Predicting selection into ECEC of higher quality in a universal context: The role of parental education and income

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ABSTRACT

There is consensus about the positive effects of high quality Early Childhood Education and Care (ECEC) on children's development, particularly for children from lower socioeconomic backgrounds. However, limited knowledge exists on the access to quality in ECEC in a universal context. This study investigates potential socioeconomic selection into ECEC of higher structural quality in the context of a universal, heavily subsidized, and regulated system in Norway, intended to provide equal access to high quality ECEC. Furthermore, we explore the impact of SES and structural quality in ECEC on student-teacher relationship quality. Our conceptual model takes into account how readily accessible information on different quality aspects is for parents. We use data from the Norwegian Mother, Father and Child Cohort Study linked with teacher-reported ECEC quality for children born in 2006–2009 (N 7,226), supplemented by registry data at ECEC and municipality level. We find that higher parental education, and to a lesser degree income, predict child attendance of ECEC with higher structural quality as rated by ECEC teachers. Further, higher parental SES and structural quality (i.e., developmental material, staff competence and stability) predict better student-teacher relationship quality in terms of higher level of closeness and less conflict. These findings suggest that ambitions of universal equal access to high quality ECEC are not entirely realized and more efforts are needed to ensure higher structural quality in ECEC and enhance relationship quality for children from less advantageous socioeconomic backgrounds.

1. Introduction

It is widely recognized that high quality Early Childhood Education and Care plays an important role in child development, particularly for children from lower socioeconomic backgrounds (Dearing, McCartney, & Taylor, 2009; OECD, 2012; Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2011; Ulferts, Wolf, & Anders, 2019; van Huizen & Plantenga, 2018; Vandell et al., 2010). Yet, disadvantaged children are more likely to experience lower ECEC quality, drawing attention to the importance of improving overall ECEC quality and ensure equity in the access to high quality ECEC (Stewart, Gambaro, Waldfogel, & Rutter, 2014; OECD, 2012). The affordability of high quality ECEC is particularly crucial in market-driven systems where prices for high quality school or center-based care are high, such as in the US (Magnuson &

Waldfogel, 2014). This is also the case in some European countries with primarily market-driven ECEC systems for the youngest children (Ireland, the Netherlands, the UK, Switzerland), while availability concern due to unmet demand of formal center care for younger children remains even in countries with mainly publicly subsidized ECEC such as France and Germany (European Commission/EACEA/Eurydice, 2019).

Countries with progressive universal access policies (e.g., Norway along with other Nordic countries) strive to provide access to high quality ECEC for all children irrespective of their parents' financial means, by mandating children's right to a place in ECEC, expanding supply, extensively subsidizing ECEC services, and introducing nationwide regulations on quality. Nordic countries are cited as an example of countries with high quality ECEC, this is reflected in requirements for staff qualifications, educational focus and consistent policies for the entire ECEC period (European Commission/EACEA/Eurydice, 2019). In Norway, ECEC is seen as a mean to reduce social inequalities, increase women workforce participation and promote positive child development. Despite the efforts, socioeconomic inequalities in utilization of

ECEC are evident across different policy contexts, even in countries with progressive universal policies (Petitclerc et al., 2017). The question remains whether socioeconomic inequalities also persist in access to quality in ECEC in universal contexts. In Norway, children of parents with higher education (but not income) were found to attend centers with somewhat higher quality (ITERS-R) (Eliassen, Zachrisson, & Melhuish, 2018). Yet, the evidence from such contexts is limited and larger population-based studies are lacking.

Socioeconomically disadvantaged children evidently benefit most from attending ECEC across early childhood in Norway (Dearing, Zachrisson, Mykletun, & Toppelberg, 2018; Zachrisson, Dearing, Blömeke, & Moser, 2017). Even though Norway is considered to represent a high quality ECEC context, there are a number of weaknesses regarding existing regulations and current practices including a shortage of educated staff, exemptions on staff qualifications and no specific regulations for monitoring, maintaining and improving process quality (OECD, 2015) that allows variations in quality. In fact, a recent study has found that quality (ITERS-R Infant Toddler Environment Rating Scale-Revised) in Norwegian ECEC centers was much lower than expected (Bjørnestad & Os, 2018). As policy makers strive to reduce social inequalities and specifically achievement gaps in education, it is crucial to understand if there are systematic socioeconomic differences in the use of ECEC of higher quality. If disadvantaged children are less likely to attend high quality ECEC, it may be an indication that the current universal policies are insufficient for ensuring equal access. If this is the case, potential implications are reduced opportunities for disadvantaged children, economic inefficiencies and increased socioeconomic inequalities in the society. This study aims at investigating socioeconomic selection into ECEC of higher quality in the context of a universal, heavily subsidized, regulated system, thereby contributing to the limited evidence on this subject and informing policy makers about the adequacy of existing universal policies.

1.1. The context of universal access: the Norwegian model of ECEC

Norway represents a setting with a nationwide universal, integrated, unitary setting ECEC system (European Commission/EACEA/Eurydice, 2019). The aim is to provide an equal access to high quality ECEC for all children from the age of 1 (legal right to a place in ECEC linked to the end of generous parental leave benefits) to 5 years old (up to start of primary education), irrespective of their socioeconomic background and geographic location. Over the years relevant for this study (2006–2015), the national coverage has expanded from 80% to 90% for 1−5 year olds, from 62% to 81% for 1−2 year olds and from 93% to 97% for 3−5 year olds (Statistics Norway, 2017). As per 2019, 92% of all children in the age of 1−5 years attended ECEC (Statistics Norway, 2020).

ECEC is heavily subsidized with capped monthly fees, which were NOK 2,250 in 2006 (app. USD 350) and NOK 2,580 (app. USD 320) in 2015, and fee reductions for siblings and low-income families (Ministry of Children and Families, 2005a; Norges Bank, 2020). As per now, the maximum monthly fee is NOK 3,135 (app. USD 350 exchange rate January 2020, there has been a substantial depreciation of NOK over the years) and should not exceed 6% of a household income per ECEC place for the first child (Ministry of Education & Research, 2020; Norges Bank, 2020). Fees are the same for public and private institutions. All centres, both public and private, are subsidized by the government and obliged to follow the nationally regulated quality standards (Ministry of Education & Research, 2005), concerning staff education, staff:child ratio and content of curriculum. The national regulations on staff:child ratio were not legally enforced during the study period, but 1:3 for small

children (under 3 years old) and 1:6 for older children (over 3 years old) was a common practice. Staff education was primarily regulated through requiring preschool education (now called Kindergarten teacher education) for the pedagogical leader (though exemptions were allowed) and the pedagogue to child norm, which was 1:7−9 for small and 1:14−18 for older children (now 1:7 and 1:14) (Ministry of Children & Families, 2005b; Ministry of Education & Research, 2017).

Parents in Norway are not able to directly choose the ECEC center, but must rank the centers they prefer in their application to the municipality. The municipality makes the ultimate decision based on the availability and parental preferences, prioritizing children according to their date of birth and children with older siblings in the same center. Municipalities are required to facilitate a coordinated admission into ECEC and ensure equal treatment of children as well as public and private ECEC (Ministry of Education & Research, 2005) that constitute around 50% of ECEC in Norway. The ECEC centers are usually divided into departments for younger and older children, and children normally attend the same center except when the family moves or parents are dissatisfied with the center.

In contrast to the U.S. for example, where Quality Rating and Improvement System (QRIS) provides an easily comparable quality rating for different preschools, there is limited information for evaluation of quality in Norway. Parents in Norway can compare different ECEC centers by accessing publicly available online information on some structural quality characteristics (e.g., type of ECEC, ownership, opening hours, number of children, child-staff ratio, share of staff with preschool education, parental satisfaction, space for play and activities per child). Alternatively or additionally, parents can obtain information about ECEC characteristics by contacting ECEC centers of interest.

1.2. ECEC quality

ECEC quality is a complex and multifaceted concept that is usually defined in terms of structural and process quality indicators. Structural quality includes factors such as group size, child-staff ratio, space, materials and staff qualifications. These factors are more distal to child development and expected to primarily work indirectly through influencing process quality. Process quality is more proximal to the child and concerns different aspects of everyday interactions between staff and children and among children (see e.g., Slot, 2018). Process quality, including global and domain-specific measures, has been demonstrated to have small, but positive and lasting effects for children's academic development (e.g., Ulferts et al., 2019). One particularly important dimension of process quality is student-teacher interactions and relationships. Student-teacher relationships (also referred to as teacher-child relationships in the literature) are gaining a central role in enhancing educational quality and promoting positive child development (Sabol & Pianta, 2012). Close relationships have a potential to improve both academic and socioemotional functioning among children with behavior and demographic risks, while conflict seems to worsen negative outcomes for children with behavior problems (Sabol & Pianta, 2012). A commonly used measure of student-teacher relationship in research involving preschool and school children is the Student-Teacher Relationship Scale (STRS) (Pianta, 2001) that has been shown to correlate with observed student-teacher interactions and relationships (Hartz, Williford, & Koomen, 2017; Howes & Ritchie, 1999). Research has demonstrated that STRS (including subscales of closeness and conflict) relates to children's academic and socioemotional development with evidence of long-terms effects extending into adolescence (e.g., Ansari, Hofkens, & Pianta, 2020; Pianta & Stuhlman, 2004; Valiente, Parker, Swanson, Bradley, & Groh, 2019).
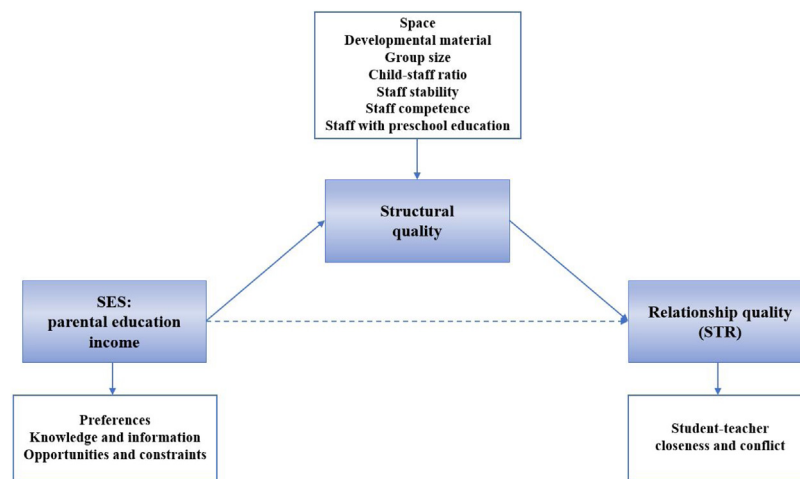
Fig. 1. Conceptual model: relation between parental SES, structural quality in ECEC and STR.
Note. The dashed line denotes the total effect of parental SES on student-teacher relationship (STR) quality. This effect includes both potential indirect effects via structural quality and other effects from SES to STR (e.g., certain parental and child characteristics associated with SES, such as stronger social skills that can influence STR). Control variables are not included in the figure to simplify the illustration.

1.3. Conceptual model: SES and ECEC quality

In this section, we present a conceptual model (Fig. 1) exploring potential mechanisms for how SES can be linked to higher structural quality in ECEC, and how SES and structural quality may predict student-teacher relationship (STR) quality. One potential mechanism linking SES and ECEC quality is that higher SES parents may have higher preferences for quality including educational and developmental aspects of ECEC, compared to lower SES parents (Johansen, Leibowitz, & Waite, 1996; Peyton, Jacobs, O'Brien, & Roy, 2001; Stahl, Schober, & Spiess, 2018; Vandenbroeck, De Visscher, Van Nuffel, & Ferla, 2008). Yet, observed parental child care choices and perceived differences in preferences may, in fact, reflect preexisting opportunities and constraints (Chaudry, Henly, & Meyers, 2010; Coley, Votruba-Drzal, Collins, & Miller, 2014; Meyers & Jordan, 2006; Vandenbroeck et al., 2008; Weber, 2011). In the context of universal systems, where barriers associated with affordability are mainly removed, parental choices and preferences might still be constrained by varying availability of high quality ECEC (Becker & Schober, 2017; Vandenbroeck et al., 2008, e.g., as a result of residential segregation and parental preferences for ECEC proximity Becker & Schober, 2017).

In line with the earlier literature (e.g., Becker & Schober, 2017; Stahl et al., 2018) we argue that higher SES parents may have better knowledge and information. Specifically, higher SES parents might be more informed about quality in ECEC, including different dimensions of quality and their significance for child development, and thus be better equipped to evaluate classroom quality, compared to lower SES parents (Cryer, Tietze, & Wessels, 2002; Mocan, 2007). As social networks are stratified by location and sociodemographic characteristics (Chaudry, 2004), parents of higher SES may access more accurate information about different ECEC alternatives through their more competent and better-informed social networks. Parents of higher SES may also employ more effective search strategies (Vandenbroeck et al., 2008), possibly reflecting better information or knowledge on when and how to look for ECEC.

In a potential evaluation of the ECEC center's quality, parents will likely base their decisions on more easily observable quality characteristics (Becker & Schober, 2017; Mocan, 2007; Stahl et al., 2018). Further, we suggest that parents may partly rely on observable structural quality characteristics in their expectation of unobservable prior to selection STR quality. This is somewhat in line with an earlier study in the U.S. (Mocan, 2007) arguing that under condition of information asymmetry between the parents and the centers, the parents are forced to extract quality information, though often unsuccessfully, from observable center and classroom characteristics. This is particularly the case for difficult to observe quality characteristics. Since larger information asymmetries have been found for difficult to observe quality aspects and parental characteristics were more strongly related to information gaps for highly observable characteristics (Camehl, Schober, & Spiess, 2018), we may discover larger socioeconomic differences for more easily observable structural quality attributes.

However, Mocan (2007) also showed that parents are weakly rational not using all information available when assessing ECEC quality. Moreover, as a result of limited and imperfect information, little experience, limited time frame for finding child care and costs associated with searching and evaluating different care alternatives, parents rely extensively on their social network as a source of information that also limits and filters this information through cultural and social norms (Meyers & Jordan, 2006). Thus, because of weak rationality, time and resource constraints, inexperience, limited information, and not always clear link between structural quality characteristics and STR quality, parents may instead use shortcuts to assess quality relying on information from their social network.

Due to a relatively compressed income distribution and relatively small wage differences between high- and low-skilled workers, the correlation between education level by year and income after tax among cohabiting couples with children under school age is 0.37 (authors own calculation in administrative records for the Norwegian population). In addition, maternal and paternal income have been shown to have a differential effect on the amount of nonmaternal care received (NICHD Early Child Care Research Network, 1997) and concern for educational aspects (Johansen et al., 1996). Therefore, both education and income, as well as maternal and paternal sources of income, can be interesting and meaningful independent predictors. In sum, we build on previous research in proposing a model for parents' selection of their child into higher quality ECEC based on how readily available and interpretable they find information about different aspects of quality. We hypothesize that higher SES parents are more likely to select ECEC of higher structural quality that may also predict STR quality.

1.4. Addressing alternative explanations of SES selection

With all studies on selection into ECEC being non-experimental, statistical control for alternative explanations is crucial for strengthening the internal validity of any inference (Duncan & Gibson-Davis, 2006). Previous studies in this area have highlighted multiple domains of potentially important variables. Besides the SES variables, these include variables related to family cultural background, parental beliefs and involvement, household composition, maternal characteristics and various child-level factors, as well as center and regional characteristics (e.g., Becker & Schober, 2017; Coley et al., 2014; Eliassen et al., 2018; Grogan, 2012; Petitclerc et al., 2017; Stahl et al., 2018; Zachrisson, Janson, & Nærde, 2013). While all the above-mentioned factors can affect ECEC choices and are relevant predictors of selection into ECEC, not all these factors will confound the association between SES and ECEC quality jeopardizing the internal validity of the study. We employed causal directed acyclic graphs (DAGs) (Pearl, 2000; Textor, Hardt, & Knüppel, 2011) to identify appropriate variables that require statistical adjustment. Assuming that SES affects structural ECEC quality through influencing *unobserved preferences, knowledge, information and opportunities* and that structural quality can then predict STR along with parental SES, we estimate the total effect of SES on structural quality and STR. The minimal sufficient adjustment required inclusion of variables conceptualized to affect both SES, *unobserved parental preferences, knowledge, information and opportunities* and STR (i.e., parent non-native speaker, single mother and mother's age). Having a non-native speaking parent may affect family educational level and income, shape parental preferences, knowledge, information and opportunities to evaluate and access ECEC quality and may influence STR (e.g., through parental and children's language competence and cultural differences in social behavior). Being a single mother will affect measures of family SES as well as influence preferences, information and opportunities (e.g., available time and financial resources). Mother's age may predict educational level and income (i.e., older mothers are more likely to complete higher education and/or have a higher level of income) as well as affect preferences and knowledge. Additionally, we control for child-level characteristics (child's temperament, behavior, gender) and for how long the teacher has known the child that can influence STR. Including these variables can improve precision of the estimates and reduce the unexplained variation in STR. Finally, we control for whether parents reported that they have changed child care, as they may have sought centers with higher structural quality. We include additional control variables related to ECEC and municipality characteristics in the sensitivity analyses to account for some of the potential mediating mechanisms (e.g. regional-level opportunities and constraints) in the relation between SES and structural quality.

1.5. The present study

The purpose of this study is to explore potential socioeconomic selection into ECEC of higher structural quality, and to examine if structural quality along with SES predicts STR, taking into account accessibility of information on different quality aspects to parents. The current study expands, in several ways, the existing research literature in the context of universal ECEC system where parents have a limited information for prior evaluation of ECEC quality. First, this study contributes to filling the gap in research on access to ECEC quality in the Nordic universal, integrated, unitary setting, utilizing rich data from a nationwide prospective cohort study. Second, in addition to different structural features, this study includes the student-teacher relationship quality that appears to play an important role in enhancing educational quality and improving children's functioning (Sabol & Pianta, 2012).

Finally, we explore individual contribution of parental education, maternal and paternal income, while accounting for alternative explanations of associations between SES, structural quality and STR.

2. Methods

2.1. Data and study population

The study is based on the sub-cohort of children, participating in the Norwegian Mother, Father and Child Cohort Study (MoBa), for which questionnaire data from ECEC teachers were collected when they were 5 years old N 7,436 (in the main analyses 7,226). ECEC teachers of the children born between 2006 and 2009 were invited to evaluate the ECEC quality and the children's functioning in an ECEC questionnaire (Q-Cc). The teacher response rate was around 41%. These data were further linked to the Medical Birth Registry of Norway (MBRN) (Irgens, 2000), that is a national health registry containing information about all births in Norway. Finally, these data were merged with ECEC-level registry data from The Norwegian Directorate for Education and Training and municipality-level registry data from the Statistics Norway.

MoBa is a prospective population-based pregnancy cohort study conducted by the Norwegian Institute of Public Health (Magnus et al., 2016). Participants were recruited from all over Norway in 1999−2008. The women consented to participation in 41% of the eligible pregnancies. The MoBa cohort now includes 114,500 children, 95,200 mothers and 75,200 fathers. The current study is based on 12th version of quality-assured data files released for research in 2020 that included only the sub-cohort of children with Q-Cc data.

2.2. Ethical consideration

MoBa has been approved by The Regional Committees for Medical and Health Research Ethics (REC) and The Norwegian Data Protection Authority (DPA). The current study has a separate approval from REC (2018/1918/REK sør-øst). Informed written consent was obtained from all participants in MoBa.

2.3. Measures

2.3.1. Structural quality

Measured at the department or base (i.e., more flexible/open group organization) level. Space and developmental materials were measured by asking ECEC teachers to rate its sufficiency and availability on a scale from 1 ("completely disagree") to 5 ("completely agree"). Group size was based on teachers' reported total number of girls and boys. Child-staff ratio was estimated by dividing the total number of girls and boys by the total number of male and female employees. Staff education was defined as a share of all employees (including the head of the department) with a preschool education of the total number of male and female employees. Staff stability was rated by ECEC teachers on a scale from 1 ("very good stability") to 5 ("not good stability"). The measure was reversed in the subsequent analysis where 5 indicated "very good stability". Staff competence was measured by asking ECEC teachers to indicate their agreement on a scale from 1 ("completely disagree") to 5 ("completely agree") that employees in the department have sufficiently good competence with regard to social competence, bullying among children, behavior problems, language competence and shy children.

2.3.2. Student-teacher relationship

Closeness and conflict were measured by 15 questions from the short form of the Student-Teacher Relationship Scale (STRS-SF)

(Pianta, 2001) and rated by ECEC teachers on a scale from 1 ("not true at all") to 5 ("very true").

2.3.3. Registry data at ECEC and municipality level

Additionally, we have acquired registry data on ECEC quality: the share (%) of staff with a preschool education, and approved play and rest area (m^2) per child at ECEC and municipality level, as well as data on ECEC coverage and spending in the municipalities. These data were used in the sensitivity analyses.

2.3.4. Socioeconomic status

Parental education and income were reported by mothers in the MoBa 15th weeks of pregnancy questionnaire and fathers in the period 2000–2009. Mothers and fathers were asked to indicate the highest level of education they have completed and their yearly gross income (including child support, unemployment benefits and other allowances). Education included six categories ranging from 9-year secondary school to college/university more than 4 years (Master's degree, medical doctor, PhD). We operationalized education as the highest attained education in the family (e.g., if the mother's educational level was higher than the father's, we used the mother's education and vice versa) assuming a compensating effect of one parent's higher education for another's lower education. Education was then combined into three categories (due to a small number of participants in the lowest educational categories): i) up to high school education ii) higher education college/university up to 4 years and iii) higher education college/university more than 4 years. Income originally included 7 categories ranging from 1 (no income) to 7 (over NOK 500,000 in gross income) that were analyzed as three categories indicating i) low (up to NOK 299,999) ii) middle (NOK 300,000–499,999) and iii) high income (NOK 500,000 and higher).

2.3.5. Control variables

The main control variables included parent non-native Norwegian speaker and single mother. Both variables were reported in the MoBa 15th weeks of pregnancy questionnaire where mothers were asked to indicate civil status and whether the child's mother or father had a mother tongue other than Norwegian. An additional control variable for structural quality included mother's age (MBRN). Additional control variables for STR included child's gender and temperament reported by parents in the MoBa child's 6th months questionnaire, teacher-reported child's behavior and time (in years) the teacher has known the child (Q-Cc). Child's temperament was measured by 10 questions based on the Infant Characteristics Questionnaire (ICQ) (Bates, Freeland, & Lounsbury, 1979) and children's behavior was measured by 5 questions from the Child Behavior Checklist (CBCL) (Achenbach & Ruffle, 2000) and 7 questions from The Conners' Parent Rating Scale-Revised: Short Form (CPRS-R) (Conners, Sitarenios, Parker, & Epstein, 1998).

2.4. Statistical methods

2.4.1. Structural equation modelling

We modelled selection into ECEC of higher structural quality and the effects of SES and structural quality on STR by means of structural equation modelling (SEM) in Mplus version 8.2. The four main SEM models were estimated with a robust Weighted Least Squares estimator (WLSMV) and parameterization 'theta'. In the first model, we estimated the total effect of SES on all structural quality indicators and STR quality to see if higher SES predicted higher structural quality and better STR (all quality indicators were included in the same SEM model and assumed to correlate). In the second model, we estimated the effects of different structural quality characteristics on STR to see if higher structural quality in ECEC had an impact on STR (closeness and conflict were included in the

same SEM model and assumed to correlate). In the last two models, we explored potential indirect effects of SES on closeness and SES on conflict via structural quality indicators (that are assumed to exist prior to forming of STR). We included those structural indicators that were shown to relate to SES and predict STR (examining individual models for closeness and conflict, structural quality indicators and SES with and without adjustment for covariates). To explore the indirect effects of SES we regressed relevant structural quality indicators on SES variables, and STR on both the structural quality indicators and SES variables, in combination with the MODEL INDIRECT command. This produced total, direct and indirect effects separately for closeness and conflict. In all models, we controlled for potential family-level confounders and the change of care, as well as child-level characteristics in the regressions for STR.

Dummy variables for middle and high category of income and higher educational levels were included as predictors in the SEM models with the lowest categories of education and income serving as reference (i.e., up to high school education and income up to NOK 299,999). We chose not to analyze SES as a composite measure, education and income were not highly correlated (polychoric correlation with a casewise deletion for education and mother's income r = 0.45; education and father's income r = 0.30; mother's and father's income r = 0.35) thereby providing an opportunity to explore their individual effects. Space, developmental material, staff competence, STR (closeness and conflict), as well as child's temperament and behavior were analyzed as latent variables. All items used to measure the latent variables were defined as categorical variables in the analysis to account for their ordered response nature. Separate confirmatory factor analyses (CFA) were performed for latent measures prior to inclusion of these measures in the final analysis, meaningful residual covariances were added based on the modification indices.

2.4.2. Missing data

Missing data were handled by multiple imputation in Mplus using Bayesian analysis of unrestricted (H1) variance covariance model (Asparouhov & Muthén, 2010; Muthén & Muthen, 2017; Rubin, 1987; Schafer, 1997). Data were imputed for all variables that we planned to use in the main analyses (with the exception of a dummy variable change of child care that was used as a condition for inclusion in some of the sensitivity analyses), all these variables were used to create 50 imputed datasets. The datasets were saved and used in the further analyses.

3. Results

Descriptive statistics for all variables included in the main analyses are presented in Table 1 (detailed descriptive statistics with all indicators of the latent variables can be found in the supplementary material). All scales in the current study have shown good reliability, with polychoric ordinal alpha (Gadermann, Guhn, & Zumbo, 2012) ranging from α = 0.83 to α = 0.91. The results from the four SEM models are provided in Tables 2 and 3 and Figs. 2 and 3 . These are the average results over the 50 imputed datasets with standardized (STDY and STDYX) estimates (regression coefficients) for latent and observed continuous variables and probit regression coefficients for an ordered categorical dependent variable staff stability. The effects of the control variables are not presented due to MoBa's restrictive policies to prevent infringement on other research projects.

3.1. Total effects of SES on structural quality and STR
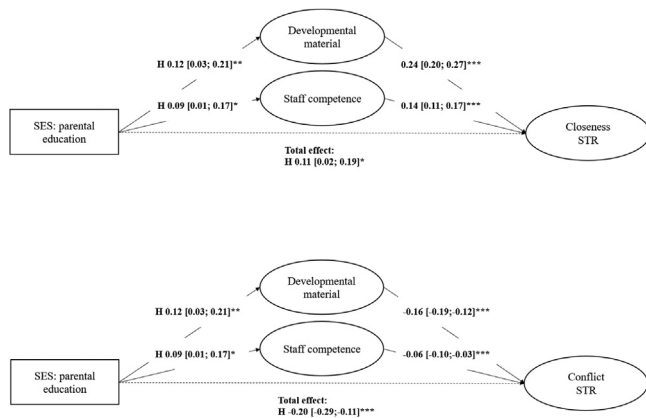
3.1.1. SES and structural quality

The results (Table 2) indicate that a higher level of parental education (more than 4 years) is positively associated with devel-

Table 1
Descriptive statistics: quality indicators, predictors and covariates.

Variables	Missing/ imputed data %	Mean (SD) %	Polychoric ordinal alpha
Space: play and rest area (sufficiency)	0.3	3.66 (0.86)	0.83
Developmental material (availability and accessibility)	0.3	4.20 (0.52)	0.80
Staff competence	0.7	3.84 (0.65)	0.89
Staff stability	1.8	4.22 (0.94)	
Group size	4.3	20.51 (5.62)	
Child-staff ratio	5.9	4.98 (1.30)	
Staff (%) with preschool education	5.0	34.03 (19.07)	
Closeness (STR)	0.2	4.35 (0.48)	0.85
Conflict (STR)	0.2	1.45 (0.54)	0.91
Parental education			
Lower education: up to high school education	1.4	16	
Higher education: up to 4 years	1.4	38	
Higher education: more than 4 years	1.4	46	
Income mother			
Low (up to NOK 299,999)	3.6	44	
Middle (NOK 300,000−499,999)	3.6	49	
High (NOK 500,000 and higher)	3.6	8	
Income father			
Low (up to NOK 299,999)	2.3	21	
Middle (NOK 300,000−499,999)	2.3	54	
High (NOK 500,000 and higher)	2.3	25	
Family-and child-level control variables			
Parent non-native Norwegian speaker	2.7	11	
Single mother	1.4	2	
Mother's age	0.2	31.18 (4.36)	
Changed child care[a]	2.8	47	
Teacher has known the child (years)	2.4	2.50 (1.38)	
Child's gender (girl)	0.0	50	
Child's temperament (ICQ)	3.2	2.18 (0.72)	0.86
Child's behavior (CPRS)	0.7	1.42 (0.50)	0.93
Child's behavior (CBCL)	0.7	1.26 (0.36)	0.85

Note: N = 7,436 (average results over 50 imputed datasets). ICQ-Infant Characteristics Questionnaire; CBCL - Child Behaviour Checklist; CPRS - Conners Parent Rating Scale; STR - Student-Teacher Relationship.

[a] Missing values for changed child care were not imputed (N = 7,226) this variable was used as a condition for inclusion in some of the analyses.

Figs. 2 and 3. Regressions: total (SES to STR) and indirect effects (SES to structural quality × structural quality to STR) of parental education on STR.
Note: N 7,226 (average results based on 50 imputed datasets). Standardized estimates with [95% CI]. Controlling for other SES variables, family- and child-level covariates (STR regression) and child care change. *Education*: the highest education in the family more than 4 years (H), reference: up to high school education.
All potential indirect effects (developmental material, staff competence and stability) are included in the same SEM model. Staff competence and stability are assumed to correlate.
The model fit for closeness and conflict: RMSEA = 0.03 CFI = 0.97 TLI = 0.97 SRMR = 0.04.
* p < .05 ** p < .01 *** p < .001

opmental material at the ECEC department that the child attended (0.12 of a standard deviation SD), similar in magnitude, but non-significant effect was observed for high mother's income. Higher parental education (more than 4 years) and high mother's income were also significantly related to higher staff competence (0.09 and 0.12 of SD), while higher father's income predicted higher staff stability. However, we found only small and non-significant effects of SES on group size and child-staff ratio. Interestingly, the share of employees with preschool education was positively related to higher parental education (0.09 and 0.11 of SD), but negatively to high mother's income (-0.12 of SD). In other words, children with highly educated parents seem to attend ECEC with a higher share of employees with preschool education, while children with high-income mothers appear to access lower quality in terms of share of employees with preschool education.

3.1.2. SES and STR

Regarding socioeconomic status and relationship quality (Table 2). Having parents with higher education (0.13 and 0.11 of SD) and a father with a higher income (0.08 of SD) were significantly related to higher level of student-teacher closeness and lower level of conflict (-0.15,-0.20 and -0.10 of SD). Having a mother with higher income was also, though non-significantly, related to higher level of closeness (0.11 of SD).

3.2. Effects of structural quality on STR

Our results (Table 3) also reveal adjusted associations between structural quality attributes and relationship quality. Higher teacher rating on developmental material, staff stability and staff competence were associated with higher rating on student-teacher closeness (0.24, 0.09 and 0.13 of a SD) and lower rating on student-teacher conflict (-0.08, -0.09 and -0.04 of SD). Furthermore, space (play and rest area) and group size were both negatively related to student-teacher closeness (-0.05 and -0.05 of SD).

Table 2
Regressions: total effects of SES on structural quality and student–teacher relationship (STR), regression coefficients β with standard errors (SE).

	Structural quality (ECEC department/base)							Relationship quality (STR)	
	Space: play and rest area	Develop. material	Group size	Child-staff ratio	Staff stability	Staff competence	Staff with preschool education	Closeness	Conflict
Hypothesized observability	*Easily observable*			*Potentially observable*				*Not observable*	
Higher education up to 4 years	0.01 (0.04)	0.07 (0.04)	0.01 (0.04)	−0.01 (0.04)	0.05 (0.04)	0.03 (0.04)	0.09 (0.04)*	0.13 (0.04)**	−0.15 (0.04)**
Higher education more than 4 years	0.09 (0.04)	0.12 (0.05)**	−0.02 (0.04)	0.07 (0.04)	0.02 (0.04)	0.09 (0.04)*	0.11 (0.04)**	0.11 (0.04)*	−0.20 (0.05)***
Middle income mother	−0.02 (0.03)	−0.01 (0.03)	0.04 (0.03)	0.04 (0.03)	−0.004 (0.03)	0.03 (0.03)	−0.03 (0.03)	0.02 (0.03)	0.01 (0.03)
High income mother	0.05 (0.06)	0.11 (0.06)	0.02 (0.05)	0.05 (0.05)	0.05 (0.06)	0.12 (0.05)*	−0.12 (0.05)*	0.11 (0.06)	0.01 (0.06)
Middle income father	−0.03 (0.04)	0.01 (0.04)	0.03 (0.03)	0.04 (0.03)	0.10 (0.04)**	−0.03 (0.04)	0.04 (0.03)	0.08 (0.04)*	−0.07 (0.04)
High income father	0.002 (0.04)	0.08 (0.05)	−0.03 (0.04)	0.05 (0.04)	0.13 (0.04)**	−0.08 (0.04)	−0.02 (0.04)	0.05 (0.04)	−0.10 (0.05)*

Note: N = 7,226 (average results over 50 imputed datasets). All quality characteristics are included in the same SEM model and are assumed to correlate. *Education*: the highest education in the family, reference category: up to high school education. *Income*: reference category low income: up to NOK 299,999. We account for whether parents reported that they have changed child care in all analyses (dummy variable). *Family-level control variables* for estimating the total effect of SES: parent non-native speaker, single mother and mother's age (structural quality). *Child-level control variables* in the models for STR: child's temperament prior to starting ECEC, teacher-reported child's behavior in ECEC (CBCL-Child Behaviour Checklist for conflict and CPRS - Conners Parent Rating Scale for closeness), teacher has known child (years), and child's gender. Model fit indices: RMSEA = 0.03 CFI = 0.96 TLI = 0.96 SRMR = 0.04.

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

Table 3
Regression: effects of structural quality (ECEC department/base) on student–teacher relationship (STR), regression coefficients β with standard errors (SE).

	Relationship quality (STR)	
	Closeness	Conflict
Space: play and rest area	−0.05 (0.02)*	0.001 (0.02)
Developmental material	0.24 (0.02)***	−0.08 (0.02)***
Group size	−0.05 (0.01)***	−0.02 (0.02)
Child-staff ratio	0.01 (0.01)	−0.03 (0.02)
Staff stability	0.09 (0.01)***	−0.09 (0.01)***
Staff competence	0.13 (0.02)***	−0.04 (0.01)**
Staff with preschool education	−0.01 (0.01)	0.03 (0.02)

Note: N 7,226 (average results over 50 imputed datasets). *Family-level control variables* for estimating the effect of structural quality characteristics on STR: closeness and conflict: SES, parent non-native speaker and single mother. *Child-level control variables*: child's temperament prior to starting ECEC, teacher-reported child's behavior in ECEC, teacher has known child (years), child's gender. We account for whether parents reported that they have changed child care. Both closeness and conflict are included in the same SEM model and are assumed to correlate. Model fit indices: RMSEA 0.03 CFI 0.96 TLI 0.96 SRMR 0.05.

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

3.3. Indirect effects of SES on STR via structural quality

Further, we explored potential indirect effects of SES on STR (separately for closeness and conflict) via structural quality indicators that were related to SES and STR. Due to space limitations, we present our results for indirect effects (path *SES to structural quality × structural quality to STR*) in figures only for parental education (see Figs. 2 and 3). The figures represent the effects of the highest level of education - college/university more than 4 years compared to the reference category - up to high school education) on STR: closeness and conflict with [95% CI], while controlling for other SES variables, potential family-level confounders and child-level characteristics that may affect STR.

3.3.1. Indirect effects: SES and closeness
We found very small, significant indirect effects from the highest level of parental education to closeness via developmental material 0.03 [0.01; 0.05] and staff competence 0.01 [0.001; 0.02], accounting for 0.03 and 0.01 of SD of the total effect of the highest level of parental education on closeness 0.11 [0.02; 0.19]. Both the total effect from the highest category of mother's income to closeness 0.11 [-0.01; 0.22] and indirect effect via developmental material 0.03 [-0.003; 0.06] were non-significant, while significant indirect effect via staff competence amounted to 0.02 [0.001; 0.03] (of SD) of the total effect. The indirect effects from the middle and high father's income via staff stability constituted 0.01 [0.003; 0.02] and 0.02 [0.01; 0.03] (of SD) of the total effects 0.08 [0.01; 0.15] and 0.05 [-0.03; 0.13] with the last one not being statistically significant.

3.3.2. Indirect effects: SES and conflict
There were also weak negative indirect effects from the highest level of parental education (more than 4 years) to conflict via developmental material -0.02 [CI -0.03; -0.004] (of SD) of the total effect -0.20 [-0.29; -0.11]. The indirect effects from the middle and high father's income via staff stability accounted for -0.01 [-0.02; -0.003] and -0.02 [-0.03;-0.004] (of SD respectively) of the total non-significant -0.07 [-0.14; 0.01] and significant effect -0.10 [-0.18;-0.01].

3.4. Sensitivity analyses

We have conducted different sensitivity analyses to explore mechanisms behind the observed associations and test the robust-

ness of the results. We have adjusted standard errors for clustering at the ECEC level to allow for non-independence of observations (multiple children in the same ECEC) in the subsample with valid ECEC IDs (see appendix Table A1). Around 78% of the total sample had valid ECEC IDs. In general, the effects in the subgroup analysis were similar (somewhat stronger) and still suggesting that higher SES were associated with higher structural quality. Additional effects became significant (for space, developmental material, and mother's middle income predicted higher child-staff ratio), some few effects became non-significant.

In addition, we addressed concerns regarding potential differences in ECEC availability across the municipalities and that higher SES families live in more affluent municipalities and might be more likely to attend higher quality ECEC by controlling for ECEC coverage and spending within municipality. Moreover, we controlled for potential quality differences between the municipalities by including the share (%) of staff with preschool education and play and rest area per child (m^2) in the municipality. These analyses allowed us to account for some of the important mediating mechanisms in the observed relations between SES and structural quality in the subsample with valid ECEC IDs that have not changed child care.

We also adjusted standard errors for clustering to allow for non-independence of observations at the municipality level. Even after controlling for ECEC and municipality characteristics, higher parental SES predicted higher structural quality in terms of developmental material and stability (see appendix Table A2).

Furthermore, we explored if higher SES predicted higher quality at the ECEC level with registry data on the share of staff with a preschool education, and play and rest area (m^2) total in ECEC and per child. This was done in the subgroup analysis for those with valid ECEC ID (this allowed us to link the registry data) and those that did not change care (as ECEC ID were collected when children were 5 years old and the registry data were used from the earlier years). Though there was a positive relation between a higher education and the share of employees with a preschool education (unadjusted analyses), the effect sizes were very small and non-significant, while a negative relation with mothers income remained.

4. Discussion

In this study, we investigated socioeconomic selection into ECEC of higher structural quality in the context of universal access, and explored effects of parental SES and structural quality on STR quality. In line with earlier research we argued that one of the mechanisms for how SES can be linked to a higher structural quality in ECEC is through preferences, knowledge and access to information affecting parental ability to evaluate quality and that parents will likely base their decision on more easily observable quality characteristics. Finally, we suggested that parents may partly rely on observable structural quality in their expectation of unobservable prior to selection STR quality (i.e., there are potential indirect effects between SES and STR).

Results (Table 2) suggested that children from families with higher SES are more likely to attend ECEC of higher structural quality (particularly with regard to developmental material, staff competence and stability) and appear to have a better relationship quality, though the effect sizes were quite small. Results also indicated that the same aspects of structural quality predicted higher relationship quality (Table 3), but indirect effects were weak.

Overall, we did not observe a consistent pattern suggesting greater socioeconomic differences for easily observable compared to more difficult to observe quality indicators. Recent studies from a similar context also did not provide consistent evidence to support this argument. While Stahl et al. (2018) reported that lower educated parents and parents with migration background experienced lower quality mainly for easily observable quality aspects, Becker and Schober (2017) found no significant social and ethnic differences for the most easily observable quality indicators (group size, child-teacher ratio).

The observed associations between SES and STR may reflect that higher SES parents are able to select ECEC with certain characteristics that may predict higher relationship quality (including recommendations from their social network and other ECEC characteristics that we do not observe), or that relationship quality is influenced by parental SES. In the last case, one potential mechanism can be that children of higher educated parents have stronger social and communication skills that make it easier to establish a more positive relationship with the teacher or higher educated parents have a better collaboration with the teachers that facilitates a more positive relationship with the child.

Our findings are in alignment with the earlier Norwegian studies that found SES selection into ECEC in Norway. Indications of socioeconomic selection have been found both with regard to participation in ECEC centers (Petitclerc et al., 2017; Sibley, Dearing, Toppelberg, Mykletun, & Zachrisson, 2015; Zachrisson et al., 2013) and attendance of ECEC centers of higher quality (Eliassen et al., 2018).

We observed somewhat more consistent patterns between parental education and ECEC quality compared to income. In addition, the effect of education was, in most cases, stronger when not controlled for income. The effects of mother's and father's income varied, both in terms of statistical significance and direction of associations. More specifically, a combined measure of parental education was significantly positively related to staff qualifications, in terms of both teacher-reported competence at the unit and a formal preschool education, as well as consistently related to higher relationship quality. Moreover, significant positive patterns of parental education were evident across quality indicators with a different degree of observability. Mother's and father's income, on the other hand, were not consistently related to teacher's qualifications and the effects were not found for quality indicators hypothesized to be easily observable to parents in the main analysis (though some significant effects appeared in the subsample analyses Tables A1 and A2). Parental income was also less consistently associated with the relationship quality. One of the potential explanations for these variations can be that income plays a less significant role in Norway, where access is universal and center care is heavily subsidized, and thus may be a less consistent predictor of quality. Parental education is also more closely related to knowledge and information, or as suggested above, might predict parental and children's social and communication skills needed to establish good relationships. These arguments are in accordance with the recent study by Stahl et al. (2018) that argued that knowledge, preferences and network might be more important than financial means in the process of ECEC selection in Germany.

Similarly to Becker and Schober (2017), we found no effects of socioeconomic status on other structural attributes such as group size and child-staff ratio in the main analysis. Becker and Schober (2017) interpreted the lack of significant results for group size and child-staff ratio (assumed to be the most easily observable quality aspects) as evidence for limited support for the family investment model and parental choice of ECEC. Our significant results for developmental materials (that should be easily observable to parents when they come to the ECEC center) do not quite support this conclusion. A possible explanation is that higher SES parents select ECEC based on structural quality aspects that are expected to vary more and more predictive of child well-being. Parents with higher SES may, in general, value these quality aspects (developmental material, staff competence, stability and education) higher than group size and child-staff ratio when considering ECEC for their children. We also cannot rule out that an alternative explanation for

the lack of associations between socioeconomic status, group size and child-staff ratio as well as a negative effect of mother's income on staff education can be incorrect reporting on the number of staff, number of children and staff education that were subsequently used to define these variables. Although, a negative association between high maternal income and staff with preschool education was confirmed with the registry data.

We also found that some of the potentially observable structural quality attributes that were related to higher SES, particularly developmental material, staff competence and staff stability, predicted higher relationship quality. This appears to provide some support to our earlier argument that parents of higher SES may select ECEC based on the structural quality indicators that are expected to promote higher relationship quality.

Larger groups were associated with a lower degree of student-teacher closeness. Associations between structural quality at classroom (e.g., group size, child-staff ratio) and staff level (e.g., pre-service qualifications) and process quality are generally supported in the literature, though with some inconsistencies. This might be attributed to limited variation within countries due to regulation of structural features, differences in methodologies and statistical techniques (Slot, 2018). More specifically regarding STR, group size has been found to moderate the effects of student-teacher closeness on children's behavior problems suggesting a beneficial effect of smaller groups (Skalická, Belsky, Stenseng, & Wichstrøm, 2015).

4.1. Limitations

Some of the limitations of this study are related to general limitations of survey designs that tend to suffer from selection and non-response bias, recall bias and measurement errors. There was some degree of selection into MoBa that seemed to be exacerbated by non-response on the ECEC questionnaire. Some authors (Gustavson, von Soest, Karevold, & Røysamb, 2012; Nilsen et al., 2009) argued that the estimates of associations are not affected by self-selection and attrition rates and that there is high potential to prevent bias by including individuals with extreme scores (Gustavson, Røysamb, & Borren, 2019). However, a recent study by Biele et al. (2019) concluded that self-selection and loss to follow-up may still result in biased estimates of the associations. The consequences for our selective sample are that we probably underestimate the effects of SES on selection into ECEC quality, as higher educated, non-single, native speaking parents were overrepresented. Our reported measures of quality and parental SES may also contain measurement errors as these rely on ECEC teachers' memory (recalling of information) and judgment when reporting quality. While the error term should account for potential errors in the dependent variable (ECEC quality), the independent variables (education and income) could introduce bias in the estimations in the way that we do not find effects of income/education on ECEC quality. Moreover, the analysis of DAGs and the minimal sufficient adjustment for confounders still relies on the researchers' judgment and availability of data and therefore doesn't eliminate the possibility of omitted variables bias.

Even though we account for clustering of children within ECEC in the subgroup analysis thereby allowing for the intracluster correlation or non-independence, we were not able to account for potential clustering within a classroom due to the lack of information on which classrooms children attended. However, this should not be a substantial concern as many children participating in MoBa are dispersed across different ECEC centers.

In addition, the observed associations between the structural and relationship quality may reflect a shared variance in teachers' reporting. There were no corresponding registry data for ECEC to provide additional support for these associations. Therefore, one should be careful about interpreting the results as strong evidence

that parents can successfully use observable structural quality attributes to expect higher relationship quality or as an indication that targeting structural quality aspects, where we found significant associations, will improve relationship quality.

It should also be mentioned that our measures of quality and modeling of potential parental selection takes a researcher perspective. This might be an oversimplification of the complex reality where parents face numerous trade-offs and constraints. We do not have an opportunity to get insight into the real parental decision-making processes when looking for ECEC, perception of quality and values parents attach to different aspects. Even though parents seem to agree on the importance of quality attributes in the professionally recognized ECEC quality measures (Cryer et al., 2002; Mocan, 2007), there is evidence of substantial information gaps between professionals and parents (Camehl et al., 2018). In addition, it would be interesting to know if parents in the study received their first choice ECEC center, as this would say something more about parental ability to choose, but this information was not available. Moreover, while we argue that some quality is difficult to observe for parents prior to selection of ECEC, both structural and relationship quality, would, at least to some degree, be observable to parents once their child is enrolled in a center. This means that parents could change the center after observing a lower quality. We account for change in the analysis, but as we do not have comparable longitudinal data on quality before and after the change of child care, we are not able to examine whether the change of ECEC centers in our study sample could be the result of children's experience of poor structural or relationship quality. Furthermore, it can be argued that student-teacher relationship from the teacher's point of view is a problematic way to conceptualize relationship quality, as this measure is child-specific. We have controlled for child-level characteristics that may affect the relationship quality to address this concern. It is also possible that teachers report less closeness and more conflict with children from lower SES backgrounds compared to those from high. While one could potentially strengthen the measurement by looking at the aggregated report for all children by teacher, we are not able to examine it as we do not have information on teachers that answered the questionnaire. Moreover, considering that children are dispersed across different ECEC, it is likely that in many cases there is only one child per reporting teacher.

Observed socioeconomic differences in ECEC quality may also reflect other preferences (e.g., ECEC proximity) and regional differences defining parental opportunities and constraints (e.g., supply and quality of ECEC, social network as the source of information that can be stratified by location). A high concentration of families with high/low SES in some areas may also affect ECEC quality. Yet, even after controlling for municipality-level factors in the sensitivity analyses we found indications that higher SES predicted higher structural quality in terms of developmental material and staff stability. Similarly, in an earlier Norwegian study (Eliassen et al., 2018) high parental education was associated with higher quality in ECEC even after controlling for municipality. Alternatively, the observed socioeconomic differences may reflect preferences for other unobservable factors, that correlate with the analyzed quality characteristics, such as socioeconomic and ethnical composition of children in the group (e.g., Becker and Schober, 2017; Stahl et al., 2018; Torquati, Raikes, Huddleston-Casas, Bovaird, & Harris, 2011) or practical considerations such as transportation, that might be more important to lower SES parents due to more limited resources. These above discussed aspects can be important mediating mechanisms of the observed associations. Finally, even in the context where parental applications for a place in ECEC are administered by the municipalities, thereby limiting potential selection by providers and parental influences, we cannot completely rule out the possibility that parents of higher SES may have some influence on the

process. One potential loophole is that private providers have their own regulations regarding admission priorities, in addition to those defined by the law for all ECEC centers.

4.2. Policy implications and directions for future research

In spite of the above-mentioned limitations, this study provides an important insight on the equity in the access to high quality ECEC in the universal context, and in particularly cast light on the access by children from less advantageous socioeconomic backgrounds. The evidence that children from less advantageous backgrounds, that could benefit most from high quality ECEC, appear to experience ECEC of lower quality, at least on some dimensions, is alarming. As discussed, high quality ECEC provides an important foundation for child development with positive short- and long-term effects for children's cognitive, language and socioemotional development. Potential consequences of the observed socioeconomic inequalities in the access to high quality ECEC are reduced opportunities for disadvantaged children, increased socioeconomic inequalities in the society and economic inefficiencies because of suboptimal return on public investment in ECEC. Variations in ECEC quality and evidence of possible selection may pose challenges for the universal system that is intended to provide homogeneous high quality ECEC services for all children. While one potential effective way to reduce inequities in the use of higher quality ECEC might be improving parental knowledge and information, more research is needed to confirm our findings across different samples and methodological approaches as well as to improve the understanding of parental preferences, information and selection process of ECEC. In future research, it would be important to study how these quality characteristics for which we observed socioeconomic disparities influence different aspects of children's development and well-being. Furthermore, future studies exploring selection into ECEC of higher quality should include a broader range of structural quality indicators based on registry data as well as different aspects of process quality.

5. Conclusion

We found indications of advantageous socioeconomic selection into ECEC of higher quality in the context of universal access in Norway. Higher parental education, and to a lesser degree income, predicted child attendance of ECEC with higher structural quality as rated by ECEC teachers. Further, higher parental SES and structural quality (i.e., developmental material, higher staff competence and stability) predicted better student-teacher relationship quality in terms of higher level of closeness and less conflict. These findings suggest that ambitions of universal equal access to high quality ECEC are not entirely realized and more efforts are needed to ensure higher structural quality in ECEC and enhance relationship quality for children from less advantageous socioeconomic backgrounds.

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None.

CRediT authorship contribution statement

Nina Alexandersen: Conceptualization, Methodology, Formal analysis, Writing - original draft, Visualization. **Henrik Daae Zachrisson:** Conceptualization, Methodology, Writing - review & editing. **Tiril Wilhelmsen:** Writing - review & editing. **Mari Vaage Wang:** Funding acquisition, Project administration, Writing - review & editing. **Ragnhild Eek Brandlistuen:** Conceptualization, Methodology, Writing - review & editing, Supervision, Funding acquisition.

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Appendix A. Sensitivity analyses

Table A1

Regressions: total effects of SES on structural quality and student-teacher relationship (STR), regression coefficients β with standard errors (SE) clustered by ECEC.

	Structural quality (ECEC department/base)							Relationship quality (STR)	
	Space: play and rest area	Develop. material	Group size	Child-staff ratio	Staff stability	Staff competence	Staff with preschool education	Closeness	Conflict
Hypothesized observability	*Easily observable*					*Potentially observable*		*Not observable*	
Higher education up to 4 years	0.03 (0.05)	0.10 (0.05)*	0.02 (0.04)	−0.02 (0.04)	0.08 (0.05)	0.02 (0.05)	0.11 (0.05)*	0.12 (0.05)*	−0.17 (0.05)**
Higher education more than 4 years	0.10 (0.05)*	0.15 (0.05)**	−0.003 (0.04)	0.05 (0.05)	0.06 (0.05)	0.11 (0.05)*	0.12 (0.05)*	0.09 (0.05)	−0.21 (0.05)***
Middle income mother	−0.02 (0.04)	−0.01 (0.04)	0.05 (0.04)	0.07 (0.03)*	0.001 (0.04)	0.03 (0.03)	−0.03 (0.03)	0.03 (0.04)	0.01 (0.04)
High income mother	0.02 (0.07)	0.11 (0.07)	−0.01 (0.06)	0.04 (0.06)	0.04 (0.06)	0.12 (0.06)	−0.14 (0.06)*	0.12 (0.07)	0.02 (0.07)
Middle income father	−0.05 (0.04)	−0.01 (0.04)	0.004 (0.04)	0.03 (0.04)	0.10 (0.04)*	−0.04 (0.04)	0.03 (0.04)	0.10 (0.04)**	−0.08 (0.04)
High income father	0.01 (0.05)	0.06 (0.05)	−0.04 (0.04)	0.07 (0.05)	0.12 (0.05)*	−0.09 (0.05)	−0.02 (0.05)	0.08 (0.05)	−0.11 (0.05)*

Note: N 5,611 (average results over 50 imputed datasets). The analyses included those with valid ECEC ID, we account for whether parents reported that they have changed child care. All quality characteristics are included in the same SEM model and are assumed to correlate. *Education:* the highest education in the family, reference category: up to high school education. *Income:* reference category low income: up to NOK 299,999. *Family-level control variables* for estimating the total effect of SES: parent non-native speaker and single mother, mother's age (structural quality). *Child-level control variables* in the models for STR: child's temperament prior to starting ECEC, teacher-reported child's behavior in ECEC, teacher has known child (years), child's gender. Model fit indices: RMSEA = 0.02 CFI = 0.96 TLI = 0.96 SRMR = 0.04.

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

Table A2

Regressions: effects of SES on structural quality, adjusted for ECEC and municipality characteristics factors, regression coefficients β with standard errors (SE) clustered by municipality.

	Structural quality (ECEC department/base)						
	Space: play and rest area[a]	Develop. material	Group size	Child-staff ratio	Staff stability	Staff competence	Staff with preschool education[b]
Higher education up to 4 years	0.000 (0.07)	0.09 (0.07)	0.01 (0.05)	−0.03 (0.06)	0.08 (0.07)	0.001 (0.06)	0.03 (0.06)
Higher education more than 4 years	0.05 (0.07)	0.15 (0.08)*	0.01 (0.06)	0.03 (0.06)	0.08 (0.06)	0.07 (0.07)	0.08 (0.06)
Middle income mother	−0.01 (0.05)	0.01 (0.05)	0.08 (0.04)*	0.08 (0.04)	−0.04 (0.05)	0.06 (0.05)	−0.05 (0.05)
High income mother	0.05 (0.10)	0.07 (0.08)	−0.04 (0.11)	0.05 (0.08)	0.05 (0.08)	0.11 (0.10)	−0.05 (0.07)
Middle income father	−0.02 (0.05)	0.03 (0.05)	−0.01 (0.05)	−0.003 (0.05)	0.10 0.06	−0.02 (0.05)	0.004 (0.05)
High income father	0.03 (0.07)	0.14 (0.06)*	−0.08 (0.05)	0.09 (0.06)	0.15 (0.06)*	−0.09 (0.07)	0.03 0.06

Note: N 3,003 (average results over 50 imputed datasets). The analyses included those with valid ECEC ID (allowed us to link the registry data) and those that reported that they have not changed child care (as ECEC ID were collected when children were 5 years old and the registry data were used from the earlier years). All quality characteristics are included in the same SEM model and are assumed to correlate. *Family-level control variables:* parent non-native speaker, single mother and mother's age. *ECEC-level control variables:* ownership (private/not private) and organization (department vs base or zone with more flexible/open groups). *Municipality-level control variables:* ECEC coverage (share (%) of children 1−5 years with a place in ECEC) and spending on ECEC (net operating expenses per capita 1−5 years in NOK 1000). Additionally controlled for [a]play and rest area per child in ECEC (m^2) and [b]share (%) of staff with a preschool education in the municipality (avg. 2009−2010). Model fit indices: RMSEA = 0.02 CFI = 0.98 TLI = 0.97 SRMR = 0.05.
*p < .05 **p < .01 ***p < .001.

Appendix B. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.ecresq.2021.01.001.

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