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Published online: 29 Aug 2023.

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Neighborhood-based factors predicting attendance of early childhood education and care in a universal system: A case of Finland

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ABSTRACT

This study investigates neighborhood-based predictors of attending early childhood education and care (ECEC) in a universal ECEC system. We used child-specific data (N = 1409) from a parent survey conducted in 2019 in Finland combined with zip code data to examine the extent to which neighborhood urbanicity and socioeconomic status (SES) are associated with attendance of ECEC at the age of four. Using binomial logistic regression, we investigated attendance of formal ECEC services in general and center-based ECEC in particular. The results show that neighborhood urbanicity was associated with attendance of ECEC even when family-based variables were controlled. Neighborhood SES was associated with attendance of ECEC only when center-based ECEC was examined in particular. The results highlight the importance of recognizing local barriers to attending different kinds of ECEC services beyond family characteristics, including in universal ECEC systems.

Introduction

In this study, we examine neighborhood-based predictors of attending early childhood education and care (ECEC) in a universal ECEC system. Attendance of high-quality ECEC is considered important in enabling parents' participation in the labor market and promoting children's early learning and development (Dietrichson et al., 2020; Felfe & Lalive, 2018). Despite the globalized trend of increasing enrollment in ECEC (see Mahon, 2016), socioeconomic disparities in attendance are widely reported in earlier research (e.g., van Lancker, 2013; van Lancker & Ghysels, 2016; Petitclerc et al., 2017). Furthermore, socioeconomic and geographic barriers to accessing ECEC and education in general are often intertwined. Lack of availability of high-quality ECEC in low socioeconomic status (SES) neighborhoods makes it more difficult for low-income families to access services (Cloney et al., 2016; Hatfield et al., 2015; Vandenbroeck et al., 2008). Poor availability and time-consuming transportation to ECEC complicates work–family consolidation (McLean et al., 2017), particularly for those with non-standard working hours (Vandenbroeck et al., 2008). This can make it difficult for families to access ECEC, especially in rural areas where long distances might be involved (Paananen et al., 2019).

Universal ECEC is often recommended as a good way to increase enrollment but also to enhance equality among children (Barnett, 2010; Esping-Andersen, 2015). The idea of universalism refers to the rights-based approach to accessing services, suggesting that all children have the right to ECEC, regardless of where they live and their family's socioeconomic background (see Bergh, 2004). The Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden) have often been presented as examples of universal ECEC systems, whereby all children have a legal entitlement to publicly provided, high-quality, full-time education and care (Karila, 2012). Indeed, in a cross-country comparison, parents from the Nordic countries perceived ECEC services to be more accessible than parents from other European countries (Ünver et al., 2018). However, the Finnish case exemplifies why the existence of a universal ECEC system does not guarantee equal access to it. According to the Finnish Institute for Health and Welfare (THL, 2020a), the ECEC enrollment rate of 1–6-year-old children in 2019 varied from 67% to 83% between the regions. In addition, there are local differences in type of ECEC (center-based ECEC, family daycare, or both) available to families (see Vlasov et al., 2019). The Finnish case offers an illustrative example of how the legislation-based universal entitlement to ECEC needs to be accompanied by other measures to ensure equal access. Regardless of being "universal", the ECEC systems might include barriers which narrow the number of children and families who are actually able to utilize the services. If local barriers to accessing ECEC remain unrecognized, childcare decisions made by families might be interpreted only as a question of parental *choice* (see Skattebol, 2016; Vandenbroeck & Lazzari, 2014). This might lead to problematic, coercive ECEC policies that target families who in public and professional discourse are categorized as "at risk" and are not using ECEC services (Vandenbroeck & Lazzari, 2014).

We argue that, to understand disparities in access to ECEC, we should treat socioeconomic and geographic barriers as interrelated and focus on the subnational level, i.e., "who gets what where" (Lobao et al., 2007, p. 2). By doing so, we take a relational approach to accessing ECEC. We maintain that barriers to access do not appear the same for every family at all times and in all places. Rather, parental decisions regarding children's ECEC attendance are produced within a complex network of social and material relations, in which the place and the connections families have with it, differ (see Massey, 2005). In this article, we investigate whether the urbanicity or socioeconomic status of a neighborhood are associated with ECEC attendance within the context of the universal system in Finland when the socioeconomic background of the family is controlled for.

The Finnish context

Aligning with the other Nordic countries, the Finnish ECEC system relies heavily on public provision and has been considered a part of universal welfare services since the 1970s. In the 1990s, children received legal entitlement to an ECEC place regardless of their parents' employment status. Children are entitled to an ECEC place from 9–10 months old, directly after the paid parental leave ends. This entitlement ends at the beginning of compulsory education (ECEC, 540/2018 Act). ECEC fees are income-tested and charged based on the number of children attending and whether that attendance is full- or part-time. There is no fee for low-income families (Client Fees in ECEC 1503/2016 Act). Although private provision is also subsidized, ECEC is still mainly publicly provided: 78% of children attending ECEC were enrolled in publicly provided services in 2019 (Finnish Education Evaluation Centre, 2019).

Formal ECEC services consist of center-based ECEC and family daycare. Center-based ECEC is the most common form of provision, but the proportions of children in center-based ECEC and family daycare differ locally. In larger cities, center-based ECEC has become the primary form of service, whereas in small municipalities family daycare can be a significant part of the provision (THL, 2020b). Both center-based ECEC and family daycare services must follow the national core curriculum, and the services are monitored by the municipalities. In addition to these commonalities, the regulations differ in terms of staff qualifications, group size and adult–child ratios

(Vlasov et al., 2019). In both public and private ECEC centers, teachers are required to have at least a bachelor's degree in ECEC. In family daycare, the caregiver must have undertaken vocational studies in the field of childcare (ECEC 540/2018 Act). Family daycare is a service provided in a caregiver's home, whereas center-based ECEC is provided in premises specifically utilized for ECEC. Thus, they form different learning environments for children.

In Finland, parents' freedom of choice has been one of the main discourses in ECEC policy (Hiilamo & Kangas, 2009). As an alternative to ECEC services, parents can take care of their under three-year-old child at home and receive a state-funded monetary benefit, the "home care allowance" (HCA), after paid parental leave ends. Families are eligible to receive HCA if the child is not attending formal ECEC and is permanently living in Finland. An additional HCA is also paid for the home care of older, under-school-age children in the family, but eligibility discontinues when the youngest child in home care turns three (Child HCA and Private Day Care Allowance 1128/1996 Act). Moreover, municipalities can offer additional supplement on top of the state-funded HCA. The size of the supplement and eligibility for it vary based on decisions made by the municipalities. For example, there might be a requirement that all children under school age in a family be cared for at home instead of being enrolled in ECEC (Lahtinen & Svartsjö, 2020). Even though HCA utilization is popular among all families with small children, mothers with a low level of education and who have no job to return to are more likely to take care of their children at home and receive the HCA for longer compared to highly educated, employed mothers (Närvi, 2017).

In the Finnish system, municipalities are responsible for organizing ECEC services. However, local circumstances in terms of organizing services differ greatly. Population growth is concentrated on the biggest cities and the nearby municipalities. On the downside, many rural municipalities, especially in the northern and eastern parts of Finland, suffer from population decline, particularly among families with children (Ministry of Finance, 2020). Whereas the biggest cities struggle to provide sufficient ECEC, many small municipalities have abolished ECEC centers and village schools at their fringes. As smaller units of ECEC services, family daycare can be used to secure locally provided ECEC in scarcely populated neighborhoods where there may be long distances between homes and center-based ECEC (Bernelius & Huilla, 2021).

Aligning with European cities in general (Musterd et al., 2016), there is also growing socioeconomic and ethnic segregation *within* the largest cities in Finland. From a global perspective, income differences in Finland are low. Whereas the most well-off areas in Finland are situated in the largest cities, there are also neighborhoods within these cities where income, education, and employment rates are significantly lower than Finnish averages (Bernelius & Huilla, 2021). These are also often areas where the percentage of the population speaking a language other than Finnish or Swedish (the two national languages of Finland) is higher than average, indicating higher proportions of migrants living in the neighborhood (Bernelius & Vilkama, 2019). At the municipal level, foreign language speakers mostly live in larger cities in southern Finland, particularly in the capital area (over 15% of the population), whereas in half of municipalities foreign language speakers account for less than 2.5% of people (Ministry of Finance, 2020). The most common foreign languages spoken among children under 15 years of age are Somali, Swahili, and Arabic (Statistics Finland, 2021). Moreover, socioeconomic and ethnic segregation in Finnish cities is more prominent among children compared to the overall population (Bernelius & Huilla, 2021).

Material and methods

Aim of the study and research questions

The purpose of this study is to investigate whether the urbanicity or socioeconomic status of a neighborhood are associated with attendance of ECEC in the Finnish universal system. The research questions are: Is neighborhood urbanicity or neighborhood SES associated with attending ECEC at the age of four? If yes, does the association remain significant when controlling for family-

based variables? To account for the differences in center- and family-based forms of ECEC, we investigate the attendance of both formal ECEC services in general and center-based ECEC in particular. The four-year-old children were chosen because in Finland they belong to the age group whose parents are no longer entitled to nationally provided HCA for caring for a child at home nor are they yet entitled to free-of-charge pre-primary education.

Participants

Study data was generated using a survey sent to parents of four-year-old children in 71 municipalities in Finland as part of a larger research project. The survey was carried out between June and December 2019, before the restrictions caused by the COVID pandemic. This is a follow-up to a survey conducted in 2016 for parents of one-year-old children from 10 municipalities across Finland. The municipalities were selected based on their different demographics, geographical locations, and economic structures, as well as on differences in local policy decisions concerning the organization of ECEC services (see Sulkanen et al., 2020). To increase the number of respondents from smaller municipalities in particular, parents from three additional municipalities were invited to participate in 2019.

The invitation to participate in the follow-up survey described in this article was sent to the parent/s of 4081 approximately four-year-old children born between October 2014 and September 2015. The invitation was sent to all parents who participated in the survey in 2016 regardless of their current municipality of residence. In total, 1871 parents (1289 mothers and 581 fathers) answered the survey (see Sulkanen et al., 2020). In this study, we use the child-specific data garnered by the survey, which means that, if more than one parent per child answered the survey individually, only the answers of the mother or the primary caregiver registered with the official population register center in Finland were included in the data (see Sulkanen et al., 2020). In the data, information concerning the ECEC service use of 19 children was not available. In addition, zip code information was missing for 10 children, and 20 participants reported that the four-year-old child did not primarily live with them. Because we were interested in ECEC attendance in specific neighborhood-based conditions, those data were excluded from the analysis. Thus, our analysis included data on 1409 children. Most of the participants (83.8%) were mothers (n = 1181), and 16.2% were fathers (n = 228). Participants' ages range varied from a minimum of 22 years to a maximum of 58 years (x̄ 36 years, SD = 5.209). More information about the participants can be found in Table 1 in the Measures section.

Guidelines for the responsible conduct of research by the Finnish National Board on Research Integrity were carefully followed throughout. Prior to commencing the study, the ethics of the research project were reviewed by the Ethics Committee of the University of Jyväskylä. The study was reviewed for compliance with ethical standards and participant protection. Confidentiality and anonymity of the participants were maintained throughout the data collection and analysis process.

Measures

Dependent variable
Attendance of ECEC at the age of four. In the survey, parents were asked about the childcare arrangements of their four-year-old child. Parents could choose all applicable options, which included center-based ECEC, family daycare, parental care, non-parental care at home, non-parental care outside the home, and "other". The answers were then categorized so that there was only one primary childcare option for each child. The categories were: center-based ECEC, family daycare, and no formal ECEC. If the respondent had chosen center-based ECEC or family daycare as well as an informal care option or options, the child's care arrangement was coded as center-based ECEC or family daycare accordingly, since the child was then enrolled in formal ECEC.

The children whose care arrangements included only parental care or other informal care solutions were included in the category of not in formal ECEC. For better readability of the results, we use "ECEC" for short rather than "formal ECEC" from now on.

Independent variables

Based on earlier studies (e.g., McLean et al., 2017; Vandenbroeck et al., 2008), we utilized two explanatory variables to measure the significance of the neighborhood in attendance of ECEC. The variables were *neighborhood urbanicity*, indicating the characteristics of urbanicity and rurality of the neighborhood, and *socioeconomic status of neighborhood* (neighborhood SES). Neighborhoods were investigated using zip code data from the Finnish Environment Institute and Statistics Finland. Our data related to participants from 316 of 3026 statistical zip codes in Finland (Official Statistics of Finland [OSF], 2020). The average number of households living in each zip code was 3191 (M = 2562). The average surface area was 74.6 km² (M = 7.7 km²) (OSF, 2020).

Neighborhood urbanicity. We used the Finnish Environment Institute's GIS-based classification to categorize the zip codes of participants' home addresses (zip code n = 316) into seven categories: inner urban area, outer urban area, peri-urban area, local center in a rural area, rural area close to an urban area, rural heartland area, and sparsely populated rural area. The categories consider, for example, population density, land use efficiency, commuter data and accessibility, and market concentration (see Helminen et al., 2014). In 54.1% of cases, a zip code included more than one type of category. In these situations, a generalization was made based on the category with the highest percentage of residents within the zip code. To avoid very small categories in the number of cases, the peri-urban area and rural area close to an urban area were combined ("commuter area"), as were rural heartland area and sparsely populated rural area ("rural area"), resulting in a five-category variable: (1) inner urban area (153 zip codes), (2) outer urban area (66 zip codes), (3) commuter area (46 zip codes), (4) local center in a rural area (16 zip codes), and (5) rural area (35 zip codes). Even though local center in a rural area is a small category, we decided to keep it separate because it represents a distinctive area of rural neighborhoods where local workplaces are concentrated. Population density is also higher in local centers than in other rural areas (see Helminen et al., 2014).

Neighborhood SES. We used an open-access zip code database from OSF (2020) to measure the neighborhood SES based on three variables: low level of education (percentage of over 17-year-old residents who had attained only compulsory education), low employment rate (percentage of unemployed residents), and low income (percentage of households whose equivalized net income is in the lowest quintile, nationally). To avoid multicollinearity, we formed an SES index by applying a ranking method developed in the city of Berlin (see Häussermann et al., 2010; in the Finnish context, see Vilkama et al., 2014). First, we ranked all zip codes in Finland (valid n = 2830, missing data from 196 zip codes) from the lowest to the highest based on the sum of the rankings of the three variables' percentage values. Zip codes with the lowest level of SES received the most points. The higher the neighborhood SES, the fewer the points received. After the ranking, the zip codes were categorized in deciles. Four categories were formed based on the deciles in such a way that the lowest 10% (the decile with the most points) represented the lowest SES neighborhoods, the second lowest 10% represented low SES neighborhoods, the middle 60% represented the medium SES neighborhoods, and the highest 20% (the quintile with the fewest points) represented the high SES neighborhoods (see Häussermann et al., 2010). Finally, the zip code ranking data were combined with the zip code data of the survey participants. Thus, the variable measuring neighborhood SES is based on the national-level ranking of the zip code of the participants' neighborhoods. The formation of the variable is presented in Figure 1.

Control variables

Because low family SES has been widely associated with lower levels of ECEC enrollment (van Lancker, 2013; Petitclerc et al., 2017), we controlled for its effect by using two independent variables: parent's educational level and equivalized household net income.
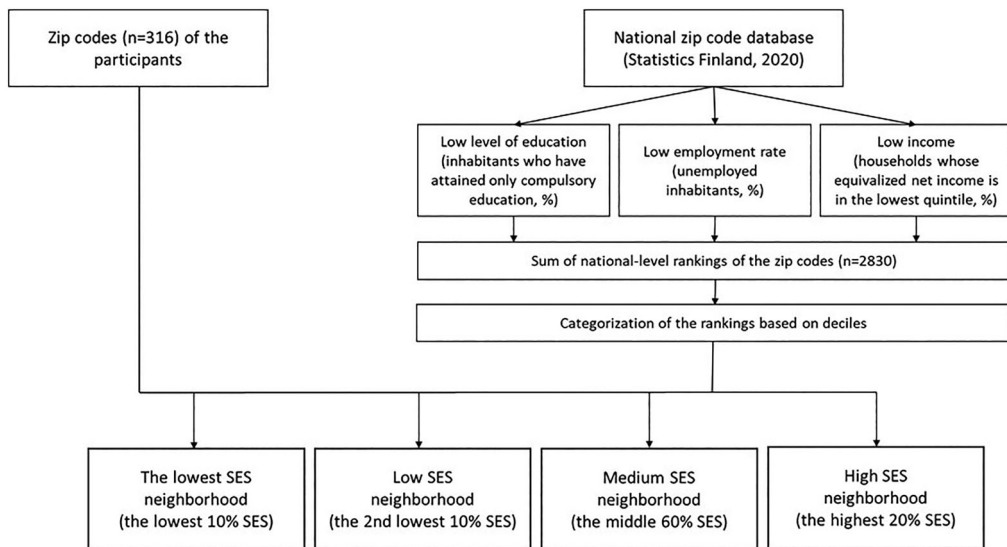
Figure 1. Formation of the Independent Variable Measuring Neighborhood SES.

Parent's educational level. In the survey, the parent chose the highest level of degree achieved from eight different options. A three-level categorical variable was formed based on the answers. The categories are (1) master's level degree or higher, (2) bachelor's degree, and (3) vocational degree or lower.

Equivalized household net income. Parents were asked about the net monthly income of their household, including social benefits. The respondents chose the appropriate option from 12 ordinal categories of income. The variable measuring equivalized household net income was formed based on the median value of each income category. In the survey, parents were also asked about household size (adults and children), including the ages of their children. The equivalized household net income was calculated by dividing the median value of the income category by its equivalent size using the modified OECD equivalence scale (Eurostat, 2018). The scale gives the first adult living in the household a weight of 1 and other over 13-year-old household members a weight of 0.5. All the under 13-year-old children were weighted as 0.3.

In addition to SES, we controlled for other family-based factors that, according to earlier studies, are assumed to be relevant in predicting attendance of ECEC in the Finnish context (see, e.g., Närvi, 2017; Tervola, 2015). Three variables were selected: receiving child home care benefits, parent's immigrant background, and parent's views on the quality of ECEC.

Child home care benefits. Parents were asked whether the family received any parental allowances (paid parental leave) or HCA for caring for their child or children at home. A dichotomous variable was formed based on whether the family received benefits (= 1) or did not (= 0).

Parent's country of birth. To measure the parent's immigrant background, the survey included a question about the parent's country of birth. The variable was coded as dichotomous based on whether the parent's country of birth was Finland (= 0) or another country (= 1).

Parent's views concerning quality of ECEC. Parent's views concerning ECEC services were obtained using a set of statements that involved the respondent's impressions or opinions about the quality of ECEC based on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The parents were asked, for example, whether they thought that children receive enough individual attention and support in ECEC, whether ECEC provided children with more inspiration and learning opportunities compared to home care, and whether ECEC groups were too large. A sum variable of 10 statements was formed to measure how positively or negatively the respondent viewed ECEC

services. Cronbach's alpha of the sum variable was 0.832, which indicates good coherence between the individual variables of the sum variable. The descriptive statistics are presented in Table 1.

Table 1. Summary of Independent Variables (N = 1409).

	Mean	%	SD	Min	Max	n
Neighborhood-based variables (zip codes)						
Neighborhood urbanicity						1409
Inner urban		61.2				862
Outer urban		22.1				312
Commuter area		8.5				120
Local center in rural area		3.2				45
Rural		5.0				70
Neighborhood SES						1409
High		23.4				330
Medium		59.8				842
Low		10.3				145
Lowest		6.5				92
Family-based variables						
Parent's educational level						1403
Master's degree or higher		44.0				618
Bachelor's degree		30.6				430
Vocational degree or lower		25.3				355
Equivalized household net income, €/month	1973.88		990.42	73.53	6538.46	1390
Family receiving child home care benefits		20.9				294
Parent's country of birth other than Finland		9.5				132
Parent's views on quality of ECEC	34.38		4.98	12	50	1353

Data analysis

To investigate ECEC attendance at the age of four in Finland, we conducted four sets of analyses. First, we used SPSS28 to perform Pearson chi-square tests for categorical variables and one-way ANOVA tests for continuous independent variables to measure whether there were statistically significant differences between the groups of children who attended center-based ECEC or family daycare, and those who were not attending ECEC. The continuous variables were standardized by converting them to a standard normal distribution. This was done to unify the differing ranges of values of the original continuous variables. As a result of the conversion, the mean value of the original variable was set to 0, with a standard deviation of 1 (Osborne, 2015).

Next, we investigated the association between neighborhood and ECEC attendance while controlling for family-based factors. Because the univariate analyses showed differences between the attendance groups, we used binary logistic regression to examine the odds ratios for attendance of ECEC in general (combined categories of center-based ECEC and family daycare) and center-based ECEC in particular. Therefore, the group "not attending center-based ECEC" includes both those who did not attend any ECEC as well as those who attended family daycare. The regression analyses were conducted using Mplus version 8. The research strategy is shown in Figure 2.

Results

Descriptive statistics

Table 2 contains the descriptive statistics and univariate analyses of the categorical variables concerning attendance of ECEC. The great majority (92.1%) of the children attended ECEC at the age of four. Most of the children (85.3%) attended center-based ECEC (n = 1202) and 6.7% attended family daycare (n = 95). In comparison, 112 (7.9%) of the children did not attend any ECEC.
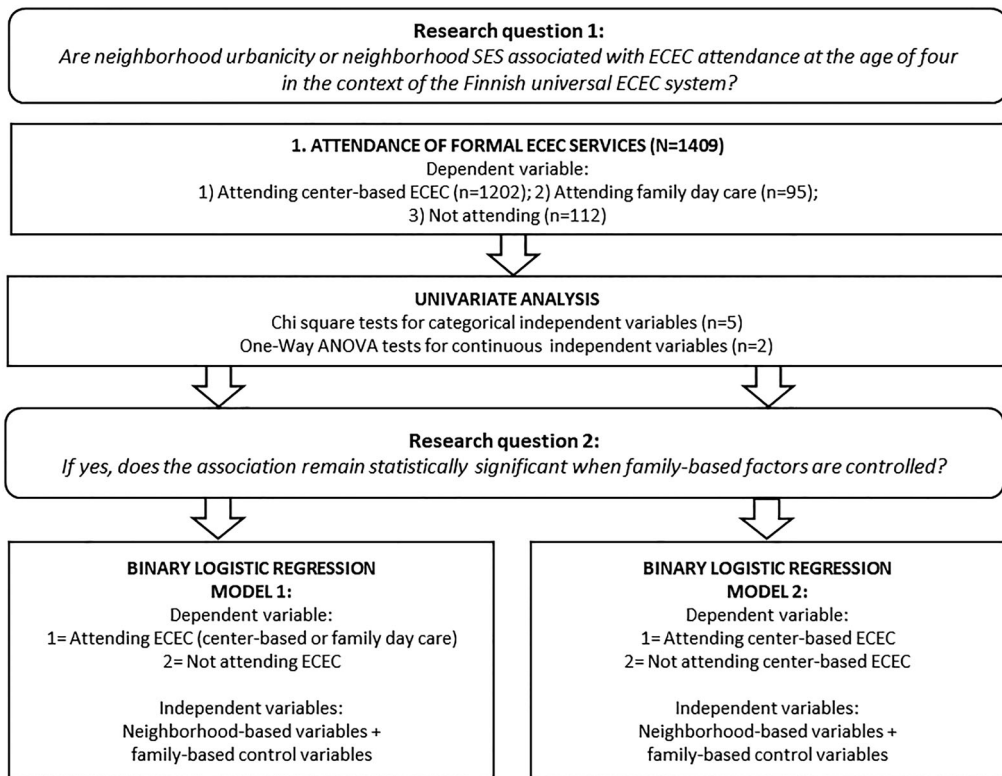
Figure 2. The Research Strategy.

Neighborhood urbanicity was associated with attendance of ECEC ($p < 0.001$). Center-based ECEC was the most common childcare option in all urbanicity categories. However, the children who attended center-based ECEC were more likely living in an inner urban area (89.4%) and less likely in a commuter area (73.3%), local center in rural area (64.4%) or rural area (67.1%). Those who attended family daycare were more likely living in a local center in a rural area (26.7%) and less likely in an inner urban area (5.0%). Those children who did not attend any ECEC were more likely living in a commuter area (15.8%) or in a rural area (21.4%) and less likely in an inner urban area (5.6%).

Neighborhood SES was associated with the form of ECEC attendance ($p < 0.01$). Attendance of center-based ECEC was more likely among children who lived in a high SES neighborhood (91.5%) and less likely among those who were living in the lowest SES neighborhoods (75.0%). On the contrary, attendance of family daycare was more likely among children who lived in the lowest SES neighborhoods (12.0%) and less likely among those from high SES neighborhoods (4.3%). Children who did not attend ECEC were less likely to be living in a high SES neighborhood (4.3%) compared to the other neighborhoods.

Center-based ECEC was the most common childcare option regardless of the parent's education. Yet, attendance of center-based ECEC was more likely among children of a parent with at least a master's degree and less likely among those whose parent had a vocational degree or lower (89.3% vs. 80.6% respectively, $p < 0.001$). Non-attendance was more typical among children whose parent had a vocational degree or lower (12.4%) and less typical among children whose parent had at least a master's degree (4.5%). There were no substantial differences in parent's educational level concerning attendance of family daycare.

Receipt of child home care benefits (paid parental leave or HCA) indicated lower likelihood of attendance of ECEC ($p < 0.001$); 28.2% of the children whose parent received child home care

Table 2. Descriptive Statistics of Categorical Measures of ECEC Attendance at Age Four.

Measure	Center-based ECEC		Family Daycare		No ECEC		Test Statistic p-value	Total
	n	%	n	%	n	%		n
Neighborhood urbanicity							<0.001***	
Inner urban area	771	89.4[b]	43	5.0[a]	48	5.6[a]		862
Outer urban area	267	85.6	19	6.1	26	8.3		312
Commuter area	88	73.3[b]	13	10.8	19	15.8[b]		120
Local center in rural area	29	64.4[b]	12	26.7[b]	4	8.9		45
Rural area	47	67.1[b]	8	11.4	15	21.4[b]		70
Neighborhood SES							.001**	
High	302	91.5[b]	14	4.2[a]	14	4.2[a]		330
Medium	709	84.2	56	6.7	77	9.1		842
Low	122	84.1	14	9.7	9	6.2		145
Lowest	69	75.0[a]	11	12.0[b]	12	13.0		92
Parent's educational level							<.001***	
Master's degree or higher	552	89.3[b]	38	6.1	28	4.5[a]		618
Bachelor's degree	358	83.3	32	7.4	40	9.3		430
Vocational degree or lower	286	80.6[a]	25	7.0	44	12.4[b]		355
Child home care benefits							<.001***	
Receiving	195	66.3[a]	16	5.4	83	28.2[b]		294
Not receiving	1007	90.3[b]	79	7.1	29	2.6[a]		1115
Parent's country of birth							.040*	
Finland	1069	84.6[a]	91	7.2[b]	104	8.2		1264
Other	122	92.4[b]	3	2.3 [a]	7	5.3		132

Notes:
[a]Adjusted standardized residual <−2;
[b]adjusted standardized residual >2.
*$p < 0.05$
**$p < 0.01$
***$p < 0.001$

benefits did not attend ECEC compared to only 2.6% of non-attendance among those whose parent did not receive benefits. Even though center-based ECEC was also the most common form of childcare among children whose parents received benefits, attendance of center-based ECEC was less typical (66.3%) compared to those whose parent did not receive them (90.3%).

It was more typical for a child to attend center-based ECEC if the parent was not born in Finland compared to the children of Finnish-born parents (92.4% vs. 84.6% respectively, $p < 0.5$). Attendance of family daycare was more typical among children of a Finnish-born parent (7.2%) compared to children whose parent was not born in Finland (2.3%).

One-way ANOVA tests

Descriptive statistics of the continuous measures and one-way ANOVA tests of ECEC attendance are presented in Table 3. An alpha level of 0.05 was used for all statistical tests. A one-way ANOVA was conducted to compare the effect of the equivalized household net income on attendance of ECEC (center-based ECEC, family daycare, not attending). There was a statistically significant difference between the groups in terms of attendance ($F(2, 1387) = [22.272]$, $p < 0.001$). Post hoc

Table 3. Descriptive Statistics on Continuous Measures and One-Way ANOVA Tests of ECEC Attendance at Age Four.

Measure (standardized)	Center-based ECEC		Family Daycare		No ECEC		F	df	p
	Mean	SD	Mean	SD	Mean	SD			
Equivalized household net income	0.039	1.001	−0.157	0.854	−0.596	0.678	22.272	2, 1387	<.001
Parent's views on quality of ECEC	0.127	0.927	−0.272	0.954	−1.149	1.004	95.331	2, 1350	<.001

comparisons (Tamhane's T2) indicated that the mean score for "not attending ECEC" (M = −0.596, SD = 0.678) was statistically significantly different from attendance of center-based ECEC (M = 0.039, SD = 1.001) and attendance of family daycare (M = −0.157, SD = 0.854). There was no statistically significant difference between the mean scores of center-based ECEC and family daycare. Thus, the results suggest that the equivalized household net income among those who did not attend ECEC was statistically significantly lower than among those who attended center-based ECEC or family daycare. There was no statistically significant difference in the equivalized household net income between those who attended center-based ECEC and those who attended family daycare.

A one-way ANOVA comparing the effect of the parent's views on quality of ECEC services in attendance of ECEC revealed a statistically significant difference between the groups (F(2, 1350) = [95.331], p < 0.001). Post hoc comparisons (Bonferroni) indicated that the mean score for attendance of center-based ECEC (M = 0.127, SD = 0.927) was statistically significantly different to attendance of family daycare (M = −0.272, SD = 0.954) and the condition of not attending ECEC (M = −1.149, SD = 1.004). In addition, the mean score of family daycare differed statistically significantly from both the condition of center-based ECEC and the condition of not attending ECEC. The results indicate that the parent's views of ECEC were more positive among those who attended center-based ECEC compared to those who attended family daycare or did not attend ECEC. However, views were more positive among those who attended family daycare than among those who did not attend any ECEC.

Association between neighborhood characteristics and attendance of ECEC

Association between neighborhood-based variables and attendance of ECEC was measured using binary logistic regression analysis. To consider the hierarchical nature of the data, we performed the analysis using COMPLEX command in Mplus 8 (Muthén & Muthén, 1997–2017). The values of multicollinearity tests between the independent variables (VIF) ranged from 1.036–1.348. The multicollinearity tests suggest that the level of multicollinearity is low as they are below the threshold of 2.5 (see Midi et al., 2010).

The results (Table 4) show that, in terms of attendance of ECEC (Model 1), living in an outer urban area (OR 0.437, p < 0.05), a commuter area (OR 0.298, p < 0.01) or a rural area (OR 0.229, p < 0.001) decreased the odds of attendance compared to children living in inner urban neighborhoods. In other words, children who lived in an inner urban area were more likely to attend ECEC compared to children living in an outer urban area, commuter area or rural area.

Concerning attendance of particularly center-based ECEC (Model 2), living in an outer urban area (OR 0.580, p < 0.05), a commuter area (OR 0.295, p < 0.001) or rural area (OR 0.279, p < 0.001) decreased the odds of attending center-based ECEC compared to living in an inner urban area. As a difference in attendance of ECEC in general, the odds of attending a center-based ECEC were also decreased for those children living in a local center in a rural area (OR = 0.532, p < 0.01). Considering the results of the univariate analyses, this was not surprising. Thus, based on the results, children who lived in an inner urban area were more likely to attend center-based ECEC compared to children living in other areas based on urbanicity.

Neighborhood SES was not statistically significantly associated with attendance of ECEC in general (Model 1). However, considering attendance of particularly center-based ECEC (Model 2), the odds of attendance of ECEC decreased when a child was living in a low SES neighborhood (OR = 0.481, p < 0.05) or in the lowest SES neighborhood (OR = 0.263, p < .01), compared to the reference category of a high SES neighborhood. In addition, the odds of attendance also decreased in medium SES neighborhoods, but this was a borderline case (OR = 0.229, p = 0.05). To summarize, the results suggest that attendance of particularly center-based ECEC was more likely among children who lived in the socioeconomically most affluent neighborhoods compared to children who lived in lower SES neighborhoods.

Table 4. Logistic Regression of Neighborhood-based Factors Predicting Attendance at Formal ECEC (Family Daycare Included) and Center-based ECEC at Age Four, in particular.

Measures	Model 1 Formal ECEC					Model 2 Center-based ECEC only				
	Est.	SE	OR	95% CI	p	Est.	SE	OR	95% CI	p
Explanatory variables (neighborhood-based variables)										
Neighborhood urbanicity (inner urban area = ref.)										
Outer urban area	−0.828	0.333	0.437	−1.48, −0.18	0.013*	−0.545	0.235	0.580	−1.01, −0.08	0.021*
Commuter area	−1.211	0.390	0.298	−1.98, −0.45	0.002**	−1.221	0.291	0.295	−1.79, −0.65	0.000***
Local center in rural area	−0.221	0.654	0.802	−1.50, 1.06	0.736	−1.460	0.532	0.225	−2.53, −0.45	0.005**
Rural area	−1.474	0.352	0.229	−2.17, −0.78	0.000***	−1.277	0.277	0.279	−1.82, −0.73	0.000***
Neighborhood SES (high = ref.)										
Medium	−0.359	0.360	0.698	−1.07, 0.35	0.319	−0.448	0.229	0.639	−0.90, 0.00	0.050
Low	−0.712	0.466	0.490	−1.63, 0.20	0.126	−0.732	0.332	0.481	−1.38, −0.08	0.027*
Lowest	−1.039	0.734	0.354	−2.48, 0.40	0.157	−1.336	0.438	0.263	−2.19, −0.48	0.002**
Control variables (family-based variables)										
Parent's educational level (master's degree = ref.)										
Bachelor's degree	−0.307	0.354	0.736	−1.00, 0.39	0.386	−0.064	0.232	0.938	−0.52, 0.39	0.782
Vocational degree or lower	−0.319	0.341	0.727	−0.99, 0.35	0.351	−0.150	0.212	0.860	−0.57, 0.27	0.478
Equivalized household net income (standardized)	0.240	0.207	1.272	−0.17, 0.65	0.246	0.152	0.120	1.164	−0.08, 0.39	0.204
Family receiving child home care benefits	−2.562	0.266	0.077	−3.08, −2.04	0.000***	−1.322	0.178	0.267	−1.67, −0.97	0.000***
Parent's country of birth other than Finland	0.598	0.599	1.819	−0.58, 1.77	0.318	0.987	0.492	2.683	0.02, 1.95	0.045*
Parent's views on quality of ECEC (standardized)	1.173	0.139	3.232	0.90, 1.45	0.000***	0.776	0.098	2.173	0.58, 0.97	0.000***

Notes:
Est. = Estimate; SE = standard error; OR = odds ratio; CI = confidence interval.
*$p < 0.05$;
**$p < 0.01$;
***$p < 0.001$.

Discussion

This study examined neighborhood-based predictors of attending early childhood education and care (ECEC) in the Finnish universal ECEC system. We combined parent survey data and zip code data to investigate whether neighborhood urbanicity and neighborhood SES were associated with attending ECEC at the age of four when family-based variables were controlled for. We examined the association between attendance of center-based ECEC and family daycare, i.e., formal ECEC services in the Finnish ECEC system, and particularly center-based ECEC.

This article contributes to the research on spatial disparities in access to ECEC. Universal ECEC is often seen as a tool to increase equality between children and increase attendance of ECEC,

particularly among children from low SES families (see Barnett, 2010; Petitclerc et al., 2017). In the case of the universal ECEC system in Finland, the results of this study show that neighborhood-based disparities in access to ECEC also exist within the context of universal ECEC: attendance was more likely in urban areas and in local centers in rural areas compared to commuter areas or more scarcely populated rural neighborhoods. It seems that even though the municipalities are obligated to provide ECEC for all children whose parents apply for it, there are spatial barriers in attendance. Especially within the context of a decentralized ECEC system where municipal policies play a crucial role, this cannot be solved by national-level policies only. Thus, more attention must be paid to local-level policies.

In addition, the results highlight the importance of more explicit examination of the *form* of ECEC that children living in different kinds of neighborhoods have access to. Earlier studies (see, e.g., Repo et al., 2020) have pointed out the ambiguity of meaning in "equal access" to ECEC. The findings of this study suggest that, in the Finnish case, neighborhood-based socioeconomic differences exist in relation to attendance of center-based ECEC and family daycare, which remain hidden if the different forms of ECEC are considered as a whole. Based on the results of the present study, attendance of center-based ECEC was more likely in high SES neighborhoods than in lower SES neighborhoods, regardless of family socioeconomic status. In addition, the univariate analyses suggest that attendance of family daycare is more typical in low SES neighborhoods, even though this could not be directly tested in the logistic regression model; more research is thus needed. These form-related differences in local-level service use should be acknowledged in future research.

In sum, the results of this study indicate a need to broaden examination of this issue from the perspective of family-based factors, such as SES or parental preference, to spatial questions of inequality. In the context of universal ECEC, parents' decisions on whether to utilize certain types of ECEC service or care for their children at home have been interpreted within the discursive framework of choice (Hiilamo & Kangas, 2009; see also Vandenbroeck & Lazzari, 2014). Even though the univariate analyses in this article are in line with earlier studies demonstrating the association between family SES and ECEC attendance (van Lancker, 2013; Petitclerc et al., 2017), the findings here highlight the need to focus on *where* a family lives. It can be argued that, within the context of a universal ECEC system, it is not parents' low income or level of education that indicate whether a child will access ECEC services. Rather, these services may be inaccessible on the basis of where they live. Based on the results of this study, this relates to attendance at center-based ECEC, in particular.

Limitations

The reasons for using certain types of ECEC service or not using them at all are complex and multiple. A number of neighborhood-based aspects affect accessibility of ECEC, such as the availability and cost of public transportation, that are not examined in this article. Our decision to use zip codes as neighborhood units has limitations in terms of accuracy of characterization. First, zip codes might consist of different types of neighborhood, merging, for example, possible socioeconomic differences. Second, zip codes differ in geographical size, and can be quite wide in sparsely populated, rural areas. Third, zip codes do not take into account where one lives within the zip code area, and thus, for example, living in a commuter area on the border of a rural area might differ significantly in everyday life compared to living on the border of an outer urban area. Fourth, as the zip code areas are purely statistical, the concept of "neighborhood" in this study does not represent any community-based area formed by locals. However, utilizing zip codes enabled us to better consider local differences within municipalities, an issue that remains hidden when comparing areas based on municipal borders (see Bernelius & Huilla, 2021).

Even though geographic and demographic differences were considered when selecting municipalities for this survey (Sulkanen et al., 2020), the parents who actually participated were, on

average, more highly educated than the overall population in Finland. In addition, compared to the overall population, participants living in urban areas in the southern part of Finland were overrepresented in the data. These issues affect the generalizability of the results concerning rural neighborhoods, in particular.

For the purposes of this study, it would have been interesting to compare differences in attendance between center-based ECEC and family daycare by utilizing multinomial regression analysis. Unfortunately, this kind of approach was not possible with our data because of the small number of cases in the group of children attending family daycare. In addition, this study did not address the possible differences in attendance between public and private ECEC. In the future, it would be useful to examine these aspects using census data, which would allow a more detailed examination of ECEC attendance and neighborhoods.

Conclusion

The results of this study increase understanding of the importance of local policies to families' childcare decisions, even when ECEC attendance is generously subsidized. It seems that there are local barriers in access to ECEC that a universal, publicly subsidized ECEC policy cannot tackle alone. The results point out that equal opportunities for attendance of ECEC need to be carefully considered, particularly when organizing ECEC for children living in socioeconomically less advantaged or sparsely populated neighborhoods. Therefore, it is crucial to also consider the differences in services *within* the ECEC system when access to ECEC is examined and evaluated.

Finally, our examination has focused on attendance at ECEC. Thus, the results of this study do not reveal the preferences or "choices" of the families. Based on our study, rather than addressing the issue of ECEC enrollment as a parental choice, the question of "who gets what where" (Lobao et al., 2007) seems to also be relevant within the context of a universal ECEC system. Thus, this study highlights the need to examine the spatial barriers of access both at the national and local levels to understand the different inequality mechanisms each policy level may produce.

Disclosure statement

No potential conflict of interest was reported by the authors.

Declaration of interest statement

No potential conflict of interest was reported by the authors.

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