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Low Preschool Teacher Quality in Private Preschools and Areas of Low Socioeconomic Status – When the Equalizing Potential of Preschools is Surpassed by Uneven Levels of Certified Preschool Teachers

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Abstract

Given preschools' important role in shaping children's learning and development surprisingly little is known about why some Swedish preschools are much more successful in offering high-quality early education than others. Earlier research has shown that socioeconomic gaps in educational achievements can largely be explained by knowledge gaps established during the preschool years. There may be social inequalities in the distribution of quality in preschools that help explain the gaps in achievement in primary school. Focusing on preschools, their neighborhoods, and municipality characteristics, this study draws on data from 8582 preschools in 290 Swedish municipalities. Results from multi-level regression analyses suggested that private preschools score lower regarding quality indicators than public preschools and that variations in preschool quality reinforce patterns of social inequality rather than acting as equalizers. Preschool quality tends to be lower in neighborhoods with low socioeconomic status thus leading to a double disadvantage for children within those contexts.

Keywords: Preschool; Social equity theory; Preschool quality; Equal education; Sweden; Equality; Social Equity.

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Popular science summary

Preschools are important in shaping children's learning and development. Previous studies have found that educational inequalities are already established at an early age, long before children enter primary school. In Sweden, the preschool quality varies a lot between different preschools and between different municipalities. The quality has been found to differ to the degree it likely affects the children's learning and development. Despite the relevance of achieving equal access to high-quality preschools, there is a lack of systematic nationwide evaluations of preschool quality and its determinants. Because of this, there is no detailed knowledge about preschool quality in Sweden. My study therefore examines and maps out indicators of preschool quality in a sample of 8582 preschools in 290 Swedish municipalities.

Using multi-level regression analysis, the preschool's quality indicators are examined in the context of their municipality. The results show that private preschools have a lower teacher quality than public and that neighborhoods with low socioeconomic status have lower teacher quality than other neighborhoods. The results show that quality in preschools is not randomly distributed and that patterns of quality reinforce social inequalities.

By law, children in Sweden have the same right to equal high-quality preschools, this is not realized today. Providing all children with equal high-quality preschool has the potential to long-term positively affect educational performances, lower crime rates, increase employment rates, and increase overall equality in society. My results can be used by policymakers as a basis for further actions to ensure high-quality preschools for all children.

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Abbreviations

ECEC – Early Childhood Education and Care

NAE – National Agency of Education (Skolverket)

SES – Socioeconomic status

SKR – Sveriges Kommuner och Regioner (Sweden's municipalities and regions).

UN – United Nations

OECD – Organization for Economic Co-operation and Development

1. Introduction

“Early childhood education and care (ECEC) can improve children's cognitive abilities and socio-emotional development, help create a foundation for lifelong learning, make children's learning outcomes more equitable, reduce poverty, and improve social mobility from generation to generation.” (OECD 2017:11).

With this thesis, I aim to fill the research gap concerning equal access to high-quality preschools in Sweden. In Sweden, preschool is considered an important educational institution and has a curriculum meant to be carried out by officially certified preschool teachers (Skolverket 2023a). All children between 1-5 years old have the right to attend preschool and from 3 years 525 hours each year are free of charge (Tornberg, Berr, and Finnman 2022). Since 1998, preschools have had a national curriculum that must be followed (Skolverket 2008, 2010), and from 2010 preschools have been officially regarded as schools in Sweden. While all preschools are meant to provide children with equal education and experience, diverse reports point to large quality differences between Swedish preschools, both within and between municipalities (De La Porte, Larsen, and Lundqvist 2023; Sheridan, Samuelsson, and Johansson 2009; Tornberg et al. 2022). Given the importance of reaching those quality thresholds, there is a lack of systematic research regarding the quality performance of Swedish preschools. Using statistical data from 8582 preschools in 290 municipalities I aim to fill the research gap with this thesis.

Earlier research has found social differences to be established for children at a young age (Becker 2011; Passaretta, Skopek, and Van Huizen 2022). By the age of 3 differences in language skills are already evident among children (ibid). In Germany, research has identified ethnic inequalities in education that have already begun for children when attending preschool (Biedinger, Becker, and Rohling 2008). Preschools can, however, act as equalizers for social differences: Preschool attendance is positively related to educational readiness when starting school and has been shown to increase educational equality between social groups. For children with less educated parents, preschool attendance has a positive effect on vocabulary development (Becker 2011). The potential positive effects of preschool attendance are, however, related to the quality of the preschool (Biedinger et al. 2008).

To measure and map preschool quality and its determinants I analyze the characteristics of preschools, as well as those of the neighborhoods, and municipalities in which they are nested. While children have, by law, the same right to equal high-quality preschool, this is not realized in reality. Providing all children with equal high-quality preschool has the equalization potential to long-term affect educational performances, crime rates, employment rates, and overall equality in society (Becker 2011; Biedinger et al. 2008; Bustamante et al. 2023; Passaretta et al. 2022; Persson 2012; Schweinhart and Lawrence 2005; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018).

The research questions guiding this thesis will be the following:

RQ: How does quality in preschools vary in Sweden?

- **How does the socioeconomic status of neighborhoods correlate with preschool quality?**
- **How does the type of principal (public or private) correlate with preschool quality?**
- **How does the population density correlate with preschool quality?**
- **How does a municipality's economic status correlate with preschool quality?**
- **How do the ruling parties in a municipality correlate with preschool quality?**

The theoretical framework that guides the thesis is based on previous research indicating the importance of preschool quality for children's development (Becker 2011; Biedinger et al. 2008; Bustamante et al. 2023; Passaretta et al. 2022; Sheridan et al. 2009; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018) and on social equity theory. Social equity theory states that inequalities between social groups are established in two ways: direct influences and signal influences (McKown 2013). The theory highlights the potential role of social institutions in establishing educational inequalities. In the thesis, I will examine preschools' potential as a direct influence on social inequalities. Unequal access to high-quality preschools may reinforce and escalate established social differences. According to social equity theory (ibid), differences in access to different institutions are part of the mechanism leading to educational achievement gaps between social groups. Based on that, I will evaluate access to high-quality preschools in different neighborhoods and municipalities.

Theoretically, I developed five hypotheses about how preschool quality – operationalized as teacher education and group size – relates to 1) the type of principle (public or private); 2) the socioeconomic status of a neighborhood; 3) population density; 4) the economic status of a municipality; and 5) the ruling parties in a municipality. Drawing on statistical data from 8582 preschools in 290 municipalities in Sweden, I use techniques of multi-level regression analysis to deal with the fact that preschools are clustered in municipalities.

There are limitations to my operationalization of quality. My operationalization of quality is statistically measurable which is not always optimal for a socially constructed concept like preschool quality. A more complex and qualitative operationalization of preschool quality was deprioritized in favor of a statistically measurable operationalization, enabling analysis on a larger scale including all preschools in Sweden. The thesis aims to examine systematic patterns of quality and to be able to draw conclusions of a systematic pattern a large quantity of preschools needs to be analyzed. The operationalization is instead based on indicators identified in previous studies as important for determining preschool quality (De La Porte et al. 2023; Persson 2012; Samuelsson, Williams, and Sheridan 2015; Sheridan et al. 2009): teacher education and group size. The thesis more accurately compares the *potential quality* of the preschools and not the actual *quality*.

2. Theoretical discussion

Theoretically, the thesis largely draws on Social Equity Theory (McKown 2013). The theory explains how social inequalities are established. Using two different mechanisms the social equity theory explains how social differences in education are established for stereotyped groups. The reason for using this theory and not more classic theories like Bourdieu's forms of capital or Weber's social stratifications is that social equity theory specifically focuses on and explains social institutions – like preschools – role in establishing social differences. The focus on social institutions and systematically established social differences aligns with the thesis's focus and is useful in formulating hypotheses and interpreting the results.

Based on social equity theory I suspect preschools could be one of the institutions enabling social inequalities. The preschool research field internationally is in unison that attending preschools may have equalization potential for children from socioeconomically disadvantaged homes (Becker 2011; Biedinger et al. 2008; Bustamante et al. 2023; OECD

2017; Passaretta et al. 2022). If the preschool's quality relates to socioeconomic status, however, the preschools rather act to reinforce social inequalities. Preschool quality has been found to correlate with residential segregation and the neighborhood's socioeconomic status (Biedinger et al. 2008; Cloney et al. 2016) indicating inequality in access to high-quality preschools. In this thesis, I will use the share of officially certified preschool teachers and group size as indicators of preschool quality. I will test the social equity theory as well as use the results to further develop the theory.

2.1. Social equity theory

Social equity theory explains educational achievement gaps between different ethnic groups (McKown 2013). Social equity theory claims that social equity is affected by two different processes: 1) *Direct Influences*; and 2) *Signal Influences*. Direct Influences include social processes of support for educational achievements that are unevenly distributed among the population, reinforcing ethnic differences. Signal Influences are cues of negative expectations towards specific groups that children of that group often live up to when made aware of the negative expectations.

I argue that differences in preschool quality can act as a *direct influence* on social equity, both regarding ethnic differences in educational achievements and regarding socioeconomic differences (e.g. the parents' education and income levels). Social equity theory is only focused on interethnic differences, but since the theory's definitions of the processes behind Social equity theory refer only to "stereotyped groups" (McKown 2013) I argue that it should translate to other stereotyped groups as well, for instance, those with low socioeconomic status, and that is how Social equity theory will be used and tested in this thesis. In Sweden, there is also a large overlap between low socioeconomic status and immigration background which is another reason why socioeconomic status should be able to replace ethnicity in its use in social equity theory.

2.2 The need for quality in early childhood education and care

Multiple earlier studies indicate that preschool quality matters in shaping children's long-term school performance (Becker 2011; Biedinger et al. 2008; Bustamante et al. 2023; OECD 2017; Passaretta et al. 2022; Persson 2012; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018). This gives preschools the potential to work as "equalizers" for children from socioeconomically disadvantaged social backgrounds. Preschools have been seen to have a

larger educational impact on children from disadvantaged families which further contributes to their equalization potential (Becker 2011; Biedinger et al. 2008; Bustamante et al. 2023; Passaretta et al. 2022). Numerous previous studies have established that high-quality preschools have the potential to long-term compensate for social disadvantages and affect future educational achievements (Becker 2011; Biedinger et al. 2008; Bustamante et al. 2023; Passaretta et al. 2022; Persson 2012; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018). However, preschool quality may also correlate with the socioeconomic status of the neighborhood, which counteracts the equalization potential. This has for instance been observed in Australia where a correlation was found between a lower socioeconomic status of children and a lower quality of preschools (Cloney et al. 2016). In Sweden, a similar pattern has been observed when comparing the density of educated preschool teachers across public preschools (Tornberg et al. 2022) and in a study conducted in Malmö (Persson 2012) it was also found that children with lower socioeconomic status were overrepresented in preschools with lower quality.

Another indication of preschool's equalization potential is found in a longitudinal study of students in Germany, the Netherlands, and the United Kingdom. The study found that 50-80 percent of the language gap measured when students finish primary school was explained by gaps found before starting primary school (Passaretta et al. 2022).

“Altogether, there is mounting evidence that social-origin gaps in school achievement are explained by inequality mechanisms operating in the years before school life.” (Passaretta et al. 2022:862).

Earlier research shows that inequalities established before school starts are formative for educational achievements later on and the years of primary school are not able to compensate for the educational inequalities that are already established before school starts (Becker 2011; Biedinger et al. 2008; Passaretta et al. 2022). The period between 1-3 years old has been identified to be important for children's development of learning (Sheridan et al. 2009). The learning environment in preschool has been seen to affect children's motivation to learn (Pakarinen et al. 2010): High teacher stress and low organization in the classroom negatively affect the school motivation for preschool children, which may be another reason for long-term effects on educational achievements.

Differences in basic mathematics and language skills are found in children by the age of two when comparing children attending high and low-quality preschools in Sweden (Sheridan et al. 2009). Children in high-quality preschools performed better in both areas. Early differences in mathematics skills may be one reason behind the large gaps in educational achievements in mathematics when students finish primary school. Mathematics is the second most common subject for students to fail in Sweden when graduating from primary school, after Swedish as a second language (Skolverket 2022a). In 2022 eleven percent of students graduated from primary school with a failed grade in Mathematics (ibid).

A study compared the long-term effects of preschool attendance across 28 countries (Cebolla-Boado, Radl, and Salazar 2017) and found a strong positive correlation between time of preschool attendance and test results of reading competencies in the 4th grade. This also confirms the importance of preschool for long-term educational performance. However, in alignment with Becker's findings (2011), the benefits are stronger for children from socioeconomically disadvantaged homes, which once again confirms the equalization potential of preschools. Becker's study did not include quality evaluations of the preschools which limits the possibilities of the analysis. An American study with preschool quality in focus showed that high-quality preschool has positive long-term effects on educational performances, employment rates, annual earnings, and home ownership, as well as negative effects on drug use, and criminal activities (Schweinhart and Lawrence 2005).

Even though preschool attendance has an equalization potential for educational achievements (Becker 2011; Biedinger et al. 2008; Bustamante et al. 2023; Passaretta et al. 2022; Persson 2012; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018), the gap is not closed merely by preschool attendance (Becker 2011) and having high attendance is not a guarantee for the equalization potential of preschool. The quality of the preschool is crucial for reaching its potential benefits (OECD 2017; Sheridan et al. 2009). In Sweden attendance in preschools is high (Tornberg et al. 2022), yet, this does not guarantee the equalization potential from attending preschools as the quality of preschools varies a lot and is not nationally evaluated in a comparable matter. In the following section, I will further examine the potential benefits of high-quality preschools.

Nobel prize winner James Heckman (2006) created a model for the return of different investments in human capital done for disadvantaged children, see Figure 1. The model

visualizes the importance of preschools for the future of individual children and society at large. It is more cost-efficient to provide children from disadvantaged backgrounds with investment in the form of high-quality preschools than waiting until later on in life. Equal high-quality preschools are not just important in the interest of equality, it is also a way for society to save money using early interventions (Heckman 2006).

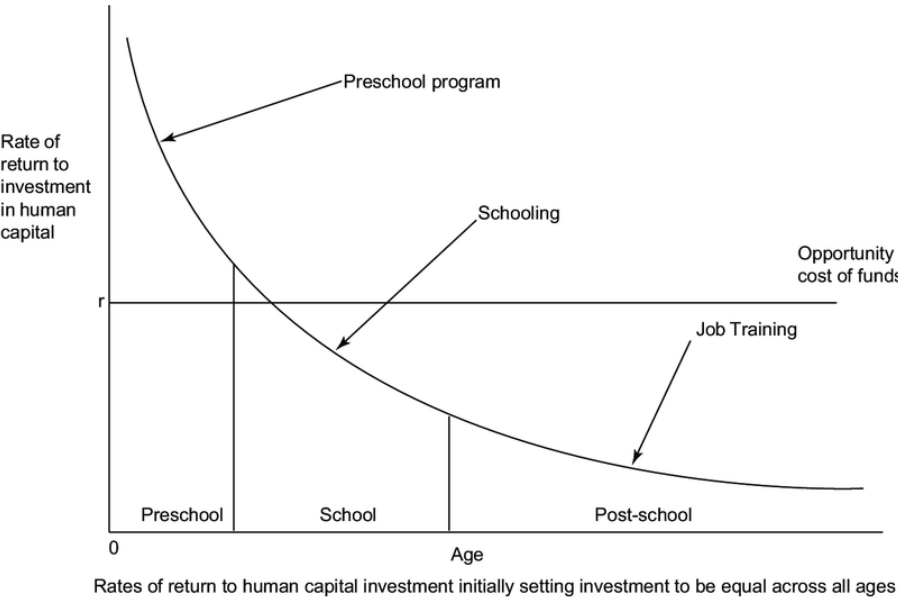


Figure 1 Rate of return to investment in human capital from (Heckman 2006:1901). The Opportunity cost of funds (r) is the return from funds if they were invested for purposes unrelated to disadvantaged children.

According to Heckman’s model keeping high quality in preschools is normatively beneficial for both society at large and the children. Preschools have educational and socializing advantages for children, and thereby society, thus entailing that keeping high-quality preschools saves money for society. Schweinhart and Lawrence’s study (2005) conducted an experimental study of preschool quality with disadvantaged children in the US, including a control group, and thereby attempted to isolate the effect of high-quality preschools. The economic benefits on the societal level that were estimated for the high-quality preschool were \$244,812 on an investment of \$15,166 per participant (\$16.14 per dollar invested) (Schweinhart and Lawrence 2005). Investing in high-quality ECEC is, thus, cost-beneficial for society long term. The cost-benefit that stands out the most in Schweinhart and Lawrence’s study (2005) is the amount of money saved in crime savings. 70 percent of the savings from high-quality preschool was in criminal costs per participant attending the high-

quality preschool. Children attending high-quality preschools are less likely to be arrested for violent crimes, property crimes, and drug crimes, so far observed until the age of 40 (Schweinhart and Lawrence 2005).

2.3. Applying the theory

Based on the discussion above this thesis will treat preschools as educational institutions that may affect children's future educational achievements as well as their general social development. As defined in social equity theory, preschools will be examined as potential direct influences. I will analyze the variation in preschool quality and compare it with socioeconomic status to examine if preschools work as direct influences for educational gaps between social groups.

3. The Swedish case

Swedish preschools have a good reputation internationally (De La Porte et al. 2023; Sheridan et al. 2009; Wallberg Roth and Tallberg Broman 2018). Children between 1-5 years may have the right to attend preschool and from 3 years old 525 hours are free of charge (Tornberg et al. 2022). The right to attend preschool for children aged 1-2 is based on the estimated need in regard to the parents' employment or studies (Skolverket 2024). The 525 hours of free preschool for children from the age of 3 is, one of the lowest numbers of free hours at preschools out of all OECD countries (OECD 2017).

Despite Sweden's good reputation the quality in preschools varies a lot and has decreased overall in the last decade (Skolverket 2023c). The quality varies between different preschools, between and within municipalities (De La Porte et al. 2023; Sheridan et al. 2009; Tornberg et al. 2022). The preschool principal is responsible for maintaining the same high quality at all preschools which should provide all children with an equal basis for further education and development (Skolverket 2010). In the case of the principal being a private actor, the municipality bears supervisory responsibility for the preschool operation (Skolverket 2017).

3.1. Development of preschools in Sweden

Preschools in Sweden have varied in their purpose over time. They initially began as a support system to the labor market and for gender equality, allowing women an entrance into the labor market (Garvis 2018). Later, another purpose was added, the educational purpose for children (ibid): Providing all children with the same basis for further education and

development regardless of family background. Today preschools are seen as important institutions in society to socialize children and prepare them for social and educational life (Skolverket 2017). However, the time a child is granted to go to preschool is still related to the working or studying hours of the parents (Skolverket 2024), which insinuates that one purpose of preschools is still storing children while parents work.

The preschool system in Sweden has changed a lot over time. During the 1970's there was an overall democratization of early childhood education and care (ECEC) in Sweden (Wallberg Roth and Tallberg Broman 2018) and in 1975 the public ECEC began to develop (Jordahl and Öhrvall 2013). The municipalities have had responsibility for the ECEC from the beginning. At first, they were mainly responsible for developing ECEC (ibid), and the responsibility for the actual content of activities was laid on each department within the daycare or preschool (Wallberg Roth and Tallberg Broman 2018). Based on interest and competence the leadership and responsibility were divided within the staff team.

From 1995 the municipalities became responsible for guaranteeing a place at a preschool to all children within a reasonable time (Jordahl and Öhrvall 2013). In 1998 preschool became the responsibility of the Swedish National Agency of Education (NAE) (*Skolverket*) and got its first curriculum (Skolverket 2008). Preschools were, as of this, no longer considered merely an institution to enable both parents to work but an educational institution preparing children for future education and social life. Ten years after the introduction of the first curriculum the quality differences increased: Preschools that already had high quality increased their quality while low-quality preschools had low or no changes (Sheridan et al. 2009). The low-quality preschools seemed to lack an understanding of the change of assignment after the curriculum (ibid). In 2003 universal preschool was introduced (*allmänna förskolan*) which gave all children from the age of four the right to 525 hours of free preschool each year (Tornberg et al. 2022). In 2010 it was extended to also include children from the age of three. From this age group (3-5 years) 95 percent of children attend preschool in Sweden today (ibid).

In 2010 preschools officially became a school in the Swedish education system (Garvis 2018) which meant that the role of preschool teachers became more important. In the curriculum from 2018 (LpFö 18), there are specific responsibilities that only apply to preschool teachers and therefore explicitly rely on the presence of a preschool teacher (Skolverket 2018). Part of

the reason for introducing a new curriculum in 2018 was to achieve more equal quality at all preschools all over Sweden (Garvis 2018).

3.2. The Swedish preschool system

The governance of ECEC is situated at a national level in Sweden but the execution of ECEC is on the municipality level. The municipalities receive funding from the state to provide preschools and other social services but the money is not earmarked (Garvis 2018). The municipalities are responsible for budgeting to provide the required social services: preschools, schools, elderly care, and so on. Funding of social services by municipalities is also dependent on local taxation which amounts to all municipalities having different budgeting depending on the residents' financial situation. Municipalities have different economic situations and different priorities which, according to Garvis (2018), are among the reasons why the preschool quality differs between municipalities. Preschool quality, like group size and education level of staff, are weighed in budgeting against primary schools and elderly care.

Between the years 2013 and 2019, the average allowance from the municipality per child for private preschools was higher than the average cost for the municipality per child for public preschools (Skolverket 2023b). After 2019 the cost per child for public preschool has been higher than the allowance for private preschools. In 2022 the average allowance per child for private preschools was about 151k SEK per child and for public preschools the cost per child was about 172k SEK. It is thereby cheaper for municipalities to have children in private preschools. Fees from parents make up only about eight percent of the cost of a place in preschool (OECD 2017). There is a maximum fee for preschool that depends on the parent's income and the number of children they have (ibid).

The responsibility for preschools in Sweden is decentralized. The main responsibility lies on each municipality to provide all children with a place at a preschool. The quality in preschools is mainly the responsibility of the headmaster and the principal (either the municipality or a private actor) (Skolverket 2017). However, the NAE argues that there is a need for the state to take action to help the municipalities ensure the quality of preschools and ensure that all children receive an equal base for future education (Skolverket 2023c).

Primary schools and preschools in Sweden are controlled under the same law (Skollagen) (Wallberg Roth and Tallberg Broman 2018). However, distinctions are made regarding the

format of education between preschools and primary schools where the statements concerning preschools are more vaguely formulated. Hours for education are not specified for preschools and neither is the planning time for the teachers (ibid). Education time in primary school for the first two years, is 6 hours per day, in preschool, since it is not regulated, it can be up to a full day.

Teachers in primary schools have 104 hours of competence development and 407 hours of non-scheduled work for planning and other sorts of administration, according to the school law. For preschool teachers such time is not specified: preschool teachers have pedagogic development time, but the time is not regulated. This means that it is up to each municipality or principal to decide how much time the preschool teachers are given for planning, and administration and how many teaching hours the preschool should have. From Wallberg Roth and Tallberg Broman's report (2018), it is clear that preschool teachers are not provided with the right conditions to follow the curriculum. They argue that the lack of official regulations of preschool does not translate to providing all children with the same educational basis and that there is a dissonance between goal documents and prerequisites to achieve the goals.

3.2.1. Privatization

In the early 1980's almost all of Sweden's welfare was publicly funded and run (Jordahl and Öhrvall 2013). However, during the 1980s people started to question the public sector's dominance of certain areas. It was argued that the consumers of the publicly provided services were lacking choices and consumer influence (ibid). During the 1980's the first private for-profit actor (Pysslingen förskolor AB) tried to establish itself on the ECEC market. The social democratic government answered in 1984 with a law forbidding state funding for private for-profit actors running daycare and after-school centers (Jordahl and Öhrvall 2013). The government was opposed to profit in childcare. They argued that for a company to profit from childcare services, they would have to lower the quality or raise the fees (Bill. 1983/84:177). The risks associated with allowing for-profit actors to receive state funding for ECEC were, in the bill, that the for-profit actors would locate their organization in wealthier areas to increase profits and this would lead to segregation: childcare would be disproportionately located where the actual needs were lower. The government also stated that allowing profit in childcare would risk that frivolous actors would join which would risk the quality. Children's need for continuity was emphasized in the bill which was why even allowing for-profit actors on trial

was not considered viable. The bill was not very well received and approximately 85 percent of the voters supported private actors in childcare (Jordahl and Öhrvall 2013). In 1991 the government shifted to the right-wing parties and in 1992 they allowed for state-funded private actors in childcare to make a profit (ibid).

Up until 2006, the municipalities had to approve each private for-profit actor who wanted to open up a preschool (Jordahl and Öhrvall 2013). In 2006 the four right-wing parties together with the Swedish Green Party (Miljöpartiet) passed a law allowing a preschool the right to be established in a municipality as long as they followed the demands from the school laws (Jordahl and Öhrvall 2013). In 2011 another law was introduced giving the private preschools the same rights to funding and the same responsibilities for providing children with a place as the public preschools.

The privatization of the Swedish welfare followed a global trend for privatization and was an answer to economic difficulties and perceived shortcomings (Jordahl and Öhrvall 2013). Today 30 percent of all preschools are private preschools (Skolverket 2023a). The other 70 percent are public and run by municipalities. Out of the privately run preschools, 34 percent are run by parent or staff cooperatives and 46 percent are run by limited liability companies, the rest of the privately run preschools are run by “other organizational formats”. 21 percent of preschool children attend a private preschool. Municipalities in bigger cities have the largest share of children going to private preschools and rural municipalities have the smallest (Skolverket 2023a).

A cross-country study compared the equalizing effect of educational performances made from preschools between countries with different degrees of privatization of preschool (Janssen, Zwier, and Van De Werfhorst 2023). The results indicated that in countries with a higher degree of privatization, preschool attendance had a lower equalizing effect on education differences related to socioeconomic status. However, the results were not statistically significant. The study showed that there may be a correlation between higher privatization and lower positive effects of preschool attendance, concerning educational performance differences. This is also supported by statistics from the NAE showing that private preschools have lower preschool teacher density (Skolverket 2023c). The results from Janssen, Zwier, and Van De Werfhorst (2023) may also be a reflection of invisible cofounders such as

preschool fees or state regulations on preschool content, and may not directly relate to lower quality in countries caused by private preschools.

3.2.2 *A preschool in crisis*

The most important factors for providing a working environment that promotes high-quality preschools are the circulation of staff, building environment, income level, planning time, staff density, and group size according to the Swedish Research Council (*Vetenskapsrådet*) referenced in (Wallberg Roth and Tallberg Broman 2018).

The question of quality and working environment in preschools has been heavily debated in Sweden for a long time. In 2013 a grassroots movement called the Preschool Rebellion (*Förskoleupproret*) was established with the aim of higher quality in preschool and better working conditions for preschool staff. The organization mainly consists of preschool staff and they are actively working for a better working environment (*Förskoleupproret* n.d.-b). The organization started as a Facebook group but grew quickly and now has more than 35,000 members (*Förskoleupproret* n.d.-a). The Preschool Rebellion has a list of demands on their webpage that they argue will raise the quality of preschools and that will encourage more people to choose to work in preschools. The demands that are at the top of the list are a maximum for group sizes dependent on age group and a maximum of child per staff (*Förskoleupproret* n.d.-b).

The preschool rebellion is not alone in their skepticism towards the preschool working environment. A report from the teachers' union from 2018 examining teachers' workload and stress, describes teachers' situation as being “stuck in an imbalance of demands and resources” [my translation] (*Läraryrket* 2018). The most common reason for sick leaves in school is psychological diagnoses which include stress diagnosis. 50 percent of teachers deem their workload as *too high* or *all too high* and the reason for this is the imbalance between demands and resources (*Läraryrket* 2018). The demands on teachers are increasing at the same time as access to competent teachers decreases. More than 80 percent of preschool teachers experienced their workload as *a bit too high*, *too high*, or *all too high* (*ibid*). Almost 50 percent of preschool teachers skip their break due to lack of time *every day*, *a couple of times a week*, or *some time each week*. When teachers were asked what they thought could be done to lower their workload the most common answer for preschool teachers was *smaller groups of children*. More than 75 percent of preschool teachers

answered that smaller groups would decrease their workload. There are official guidelines for group sizes in preschools. Yet, the average size of children groups is well above the NAE's guidelines. In 2016 when the guidelines were implemented the national average of children in a group was 16 (Skolverket 2023a). This is the same average as I have in my data from 2022. Based on the guidelines the average group should be 11 children. When teachers were asked what makes them stressed, the most common answer for preschool teachers was *too many students* and *too little time for planning the education* (Läraryrket 2018). This once again shows the problem with too large children groups, too few preschool teachers, and a lack of regulations of staff density and planning time. This indicates a clear dissonance between the demands and the recourses.

A recent Swedish study found the working conditions for preschool teachers as precarious and bearing the stamp of uncertainty, disguised as a need for flexibility (Alvinus and Svensén 2020). Preschool teachers have low incomes compared to the level of education needed and express uncertainty about working conditions, staffing, resources, and the number of children daily (ibid). Alvinus and Svensén (2020:56) describe the preschool environment as a place of crisis. A crisis is defined according to Sundélius, Stern, and Bynander (1997) quoted in (Deverell, Almgren, and Örtenwall 2004:11):

”Kriser är situationer då centrala aktörer uppfattar situationen som att: betydande värden står på spel eller hotas, en begränsad tid står till förfogande, omständigheterna präglas av en betydande osäkerhet.”

”A crisis is a situation when central actors perceive the situation as important values are at stake or are threatened, a limited time is at disposal, the conditions bear the stamp of considerable uncertainty”

A group mentality among preschool staff is evident in Alvinus and Svensén's study (2020). The preschool staff put up with poor working conditions because of loyalty to their colleagues. They compensate for poor scheduling by working overtime to spare their colleagues having to work alone or understaffed.

According to the NAE, the lack of educated teachers and preschool teachers will continue onwards (Skolverket 2023c). They estimate that Sweden will lack 12,000 teachers and

preschool teachers by the year 2035. This will lead to a large portion of uneducated staff working in schools and preschools. The problem does not only lie in a lack of people studying to become preschool teachers, preschool teachers are also leaving the career after only a few years. This pattern could of course be coincidental but it could also be confirmation of the working environment described by Alvinus and Svensén. Preschool teachers stand out in the highest amount of teachers who stopped teaching five years after graduating (24 percent), and out of those, the highest amount of teachers on temporary leave (16 percent), and the highest amount of teachers who stopped teaching and left the field of education altogether (35 percent) (SCB 2022). These numbers indicate untenable working conditions. In OECD's report (2017) it is stated that improving working conditions can increase quality in preschools.

3.3. Goal conflict

Initially, the purpose of ECEC was to support the labor market that needed more workers and to increase gender equality by allowing women an easier entrance to the labor market (Skans 2011). ECECs were also used as part of the welfare system, providing support for socially disadvantaged families. The role of ECEC was to socialize children and allow the mothers to be a part of the labor market (ibid). This changed officially in 1998 when preschools got their first curriculum and became the responsibility of the NAE (Skolverket 2008). However, the official change did not necessarily change the general idea in society of the role of a preschool. The change into an educational institute was a top-down decision and it is not clear if it had support from parents and staff in preschools which might have hindered the shift. After the shift in 1998, many preschools seemed to lack an understanding of their changed assignment (Sheridan et al. 2009). The confusion around the role of preschools can be understood as a goal conflict. Is a preschool an educational and socializing institution for children or a resource for parents who need to work?

The goal conflict of preschools could be one reason behind the varying quality and the lack of media attention the quality has received. Is it an educational institution or a storage unit for children? The idea of preschools as a place to leave your children while you work may be enough for many parents and they are thus satisfied even though many preschools don't follow official recommendations and have a decreasing share of officially certified preschool teachers (Skolverket 2014, 2023a). Having a person who is nice and takes care of your child may be more important for parents than having an educated preschool teacher who follows

the curriculum. The NAE has a slightly different idea of the goal of preschools: “The preschool should stimulate the children’s development and learning, and provide the children with safe care. The preschool should be based on a holistic approach of the child and the child’s needs, and should be shaped so that care, development, and learning work as a whole.” [my translation] (Skolverket 2017:8). Having this general disagreement in society about the goal of preschools may be a reason behind their low priority and overall lacking quality.

3.4. Evidence from Swedish preschools and schools

In Sweden, the difference between children of highly-educated parents and those of less-educated parents is evident in school performance (Sveriges officiella statistik 2022). Only 54 percent of children from parents with primary education as highest education graduate from primary school with qualifications to continue their education. Compared to 94 percent of children from parents having attended a long education after upper secondary school (e.g. university). A similar trend can be seen comparing children without and with a Swedish background (having at least one parent born in Sweden). 75 percent of children without a Swedish background graduate from primary school with qualifications to continue their education. The corresponding number for children with a Swedish background is 89 percent. I argue that since preschool quality affects later educational performances (Bustamante et al. 2023; OECD 2017; Persson 2012; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018), preschools likely act as a direct influence on achievement gaps between social groups.

The preschool research set in Sweden is rather limited to the relation between social inequalities and quality in preschools. This is partly because educational research relating to social differences has largely focused on primary and upper secondary school, overlooking the importance of preschool. Partly because there is no national record of quality in preschools, contrary to primary and upper secondary schools where there are standardized national tests of knowledge. The lack of standardized quality evaluations in preschools extensively limits the possibilities for comparing quality in preschools.

Given the organizational similarities between primary school and preschool, I expect similar patterns will be found in my analysis of preschools as have been found in earlier research of primary school. There are three main organizational similarities: Both preschools and primary schools are controlled under the same law (Skollagen), they are primarily the responsibility of each municipality and they exist in both a private and a public format (Skolverket 2017;

Wallberg Roth and Tallberg Broman 2018). Because of the similarities between preschool and primary school earlier research from both will be examined in this section.

Research on differences in school quality has found that quality in primary schools correlates to the neighborhoods and the student's socioeconomic status: disadvantaged areas and disadvantaged students generally attend lower-quality primary schools (Bygren and Szulkin 2010; Holmlund, Sjögren, and Öckert 2020). There are large knowledge gaps between students of different social backgrounds in primary school. The quality between schools also varies: teachers with high competence usually work at schools with students that have privileged backgrounds and teachers with lower competence often work in schools with students that have less privileged backgrounds (Holmlund et al. 2020). 85 percent of ninth-grade students in Sweden finish primary school with grades that allow them to continue to upper secondary school. However, when comparing students with parents of different education levels the results vary: For children with parents with the lowest education level (up to primary school) only 54 percent of students received grades that allowed them to continue to upper secondary school, the corresponding percentage of children with parents with the highest education level is 94 percent (Sveriges officiella statistik 2022). This type of individual quality evaluation does not exist for preschool children. However, it is clear from this that the Swedish educational system has not succeeded in providing equal high-quality education to all children. I deem it likely that similar patterns may be found in preschools. The results from Sheridan's study of children's learning in Swedish preschools (2009) show that the learning environments between the preschools in the study varied to the degree that children's well-being and learning should have been affected. Since 2009 when Sheridan's study was conducted the quality of preschools and the share of preschool teachers has decreased (Skolverket 2014, 2023a, 2023c). Knowledge differences between the children in high-quality and low-quality preschools were, in 2009, found in basic mathematics, language, and communication (Sheridan et al. 2009). Children in high-quality preschools had a better understanding of mathematics and were more competent in language and communication (Sheridan et al. 2009). The variation in preschool quality may be one reason for the large knowledge gaps in students finishing primary school. If preschool quality, like primary school quality (Bygren and Szulkin 2010; Holmlund et al. 2020), is distributed in favor of children in neighborhoods with higher socioeconomic status the preschools may act to amplify social differences.

Sweden is right now experiencing an increase in gang-related crime and violence (Öberg and Merenius 2023). An important part of crime prevention is attempting to anticipate who is at risk of committing criminal acts. There are multiple risk factors for someone to become a criminal e.g. school motivation, educational performance, and socioeconomic background (Ring and Shannon 2023). Both school motivation and educational performance correlate to the quality of preschool a child attends (Bustamante et al. 2023; OECD 2017; Pakarinen et al. 2010; Persson 2012; Schweinhart and Lawrence 2005; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018). As discussed above preschool quality may relate to socioeconomic background (Cloney et al. 2016; Persson 2012; Tornberg et al. 2022) and the quality differences may therefore work as a double disadvantage for children with a weak socioeconomic background. Children with a weak socioeconomic background already have a higher risk of committing a crime, if these children also are placed at low-quality preschools that risk increases further, amplifying the structural inequality. Improving preschool quality and guaranteeing equal high quality at all preschools may have a crime-preventive effect and decrease gang-related crime in the long term.

4. Hypotheses

Based on the theoretical framework and the literature review five hypotheses are established. In accordance with social equity theory as discussed under 2.1. *Social equity theory* and 2.3. *Applying the theory*, I suspect that preschool quality acts as a direct influence and is distributed in the disfavor of children living in neighborhoods with lower socioeconomic status.

H1: Low socioeconomic status in a neighborhood correlates with lower quality in preschools.

Based on the discussion in 3.2.1 *Privatization* my second hypothesis is established:

H2: Private preschools have lower quality than public preschools.

Lastly, my three final hypotheses are formulated based on the discussion in 3.4. *Evidence from Swedish preschools and schools* where other aspects of the preschool surroundings are examined as population density and municipality characteristics. The effect of municipality characteristics has not been established in previous research and the last two hypotheses are because of that, open to the direction of the correlation.

H3: High population density correlates with low quality in preschools.

H4: The economic status of a municipality correlates to the quality of preschools.

H5: The ruling parties in a municipality correlate to the quality of preschools.

5. Significance and scientific novelty

Many studies have concluded that there are quality differences between preschools in Sweden (De La Porte et al. 2023; Persson 2012; Sheridan et al. 2009; Tornberg et al. 2022) but no clear pattern has been yet identified.

Earlier analyses have suggested that the socioeconomic status of the children did not explain the differences in preschool quality in Sweden (Tornberg et al. 2022). However, these results were not based on the same quality measures as I use in this thesis and they were based on different measuring units. Their quality indicators were only focused on the education level of staff and staff density, and their results only included public preschools. They were measured by each child and not the neighborhood and they did not account for differences between municipalities which I will do by using a multi-level regression analysis. Because of this, I believe that my results may differ from theirs. A correlation that was found in the earlier analysis however was that uneducated staff were overrepresented in preschools with many children with foreign backgrounds (Tornberg et al. 2022) which aligns with SET. Another study conducted in a specific municipality in Sweden (Malmö) found a correlation between the socioeconomic status of a child and preschool quality (Persson 2012), which may indicate that similar patterns can be found in other municipalities.

This thesis offers a unique opportunity to analyze quality differences in preschools because of the large datasets that will be combined and the usage of multi-level analysis. The chosen method allows for patterns of quality to be identified both within and between municipalities. This thesis will include all preschools in Sweden with quantifiable quality indicators, their surrounding neighborhood socioeconomic variables, the economy of the municipality, and the political ruling. Since inequality is a structural problem, it is more valuable to look at the preschool units and their surroundings than compare individual children and their backgrounds. This offers more information about the systematic inequality that may be reproduced in the variance of preschool quality. The choice of preschools with their neighborhoods as the measuring unit is also important because of the association between

preschool quality and residential segregation (Biedinger et al. 2008). To the best of my knowledge, no earlier study in Sweden has looked at the relationship between neighborhood characteristics, type of principal, municipality characteristics, and preschool quality.

In De La Portes's study (2023) following the development of preschool quality in Sweden, it was evident that the financial crisis around 2010 negatively impacted the quality of preschools at large (De La Porte et al. 2023). Since 2021 Sweden has had another financial recession which could mean that quality is once again negatively affected and I suspect that the quality setback could have different effects among preschools. It has been established that there already was great variation in the quality of preschools both between and within municipalities, before the pandemic and the financial recession, I suspect that this variation might have been reinforced both by the recent pandemic and the current financial recession. Having potentially exaggerated variations of qualities will make it easier to detect patterns of variations, which is why this study is benefitting from being conducted now.

6. Data and methods

The data consists of several combined data sets. One data set including information from 2022 on all preschool units in Sweden comes from the NAE (Skolverket 2022b). The second dataset consists of socio-demographic data of geographical areas, Deso, and was accessed through RISE who ordered the data from Statistics Sweden (SCB), which is a government agency that produces official statistics. A Deso is a demographic statistics area and Sweden is divided into 5 984 different Deso, which at the start (in 2018) had a population ranging from 700 to 2500 residents in each (SCB n.d.). This dataset consisted, mostly of data from 2020 (for the following variables: income level, born outside the Nordic countries, population density, and education level) and one variable from 2019 (unemployment rates). The rest of the data is on the municipality level and is a combination of two different open datasets from Statistics Sweden (SCB), the information on the municipality economy is from 2022 and the political government of the municipality is from 2018 which means that the government has had four years of political ruling when the preschool data was measured and therefore may have made an impact with their governing. Aside from the political government being from the years before the rest of the data, it is a slight limitation that the data comes from different years. Nevertheless, the years are close together and the available data still provides indications of differences between preschool quality in different neighborhoods. Even though there might

have been slight changes in the income levels, education levels, population density, population born outside the Nordic countries, and employment rates in the 2 and 3 years that differed in the data, it is unlikely that many neighborhoods had a significant change in the variables during such a short period. A pattern of quality may still be possible to detect.

6.1. Evaluating preschool quality

There are two aspects of quality to focus on when it comes to preschools: structural quality, and process quality. *Structural quality* refers to the level of education among the preschool staff members, whereas *process quality* reflects the physical environment, surroundings of the preschool, and interactions (De La Porte et al. 2023; Persson 2012). Process quality can also be said to include the child group size which together with the staff-to-child ratio is of great importance for the quality of preschools. Process quality is found to be a very important factor concerning educational equality in a country (Van Lancker and Ghysels 2016). High process quality is deemed essential for disadvantaged children to gain the equalization benefits of preschool (Van Lancker and Ghysels 2016). The ratio between child and staff is important for preschool quality and for future educational performances (Persson 2012). In Sweden, the quality focus has been on the education level of the staff and the group size of children (De La Porte et al. 2023). These are important factors for high-quality preschools (Samuelsson et al. 2015) and will be the basis for preschool quality in this thesis. The thesis will use two quality indicators: 1) share of educated staff, to reflect structural quality and 2) group size, to reflect process quality.

6.1.1 Existing evaluations

All preschools are required to do quality evaluations regularly to ensure the preschool's high quality and develop the organization (Skolverket 2017). It is the principal who is responsible for the quality evaluation and its format. To do the quality evaluations some measures are commonly used: staff density (how many children per staff) and the share of staff with preschool teacher education (Garvis 2018). In addition to the measures, two surveys are often used to evaluate the quality: One survey for the preschool staff about their work environment and one survey for the parents about how they perceive the social and learning environment. The problem with the surveys is that to adequately evaluate the quality of a preschool one needs sufficient pedagogical knowledge (Sheridan et al. 2009). Parents often have limited knowledge of preschools and are usually not qualified to evaluate the learning environment

(Garvis 2018). Garvis (2018) also identifies a risk that parents with immigrant backgrounds are, e.g. because of language barriers disadvantaged when assessing preschool quality. This theory is supported by lower response rates in areas with mother tongues other than Swedish. Due to language barriers, some parents' experiences may not be heard. Earlier research has also shown that preschool staff without teacher education generally deem the quality higher than the officially certified preschool teachers do (Sheridan et al. 2009). The results from the officially certified teachers' evaluations are also closer to the external evaluations. This could entail that when the staff is allowed to evaluate the quality of a preschool and most of the staff lack education, they may self-evaluate as higher quality than they have and may also, therefore be ranked higher than a preschool with more officially certified preschool teachers even though the latter preschool has higher quality. Overall, both staff with and without teacher education usually deem the quality as higher than external evaluations do. The quality measures are also largely dependent on the goals set by individual municipalities (Garvis 2018). There is no legislation for staff density and the portion of preschool teachers, and there are only guidelines for group size in preschools and they are usually not followed (Skolverket 2016, 2023a), which leaves these aspects of quality to be decided by each principal. Another problem is that the quality is not measured for individual achievements even though the preschool curriculum includes individual goals for development and learning (Skolverket 2018). As a result of everything discussed above the existing evaluations are not a good estimation of preschool quality. There is a need for a standardized quality evaluation to make the evaluations comparable, reliable, and valid.

In the last ten years, some quality indicators have developed in the wrong direction, or not at all: children group size and education of staff. In 2016 a new guideline for group sizes in preschools was introduced (Skolverket 2016). This guideline is, however, not visible in the development of the actual group sizes. If the guidelines were followed the national average group size should be 11. The national average of child groups was 16.8 in 2013 (Skolverket 2023a) and 15.8 in my data from 2022. In ten years it has only decreased by 1 child and is still 44 percent larger than the recommendations.

Several studies agree that education and competence of staff are the most important indicators of quality in preschools (Sheridan et al. 2009; Skolverket 2023a; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018), yet the share of staff who are officially certified

preschool teachers has decreased in the last ten years and the share of staff without relevant education has increased (Skolverket 2014, 2023a). Only about 40 percent of the staff in preschools are officially certified preschool teachers. 17 percent have education from upper secondary school of work with children and another. 40 percent lack relevant education and have neither qualifications from pedagogical education from university nor upper secondary school (Skolverket 2023a). Of these 40 percent, less than half have some kind of pedagogical education (including isolated pedagogical courses or beginning a relevant education program and not graduating) and the other half have “other education” that is not related to teaching or children. The share of preschool staff with “other education” has increased drastically in the last ten years. In 2013 only 6 percent of the full-time staff in preschools were missing pedagogical education and education for working with children (they had “other education”) (Skolverket 2014). The share of staff lacking any relevant education has thus increased quite a lot in ten years, from 6 percent to 23. This does not correspond to the curriculum establishing that only staff who are officially certified preschool teachers are qualified to carry out the education in preschools (Skolverket 2023a).

”Endast den som har legitimation som förskollärare och är behörig får bedriva undervisningen. I förskolan får det även finnas annan personal med sådan utbildning eller erfarenhet att elevernas eller barnens utveckling och lärande främjas” (Skolverket 2023a:5–6).

“Only an officially certified preschool teacher is qualified to carry out the education. In the preschool, it is also allowed for other personnel to exist with the education or experience that promotes the students or children’s development and learning” [My translation] (Skolverket 2023a:5–6).

In the quote above it is phrased as though most of the staff in preschools should be officially certified preschool teachers and that other personnel are merely “allowed” if they promote development and learning. In preschools today the preschool teachers make out a minority of the preschool staff. All preschools are required to carry out education by the curriculum and only officially certified preschool teachers are allowed to carry out that education (Skolverket 2023a). The number of preschool teachers at a preschool is therefore very important for the ability to provide the required education. If the preschool isn’t providing the required

education it could be argued that it is not a preschool, it should instead be classified as *other pedagogical establishments*. Other pedagogical establishments are other types of daycare that are not preschools and do not follow the school law or the preschool curriculum.

The share of officially certified preschool teachers within the staff is higher in public preschools compared to private preschools, 43 percent versus 31 percent (Skolverket 2023a). The share of staff with irrelevant education is lower in public preschools compared to private preschools, 20 percent versus 32 percent. Private preschools thus have more staff with an education that is not related to children or teaching than they have officially certified preschool teachers.

The distribution of officially certified preschool teachers also differs between different types of municipalities: the largest share of preschool teachers is found in smaller towns, 47 percent, and the smallest share of preschool teachers is found in big cities, 31 percent (Skolverket 2023a). The share of officially certified preschool teachers among the staff varies a lot between municipalities: between 20-70 percent (Skolverket 2023c). Between the municipalities, there are big differences in the numbers of children for each officially certified preschool teacher, between 7 and 25 children (Tornberg et al. 2022). Among the public preschools, the range is even bigger between municipalities, 7 and 27.

The statistics above lack any comparisons within municipalities between different neighborhoods and evaluations if there's a compensatory correlation between the share of educated staff or socioeconomic backgrounds and group sizes as there should be according to NAE guidelines for group sizes (Skolverket 2016). When looking at children's backgrounds the variance of preschool teacher density seemed to reinforce established social differences instead of compensating for them: The density of preschool teachers was lower in preschools with a lot of immigrant children (Persson 2012; Skolverket 2023c; Tornberg et al. 2022).

6.1.2. Operationalizing teacher quality

The most important quality indicator according to the NAE is the educational level and competence of staff (Skolverket 2023a). Pedagogical awareness is crucial for how staff handle the content of the preschool and it is what mainly determines a preschool's quality (Sheridan et al. 2009). Staff with competence in how children learn can consider what experiences, contents, and activities are important for the children to participate in and at what age (ibid). The more awareness the staff has for this, the more it will influence the choices of how to

work with the children and the curriculum. These aspects are what differentiates a preschool of high quality from a preschool of low quality (ibid). Teacher quality is operationalized as the percentage of officially certified preschool teachers within a preschool's staff team.

In preschools, the average percentage of officially certified preschool teachers within the staff team is 40 percent (Skolverket 2023a). The Teacher Union (Sveriges Lärare) wants to increase the preschool teacher density and does not deem 40 percent of preschool teachers as sufficient to keep high-quality¹. Because of this, I will deem everything beneath 40 percent as low quality.

6.1.3. Operationalizing group size quality

Previous research suggests that children learn better in smaller groups with competent adults (De La Porte et al. 2023). The smaller groups provide children with better opportunities for interaction and interplay. Preschool teachers find it easier to follow the preschool curriculum when the groups of children are smaller than they usually are (Samuelsson et al. 2015). With today's comparably large group sizes, the preschool teachers find that they cannot follow the curriculum and meet the children on an individual level, which challenges all children (ibid). In 2016 new guidelines for group sizes were introduced that correlate to the children's ages (Skolverket 2016). The recommendations are 6-12 children for children ages 1-3 and 9-15 children for children ages 4-5 years (ibid). Group size quality is operationalized as the average group size of the preschools. The recommendation of 11 is the basis for my evaluation of group size quality, everything 11 or below is considered high quality, and everything above is considered low quality. In the following section, I will explain how the number 11 for the recommended group size is established.

6.2. Dependent variables

The two dependent variables are 1) *Teacher quality* based on the share of educated preschool teachers in the staff team; and 2) *Group size*, which indicates the group quality and is based on the average number of children in a group in each preschool. Both dependent variables in the two models are standardized by scaling them based on their standard deviation. This is done to emphasize the internal variation of the variables instead of the specific share of

¹ Personal correspondence via E-mail, with Petra Hultqvist from the Swedish Teachers Union (Sveriges Lärare),(2023-10-18).

preschool teachers and the precise number of children in each group. By scaling the variables, the variation between preschools is emphasized which is the main interest of this thesis.

For teacher quality, the mean percentage of preschool teachers in a staff team (40 percent) is made the center (0) of the standardized variable. This is because there is no official law or recommendation for the share of preschool teachers. However, the national teachers union (Sveriges Lärare) has stated that they would like to see the mean increased to obtain better quality in preschools². Because of this, the mean is made the center, and having less than the mean is considered low teacher quality. The second model is also scaled, but since there is an official recommendation for group size (11), that is made the center instead of the mean (16).

The recommended average of group size is calculated based on the median number according to the recommendation for the two age groups: 6-12 (median 9) children for children ages 1-3 and 9-15 (median 12) children for children ages 4-5 years (Skolverket 2016); and the registered numbers of children from the different age groups. The two age groups make out an approximately equal portion of all preschool children: Children aged 1-3 were 277,000 (2021) and children aged 4-5 were 235,000 (2021). Considering that older children likely spend longer days in preschool, I round off the age groups to being the same size. The national average should thus be the mean of the two recommendation medians, 9 and 12, which results in 10.5. I rounded up the number to 11 children in the average group, if the recommendations are followed. This number could be argued to be even lower because there should reasonably be fewer groups of the older age group since those groups are larger. Because of this, it could be argued that the average group size according to the recommendations should be weighted in favor of the youngest children. However, since I only use this number as a center for the standardized variable for group size, and it is already five children less than the actual average in my data (15.8) I chose to keep 11 as the recommended average.

<p>Standardized Teacher Quality</p>	<p>A continuous scaled variable based on Z-scores of the percentage of preschool teachers among the staff of a preschool unit. The center (0) is the mean percentage of preschool teachers which is 40 percent. This variable comes from the NAE and is on the preschool unit level. The z-score (standard deviation) of the share of preschool teachers is 17 percentage points.</p>
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² Personal correspondence via E-mail, with Petra Hultqvist from the Swedish Teachers Union (Sveriges Lärare),(2023-10-18).

Standardized Group Size	A continuous scaled variable based on Z-scores of the average group size of a preschool unit. The center here is modified so that zero represents the official recommendations for group size in preschools (11). This variable comes from the NAE and is on the preschool unit level. The z-score (standard deviation) of group size is four children.
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6.3. Independent variables

There are eight independent variables based on the theoretical framework. Six of the independent variables are on the preschool level (principle, the share of low income, the share of the population born outside of the Nordic countries, the share of unemployment, share with low educational level, and population density) the other two are on the municipality level (tax capacity, and political government). The variable for tax capacity is standardized by scaling it based on its standard deviation. This is done to emphasize internal variation of the variable and thereby more easily identify patterns of preschool quality relating to tax capacity.

Type of Principal	A categorical variable with two categories: Public and private, refers to the principal of the preschool unit. This variable comes from the NAE and is on the preschool unit level.
Share with low income	A continuous variable of the percentage of the population in a neighborhood with low-income standards. Low economic standard is defined by Statistics Sweden as equal to, or less than 167 400 SEK per consumption unit. This variable comes from Statistics Sweden and is on the Deso unit level.
Share of the population born outside of the Nordic countries	A continuous variable of the percentage of the population in a neighborhood born outside of the Nordic counties. This variable comes from Statistics Sweden and is on the Deso unit level.
Share of unemployment	A continuous variable of the percentage of the population in a neighborhood without gainful employment. This variable comes from Statistics Sweden and is on the Deso unit level.
Share with low education level	A continuous variable of the percentage of the population with upper secondary school (Gymnasium), or less, as the highest education level in a neighborhood. This variable comes from Statistics Sweden and is on the Deso unit level.
Population density	A continuous variable of the population of a Deso divided by the

	area of the Deso. This variable comes from Statistics Sweden and is on the Deso unit level.
Tax capacity	A continuous scaled variable of the taxable income per capita in a municipality. This variable has been scaled by z-score, with the mean as zero. This variable comes from open data from Statistics Sweden and is on the municipality level.
Political government	A categorical variable of the political government of a municipality. There are four categories in this variable: Right-wing parties; Left-wing parties, Both right- and left-wing parties, and “Other” parties. The last category often refers to smaller parties that may be municipality-specific. This variable comes from open data from Statistics Sweden and is on the municipality level.

I create initial regression models for both quality indicators to investigate the covariation of the variables relating to socioeconomic status on the preschool level (share of low income, the share of the population born outside of the Nordic countries, the share of unemployment, share with a low level of education). Each of the four socioeconomic variables is analyzed separately as part of the multi-level model and then all in one regression model for teacher quality, see Appendix. This is done to determine and illustrate how they covary and thus may affect each other’s significance and effect size. All four socioeconomic variables’ –income; born outside the Nordic countries; unemployment; and education – correlations with teacher quality are statistically significant when analyzed separately. However, when they are simultaneously analyzed in the same model only education keeps its statistically significant correlation with teacher quality.

I examine the covariation of the socioeconomic variables again, this time with group size as the dependent variable, see Appendix. The results for group size are similar to those for teacher quality: all four socioeconomic variables have a statistically significant correlation with the dependent variable when analyzed separately, but the statistical significance disappears for all but one when they are included in the same model. The effect size is also decreased in the final model, which also indicates covariation between the variables. From this, it seems as though the four socioeconomic variables covary with each other and may thus disrupt effect sizes and significance from each other. To solve the problem of variables

covarying I create a composite variable using the four socioeconomic variables. Using a Cronbach's alpha test I evaluate the internal reliability of the composite variable. Based on the results I created two kinds of composite variables for socioeconomic status (SES): 1) excluding the education variable since it had the least internal correlation with the others and 2) including the education variable since it still had enough internal correlation with the others to be acceptable for a composite variable. The composite variable including all four variables got 0.77 as raw alpha and the composite variable with three variables – excluding education level – got 0.88. Both values are acceptable and indicate strong internal covariation for a composite variable but the one with only three variables has a somewhat stronger internal covariation.

I compare the two alternatives for the composite variable by including them in regression models for the two dependent variables, six models in total (see Appendix). When the composite variable which does not include education level, as well as education level are added in the same model, the significance disappears for the teacher quality model, but not for the group size model. For both dependent variables, a decrease of significance and effect size is apparent in the model including both the composite variable not including education level, and the variable for education level, compared to the two models only including each of the composite variables.

This is an indication that covariation still disturbs the composite variable when education is not included in the composite and is added separately. Because of this, I choose the composite variable including all four socioeconomic variables for the final model for both teacher quality and group size.

Socioeconomic status (SES)	A continuous and composite variable based on the mean percentage of the population with low income, born outside the Nordic countries, who are unemployed and with low level of education.
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Summary Statistics

Variable	N	Mean	Std. Dev.	Min	Pctl. 25	Pctl. 75	Max
Standardized teacher quality	8582	-0.000000000000000044	1	-2.3	-0.68	0.66	3.5
Share (%) of officially certified teachers	8582	40	17	0	28	52	100
Standardized group size	8582	0.76	0.65	-1.3	0.4	1.1	9.2
Group size	8582	16	4.1	3	14	18	69
SES	8582	0.71	0.1	0.25	0.66	0.78	0.91
Standardized tax capacity	8582	-0.000000000000000018	1	-1.7	-0.71	0.27	5.2
Tax capacity	8582	238122	39052	172305	210278	248528	442641
Population density	8582	0.0029	0.0053	0.000000066	0.00021	0.003	0.048
Type of principal	8582						
... Private actor	2524	29%					
... Municipality	6058	71%					
Government	8582						
... Both left- and right-wing parties	3077	36%					
... Right-wing parties	4778	56%					
... Left-wing parties	662	8%					
... Other parties	65	1%					

Table 1 Summary table of all variables.

6.4. Methodology

This thesis is based on a positivistic epistemology and will focus on measurable accounts of preschool quality as well as measurable characteristics for preschools, neighborhoods, and municipalities. This approach is chosen due to its potential to include a large number of cases, enabling analysis of patterns across all preschools in Sweden. With my aim for the thesis of examining systematic patterns of quality in preschools rather than the nature of quality in preschools, the quantitative approach is superior in its potential to compare a large number of cases in the relatively short time frame that a master's thesis has. A more complex and profound analysis of preschool quality could have been made if a qualitative approach had been chosen however this would have decreased the number of cases that could be included and was deprioritized in favor of establishing systematic patterns of quality.

The analysis is divided into two and I will analyze the two indicators of quality – staff quality and group size – as separate dependent variables. This is done because of the overall low quality in preschool and by separating the two quality indicators the aim is to increase the possibility of finding patterns of quality. It is also done because the two quality indicators have different prerequisites, with one having official recommendations that can be followed – group size – and the other not having any rules or guidelines, leaving it up to every principal

to decide how many preschool teachers to hire. The analysis method will be multi-variate multi-level linear regression.

6.4.1. Multi-variate multi-level linear regression

Multi-level models – also known as mixed effect models, hierarchical models, or nested models, – are useful when variables are structured on different levels – micro, meso, and macro (Robson and Pevalin 2016). This thesis is based on a meso level, but in different levels of meso which can also be distinguished using multi-level analysis. The preschool variables are on the lower level (level 1), and the municipality variables are on the higher level (level 2), see Figure 2. A regular multi-variate linear regression includes the assumption that the independent variables are independent of each other. When the data is nested, like it is in my case, this assumption is violated (Robson and Pevalin 2016). Multi-level analysis allows for distinguishing the effect of a variable on level 1, in the context of level 2 (Robson and Pevalin 2016). In doing this the effects of a specific variable can be identified more accurately in their context. The model is a random-intercept model which means that the independent variables that are added on level 2 are added as random intercepts only changing the intercept and not the coefficient. This is done to keep the model structure as simple as possible while still accounting for the nested structure of the data.

6.4.2. Model structure

The model is a two-level, multi-level model, see Figure 2. Independent variables regarding the preschool and neighborhood characteristics as well as both dependent variables are on the first level. Independent variables regarding municipality characteristics are on the second level adding a random intercept for each municipality.

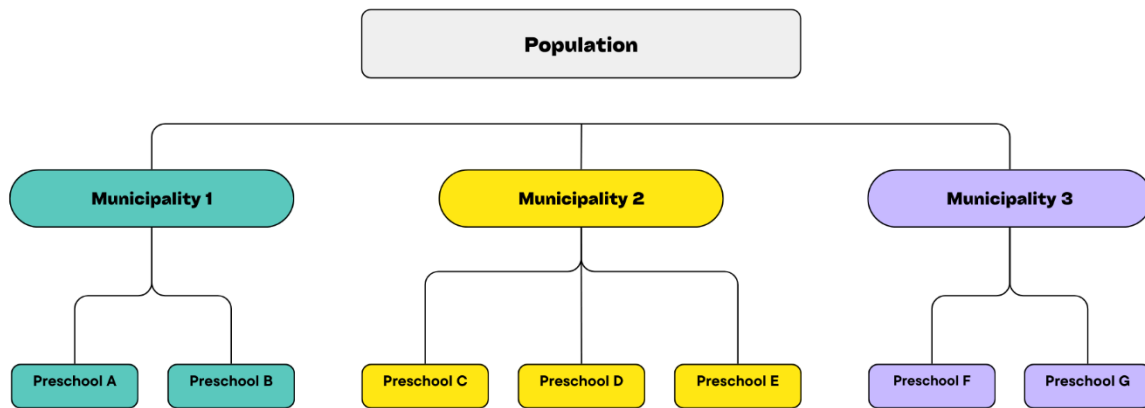


Figure 2 Model structure

6.4.3. Methodological considerations and limitations

The limitations of the thesis are mainly regarding two aspects: the operationalization of quality and data. In the following sections, I will elaborate on each aspect of methodological limitations and the considerations that have been made for them.

Operationalizing a concept like quality into a quantifiable measure is not optimal and some important considerations need to be made: Can quality be quantifiably measured? Which quantifiable aspects most accurately capture quality? Quality in preschool is a social construct of what is considered important for preschool at the time and it is closely related to the doxa of the purpose of preschools. My operationalization in this thesis is based on indicators previous studies have found to be the most important for quality. The indicators of quality entail the preschool's prerequisite for quality based on the argument that high quality is easier to hold with more officially certified preschool teachers present and with smaller groups of children. What is compared is more accurately the *potential quality* of the preschools and not the *quality*. I deprioritized delving deeper into the concept of preschool quality and operationalizing it in a more complex matter, in favor of analyzing a large number of preschools and being able to identify nationwide patterns of quality. A larger sample makes the results more likely to be generalizable for preschools outside of the sample and potentially outside of Sweden. The latter is, however, heavily reliant on the preschool system in the country for the results from this thesis to be generalizable outside of Sweden.

The limitations of the data are related to both the sample and the structure of the data. At the beginning of the data processing, the sample consisted of all 9310 preschools in Sweden. However, to match the preschools with their surrounding neighborhood they had to be converted to geographical data points based on their postal address. During this process, 729 preschools were unable to be matched to coordinates based on their postal address and were thus excluded from the final sample. This problem is likely due to formatting or human errors in the filing of postal addresses for the preschools. The final sample is of 8583 preschools make up 92.2 percent of all Swedish preschools.

The second data-related limitation concerns the nesting of the data. The data includes three levels – preschool, neighborhood, and municipality – however, in the model structure I have decided to treat it as two levels: preschools and municipalities. This is because the number of preschools in each neighborhood is on average too low: the mean and median are both two preschools per neighborhood. For an appropriate multi-level analysis, more observations on each level are needed (Robson and Pevalin 2016). The least number of observations per group should preferably be 20-30 observations (ibid). Even if the neighborhoods are aggregated to a larger area (RegSo) the mean number of preschools is still two. My solution to this is to treat the variables in levels 1 and 2 as the same level, see Figure 2. The neighborhood characteristics are treated as though they are on the preschool level. The multi-level analysis will thus, mainly show the nested differences between municipalities. The potential problem with treating the three levels as two levels is that the nested similarities within a neighborhood are overlooked. An alternative would be to aggregate the preschools to a neighborhood average which would overlook the individual differences between preschools. Specifically, it would dismiss or lessen the effect of private or publicly run preschools which I hypothesize (**H2**) to be important based on earlier research. Since each neighborhood on average has two preschools I deem the nested qualities within neighborhoods to be of less importance than dismissing individual differences between preschools would be. It is of more importance to the thesis to understand how the preschool's characteristics and their neighborhood characteristics relate to preschool quality than to investigate the potential clusters within a neighborhood.

Like all research, this thesis has its limitations. Nevertheless, I argue that the results are still insightful and useful for the area of research and the limitations are acceptable.

6.4.4. Ethical consideration

All the data in the thesis is secondary data and has already been anonymized by the NAE and by Statistics Sweden. This makes the data rather secure from personal identification. The smallest unit of data is also preschools not individuals which further obstructs attempts at identifying individuals through the data. The ethical issues concerning anonymity are thus minimal in this thesis. However, since the dataset consists mainly of open-source data and data ordered from Statistics Sweden, none of the participants have been informed about the study nor have they agreed to be a part of the study. In the ideal study, all participants should be informed and consent to participation, however, that is hard to achieve when the participant sample is all residents living in any Swedish municipality – all Swedish residents. The lack of consent and information to participants is an ethical limitation, however, informing and seeking consent from all Swedish residents to “participate” in this thesis would not be possible. Since identification of individuals in the data is not possible it would also not be possible to exclude individuals from the data even if they so wished.

7. Findings

In the following section, I will first study the distribution of the two quality criteria – teacher quality and group size. Afterward, I will demonstrate the extent to which those criteria correlate with my selected independent variables. Finally, I will present results from the multi-variate multi-level regression analyses. These models will allow for a more complex and accurate analysis of the associations between each of the independent variables and the dependent variables while taking into account the nested data and the effects of the other independent variables. This will provide important information for conclusions to be drawn regarding the research questions and each of the five hypotheses.

7.1. Distribution of the dependent variables

Quality in preschools varies a lot between preschools. This is evident in the variation of the share of officially certified preschool teachers in a team of staff and the varying group sizes. In Figures, 3 and 4, the distribution of preschool teacher quality and group size is shown. The blue lines in the graphs show the mean of each variable and the red line in Figure 4 shows the recommended group size. The mean share of officially certified preschool teachers in a team of staff is 40 percent and the mean number of children in the groups is 16.

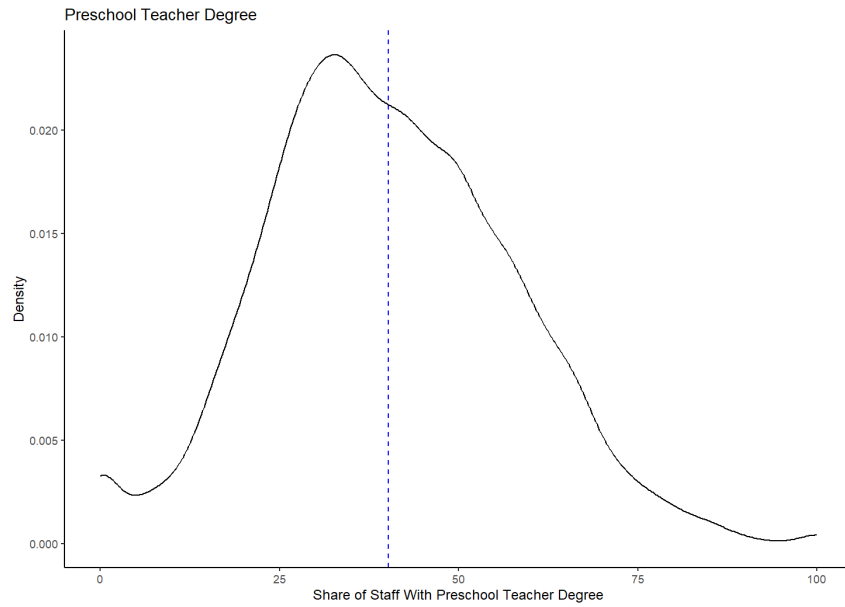


Figure 3 Distribution of share of preschool teachers. The blue line is the mean (40%).

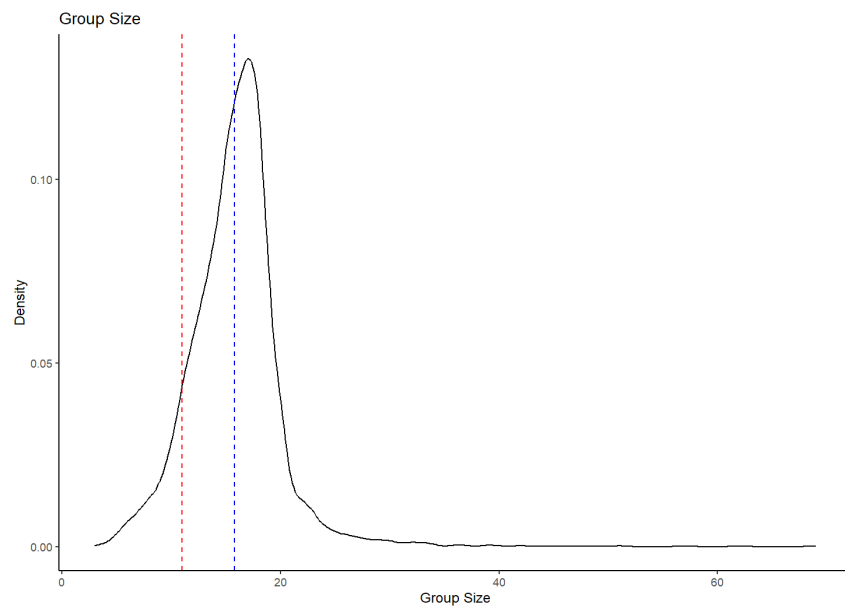


Figure 4 Distribution of group size. The red line is the recommendation (11) and the blue line is the mean (15.8)

The largest variation of quality is found in teacher quality. The distribution is wider in the share of staff who are officially certified preschool teachers than in the average group size. This may be a result of the official recommendations that exist for group size and that do not exist for the share of preschool teachers. However, the distribution of group size is not centered around the recommendation but rather substantially higher than the recommendation,

see Figure 4. From this, it seems to be something else than the recommendations that are making the group sizes consistent.

In contrast to group size, there are no rules, laws, or recommendations concerning the density or share of officially certified preschool teachers. However, there is a curriculum for preschools that needs to be followed, and that curriculum is to be carried out by an officially certified preschool teacher, so there is an indirect demand for officially certified preschool teachers. Figures 3 and 4 indicate an overall low preschool quality: many preschools have relatively few qualified teachers and the large majority of preschools have group sizes that exceed the recommended number of 11 children per group. The figures also indicate a large variety in quality which confirms results from previous research with a lack of consistency in preschool quality (De La Porte et al. 2023; Sheridan et al. 2009; Tornberg et al. 2022). The variation is most prominent concerning teacher quality.

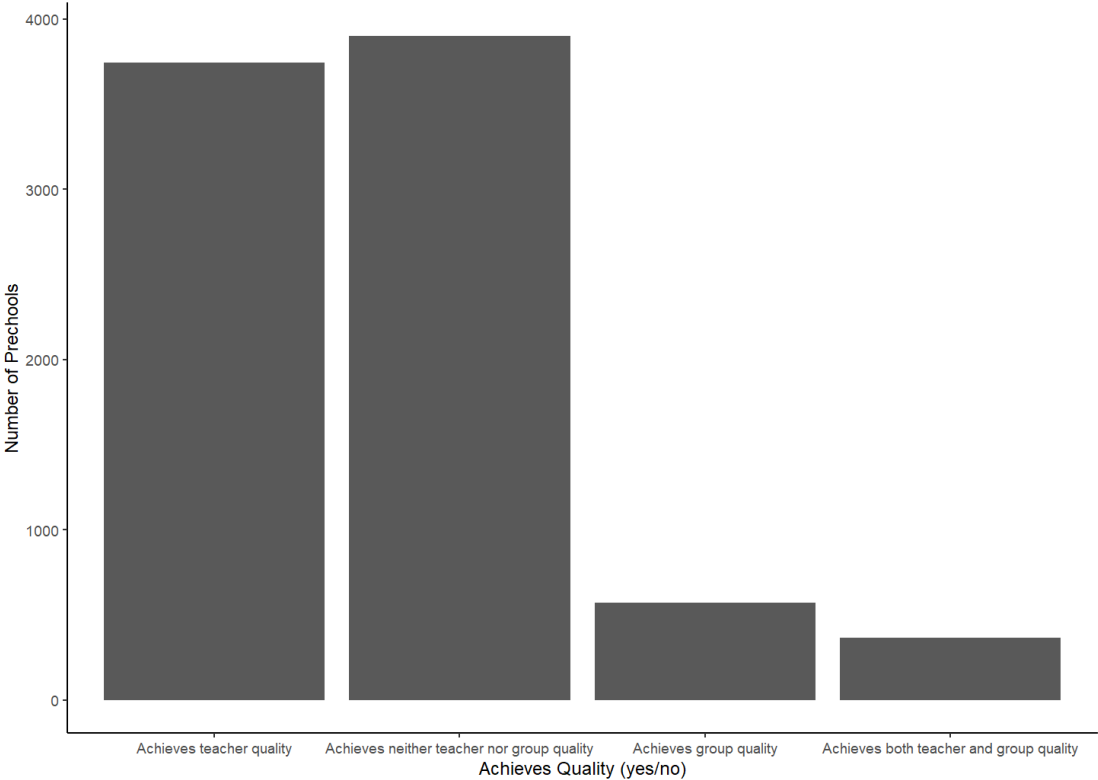


Figure 5 Histogram of preschool quality

Figure 5 demonstrates the distribution of preschools that either only maintain high teacher quality, only high group quality, both, or neither. The preschools that both follow the group size recommendations and have, at least, 40 percent certified preschool teachers on the staff

make up the smallest of the four categories. The largest category of preschools neither have good teacher quality nor group quality, they have less than 40 percent of preschool teachers and do not follow the group size recommendations. This category includes close to 4000 preschools. The category of preschools that maintain a high teacher quality is large because the determinant is based on the mean share of preschool teachers. This makes the figure a bit misleading since it looks like a very large portion of the preschools have high teacher quality, but this is due to nonexistent recommendations for teacher density and the share of teachers. The teacher union in Sweden wants to see an increase in the share of officially certified preschool teachers and in this thesis, 40 percent is therefore considered the minimum share of officially certified preschool teachers to achieve any quality.

The quality in preschools in Sweden varies a lot between preschools and is overall low, mainly regarding the group sizes. This is in line with results from earlier research (De La Porte et al. 2023; Sheridan et al. 2009; Tornberg et al. 2022) and has been consistent in results going back fifteen years which entails the long-term problem of inconsistent preschool quality in Sweden.

7.2. Distribution of the independent variables

7.2.1 Teacher quality

All independent variables are presented together with teacher quality in scatter plots to give an overview of the distributions, see Figure 6. For the numeric variables (SES, tax capacity, and population density) the red line illustrates the regression with teacher quality and for the categorical variables (type of principal and government) the red line illustrates the mean value of teacher quality. Visually public preschools seem to have higher teacher quality than private ones. Teacher quality also seems to be slightly positively correlated with socioeconomic status, and negatively correlated with tax capacity and population density. There is no obvious correlation between the different categories of governments and teacher quality.

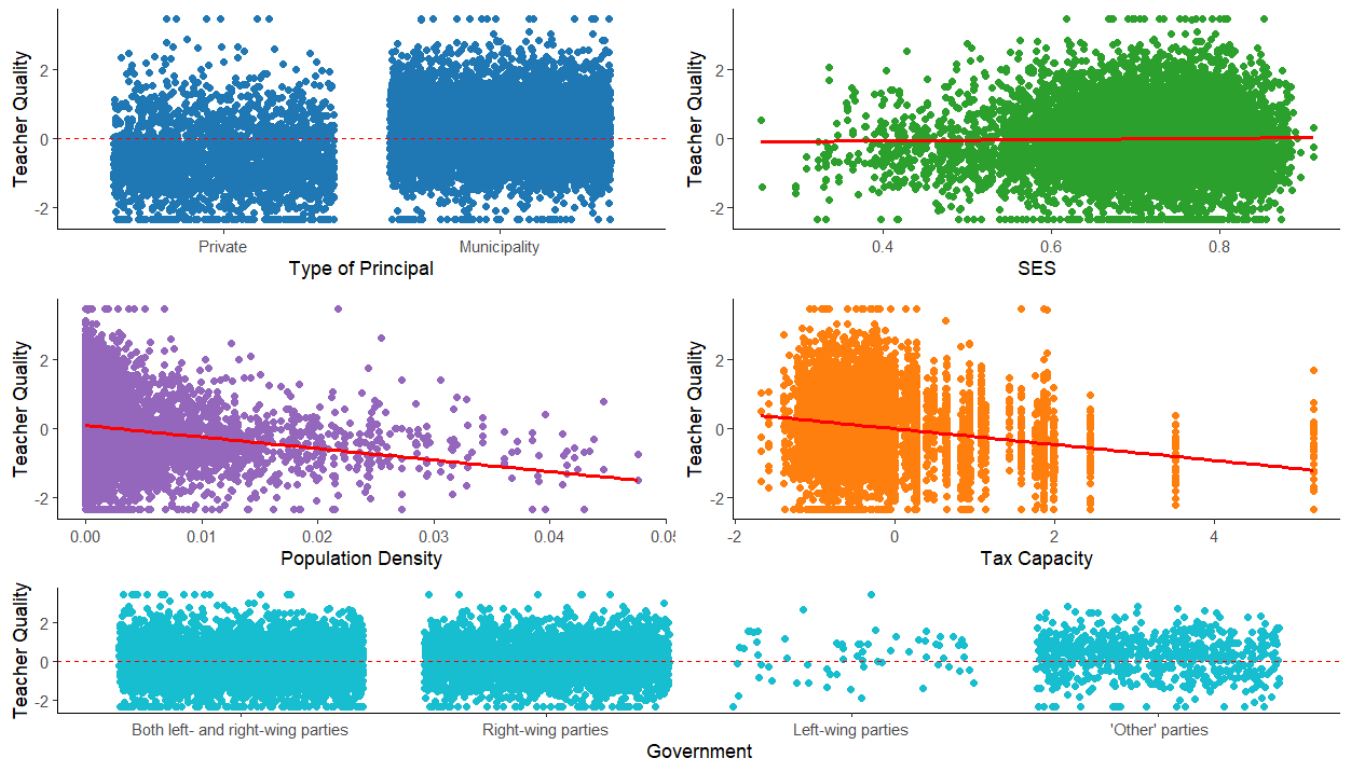


Figure 6 Scatterplots of teacher quality and the independent variables. For the numeric variables, the red line represents the regression. For the categorical variables, the red line represents the mean of teacher quality.

7.2.2 Group size

All independent variables are presented together with group quality in scatter plots to give an overview of the distributions, see Figure 7. There seems to be a positive correlation between group size and socioeconomic status. For the four other variables, there is no clear correlation that appears from the scatter plots. Correlations might still appear when the multi-level models are analyzed that are not visible in the scatterplots. Overall the data points are much more closely distributed for group size (Figure 7) than teacher quality (Figure 6) which aligns with the distributions presented in Figure 4 compared to Figure 3.

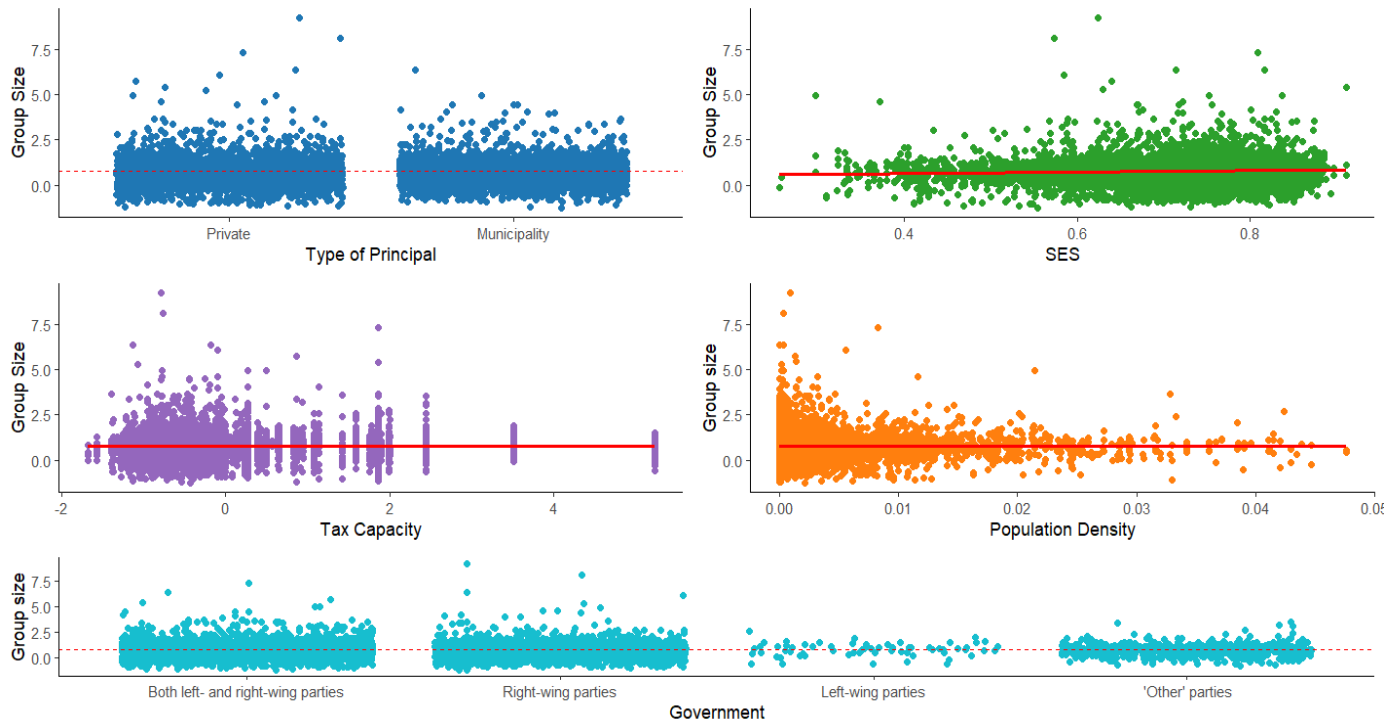


Figure 7 Scatterplots of group size and all independent variables. For the numeric variables, the red line represents the regression. For the categorical variables, the red line represents the mean of group size.

7.3. Multi-level analysis

Two models are analyzed separately to measure and examine the two types of quality: Teacher quality and Group size. Both models are multi-level models and include the same independent variables based on the hypotheses being tested. The results from the two models disagree with each other and the clearest pattern is found for teacher quality.

7.3.1 Teacher quality

In Table 1 the multi-level model for teacher quality is presented. The independent variables with a statistically significant correlation are type of principal, socioeconomic status (SES), and tax capacity. The high statistical significance of the correlation shows that these results may be generalizable outside of the sample. Out of the three variables with statistically significant correlations, municipality as principal is the one with the largest effect size. This is in support of hypothesis **H2**, indicating that private preschools have lower quality than public ones. Having the municipality as a principal (a public preschool) is positively associated with teacher quality in the model compared to a private actor as a principal which is the reference category. The effect on teacher quality that is associated with having the municipality as principal is 0.68 standard deviations which represents a 12 percent higher share of preschool

teachers. The statistical significance is high ($p < 0.001$) and the confidence interval is narrow and stays on the positive side of the center in the models (Figure 8 and Table 2) which shows the certainty also in the direction of the results. In this case, private preschools have considerably lower teacher quality than public ones.

The second largest effect size for statistically significant correlations is found for the socioeconomic status variable (SES). There is a statistically significant positive correlation ($p < 0.001$) between socioeconomic status and teacher quality. This is in support of **H1** that low socioeconomic status in a neighborhood correlates with low quality and points to underlying systematic reinforcement of disadvantages for children in neighborhoods with low socioeconomic status. This confirms the preschools' potential as a direct influence on disadvantaged children and supports social equity theory. In teacher quality, there is no sign of the compensatory resource distribution that many municipalities claim to be doing concerning preschools in disadvantaged neighborhoods (Tornberg et al. 2022). The effect on teacher quality that is associated with socioeconomic status is 0.61 standard deviations which represents a 10 percent higher share of preschool teachers for higher socioeconomic status in the neighborhood. This confidence interval is also quite narrow and stays on the positive side (see Figure 8 and Table 2) which increases the certainty of the correlation direction.

Since preschool quality has been observed to affect later educational achievement (Becker 2011; Biedinger et al. 2008; Bustamante et al. 2023; OECD 2017; Passaretta et al. 2022; Persson 2012; Sheridan et al. 2009; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018) this socioeconomically skewed distribution of preschool quality could be part of the explanation for the gaps in school results for students finishing primary school (Sveriges officiella statistik 2022) correlating with socioeconomic status.

The correlation between the economic status (tax capacity) of a municipality and teacher quality is the last statistically significant correlation ($p < 0.001$) in the model. The effect size is considerably smaller than the other two and is in the opposing direction. Higher tax capacity is negatively associated with teacher quality. The effect size is -0.15 standard deviations which represents a 3 percent lower share of officially certified preschool teachers for 1 standard deviation increase in a municipality's tax capacity. The confidence interval only includes negative values which increases the certainty of the negative direction of the

correlation. This is in line with **H4**, there is a correlation between economic status and teacher quality. Higher economic status correlates with lower teacher quality.

<i>Predictors</i>	Teacher Quality	
	<i>Estimates</i>	<i>p</i>
Intercept	-0.95 (-1.13 – -0.77)	< 0.001
Municipality as Principal	0.68 (0.64 – 0.72)	< 0.001
SES	0.65 (0.46 – 0.84)	< 0.001
Population density	2.28 (-1.82 – 6.37)	0.276
Tax Capacity	-0.15 (-0.23 – -0.07)	< 0.001
Government of right-wing parties	0.10 (-0.04 – 0.24)	0.155
Government of 'other' parties	0.32 (-0.17 – 0.81)	0.205
Government of left-wing parties	-0.10 (-0.31 – 0.10)	0.329
Random Effects		
σ^2	0.65	
τ_{00} Municipality	0.25	
ICC	0.27	
N Municipality	290	
Observations	8582	
Marginal R^2 / Conditional R^2	0.120 / 0.362	

Table 2 Teacher quality multi-level model

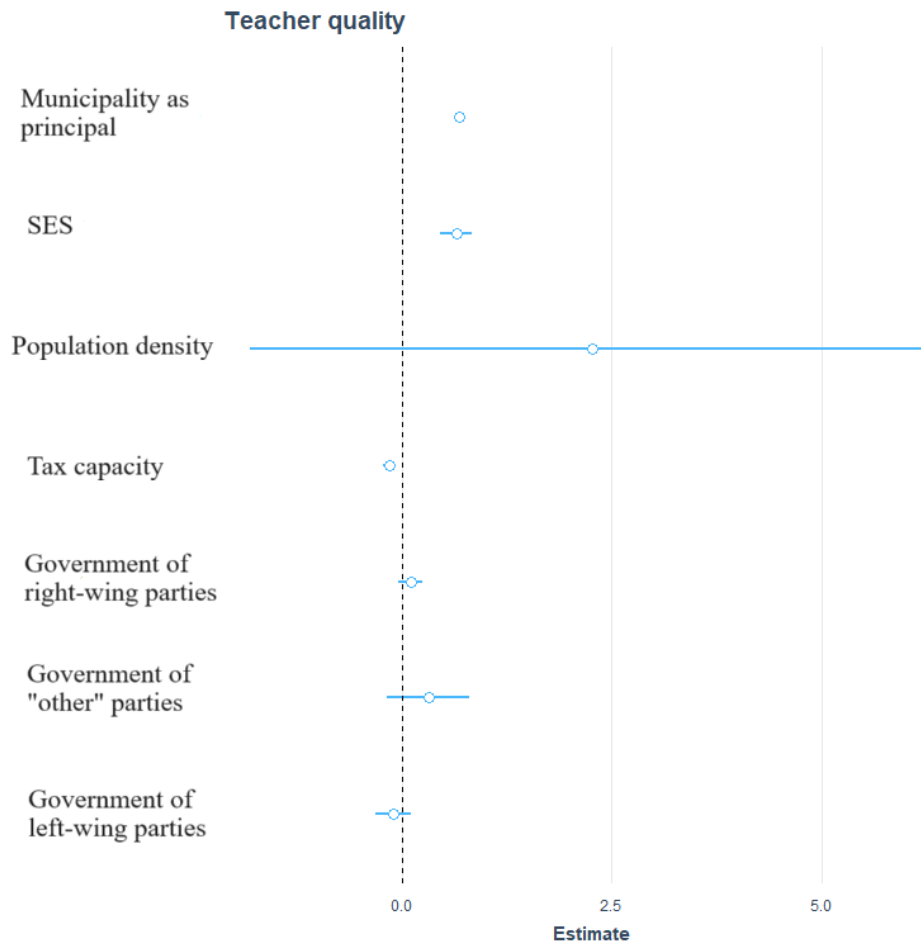


Figure 8 Teacher quality multi-level model effect size and confidence interval (95%).

There is no clear correlation between population density and teacher quality. The effect size is the largest one out of all independent variables. Higher population density correlated with higher teacher quality which is in opposition to **H3**. However, the correlation is not statistically significant ($p = 0.276$) and the confidence interval stretches over both positive and negative values, see Figure 8 and Table 2. As a consequence, the correlation is uncertain between teacher quality and population density. Concerning teacher quality I can't find support for my hypothesis and, thus, discard **H3**.

The parties in the municipality government correlate slightly with teacher quality but the correlations are not statistically significant ($p = 0.155$; 0.205 ; 0.329). The reference category in the model is a government of both left and right-wing parties. Compared to that category right-wing parties and "other" parties have a slight positive correlation and left-wing parties have a slight negative correlation. However, none of the correlations are statistically

significant and the confidence interval stretches over both positive and negative values for all three categories. There doesn't seem to be a clear correlation between the ruling parties of the municipality and preschool quality which was unexpected and opposes **H5**. These results may be because of lacking unison in different municipal parties that are affiliated with the same mother party, e.g. having Social Democrats being the ruling party in two different municipalities may mean different politics. The political effects on the municipality level might appear more clearly if specific rulings and local policies were analyzed instead of party affiliation. This could be interesting to analyze further in future research. From these results, I must nevertheless discard **H5**.

7.3.2. Group Size

The correlation found for group size is in the opposite direction from the correlation for teacher quality. Yet the same two independent variables seem to be of most importance and are the only ones with statistically significant correlations: type of principal ($p < 0.001$) and socioeconomic status (SES) ($p < 0.001$), see Table 3. The high statistical significance of the correlation shows that these results may be generalizable outside of the sample. This time socioeconomic status has the largest effect size, 0.53 which corresponds to 2 children more for higher socioeconomic status. These results contradict both the results for teacher quality and **H1**. Regarding group size I discard **H1**: the group quality is slightly higher in neighborhoods with lower socioeconomic status. This could be the result of the compensatory distribution of resources that some municipalities do to compensate for social differences. An alternative explanation is that these neighborhoods have fewer officially certified preschool teachers and less qualified staff is cheaper to hire and the preschools can thus afford to have smaller groups.

The second statistically significant correlation is found with the independent variable for the type of principal ($p < 0.001$). Once again the results contradict both hypothesis **H2** and the results from the model for teacher quality: Having the municipality as the principal is associated with having slightly larger groups. The effect size for having the municipality as principal is 0.08, which corresponds to an increase of 0.3 children in each group. The effect size is very small, nonetheless, the results are statistically significant and the confidence interval does not cross to the negative values which indicates a high certainty for the direction of the correlation, see Figure 9 and Table 3. The effect size is nevertheless a lot smaller than

what type of principal had for teacher quality. However small, the correlation contradicts **H2**, private preschools have slightly higher group quality and this hypothesis is discarded concerning group quality.

<i>Predictors</i>	Group size	
	<i>Estimates</i>	<i>p</i>
Intercept	0.29 (0.17 – 0.41)	<0.001
Municipality as principal	0.08 (0.05 – 0.11)	<0.001
SES	0.53 (0.38 – 0.68)	<0.001
Population density	0.10 (-3.07 – 3.26)	0.953
Tax capacity	0.01 (-0.02 – 0.05)	0.444
Government of right-wing parties	0.03 (-0.03 – 0.10)	0.293
Government of 'other' parties	-0.01 (-0.24 – 0.23)	0.944
Government of left-wing parties	-0.03 (-0.12 – 0.07)	0.614
Random Effects		
σ^2	0.39	
τ_{00} Municipality	0.04	
ICC	0.09	
N Municipality	290	
Observations	8582	
Marginal R^2 / Conditional R^2	0.011 / 0.096	

Table 3 Group size multi-level model.

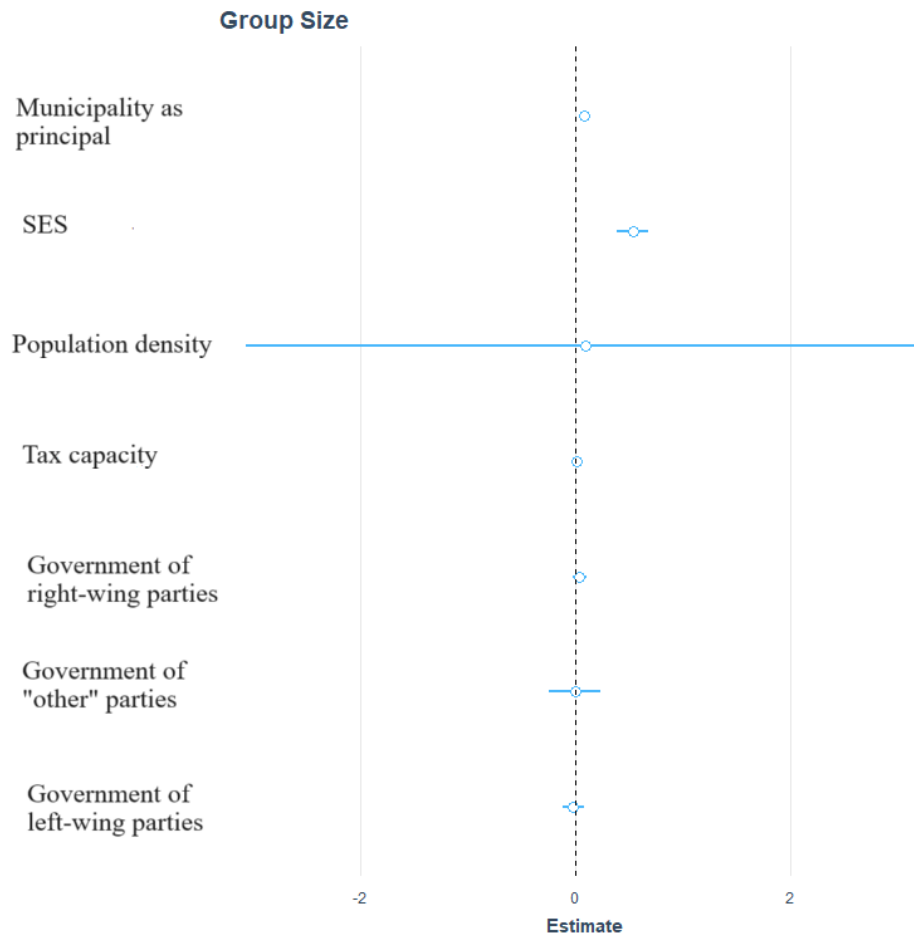


Figure 9 Group size effect size and confidence intervals (95%).

Concerning population density and group size the correlation is not clear. The correlation is positive, indicating that higher population density correlates with larger groups and lower group quality, see Table 3. However, the effect size is very small, lacks significance ($p = 0.953$), and the confidence interval stretches over a wide span of both positive and negative values, see Figure 9. **H3**, according to which, population density correlates with lower quality, is thus not supported. The correlation is aligned with **H3** but the correlation is too uncertain to indicate anything hence this hypothesis is discarded.

There does not seem to be a clear correlation between tax capacity and group size. The correlation is slightly positive, but not statistically significant ($p = 0.444$) and the confidence interval stretches over both positive and negative values, making the direction uncertain. Regarding group size I discard **H4**, there is no correlation between economic status and group size.

The parties in the municipality government correlate very slightly with group size but the correlations are not statistically significant. The reference category in the model is a government of both left and right-wing parties compared to which, a government with only right-wing parties yields a positive correlation whereas left-wing parties and “other” parties have a slight negative correlation. However, none of the correlations are statistically significant ($p = 0.293; 0.944; 0.614$) and the confidence interval stretches over both positive and negative values for all three categories. There does not seem to be a clear correlation between the ruling parties of the municipality and group size which was unexpected and contradicts **H5**. The ruling parties in a municipality had no clear correlation to either of the quality indicators. These results may be because of lacking unison in different municipal parties that are affiliated with the same mother party, e.g. having Social Democrats being the ruling party in two different municipalities may mean different politics. The political effects on the municipality level might appear more clearly if specific rulings and local policies were analyzed instead of party affiliation. This could be interesting to analyze further in future research. From these results, however, I discard **H5**.

7.4. Summary of main findings

This thesis was conducted to examine patterns of quality in preschools. Quality was operationalized using two indicators, education of staff (teacher quality) and group size. The results differed quite a lot between the two quality indicators, mainly in direction. The two variables that had the strongest correlations, that were statistically significant, with both dependent variables were the type of principal (public or private) and socioeconomic status, see Tables 2 and 3. These seem to be the most important variables for predicting preschool quality. The economic status of a municipality also had a slight negative correlation to teacher quality, entailing that municipalities with higher economic status had slightly lower teacher quality – effect size corresponding to 3 percent fewer officially certified preschool teachers for each standard deviation higher tax capacity. Overall, quality in Swedish preschools is rather low and varying, and I will start the summary by discussing this.

As discussed in 3.4. earlier studies have found large quality gaps between preschools which are again, confirmed in this thesis (see Figures 3, 4, and 5). The overall quality is low in preschools as is illustrated under 7.1. in Figure 5 and supports the struggles preschools face according to Wallberg Roth and Tallberg Broman in their report (2018) as a result of the

dissonance of goals and prerequisites discussed under 3.2. and 3.2.2. This also supports the NAE in their statement that municipalities need support from the state to achieve equal high-quality preschool for all children (Skolverket 2023c). The municipalities currently, clearly are not able to achieve equal high quality across preschools.

Contrary to SKR's report (Tornberg et al. 2022) I found a pattern of preschool quality correlating to socioeconomic status in my data. The differences in results may relate to differences in operationalization of quality or unit for measuring. SKR analyzed individual children as the measuring unit and I used preschools as the unit. My results concerning teacher quality, however, confirm Persson's earlier results from Malmö (Persson 2012). Teacher quality is positively correlated with the socioeconomic status of a neighborhood and children in disadvantaged neighborhoods have access to preschools with lower quality than other children. The Persson study is 12 years old and finding similar patterns in my results shows that unequal distribution of preschool quality is not a new problem, but something that municipalities have been struggling with for at least a decade. Further supporting the NAE's claim that municipalities need the state to take action to achieve equal high quality in all preschools (Skolverket 2023c). My results concerning group size indicate the opposite direction of correlation. Nevertheless, the effect size for teacher quality is larger than for group size, indicating a larger variation associated with socioeconomic status for teacher quality than group size. There is also a larger variation overall for teacher quality, while most preschools are more similar in their group sizes. This entails that there are larger differences in teacher quality between preschools and patterns of that quality are therefore more interesting to examine. Teacher quality is also deemed to be the most important quality indicator (Sheridan et al. 2009; Skolverket 2023a; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018). The pattern of preschool quality relating to the socioeconomic status of the neighborhood that I identified in my data confirms results from the international studies (Biedinger et al. 2008; Cloney et al. 2016) discussed under 2. and 2.2. finding correlations with the socioeconomic status of neighborhoods, residential segregation, and preschool quality.

My results concerning the type of principal relating to quality, support both the concerns expressed by the Swedish government in the 1980s (Bill. 1983/84:177) and results from an international study indicating that higher levels of privatization in ECEC may correlate with

lower quality. In regard to teacher quality, private preschools have considerably lower quality than public. The effect size corresponds to 12 percent fewer officially certified preschool teachers in private preschools compared to public. In regard to group size, the effect size of the correlation for type of principal was considerably lower, and in the opposite direction. Private preschools have slightly smaller group sizes, the effect size is minor and corresponds to 0.3 children. The substantial differences concerning teacher quality support the concerns the Social Democrats expressed in the 1980s (Bill. 1983/84:177): that allowing private actors on the ECEC market may lower the quality. The difference in quality could be a result of a lack of control of the quality which potentially could be resolved by applying a mandatory, nationally standardized quality evaluation for preschools.

Overall, the strongest effect sizes were found for teacher quality (0.68 and 0.65) compared to group size (0.08 and 0.53) indicating a larger variance and a clearer pattern for teacher quality than for group size. One reason for this may be that there is a larger variety in the share of preschool teachers than there is of group sizes, see Figures 3 and 4. Another reason may be that there is a more systematic pattern concerning teacher quality and that group sizes are distributed more at random. Because of the substantially stronger effects found for teacher quality and that teacher quality is considered the most important indicator of quality in preschools (Sheridan et al. 2009; Skolverket 2023a; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018) the rest of the discussion will focus mainly on teacher quality.

The results show that the teacher quality varies a lot between preschools and socioeconomic disadvantages are mirrored in preschool teacher quality. In neighborhoods with low socioeconomic status, the low preschool teacher quality reinforces disadvantages and acts as a direct influence on educational achievements in accordance with social equity theory. The results also support findings from international studies stating that social differences are largely established before children start school (Becker 2011; Passaretta et al. 2022). The low quality in preschools directly influences children's educational achievements negatively in neighborhoods with low socioeconomic status. Instead of benefitting from the preschool's equalization potential, preschool quality reinforces social inequalities in neighborhoods. These results indicate that social equity theory can be applied to multiple types of stereotyped or disadvantaged groups and not merely based on ethnicity. This thesis only uses one mechanism from the social equity theory: the direct influences and disregards the other

mechanism, signal influences. It is not certain that the latter mechanism would translate to being applied to any stereotyped groups since the many different stereotyped groups depend on different social structures of power that also interact with each other. Since the second mechanism in social equity theory is based on social constructivism it is not possible to evaluate its adaptation to other stereotyped groups based on this thesis. It is, however, evident from the results that the social equity theory's mechanism of direct influences can be applied to stereotyped groups relating to socioeconomic status and not only ethnicity.

From my results, the variety in preschool teacher quality is clearly not randomly distributed but relates to social inequalities in society as well as correlating with whether the preschool is privately or publicly run. Private preschools hold lower quality than public ones regardless of both being financed by the same funds and having the same curriculum to follow.

Even though both previous research (Sheridan et al. 2009; Wallberg Roth and Tallberg Broman 2018), the NAE, and the Swedish municipalities (Skolverket 2023a; Tornberg et al. 2022) agree that the education level of staff is the most important factor for quality in preschools there are no official demands or recommendations on the number or density of officially certified preschool teachers in preschools. This is likely a reason for the wide variety in preschool teacher quality. However, there are official recommendations on group size and these are, in the majority of preschools, not followed. However, the group sizes are much more densely distributed compared to the share of preschool teachers within a staff team, which could be a result of the recommendations, see Figures 3 and 4. Introducing recommendations for teacher density is, just like group size recommendations, not certain to have a strong effect either. If preschool teacher density instead was introduced as a requirement it might have more effect in being reinforced.

Because of the important role preschools play in preparing children for social and educational life these quality differences that appear in the results can be considered to lay the groundwork for the educational segregation that is being observed in primary school. In support of Passaretta et al. results (2022) discussed under 2.2., my results indicate that preschools could have a part in explaining the large education gaps between groups of different socioeconomic status. Preschool quality differences lay the grounds for future social inequalities.

I find that preschools act as direct influences and act to further increase and establish social differences for children growing up in neighborhoods with low socioeconomic status. These social differences are established before the children even start primary school and are evident in the results when students finish primary school.

The gaps in educational achievements in Sweden are growing (Stolpe 2021) and the decreasing quality in preschools may reinforce such a development. To ensure that students will gain the most from their school years they need to be prepared during their preschool years. With the preschool system as it is today, this is not a reality for most children. Overall the quality is very low and it is distributed in a way that disfavors children in neighborhoods with low socioeconomic status. As it is today, Sweden is not near to reaching the UN's sustainability goal of equal high-quality preschool for all children.

My results are, to the best of my knowledge, novel in showing that there is a national pattern of preschool quality that reinforces social inequality. However, it is not news that the overall quality is low and that it varies a lot between preschools. My results in combination with previous research can be used by policymakers as the basis for a change in the Swedish preschool system to start working towards the UN's sustainability goal of equal high-quality preschool.

What is actively being done to increase quality? In 2016 the group size recommendations were introduced. This has, so far, had a negligible measurable effect. If low quality is due to the goal conflict – preschools being a resource for parents to access the workforce **or** an educational institute – then maybe we need to choose: Should we change the name back to daycare, remove the curriculum, and stop educating preschool teachers? Or do we want to hold up the UN's goal of quality preschools for all children, follow the curriculum we have set, and treat preschools as the educational institute it is stated to be in policy documents and Swedish law? There is an urgent need for something to change in the Swedish preschool system as it is today. Politicians need to decide if it is a change back to having daycare not related to any education or if it is a change to stronger support for preschools to achieve the high-quality education the curriculum and the NAE's goal documents state. The NAE argues that there is a need for the state to take action to ensure high-quality preschools (Skolverket 2023c). My conclusion from this thesis is that they are correct and action needs to be taken on a higher level than municipalities to achieve high quality in all preschools.

7.5. Conclusion

The thesis analyzed patterns of quality in preschools in Sweden between different neighborhoods and municipalities. The aim was to find preschools at higher risk of having low quality and identifying potential patterns in quality. Drawing on social equity theory, I tested whether preschool quality is associated with a diverse range of socio-demographic and political factors. Empirically, I found that it is in particular socioeconomic status of the neighborhood, the type of principal (public or private), and the economic status of the municipality that predicts preschool quality. By contrast, I did not find support for the hypotheses that preschool quality is determined by population density or the political government of the municipality.

The findings show that teacher quality is lower in neighborhoods with lower socioeconomic status, in private preschools, and in municipalities with higher economic status. The results regarding group size are the opposite. There are smaller groups – indicating higher quality – in neighborhoods with lower socioeconomic status and in private preschools. However, the effect sizes relating to group size are much smaller than the effect sizes relating to teacher quality. This indicates a greater variance in teacher quality associated with socioeconomic status and private preschools than the variance in group size associated with socioeconomic status and private preschools. Teacher quality is also regarded as the most important indicator for quality in preschools (Sheridan et al. 2009; Skolverket 2023a; Tornberg et al. 2022; Wallberg Roth and Tallberg Broman 2018). The main findings are that preschool quality is lower in private preschools as well as in neighborhoods with low socioeconomic status. The low preschool quality is an additional disadvantage for children growing up in neighborhoods with low socioeconomic status.

Preschool quality is not distributed at random and socioeconomic inequalities between neighborhoods are mirrored in preschool quality. Economic differences between municipalities are in contrast, and higher economic status is related to lower preschool quality. The strongest correlations were, however, found for the socioeconomic status of the neighborhood and type of principal. Private preschools have lower teacher quality than public ones.

Earlier research indicates that gaps in educational achievement can, to a large degree, be explained by gaps in competencies before school starts (Passaretta et al. 2022). I argue that

these quality differences in preschools are part of the explanation for the growing educational gaps for students finishing primary school in Sweden. Increasing the quality overall and evening it out between preschools is an important step to ensure equal education for all children in Sweden.

While pointing to a range of factors that are important regarding preschool quality, my study comes with several limitations. The most prominent one is that it does not measure actual preschool quality, merely quality *indicators* which brings a certain level of uncertainty to the conclusions that can be drawn. The conclusions mainly refer to the potential quality distribution and not the actual quality distribution. However, since the focus of the thesis was not to analyze quality but to analyze the variation of quality across preschools, this is still achieved using the preschool's potential quality. In the analysis, it is also assumed that the children living in the neighborhood around preschools are the ones to attend the preschool which is not true for all children. Children can attend other preschools further away and from the data, I cannot know for sure which children attend which preschool. However, by analyzing the neighborhoods around the preschools the results show the quality of preschools that are easiest accessible for children in the different neighborhoods.

These results indicate that there is a structural pattern in preschool quality that acts as a direct influence on children in neighborhoods with low socioeconomic status. There is an incoherence in preschool quality in Sweden and private preschools overall have lower quality than public. All children in Sweden are not granted access to high-quality preschools and Sweden being able to reach the UN's sustainability goal is becoming less likely as the preschool quality decreases. These results can be used as a decision basis for future policies concerning preschools both on the municipality and state levels.

7.6. Future research

As this thesis was conducted three areas for future research emerged: the goal conflict, local policy differences, and standardizing quality evaluations. There is a large dissonance between goal documents, policy documents, and prerequisites for preschools to follow these. It seems from this, that there is a lack of agreement on what a preschool should be. The lack of agreement quickly became evident when speaking to friends and colleagues about my thesis. Many were horrified by the lack of national guidelines and overall low quality. Just as many thought that the school part of preschools was given too much focus and that the most

important thing is that there is someone there who is kind to the children. It would be interesting in future research to examine society's disagreement on the goal of preschools.

From my results, it was evident that party affiliation did not have a clear correlation to preschool quality. Yet, the municipalities have a lot of freedom in their responsibility to run the preschools. Because of this, it would be interesting to compare local policies between municipalities to evaluate how they relate to quality in preschools.

The variation of preschool quality that was, ones more confirmed in this thesis indicates a need for a nationally comparable quality evaluation. It would be interesting to research what type of standardized quality evaluation could be possible to have in preschools and how they could most accurately capture quality. In primary school, the quality evaluations are often based on grades or national exams, but preschool students are not graded and they are not tested with exams either. This entails a need to be creative in creating a new type of quality evaluation specifically for preschools. If Sweden plans to reach the UN's sustainability goals of equal access to high-quality preschools a nationally comparable quality evaluation is nevertheless needed.

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Appendix

Initial regression models for both qualities were created to investigate the covariation of the variables relating to socioeconomic status (share of low income, the share of the population born outside of the Nordic countries, the share of unemployment, share with a low level of education). This is further discussed under 6.3. *Independent Variables*.

<i>Predictors</i>	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>
Intercept	-0.48 (-0.60 – -0.36)	<0.001	-0.39 (-0.51 – -0.26)	<0.001	-0.43 (-0.55 – -0.31)	<0.001	-0.39 (-0.51 – -0.26)	<0.001	-0.11 (-0.25 – 0.04)	0.163	-0.11 (-0.28 – 0.06)	0.192
Municipality as principal	0.67 (0.63 – 0.71)	<0.001	0.67 (0.63 – 0.71)	<0.001	0.67 (0.63 – 0.71)	<0.001	0.67 (0.63 – 0.71)	<0.001	0.68 (0.64 – 0.72)	<0.001	0.68 (0.64 – 0.72)	<0.001
Population density	0.27 (-3.79 – 4.33)	0.895	2.63 (-1.52 – 6.78)	0.214	2.03 (-2.07 – 6.14)	0.332	2.13 (-2.01 – 6.26)	0.313	-0.50 (-4.55 – 3.56)	0.811	-0.19 (-4.44 – 4.07)	0.932
Tax capacity	-0.12 (-0.20 – -0.04)	0.004	-0.15 (-0.23 – -0.06)	<0.001	-0.12 (-0.20 – -0.04)	0.004	-0.13 (-0.21 – -0.05)	0.002	-0.19 (-0.27 – -0.10)	<0.001	-0.18 (-0.26 – -0.09)	<0.001
Government of right-wing parties	0.10 (-0.04 – 0.24)	0.147	0.10 (-0.04 – 0.24)	0.159	0.11 (-0.03 – 0.24)	0.140	0.10 (-0.04 – 0.24)	0.154	0.10 (-0.04 – 0.24)	0.164	0.10 (-0.04 – 0.24)	0.160
Government of 'other' parties	0.33 (-0.17 – 0.82)	0.193	0.32 (-0.18 – 0.81)	0.206	0.32 (-0.17 – 0.81)	0.203	0.32 (-0.17 – 0.82)	0.205	0.33 (-0.16 – 0.81)	0.190	0.32 (-0.16 – 0.81)	0.193
Government of left-wing parties	-0.11 (-0.31 – 0.10)	0.320	-0.10 (-0.31 – 0.11)	0.339	-0.12 (-0.32 – 0.09)	0.269	-0.11 (-0.31 – 0.10)	0.322	-0.09 (-0.29 – 0.12)	0.417	-0.09 (-0.30 – 0.12)	0.392
Low income			-0.42 (-0.58 – -0.26)	<0.001							0.13 (-0.32 – 0.58)	0.573
Born outside the Nordic countries					-0.41 (-0.56 – -0.26)	<0.001					-0.10 (-0.38 – 0.19)	0.507
Unemployment							-0.51 (-0.73 – -0.29)	<0.001			-0.16 (-0.80 – 0.48)	0.626
Upper secondary school or less as highest education									-0.65 (-0.81 – -0.49)	<0.001	-0.62 (-0.84 – -0.39)	<0.001
Random Effects												
σ^2	0.65		0.65		0.65		0.65		0.65		0.65	
τ_{00}	0.25 Municipality		0.25 Municipality		0.24 Municipality		0.25 Municipality		0.24 Municipality		0.24 Municipality	
ICC	0.28		0.28		0.27		0.28		0.27		0.27	
N	290 Municipality		290 Municipality		290 Municipality		290 Municipality		290 Municipality		290 Municipality	
Observations	8582		8582		8582		8582		8582		8582	
Marginal R ² / Conditional R ²	0.114 / 0.360		0.118 / 0.363		0.119 / 0.360		0.117 / 0.363		0.122 / 0.362		0.122 / 0.361	

Table 4 Teacher quality stepwise regression separating the four socioeconomic variables.

<i>Predictors</i>	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>
Intercept	0.67 (0.62 – 0.73)	<0.001	0.76 (0.70 – 0.82)	<0.001	0.71 (0.65 – 0.77)	<0.001	0.76 (0.69 – 0.82)	<0.001	0.92 (0.83 – 1.01)	<0.001	0.89 (0.78 – 0.99)	<0.001
Municipality as principal	0.08 (0.05 – 0.11)	<0.001	0.08 (0.05 – 0.11)	<0.001	0.08 (0.05 – 0.11)	<0.001	0.08 (0.05 – 0.11)	<0.001	0.09 (0.06 – 0.12)	<0.001	0.09 (0.06 – 0.12)	<0.001
Population density	-1.56 (-4.69 – 1.58)	0.331	0.72 (-2.48 – 3.92)	0.659	-0.13 (-3.31 – 3.04)	0.934	0.19 (-3.00 – 3.39)	0.905	-2.20 (-5.34 – 0.93)	0.169	-0.69 (-3.98 – 2.61)	0.683
Tax capacity	0.04 (0.00 – 0.07)	0.039	0.01 (-0.02 – 0.05)	0.497	0.04 (0.00 – 0.08)	0.040	0.03 (-0.01 – 0.07)	0.113	-0.01 (-0.04 – 0.03)	0.792	-0.01 (-0.05 – 0.03)	0.709
Government of right-wing parties	0.04 (-0.03 – 0.10)	0.262	0.03 (-0.03 – 0.10)	0.299	0.04 (-0.03 – 0.10)	0.266	0.03 (-0.03 – 0.10)	0.288	0.03 (-0.03 – 0.10)	0.299	0.03 (-0.03 – 0.10)	0.310
Government of 'other' parties	0.00 (-0.23 – 0.24)	0.992	-0.01 (-0.24 – 0.23)	0.947	-0.01 (-0.25 – 0.23)	0.944	-0.01 (-0.24 – 0.23)	0.951	0.00 (-0.23 – 0.23)	0.995	-0.00 (-0.24 – 0.23)	0.973
Government of left-wing parties	-0.03 (-0.13 – 0.07)	0.605	-0.02 (-0.12 – 0.08)	0.659	-0.04 (-0.14 – 0.06)	0.476	-0.03 (-0.13 – 0.07)	0.611	-0.01 (-0.11 – 0.08)	0.780	-0.01 (-0.11 – 0.08)	0.766
Low income			-0.41 (-0.53 – -0.29)	<0.001							-0.28 (-0.62 – 0.05)	0.099
Born outside the Nordic countries					-0.31 (-0.43 – -0.20)	<0.001					0.01 (-0.20 – 0.22)	0.923
Unemployment							-0.47 (-0.64 – -0.30)	<0.001			0.06 (-0.42 – 0.55)	0.793
Upper secondary school or less as highest education									-0.44 (-0.56 – -0.31)	<0.001	-0.29 (-0.46 – -0.13)	0.001
Random Effects												
σ^2	0.39		0.39		0.39		0.39		0.39		0.39	
τ_{00}	0.04 Municipality		0.04 Municipality		0.04 Municipality		0.04 Municipality		0.04 Municipality		0.03 Municipality	
ICC	0.08		0.08		0.09		0.09		0.08		0.08	
N	290 Municipality		290 Municipality		290 Municipality		290 Municipality		290 Municipality		290 Municipality	
Observations	8582		8582		8582		8582		8582		8582	
Marginal R ² / Conditional R ²	0.007 / 0.091		0.011 / 0.093		0.010 / 0.099		0.010 / 0.095		0.012 / 0.094		0.012 / 0.093	

Table 5 Group size stepwise regression separating the four socioeconomic variables.

<i>Predictors</i>	Model 1		Model 2		Model 3	
	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>
Intercept	-0.89 (-1.08 – -0.70)	<0.001	-0.23 (-0.52 – 0.07)	0.128	-0.95 (-1.13 – -0.77)	<0.001
Municipality as principal	0.67 (0.63 – 0.71)	<0.001	0.68 (0.64 – 0.72)	<0.001	0.68 (0.64 – 0.72)	<0.001
SES without education level	0.50 (0.32 – 0.67)	<0.001	0.11 (-0.12 – 0.33)	0.348		
Population density	2.51 (-1.62 – 6.65)	0.233	0.05 (-4.16 – 4.26)	0.981	2.28 (-1.82 – 6.37)	0.276
Tax capacity	-0.13 (-0.22 – -0.05)	0.001	-0.18 (-0.27 – -0.10)	<0.001	-0.15 (-0.23 – -0.07)	<0.001
Government of right-wing parties	0.10 (-0.04 – 0.24)	0.151	0.10 (-0.04 – 0.24)	0.163	0.10 (-0.04 – 0.24)	0.155
Government of 'other' parties	0.32 (-0.17 – 0.81)	0.206	0.32 (-0.16 – 0.81)	0.193	0.32 (-0.17 – 0.81)	0.205
Government of left-wing parties	-0.11 (-0.32 – 0.10)	0.307	-0.09 (-0.29 – 0.12)	0.405	-0.10 (-0.31 – 0.10)	0.329
Upper secondary school or less as highest education			-0.59 (-0.79 – -0.39)	<0.001		
SES with education level					0.65 (0.46 – 0.84)	<0.001
Random Effects						
σ^2	0.65		0.65		0.65	
τ_{00}	0.25 Municipality		0.24 Municipality		0.25 Municipality	
ICC	0.28		0.27		0.27	
N	290 Municipality		290 Municipality		290 Municipality	
Observations	8582		8582		8582	
Marginal R ² / Conditional R ²	0.119 / 0.362		0.122 / 0.362		0.120 / 0.362	

Table 6 Teacher quality stepwise comparison of the two composite variables.

<i>Predictors</i>	Model 1		Model 2		Model 3	
	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>	<i>Estimates</i>	<i>p</i>
Intercept	0.31 (0.18 – 0.44)	<0.001	0.67 (0.46 – 0.88)	<0.001	0.29 (0.17 – 0.41)	<0.001
Municipality as Principal	0.08 (0.05 – 0.11)	<0.001	0.09 (0.06 – 0.12)	<0.001	0.08 (0.05 – 0.11)	<0.001
SES without education level	0.44 (0.30 – 0.58)	<0.001	0.23 (0.06 – 0.40)	0.008		
Population density	0.47 (-2.73 – 3.67)	0.772	-0.97 (-4.23 – 2.29)	0.560	0.10 (-3.07 – 3.26)	0.953
Tax Capacity	0.03 (-0.01 – 0.06)	0.156	0.00 (-0.04 – 0.04)	0.999	0.01 (-0.02 – 0.05)	0.444
Government of right-wing parties	0.04 (-0.03 – 0.10)	0.284	0.03 (-0.03 – 0.10)	0.301	0.03 (-0.03 – 0.10)	0.293
Government of 'other' parties	-0.01 (-0.25 – 0.23)	0.938	-0.00 (-0.24 – 0.23)	0.969	-0.01 (-0.24 – 0.23)	0.944
Government of left-wing parties	-0.03 (-0.13 – 0.07)	0.561	-0.02 (-0.12 – 0.08)	0.707	-0.03 (-0.12 – 0.07)	0.614
Upper secondary school or less as highest education			-0.32 (-0.47 – -0.18)	<0.001		
SES with education level					0.53 (0.38 – 0.68)	<0.001
Random Effects						
σ^2	0.39		0.39		0.39	
τ_{00}	0.04 Municipality		0.04 Municipality		0.04 Municipality	
ICC	0.09		0.08		0.09	
N	290 Municipality		290 Municipality		290 Municipality	
Observations	8582		8582		8582	
Marginal R ² / Conditional R ²	0.011 / 0.096		0.012 / 0.095		0.011 / 0.096	

Table 7 Group size stepwise comparison of the two composite variables.