preschool and neighbourhood segregation

We use the segregation ratios at the municipal level as dependent variables in a set of regression models

to ascertain what the discrepancies between neighbourhood and preschool segregation could depend on. We still define the segregation ratio as the preschool isolation index divided by the neighbourhood isolation index, as outlined above. Positive coefficients indicate a positive correlation between the variables and a higher segregation ratio, that is, a higher isolation index in preschools relative to neighbourhoods. We include independent variables that the reviewed literature suggests are important factors for understanding the degree of segregation in compulsory schools and applying them to preschools. From a policy perspective, the public debate about free choice of compulsory schools revolves around economic segregation and segregation based on children's or parents' country of birth. However, given the findings highlighted in Figure 1, we also see value in considering the segregation ratio for educational background when discussing preschool segregation.

Private providers tend to increase segregation

We first discuss results of the analysis of educational background, then income and finally foreign background. To begin with, the share of children with a low educational background at the municipal level is positively correlated with the segregation ratios for both the high and low educational background groups (see Table 4).

Higher shares of highly educated parents in the municipality are correlated with higher segregation ratios for low educational background. A higher share of high-income and low-income earners also coincides with a higher segregation ratio for educational level. Finally, the segregation ratios for children with differing educational backgrounds are higher when the share of preschoolers who do not commute outside their neighbourhood is higher; the rather small coefficients should be noted. At the same time, high shares of public providers correlate with a higher segregation ratio for children with low educational background, and with a lower segregation ratio for children with high educational background. Thus, we can conclude that commuting is associated with lower isolation of children with both high and low educational backgrounds in preschool. The presence of more public preschools is associated with lower segregation ratios for children with highly educated parents; the opposite is found for children with less-educated parents. When analysing the segregation ratios for the different income groups,

we note that the share of public providers strongly correlates with a higher segregation ratio for children with low-income background and displays a negative correlation with the segregation ratio for children from high-income families. In municipalities where fewer children commute, the segregation ratio for children with low-income background tends to be higher.

Regarding children with foreign background, high shares of children with foreign background in the municipalities are negatively correlated with the segregation ratio of the foreign-background group. A low level of commuting is associated with a lower segregation ratio for children with foreign background.

To sum up, the level of segregation at preschool relative to the neighbourhood is dependent on children not commuting to another neighbourhood to attend preschool. When children attend preschool in the same area, isolation of children with low income and foreign background decreases in preschools. This shows that commuting contributes to increased isolation of these groups in preschools, compared to neighbourhoods,

Table 4 OLS regression. Associations with higher preschool segregation. The dependent variable is the segregation ratio. Observation at the municipal level, $N = 290$

Index	Low education	High education	Low income	High income	Foreign background
Variables	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.
Constant	-0.171 (0.006)***	0.693 (0.006)***	0.377 (0.007)***	0.398 (0.012)***	1.535 (0.015)***
Share not commuting	0.075 (0.001)***	0.004 (0.001)***	0.024 (0.001)***	0.002 (0.002)***	-0.018 (0.002)***
Share public PS	0.167 (0.001)***	-0.074 (0.001)***	0.154 (0.002)***	-0.145 (0.003)***	0.136 (0.004)***
Share high income	0.664 (0.004)***	0.399 (0.004)***	0.49 (0.005)***	-0.165 (0.008)***	-0.079 (0.01)***
Share low income	0.618 (0.004)***	0.136 (0.004)***	-0.33 (0.005)***	0.528 (0.009)***	-0.389 (0.011)***
Share high education	1.258 (0.007)***	-0.119 (0.007)***	0.65 (0.008)***	0.8 (0.014)***	-0.126 (0.017)***
Share low education	0.516 (0.007)***	0.895 (0.007)***	0.795 (0.008)***	1.29 (0.014)***	0.055 (0.018)**
Share foreign background	0.099 (0.003)***	0.054 (0.003)***	-0.29 (0.003)***	-0.368 (0.006)***	-1.793 (0.007)***
Metropolitan (Close to large city = ref.)	-0.176 (0.001)***	-0.007 (0.001)***	-0.04 (0.001)***	-0.026 (0.002)***	0.109 (0.002)***
Suburban (Close to large city = ref.)	-0.021 (0.001)***	-0.072 (0.001)***	-0.002 (0.001)**	-0.073 (0.001)***	0.106 (0.002)***
Large city (Close to large city = ref.)	-0.07 (0.001)***	-0.09 (0.001)***	-0.074 (0.001)***	-0.149 (0.001)***	-0.033 (0.001)***
Small city (Close to large city = ref.)	-0.012 (0.001)***	-0.061 (0.001)***	-0.049 (0.001)***	-0.09 (0.001)***	-0.104 (0.001)***
Rural (Close to large city = ref.)	0.004 (0.001)***	0.036 (0.001)***	-0.008 (0.001)***	0.14 (0.001)***	-0.013 (0.001)***
R ²	0.484	0.528	0.422	0.391	0.36
N	290	290	290	290	290

Source: Author's calculations using data from Statistic Sweden.

Notes: P -values $<0.001 = ***$, $<0.005 = **$, $<0.010 = *$. The models are weighted by population count at the municipality level.

Table 5 OLS regression. Associations with higher preschool segregation. The dependent variable is the segregation ratio. Observation at the municipal level. Only 1–2 year-olds

Modelled index	Low education	High education	Low income	High income	Foreign background
Variables	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.
Constant	–0.13 (0.01)***	0.561 (0.011)***	1.047 (0.012)***	–0.085 (0.019)***	1.535 (0.024)***
Share not commuting	0.125 (0.002)***	–0.036 (0.002)***	0.007 (0.002)***	–0.099 (0.003)***	–0.096 (0.004)***
Share public PS	0.012 (0.003)***	0.056 (0.003)***	0.166 (0.003)***	0.056 (0.005)***	0.223 (0.007)***
Share high income	0.964 (0.007)***	0.4 (0.008)***	0.547 (0.008)***	0.555 (0.013)***	–0.025 (0.016)
Share low income	0.722 (0.007)***	–0.001 (0.008)	–0.225 (0.009)***	0.777 (0.014)***	–0.038 (0.017)*
Share high education	1.352 (0.011)***	–0.014 (0.012)	0.159 (0.013)***	0.706 (0.021)***	–0.16 (0.026)***
Share low education	0.57 (0.011)***	1.044 (0.013)***	0.167 (0.014)***	1.479 (0.022)***	0.013 (0.027)
Share foreign background	0.044 (0.005)***	0.052 (0.006)***	–0.816 (0.006)***	–0.604 (0.01)***	–2.378 (0.012)***
Metropolitan (Close to large city = ref.)	–0.242 (0.001)***	0.053 (0.002)***	–0.109 (0.002)***	–0.001 (0.003)	0.086 (0.004)***
Suburban (Close to large city = ref.)	–0.031 (0.001)***	–0.069 (0.001)***	0.049 (0.002)***	–0.124 (0.002)***	0.194 (0.003)***
Large city (Close to large city = ref.)	–0.077 (0.001)***	–0.074 (0.001)***	–0.092 (0.001)***	–0.135 (0.002)***	–0.041 (0.003)***
Small city (Close to large city = ref.)	0.002 (0.001)	–0.042 (0.001)***	–0.069 (0.001)***	–0.067 (0.002)***	–0.056 (0.003)***
Rural (Close to large city = ref.)	0.019 (0.001)***	0.059 (0.001)***	0.002 (0.001)	0.154 (0.002)***	–0.026 (0.003)***
R ²	0.589	0.471	0.563	0.404	0.43
N	290	290	290	290	290

Source: Author's calculations using data from Statistic Sweden.

Notes: *P*-values <0.001 = ***, <0.005 = **, <0.010 = *. The models are weighted by population count at the municipality level.

which accords with findings for compulsory school (Andersson, Malmberg and Östh, 2012), where socio-economically stronger households have been found to make their children commute. For preschools as well, higher SES is associated with commuting, especially when the family's socioeconomic characteristics differ from those of the neighbourhood where they live (Fjellborg and Forsberg, 2022).

Contrary to findings from the United States discussed by Frankenberg, Garces and Hopkins (2016), the preschool-to-neighbourhood segregation ratio of children with foreign background is positively correlated with higher shares of enrolment in public preschools. This could be an effect of private preschools attracting preschoolers with a variety of backgrounds in Sweden; however, those who decide to stay in their neighbourhood and not commute are more often of foreign descent (Fjellborg and Forsberg, 2022). At the same time, municipalities with a relatively high share of foreign-background residents also have higher shares of private preschool providers (Table 2).

Lastly, all models have been tested with the residential isolation index as a control variable, as it is reasonable to assume that already high neighbourhood isolation affects levels of preschool isolation. Adding this control variable does not change the interpretation of the results, nor does it change the findings. The R² values increase substantially, and the magnitude of coefficients for explanatory variables tends to be somewhat lower. However, some selection effects of depending on different age groups may be driving the results displayed above. We will address such implications in the final section below.

Segregation by age groups

Figure 2 shows that segregation of children by their parents' level of education is higher in preschools than neighbourhoods in the two age groups. The segregation ratio of children with low educational background is higher in the younger age group, while the high-education segregation ratio is higher in the

older age group. To investigate the possible selection effects related to children's age we regress the segregation ratios for younger and older children separately (Tables 5 and 6) on the same explanatory factors used for the full population (Table 4). The results are in line with the full population model, but with some nuances and differences, highlighted below.

For older children, the association between higher shares of public preschools and lower segregation ratios for those with high-education and high-income background is clear. This shows that in places where there are fewer private preschool options, segregation by these background characteristics is lower in preschools than in neighbourhoods. For the younger age group, the presence of more public preschools is associated with a higher segregation ratio. When we take, for example, the negative correlation between the segregation ratio for high educational background and a high share of public preschools in the full population model and compare it with the coefficients for the older children, we find that the group of older children (3–5

years old), who make up a larger share of all children attending preschool, drives these results. Furthermore, if one compares the relationship between the different segregation ratios and the share of children who do not commute, it emerges that younger children with high-education and high-income background lie behind results showing that commuting increases the segregation ratio for these background characteristics.

Altogether, these patterns in the drivers of segregation in preschool as opposed to neighbourhoods shed new light on how demographics and housing factors structure families' early education strategies. For example, younger families with high education and income may not have had enough time or gathered sufficient capital to attain the housing situation they desire, and therefore use their assets to navigate the educational system more consciously (compare results from Fjellborg and Forsberg, 2022). This group also seems more prone to choose non-public alternatives, as indicated by the negative relation at the municipal level between the share of children in public preschools and the higher

Table 6 OLS regression. Associations with higher preschool segregation. The dependent variable is the segregation ratio. Observation at the municipal level. Only 3–5 year-olds

Modelled index	Low education	High education	Low income	High income	Foreign background
Variables	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.	Coef. (S.E.) Sig.
Constant	-0.027 (0.007)***	0.799 (0.008)***	0.408 (0.008)***	0.788 (0.016)***	1.723 (0.018)***
Share not commuting	0.038 (0.001)***	0.024 (0.001)***	0.003 (0.001)*	0.041 (0.002)***	-0.036 (0.003)***
Share public PS	0.149 (0.002)***	-0.113 (0.002)***	0.16 (0.002)***	-0.191 (0.004)***	0.148 (0.004)***
Share high income	0.472 (0.004)***	0.366 (0.005)***	0.56 (0.005)***	-0.522 (0.01)***	-0.158 (0.012)***
Share low income	0.388 (0.005)***	0.29 (0.006)***	-0.137 (0.006)***	0.501 (0.013)***	-0.444 (0.015)***
Share high education	1.241 (0.007)***	-0.197 (0.009)***	0.449 (0.009)***	0.712 (0.017)***	-0.276 (0.02)***
Share low education	0.467 (0.008)***	0.82 (0.009)***	0.591 (0.009)***	1.129 (0.018)***	-0.129 (0.021)***
Share foreign background	0.197 (0.003)***	-0.067 (0.004)***	-0.312 (0.004)***	-0.432 (0.008)***	-1.77 (0.009)***
Metropolitan (Close to large city = ref.)	-0.136 (0.001)***	-0.037 (0.001)***	-0.027 (0.001)***	-0.077 (0.002)***	0.125 (0.002)***
Suburban (Close to large city = ref.)	-0.013 (0.001)***	-0.083 (0.001)***	-0.018 (0.001)***	-0.1 (0.002)***	0.083 (0.002)***
Large city (Close to large city = ref.)	-0.067 (0.001)***	-0.097 (0.001)***	-0.066 (0.001)***	-0.184 (0.002)***	-0.038 (0.002)***
Small city (Close to large city = ref.)	-0.016 (0.001)***	-0.063 (0.001)***	-0.039 (0.001)***	-0.122 (0.002)***	-0.111 (0.002)***
Rural (Close to large city = ref.)	0.003 (0.001)***	0.037 (0.001)***	-0.021 (0.001)***	0.135 (0.002)***	-0.036 (0.002)***
R ²	0.495	0.517	0.387	0.446	0.343
N	290	290	290	290	290

Source: Author's calculations using data from Statistic Sweden.

Notes: *P*-values <0.001 = ***, <0.005 = **, <0.010 = *. The models are weighted by population count at the municipality level.

segregation ratio for younger children with highly educated parents. This is not the case for older children.

Conclusions

This paper provides the big picture of segregation in Swedish preschools in 2017. Comparing preschool segregation to neighbourhood segregation, we found that the segregation of children by educational background tends to be larger in preschools than in neighbourhoods, in all types of municipalities. The analysis shows variations between segregation at the neighbourhood level and in preschools across municipality types, which in itself is an important finding. This means that Swedish preschools are not capable of achieving a mix of subpopulation groups, which is a policy goal. Instead, preschools reflect, or in some cases deepen, the levels of segregation that children experience in their neighbourhoods. This is especially visible when analysing segregation of children by their parents' level of education. However, segregation by income tends to be lower in preschools than neighbourhoods in metropolitan areas and the suburbs surrounding these metropolitan municipalities, making the results for segregation by education even more interesting.

When investigating correlations between various municipality characteristics and the levels of preschool-to-neighbourhood segregation, we formulated three explicit hypotheses. The first stated that *in municipalities with a high share of private preschools, the segregation of children with highly educated, high-income parents is higher in the preschools than in the neighbourhood*. By including a variable on the share of public preschool enrolment at the municipality level, we found that a high share of children in public preschools is associated with lower segregation in preschools, in comparison to neighbourhoods of children with high-education and high-income background. Furthermore, we find higher segregation of children with foreign background, low income, and low education in places where the share of public preschools is higher. We conclude that having more private preschool options correlates with higher segregation, when analysing educational background and high income.

The second hypothesis was related to so-called white avoidance or white flight. *Municipalities with a high share of foreign-background children experience higher preschool segregation than neighbourhood segregation*, especially when measuring segregation by foreign and Swedish background. Our findings suggest that the share of children with foreign background in a municipality correlates positively with higher preschool-to-neighbourhood segregation of children by their parents' educational level. However, segregation in preschool by income or foreign background is

negatively correlated with the share of foreign-background residents in the municipality, even if preschool segregation for children with foreign background is higher than the corresponding neighbourhood segregation in metropolitan and suburban municipalities.

The literature on ECEC access for low-SES communities indicates that low income and education correlate with reduced use of ECEC, while simultaneously, in the majority of OECD countries, there is a tendency for highly educated women to be more prone to return to work as soon as is feasible, and as a result they are more likely to be open to using ECEC frameworks from an early age (cf. [Petitclerc et al., 2017](#)). Even if such selection effects are reduced in countries with universal ECEC subsidies (e.g. Norway) our findings provide a slightly different picture. For example, income segregation tends to be lower in preschool than in the neighbourhood, and segregation by low education is higher for the 0–2 year-olds, while a different pattern is found for 3–5 year-olds. Generous conditions for parental leave and a fairly long history of gender equality potentially contribute to increasing the symbolic value, for highly educated and higher-income groups in Sweden, of 'investing' in time at home with children. This may be an important contributing factor to how the results for the Swedish case appear to diverge from those of other OECD countries. The social pressure to be a good parent and stay at home with the children may be just as important to consider as the economic benefits of returning to work. Lower-income groups and those with less education might be forced back to work to make ends meet, since parental leave benefits do not fully compensate for salary loss.

Finally, in the third hypothesis, *we anticipate higher preschool segregation than neighbourhood segregation for children of highly educated parents*. We find that a high share of public preschools correlates with a lower segregation ratio of children from highly educated households. This agrees with results from previous research showing that highly educated, middle-class parents are more likely to have their children commute to school ([Andersson, Malmberg and Östh, 2012](#); for preschool commuting, see [Fjellborg and Forsberg, 2022](#)) and to gather in particular (pre)schools. We find segregation by educational level to be the strongest indication of segregation processes in the preschool market, especially as income and educational level often are correlated variables, and the heightened preschool segregation related to income is less than that related to educational level, at least in larger urban areas. We conclude that competition in the preschool market and the free preschool choice allow for stronger segregation of those with high education, which consequently also relates to the segregation of children from families with low education.

To sum up, this study shows that the overall pattern of segregation in preschools reflects the social and

foreign/Swedish-background segregation of neighbourhoods in the municipalities where they are situated. However, we find that private alternatives in the preschool market are associated with an increase in various forms of segregation. Our results show that free preschool choice is important, and that variance in preschool segregation may depend on different factors than compulsory school segregation. We find that segregation of children by their parents' level of education is greater in preschools than in neighbourhoods, while most studies on compulsory school segregation find increasing segregation by ethnicity and income in contexts with free school choice. We do not find increased income segregation in preschools, but rather the opposite. However, in less urban municipalities, segregation of children with high-income and high-education backgrounds covary. Since there are no clear indicators of quality for preschools, these correlations instead describe parents' choices of social environment.

Segregation and preschool choice are conspicuously important aspects of ECEC that need to be further investigated. Stricter rules for admission may, of course, reduce segregation, but segregation by income and other factors may still be problematic, since this type of segregation is stronger in the housing sector. What becomes important is that the positive effects of mixed educational backgrounds become even more difficult to obtain in a free-market and consumer-oriented preschool system. Future studies should explore the impact of the location of preschools particularly favoured by highly educated households, to allow us to understand whether it is possible to mitigate some of the correlations found in this paper through the deliberate siting of certain preschool types. Lastly, it is of course positive that parents are invested in their young children's social and educational development. However, it appears that free-choice and market-based solutions are simultaneously associated with an increase in segregation, which could be harmful for some groups of children. Sweden's preschool policy should consider how the system could be modified to avoid such unintended consequences of privatization and free choice.

Notes

- 1 Childminders (Pedagogisk omsorg) are also available, but they are a diminishing and peripheral service. In 2018, 1.7 per cent of all 1–5 year-olds attended a childminder's service according to The Swedish National Agency of Education. Therefore, our study focuses solely on preschools.
- 2 Calculations have been performed both including and excluding childminders. When including childminders, segregation indices for preschools/childcare are generally somewhat higher than those discussed in the empirical section, indicating that childminders tend to have homogeneous groups of children.

- 3 $\sum_{i=1}^N = [(n_{ia}/N_a) * (n_{ia}/n_i)]$, where n_{ia} represents the number of members of group A (e.g. high-income earners) in neighbourhood or preschool i . N_a denotes the number of members of group A (e.g. high-income earners) in the municipality, and n_i the total population in the neighbourhood or preschool. This equation gives a probability ranging from 0 to 1, where higher values indicate a higher probability of meeting someone from the same group in the neighbourhood or preschool.

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Data Availability

The data supporting the results of this study are available from Statistics Sweden. There are restrictions on the availability of these data, which have been used under licence for this study. The data are available at <https://www.scb.se/en/services/ordering-data-and-statistics/ordering-microdata/> with permission from Statistics Sweden.

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