

# The impact of non-economic and economic disadvantage in pre-school children in England

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# Key findings

This report addresses two research questions:

## Research question 1

The effectiveness of the Early Childhood Education and Care (ECEC) that children receive has been shown to vary according to their level of disadvantage; this has generally been defined as economic disadvantage. However, children's educational outcomes have also been shown to be influenced by aspects of the home environment such as home learning environment (HLE), household chaos and the quality of the parent/child relationship. This suggests that a broader understanding of child disadvantage may be possible, where disadvantage is defined in terms of aspects of the home environment that are not primarily economic. This report aims to define such a non-economic disadvantage measure and to explore the effectiveness of this measure as a predictor and moderator of children's cognitive and socio-emotional outcomes in school year one.

## Research question 2

Previous research has indicated that the benefit that disadvantaged children derive from out-of-home ECEC may depend more on the quality of the ECEC they receive than on the quantity. The second aim of this report is to identify in more detail which aspects of the quality of the ECEC that disadvantaged children receive are most significant as predictors of their cognitive and socio-emotional outcomes in school year one.

Analysis used data from the Study of Early Education and Development (SEED), a longitudinal study of 5,642 English children, exploring the impact of pre-school education and home environment on children's cognitive and socio-emotional outcomes at the start of primary school.

## Home and economic disadvantage

The children were divided into those who did and did not experience economic disadvantage. Children were also divided into two groups according to whether or not they experienced non-economic "home disadvantage", a new measure derived from scores for HLE, household chaos, and aspects of the parent/child relationship.

- Home and economic disadvantage were found to be largely independent of one another.
- Both home and economic disadvantage were associated with poorer child cognitive and socio-emotional outcomes at age five to six, with children who experienced both types of disadvantage most strongly affected.

## The quantity of group ECEC that children attended

- For children who experienced only home disadvantage, between 15 and 30 hours per week in group ECEC (in nursery classes, playgroups etc.) had benefits for child Verbal ability at age five to six.

- Children who experienced one type of disadvantage (home or economic, but not both) had some poorer socio-emotional outcomes aged five to six associated with group ECEC use, but only when usage was in excess of 30 hours per week.
- Non-disadvantaged children using 20 to 30 hours per week group ECEC had poorer Externalising behaviour scores aged five to six than those using up to 15 hours per week, which may indicate that for children with the richest home environments, out-of-home group ECEC is relatively less beneficial than for disadvantaged children.

#### The quality of group ECEC that children attended

Data on the quality of the group ECEC that children attended aged three to four was analysed to produce six quality scales:

1. Overall quality.
  2. Diversity.
  3. Numeracy.
  4. Care.
  5. Shared thinking.
  6. Early literacy.
- For non-disadvantaged children, there was a significant association between higher scores on the Care factor and better child Verbal ability in school year one. For this group, there was also a significant association between higher scores on the Early literacy factor and better child Prosocial behaviour.
  - For children who experienced only home disadvantage, there were associations between all the quality factors except Shared thinking and better child Non-verbal ability in school year one.
  - For children who experienced only economic disadvantage, there was an association between higher scores on the Shared thinking factor and better child Emotional self-regulation. There were also significant associations between higher scores on the Early literacy factor and better child Sociability, Externalising behaviour, Prosocial behaviour, Behavioural self-regulation and Emotional self-regulation.
  - For children who experienced both home and economic disadvantage, there was a significant association between higher scores on the Numeracy factor and better child Prosocial behaviour. There were also associations between higher scores on all the quality factors except Numeracy and better child Cognitive self-regulation.

#### Conclusion

- The effects of the quantity and quality of the ECEC are moderated by child disadvantage.
- A wider perspective on disadvantage that includes consideration of the home environment may be useful in formulating policy for early childhood services in England.

## **Glossary of abbreviations**

BAS	British Ability Scales
CPD	Career and Professional Development
ECEC	Early Childhood Education and Care
ECERS-E	Early Childhood Environment Rating Scale – Extension
ECERS-R	Early Childhood Environment Rating Scale – Revised
EFA	Exploratory Factor Analysis
EPPSE	Effective Pre-school, Primary and Secondary Education
FSM	Free School Meals
HE/P	Home Environment/Parenting
HLE	Home Learning Environment
IMD	Index of Multiple Deprivation
MI	Multiple Imputation
MORS	Mothers Object Relations Scale
PSD	Parenting Styles and Dimensions
SEED	Study of Early Education and Development
SEN/D	Special Educational Needs/Disability
SSTEW	Sustained Shared Thinking and Emotional Well-being Scale

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# Chapter 1: Introduction

## Aims of this report

Analysis of data from the Study of Early Education and Development (SEED) (Department for Education, 2015-2021) was undertaken in order to address the following two research questions:

### Research question 1

The effectiveness of ECEC has been shown to vary according to children's level of disadvantage; this has generally been defined as economic disadvantage. However, children's educational outcomes have also been shown to be influenced by aspects of the home environment such as HLE, household chaos and the quality of the parent/child relationship. This suggests that a broader understanding of child disadvantage may be possible, where disadvantage is defined in terms of aspects of the home environment that are not primarily economic. This report aims to define such a non-economic disadvantage measure and to explore the effectiveness of this measure as a predictor and moderator of children's cognitive and socio-emotional outcomes in school year one.

### Research question 2

Previous research has indicated that the benefit that disadvantaged children derive from out-of-home ECEC may depend more on the quality of the ECEC they receive than on the quantity. The second aim of this report is to identify in more detail which aspects of the quality of the ECEC that disadvantaged children receive are most significant as predictors of their cognitive and socio-emotional outcomes in school year one.

## Background

### Disadvantage and child development

It has long been recognised that children from disadvantaged backgrounds have poorer health and education outcomes compared to the children from more advantaged backgrounds (RCPCH, 2017). Children's development is affected by interacting influences at hierarchical levels from individual child through family, community, and wider society factors, and starts early in life. Hence, children having the best start in life is critical for well-being given that early years experiences and circumstances shape lifelong well-being and inequalities (Marmot, 2010). Policy action to improve early developmental outcomes therefore makes social and economic sense (OECD, 2022). However, the UK faces challenges in improving children's outcomes in the early years and into school, as one in five children are estimated to live in relative poverty, and a similar proportion start school with developmental delay (RCPCH, 2017).

Developmental inequalities related to socio-economic status persist and are widening across the UK (Bradbury, 2011; Bradbury, 2013; Machin, McNally and Wyness, 2013; Ofsted, 2015; Social Mobility Commission, 2016). In this work on social inequalities, the measures of disadvantage are typically socio-economic, including parental education, occupational status and income. One of the most commonly used indices of childhood

disadvantage is eligibility for free school meals (FSM), which is based on parental income and benefits data.

However, research has increasingly indicated that non-economic factors can also contribute to poorer child outcomes. In particular, the HLE refers to the degree to which there are learning opportunities provided for the child in the home environment. Melhuish et al. (Melhuish, Sylva et al., 2001; Melhuish, Sylva et al., 2008; Melhuish, Sammons et al., 2008) originated the HLE concept and showed how the HLE at three years of age was a major determinant of child cognitive and social development through primary school and, subsequently it was found, up to 18 years of age (Sammons, Sylva et al., 2014; Toth, Sammons et al., 2019). There is a social class gradient when it comes to experiences such as parents reading and playing with their children. Families where both parents are highly educated typically spend 110 minutes a day on educational activities with their young children, compared to just 71 minutes where parents have low levels of education (Social Mobility Commission, 2016). However, the relationship between the HLE and socio-economic factors is not strong, having a correlation of around 0.3 (Melhuish, Sylva et al., 2001; Melhuish, Sylva et al., 2008). Hence, socio-economic and home environment disadvantage are relatively independent influences upon children's development (Melhuish, Sylva et al., 2008). In addition to the HLE, the SEED study showed that several other aspects of parenting were significantly associated with differences in children's development (Melhuish and Gardiner, 2020). These findings indicate that early childhood disadvantage that may influence children's outcomes should be considered in more than socio-economic terms.

## **ECEC and child development**

The benefits of ECEC upon children's development have been well documented (eg, Melhuish and Barnes, 2021). A literature review of ECEC for the European Commission states that "High-quality childcare has been associated with benefits for children's development, with the strongest effects for children from disadvantaged backgrounds" (Melhuish, Ereky-Stevens et al., 2015). A large-scale longitudinal study in the UK, the Effective Pre-school, Primary and Secondary Education (EPPSE) project, found that both the duration and quality of ECEC experience were associated with differences in children's development (Melhuish, Sammons et al., 2008; Sylva, Melhuish et al., 2010; Sammons, Sylva et al., 2014). Similar findings occurred in a parallel study in Northern Ireland (Melhuish, Quinn et al., 2012). The EPPSE project was influential in promoting wide-ranging changes to the provision of ECEC in the UK and elsewhere. In the UK, universal free part-time ECEC was provided for all children from age three from 2004. In addition, there were substantial changes to the ECEC national curriculum, increases in the training and qualifications of staff, and a systematic quality monitoring system was provided for all ECEC settings. Additionally in 2013, the free part-time ECEC provision was extended down to age two for the 40% poorest families, and in 2017 the 15 hours/week of part-time provision was extended to 30 hours/week if a parent worked or studied for 16+ hours/week. These changes meant that virtually all children received some ECEC before starting school, and also that the conditions favoured improvements in the quality of ECEC (Melhuish, 2016).

The SEED study was initiated to examine ECEC and its possible influences upon children following the wide-ranging changes to the UK ECEC system that followed the EPPSE study. SEED is a longitudinal study of 5,462 children looking at their home and ECEC experiences and their relationship with children's development. A substantial number of children in the EPPSE study had no out-of-home ECEC experience, and this group was used for baseline comparisons for evaluating ECEC influences. However, following the policy changes mentioned above there were very few children in the SEED study with no out-of-home ECEC experience, although the extent of ECEC experience varied widely. Additionally, the range of quality of ECEC was higher in the SEED study than in the EPPSE study (Melhuish and Gardiner, 2019) and this appeared to be the result of increased staff qualifications, increased ECEC monitoring and related policy changes in the time since the EPPSE findings became known. The SEED study found child development differences associated with ECEC to be smaller than in the EPPSE study, and this difference in results is likely to reflect the lack of a no ECEC comparison group in the SEED study and the increased ECEC quality observed in the SEED study. However, the SEED study did find that for the 40% most disadvantaged children, using a minimum of 10 hours per week of formal ECEC no later than age two, combined with 20+ hours per week of formal ECEC between age two and the start of school, was associated with improved child outcomes at the start of school and improved verbal ability in school year one (Melhuish and Gardiner, 2020). Also, attending higher quality ECEC in between ages two and four was associated with better academic outcomes at age seven.

In addition to the findings related to ECEC, SEED found that, over and above effects associated with socio-economic factors, the characteristics of the home environment, including the HLE and several aspects of parenting were associated with considerable influence on children's cognitive and socio-emotional outcomes.

The pattern of results raise questions concerning the possible interaction between socio-economic disadvantage and ECEC experience, as well as the interaction between home disadvantage and ECEC experience. To this end, the current study produced independent measures of economic and home disadvantage, considered their influence upon child outcomes at the start of school, as well as possible interaction effects with ECEC experience in terms of amount and quality of ECEC.

When the possible effects of ECEC quality are considered, they appear to be stronger for children from disadvantaged backgrounds and this raises the question of what aspects of ECEC quality might be most important for such children and what structural factors might improve ECEC quality.

## **Overview of data and measures**

### **The SEED study**

The SEED study is a major longitudinal study of the impact of children's pre-school education and care, and other early experience, on their subsequent development and educational attainment. Set up by the Department for Education, the study sample consists of 5,642 children born in England between 2010 and 2012.

The SEED sample was selected in such a way that economically disadvantaged children were over represented. Families were recruited to the SEED study in approximately equal numbers from:<sup>1</sup>

- The **most disadvantaged** 20% of the population.
- The **moderately disadvantaged** 20%–40% of the population.
- The **least disadvantaged** 60% of the population.

The present study comprises an analysis of data from the 3,218 children who took part in the SEED Wave 4 survey, which was carried out when the children were five years old.

### **Child outcomes**

Children’s cognitive development was assessed during school year one using two British Ability Scales (BAS) measures (Elliott, 2011):

1. BAS Verbal ability (“naming vocabulary”).
2. BAS Non-verbal ability (“picture similarities”).

Children’s socio-emotional development was assessed using the Children’s Self-regulation and Behaviour Questionnaire (CSBQ) (Howard and Melhuish, 2017), completed by children’s teachers during the spring of children’s school year one. The CSBQ questionnaire was scored to produce two socio-emotional problems scales:

1. Externalising behaviour (eg, child loses temper, child argues with other children).
2. Internalising behaviour (eg, child is easily upset, child is anxious).

and five socio-emotional strengths scales:

3. Sociability (eg, child has friends, child plays with other children).
4. Prosocial behaviour (eg, child is co-operative, child is helpful, child shares things).
5. Behavioural self-regulation (eg, child follows instructions, child waits their turn).
6. Cognitive self-regulation (eg, child chooses their own tasks, child persists with tasks).
7. Emotional self-regulation (eg, child is calm, child keeps temper).

In order to simplify the interpretation of results, the two socio-emotional problems scales were inverted so that for all child outcomes higher scores are associated with more favourable child outcomes.

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<sup>1</sup> These groups were identified using the benefits which families were in receipt of and family income. Details are given in the Technical Appendix.



## Children's ECEC

The ECEC that children receive was classified into three categories:

### 1. Formal group ECEC

ECEC in a non-domestic setting and eligible for government funding (eg, day nurseries, nursery classes or schools and playgroups).

### 2. Formal individual ECEC

ECEC in a domestic setting and eligible for government funding (ie, childminders).

### 3. Informal individual ECEC

ECEC in a domestic setting and not eligible for government funding (eg, childcare with relatives, friends, neighbours or nannies).

The total amount of ECEC of each type was calculated between a child's third birthday and when the child started school. This was divided by the 38 annual weeks of the school terms to give a mean weekly usage for each type of ECEC during this period.

## HE/P variables

Children's home environment was assessed using nine HE/P variables:

1. HLE index. For example, home activities that allow learning opportunities for the child; eg, child read to, taken to library, painting/drawing, play with letters/numbers, songs/rhymes (Melhuish, Sylva et al., 2008).<sup>2</sup>
2. Household disorder (CHAOS scale including confusion, hubbub and disorder scale) (Melhuish, Belsky et al., 2008).<sup>3</sup>
3. Parent's psychological distress (using the Kessler scale). For example, symptoms of depression or anxiety (Kessler, Andrews and Colpe, 2002).<sup>3</sup>
4. Limit setting (ie, how often parents set limits on their child's behaviour such as time out or telling off).<sup>3</sup>
5. Warmth from the Mothers Object Relations Scales (MORS) (a measure of closeness in the parent/child relationship, eg, relationship characterised by affection, doing things together) (Simkiss, 2013).<sup>4</sup>
6. Invasiveness from the MORS (a measure of conflict in the parent/child relationship eg, regarding child as demanding of attention, feeling annoyance toward child) (Simkiss, 2013).<sup>4</sup>
7. Authoritative parenting, a parenting style characterised by high demands and high responsiveness, from Parenting Styles and Dimensions (PSD) (Robinson, Mandleco et al., 1995).<sup>5</sup>
8. Authoritarian parenting, a parenting style characterised by high demands and low responsiveness, from PSD (Robinson, Mandleco et al., 1995).<sup>5</sup>

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<sup>2</sup> This measure was assessed at SEED Waves 1, 2 and 3. The mean value of these three measures was used in the analysis.

<sup>3</sup> This measure was assessed at SEED Waves 1 and 2. The mean value of these measures was used in the analysis.

<sup>4</sup> This measure was assessed at SEED Wave 2.

<sup>5</sup> This measure was assessed at SEED Wave 3.

9. Permissive parenting, a parenting style characterised by low demands and high or low responsiveness, from PSD (Robinson, Mandlco et al., 1995).<sup>5</sup>

### **Demographic covariates**

The following demographic covariates were controlled for:

1. Child's age in school year.
2. Child's birth weight.
3. Maternal age at birth of child.
4. Child's sex.
5. Child's ethnic group.
6. Mother's highest qualification.
7. Highest parental socio-economic status.
8. Number of siblings living in the household.
9. Couple or lone parent household.
10. Workless or working household.
11. Type of accommodation tenure.
12. Household income.
13. Area deprivation (Index of Multiple Deprivation (IMD)).

### **ECEC settings quality**

During Wave 2 of the SEED study, 598 of the Formal group ECEC settings that children attended at ages three to four were visited and quality assessments were carried out using three quality scales:

1. Early Childhood Environment Rating Scale – Revised (ECERS-R) (Harms, Cryer and Clifford, 2005), a general assessment of ECEC quality for the over-threes.
2. Early Childhood Environment Rating Scale – Extension (ECERS-E) (Sylva, Siraj-Blatchford and Taggart, 2011), an extension to ECERS-R focusing on the specifically educational aspects of children's ECEC experience.
3. Sustained Shared Thinking and Emotional Well-being Scale (SSTEW) (Siraj, Kingston and Melhuish, 2015), which focuses on the quality of staff/child interactions in ECEC settings.

Quality data was available for 933 of the 3,218 children in the analysis sample.

The ECERS-R, ECERS-E and SSTEW scales are made up of a number of subscales. ECERS-R consists of five subscales:

1. Personal care routines.
2. Language reasoning.
3. Activities.
4. Interaction.
5. Programme structure.

ECERS-E consists of three subscales:

1. Literacy.
2. Mathematics.
3. Diversity.

SSTEW consists of five subscales:

1. Building trust, confidence and independence.
2. Supporting and extending language and communication.
3. Supporting emotional well-being.
4. Supporting learning and critical thinking.
5. Assessing learning and language.

## Sample size

The sample size available for analyses depended on the outcome variable and on whether the model included quality data; see Table 1.

**Table 1: Sample size available for analyses.**

Outcome	Models excluding quality data	Models including quality data
Verbal ability	3164	919
Non-verbal ability	3165	919
Socio-emotional outcomes	2566	762

## Overview of analysis methods

Analyses were carried out using factor analysis and linear regression models. Where there was missing covariate data in the regression models, multiple imputation was used. Regression models used robust standard errors estimates to take account of clustering in the data. Results are reported as standardised model coefficient. These give the change in the outcome (dependent) variable, in standard deviation units, corresponding to a two standard deviation change in the covariate (independent variable). Analyses were carried out in R 4.1.0 (R Core Team, 2021). Full details of the analysis methods are given in the Technical Appendix.

## A note on causation

The aim of this study is to explore possible causal effects. However, as with any observational study, causation cannot be proven. A key variable is child disadvantage, for which it is not possible to use a randomised intervention, and all research in this field is subject to the restrictions inherent in observational studies.

Although causation cannot be proved, the aim is to argue that the associations found are likely to be causal. The following criteria are used to support this:

1. **Temporality:** The putatively causal exposure precedes the outcome in time.
2. **Strength of effect size:** Whilst a small effect may be causal, the larger an effect is the stronger the evidence is that the effect is causal.

3. **Reproducibility:** Where similar effects have been found in other studies, this strengthens the case for causality.
4. **Dose-response relationship:** Where higher levels of exposure are associated with higher values of the outcome, this strengthens the case for there being a causal relationship.
5. **Plausibility:** There is a plausible mechanism linking the putative cause and the effect.
6. **Analogy:** The case for causation is strengthened where there are similarities between the observed association and other known associations.
7. **Controlling for confounders:** Potential confounders, including demographic variables, have been controlled for.

The first six of these criteria are drawn from the Bradford Hill criteria (Wikipedia, 2023) for establishing a causal relationship.<sup>6</sup>

## A note on statistical significance

An observed relationship between variables needs to be of a certain strength in order that we can be reasonably confident that it represents a true association and is not due to chance. Confidence in a statistical relationship is quantified using p-values. A p-value represents the probability that a given relationship could be observed through chance alone if no true relationship in fact existed. Conventionally, the threshold for considering a statistical relationship reliable (“significant”) is a p-value of 0.05 (or 5%). Throughout this report, statistical significance will be indicated using stars; see Table 2.

**Table 2: Overview of statistical significance.**

p-value	Indicated by stars	Comments
p < 0.05	*	Conventional threshold for considering an association reliable. Indicates stronger and more reliable associations.
p < 0.01	**	
p < 0.001	***	

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<sup>6</sup> There are three further Bradford Hill criteria which are not applicable to the present study:

1. **Specificity:** The outcome (usually a disease) is found specifically in the populations in which the exposure occurs.
2. **Coherence:** Where there is coherence between epidemiological and laboratory findings this increases the likelihood of there being a causal effect.
3. **Experiment:** The observational finding can be confirmed by experiment.

## Chapter 2: Defining home disadvantage

### Key findings

- Exploratory Factor Analysis (EFA) shows that eight of the HE/P variables load onto a single home disadvantage factor.
- The sample can be divided into home disadvantaged and non-home disadvantaged groups according to whether children have above or below the median score on this home disadvantage factor.

### Introduction

There are nine HE/P variables available, which describe various aspects of children's home environment and the quality of the parent/child relationship.

1. HLE.
2. Household CHAOS.
3. Parent's psychological distress.
4. Limit setting.
5. MORS warmth.
6. MORS invasiveness.
7. PSD authoritative parenting.
8. PSD authoritarian parenting.
9. PSD permissive parenting.

The aim is to use EFA to find an underlying factor that can be identified with the overall quality of the home environment. Children can then be classified into the relatively home disadvantaged and the relatively home advantaged according to scores on this factor.

Limit setting was omitted from the factor analysis. Whilst this parenting variable is correlated with aspects of a poorer home environment (see Table 3), higher levels of Limit setting are associated with better child outcomes in many cases (Melhuish and Gardiner, 2020). As Limit setting has mixed effects it is inappropriate to regard Limit setting as contributing to either a better or worse home environment per se.

### Method

The correlations between the HE/P variables were examined to ascertain whether EFA with a single factor was appropriate. The variables (omitting Limit setting) were analysed using EFA and a single common factor extracted. Children with missing data were omitted. Children were divided into home disadvantaged and non-home disadvantaged groups according to whether they scored above or below the median on the "home disadvantage" factor.

### Results

Of the 3,218 children in the sample, 3,146 had complete data on the eight HE/P variables included (97.8%). The correlations between the HE/P variables are shown in Table 3. The pattern of correlations is consistent with there being a single underlying home environment factor, with five of the variables correlated with each other

(Household CHAOS, Parent's psychological distress, MORS invasiveness, PSD authoritarian parenting and PSD permissive parenting) and the remaining three variables (HLE, MORS warmth and PSD authoritative parenting) correlated with each other and having an inverse correlation with the first group.

**Table 3: Correlations between the nine HE/P variables.**

	HLE	Household CHAOS	Parent's psychological distress	Limit setting	MORS warmth	MORS invasiveness	Authoritative parenting	Authoritarian parenting	Permissive parenting
HLE	+1.000	-0.180	-0.056	-0.115	+0.202	-0.130	+0.259	-0.193	-0.135
Household CHAOS	-0.180	+1.000	+0.334	+0.233	-0.207	+0.329	-0.227	+0.254	+0.289
Parent's psychological distress	-0.056	+0.334	+1.000	+0.186	-0.240	+0.369	-0.133	+0.215	+0.219
Limit setting	-0.115	+0.233	+0.186	+1.000	-0.121	+0.433	-0.134	+0.365	+0.235
MORS warmth	+0.202	-0.207	-0.240	-0.121	+1.000	-0.284	+0.311	-0.130	-0.117
MORS invasiveness	-0.130	+0.329	+0.369	+0.433	-0.284	+1.000	-0.224	+0.402	+0.356
Authoritative parenting	+0.259	-0.227	-0.133	-0.134	+0.311	-0.224	+1.000	-0.258	-0.206
Authoritarian parenting	-0.193	+0.254	+0.215	+0.365	-0.130	+0.402	-0.258	+1.000	+0.451
Permissive parenting	-0.135	+0.289	+0.219	+0.235	-0.117	+0.356	-0.206	+0.451	+1.000

Positive correlations are highlighted in pink. Negative correlations are highlighted in blue.

EFA with a single factor produced the factor loadings shown in Table 4.

**Table 4: Loadings of the HE/P variables onto a single factor (sorted from highest to lowest).**

Variable	Loading on single factor
MORS invasiveness	+0.654
Authoritarian parenting	+0.592
Permissive parenting	+0.558
Household CHAOS	+0.522
Parent's psychological distress	+0.473
HLE	-0.294
MORS warmth	-0.390
Authoritative parenting	-0.422

Higher values of this factor are associated with higher levels of MORS invasiveness, Authoritarian parenting, Permissive parenting, Household CHAOS and Parent's

psychological distress and lower levels of Authoritative parenting, MORS warmth and HLE. This factor may be characterised as a measure of home disadvantage.

Dividing children into two groups according to whether they scored above or below the median on this factor resulted in a classification of 1,611 children as experiencing home disadvantage and 1,607 children as not experiencing home disadvantage.<sup>7</sup>

## **Conclusion**

It is possible to classify children as home disadvantaged/not home disadvantaged according to their scores on a common factor extracted from eight of the HE/P variables that characterise the home environment that children experience. The utility of this definition of home disadvantage will be explored in the remainder of this report.

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<sup>7</sup> Where children had incomplete HE/P variables the home disadvantage factor was missing. In these cases the classification relied on multiple imputation. Details are given in the Technical Appendix.

# Chapter 3: Home disadvantage and economic disadvantage as predictors of child outcomes

## Key findings

- Children who experience home disadvantage, but not economic disadvantage, exhibit poorer Verbal ability at age five to six than non-disadvantaged children, and also poorer outcomes for three of the seven socio-emotional measures.
- Children who experience economic disadvantage, but not home disadvantage, exhibit poorer outcomes for both Verbal and Non-verbal ability at age five to six than non-disadvantaged children, and also show poorer outcomes for Cognitive self-regulation.
- Children who experience both home and economic disadvantage show poorer outcomes than non-disadvantaged children at age five to six on all cognitive and socio-emotional measures.

## Introduction

Based on their family's income and benefits received, children in the SEED study were divided into three disadvantage groups: most disadvantaged, moderately disadvantaged and least disadvantaged. For the present study, this was simplified to a two-way classification, with the first two groups making up an economically disadvantaged group and the last group constituting an economically non-disadvantaged group.

In this chapter, the relationship is explored between this classification of children's economic disadvantage and the home disadvantage classification defined in Chapter 2. Economic disadvantage and home disadvantage are considered as predictors of children's outcomes in school year one.

## Method

The degree to which economic disadvantage and home disadvantage are related was explored by cross tabulation of these two groups of children. The Goodman-Kruskal Gamma correlation coefficient was calculated.

Linear regression models of children's age five to six outcomes were fitted in terms of (1) home disadvantage and (2) economic disadvantage. A further model (3) considered the effects of disadvantage by analysing outcomes in terms of a four-level factor:

- (a) No disadvantage (reference level).
- (b) Home disadvantage only.
- (c) Economic disadvantage only.
- (d) Both home and economic disadvantage.

All models controlled for the following covariates:

1. Formal group ECEC use.
2. Formal individual ECEC use.
3. Informal individual ECEC use.



4. Child's age in school year.
5. Child's birth weight.
6. Maternal age at birth of child.
7. Child's sex.
8. Child's ethnic group.
9. Number of siblings living in the household.
10. Couple or lone parent household.

Note that directly or indirectly economic covariates, such as household income or mother's education, were not controlled for in these analyses.

## Results

A breakdown of the sample by home and economic disadvantage is shown in Table 5.

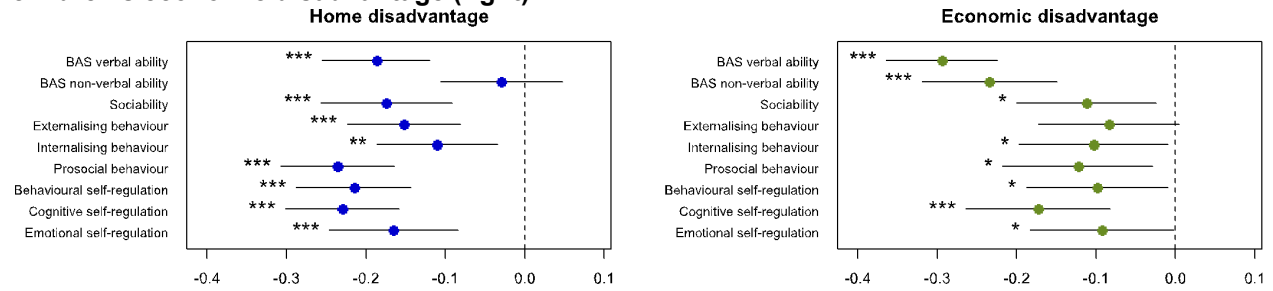
**Table 5: Cross-tabulation between home and economic disadvantaged children.**

Home disadvantage	Economic disadvantage		TOTAL
	Not disadvantaged	Disadvantaged	
Not disadvantaged	751	856	1607
Disadvantaged	584	1027	1611
TOTAL	1335	1883	3218

The cross-tabulation indicates that home and economic disadvantage are largely independent. This is confirmed by the low value of the Goodman-Kruskal Gamma correlation (0.213).

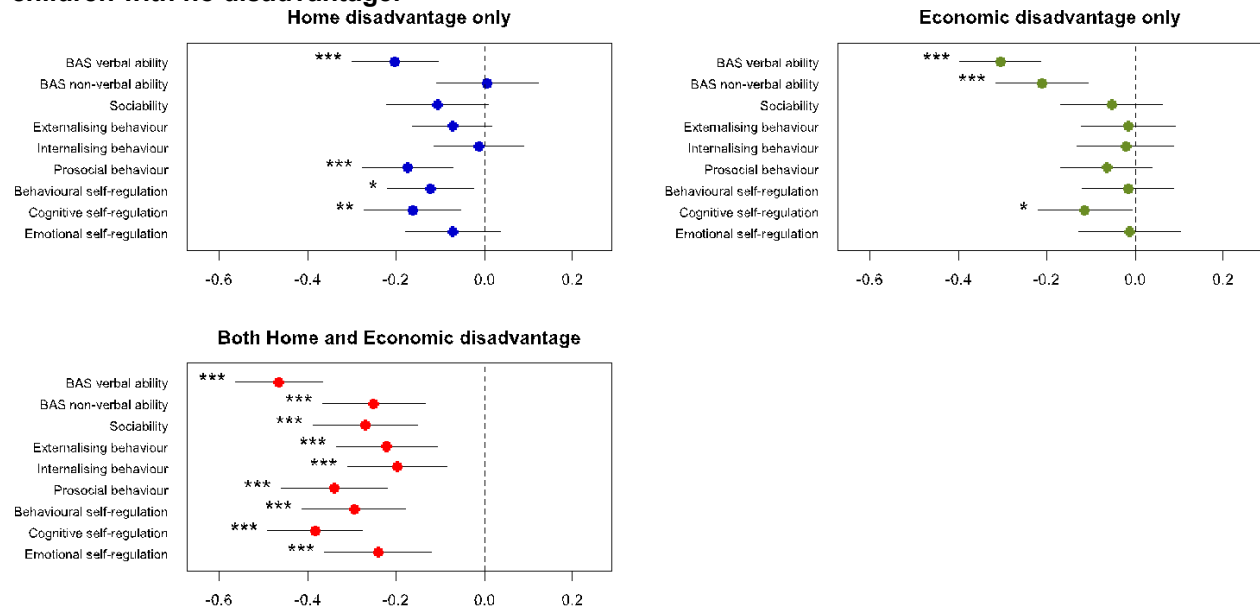
The results of models of children's age five to six outcomes in terms of home disadvantage (Model 1) are shown in Figure 1 (left panel). The results of models of children's age five to six outcomes in terms of economic disadvantage (Model 2) are shown in Figure 1 (right panel). The results of Model 3 are shown in Figure 2.

**Figure 1: Results of models of child outcomes in terms of children’s home disadvantage (left) and children’s economic disadvantage (right).**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 2: Results of models of child outcomes in terms of children’s (a) home disadvantage alone, (b) economic disadvantage alone, (c) home and economic disadvantage. The comparison group is children with no disadvantage.**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

## **Discussion**

Children who experience home disadvantage exhibit poorer outcomes for all measures except Non-verbal ability, as compared to children who do not experience home disadvantage (Figure 1, left). Children who experience economic disadvantage show poorer outcomes on all measures except Externalising behaviour, as compared to those who do not experience economic disadvantage (Figure 1, right). A comparison of these results shows that the negative effects of home disadvantage are particularly focused on children's socio-emotional outcomes whilst the negative effects of economic disadvantage are strongest for children's cognitive outcomes.

Where both home and economic disadvantage are considered together, children who experience home disadvantage (but not economic disadvantage) exhibit poorer outcomes for Verbal ability, and for three of the seven socio-emotional outcomes (Prosocial behaviour, Behavioural self-regulation, Cognitive self-regulation), as compared to children who experience neither kind of disadvantage (Figure 2). Children who experience economic disadvantage (but not home disadvantage) exhibit poorer outcomes for both cognitive measures and for Cognitive self-regulation, as compared to non-disadvantaged children (Figure 2). Children who experience both home and economic disadvantage exhibit poorer outcomes on all cognitive and socio-emotional measures, as compared to non-disadvantaged children (Figure 2).

## **Conclusion**

Both the home and economic disadvantage that children experience are strongly associated with children's cognitive and socio-emotional outcomes at age five to six. Home disadvantage is more strongly associated with poorer socio-emotional outcomes, whilst economic disadvantage is more strongly associated with poorer cognitive outcomes. Where children experience both home and economic disadvantage all age five to six outcomes are considerably poorer than the outcomes for children who experience neither type of disadvantage.

# Chapter 4: Home disadvantage and economic disadvantage as moderators of the effects of quantity of ECEC

## Key findings

- Children who experienced only home disadvantage and who used >15 to 20 hours per week Formal group ECEC had better Verbal ability at age five to six as compared to the up to 15 hours per week reference group.
- For children who experienced only economic disadvantage, use of Formal group ECEC in excess of 30 hours per week was associated with poorer socio-emotional outcomes for Externalising behaviour, Behavioural self-regulation and Emotional self-regulation.
- Associations between Formal group ECEC use of greater than 30 hours per week and poorer socio-emotional outcomes were not found for children who experienced only home disadvantage or both home and economic disadvantage.
- Non-disadvantaged children who used 20 to 30 hours per week Formal group ECEC had poorer Externalising behaviour and Emotional self-regulation than the up to 15 hours per week reference group.
- For children experiencing only economic disadvantage, greater use of Informal individual ECEC was associated with better Verbal ability at age five to six.
- Children who experienced economic disadvantage had some poorer socio-emotional outcomes at age five to six associated with Formal individual (childminder) ECEC use: specifically, these were poorer Externalising behaviour (children with only economic disadvantage) and poorer Sociability (children with both economic and home disadvantage).

## Introduction

Previous studies have shown that the amount and type of ECEC that children experience affects their cognitive and socio-emotional development assessed at the start of school. In this chapter we investigate the extent to which these effects of the type and quantity of ECEC use may be moderated by children's home and economic disadvantage.

## Method

In initial models, children's age five to six cognitive and socio-emotional outcomes were regressed on the amount of ECEC children used between age three and the start of school, with ECEC use considered in three categories (Formal group ECEC, Formal individual ECEC, Informal individual ECEC). Models controlled for HE/P covariates, demographic covariates and home and economic disadvantage.

A second set of models investigated the moderation of ECEC effects by child disadvantage. The previous analysis was repeated with separate effects of ECEC fitted for four groups of children:

- (a) Non-disadvantaged children.

- (b) Children experiencing only home disadvantage.
- (c) Children experiencing only economic disadvantage.
- (d) Children experiencing both home and economic disadvantage.

A third set of models examined the effect of specific levels of Formal group ECEC use. The initial models were rerun with the continuous Formal group ECEC covariate replaced by the following banded Formal group ECEC use factor:

1. Up to 15 hours per week (reference level).
2. >15 to 20 hours per week.
3. >20 to 30 hours per week.
4. >30 hours per week.

Finally, we investigated the moderation by child disadvantage of the effects of banded Formal group ECEC use. The models with the banded Formal group ECEC factor were rerun with separate effects of Formal group ECEC fitted for the four child disadvantage groups.

## **Results**

The results of the initial models of child outcomes in terms of Formal group, Formal individual and Informal individual ECEC use are shown in Figure 3. A summary plot showing significant associations between ECEC use and children's outcomes is given in Figure 4.

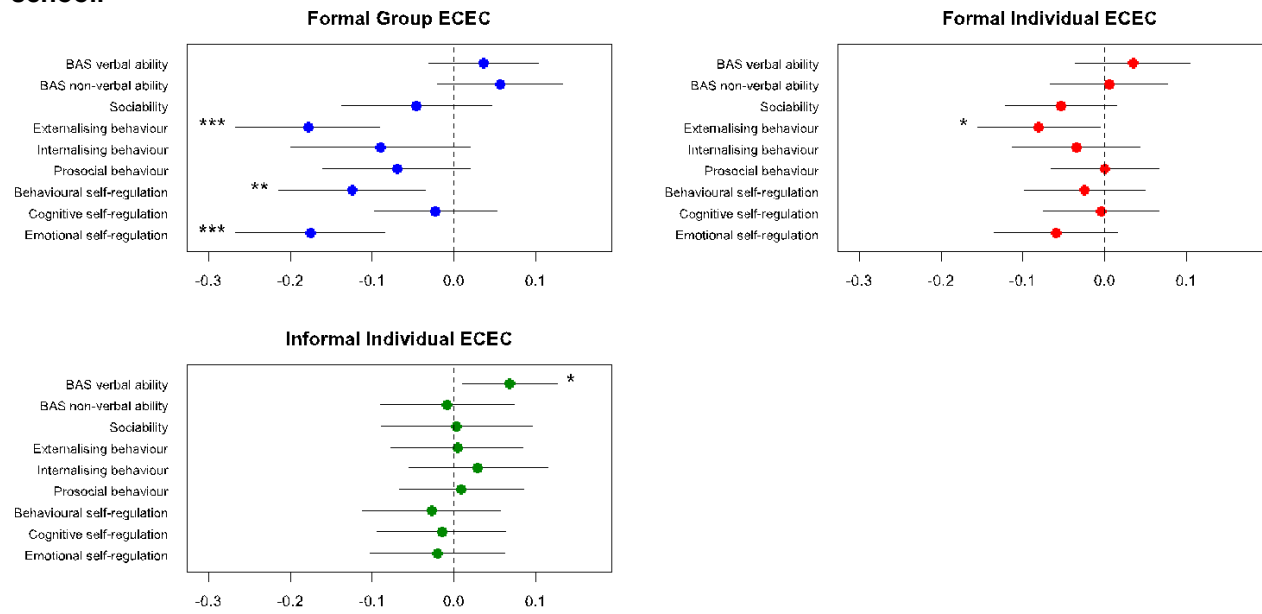
The results of models showing the moderation of the effects of ECEC use by child disadvantage group are shown in Figures 5 to 7. A summary plot showing significant associations between ECEC use and children's outcomes moderated by disadvantage group is shown in Figure 8.

A breakdown of the sample by Formal group ECEC use bands and child disadvantage groups is shown in Table 6.

The results of models of child outcomes in terms of banded Formal group ECEC use are shown in Figure 9.

The results of models of child outcomes in terms of banded Formal group ECEC use moderated by child disadvantage group are shown in Figure 10a, 10b and 10c.

**Figure 3: Results of models of child outcomes in terms of (a) mean Formal group ECEC use between age 3 and the start of school, (b) mean Formal individual ECEC use between age 3 and the start of school and (c) mean Informal individual ECEC use between age 3 and the start of school.**



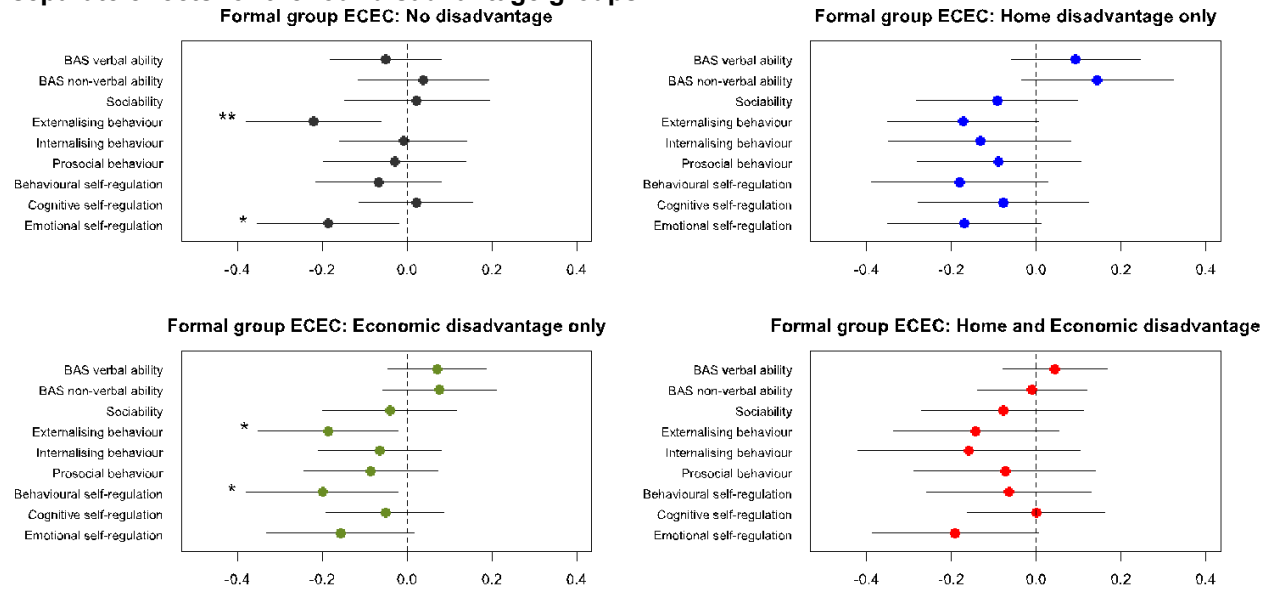
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 4: Summary of significant associations between ECEC use and children’s age 5 to 6 outcomes.**

BAS verbal ability			▲
BAS non-verbal ability			
Sociability			
Externalising behaviour	▼	▼	
Internalising behaviour			
Prosocial behaviour			
Behavioural self-regulation	▼		
Cognitive self-regulation			
Emotional self-regulation	▼		
	Formal group ECEC	Formal individual ECEC	Informal individual ECEC

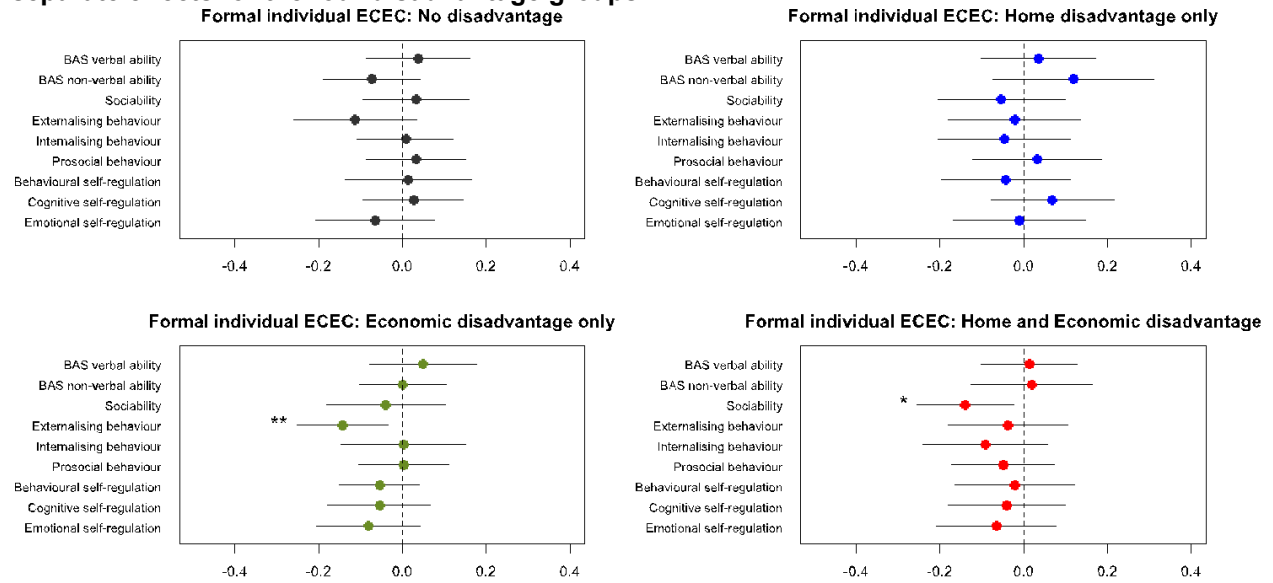
- ▲ Significant positive association
- ▼ Significant negative association

**Figure 5: Results of models of child outcomes in terms of mean Formal group ECEC use, with separate effects for the four disadvantage groups.**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* = p < 0.05, \*\* = p < 0.01, \*\*\* = p < 0.001.

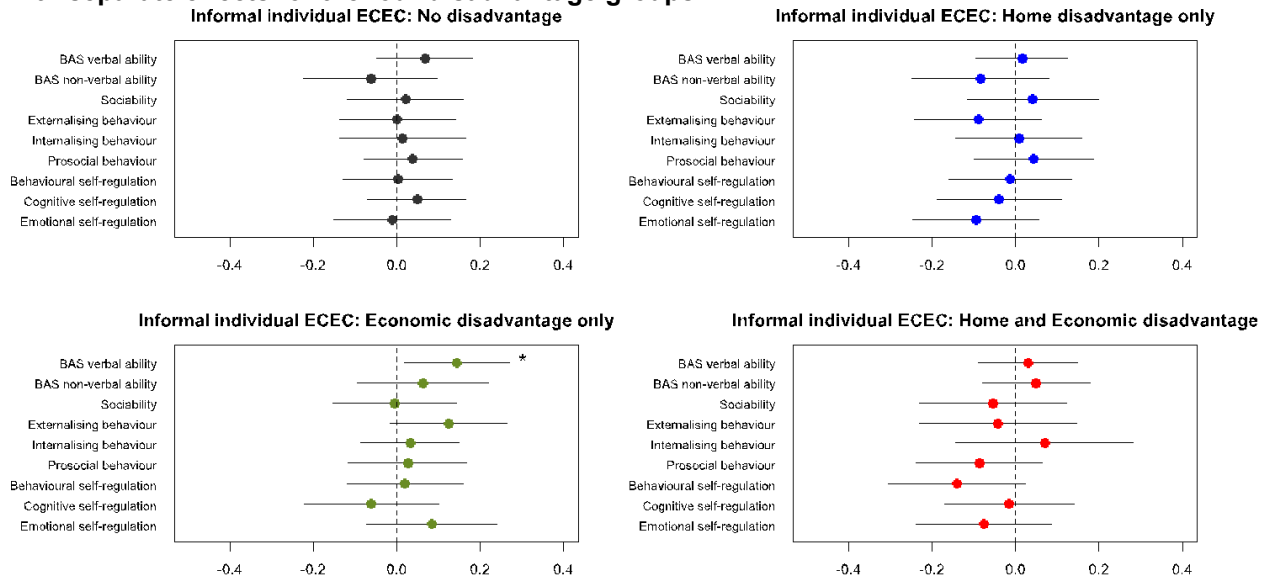
**Figure 6: Results of models of child outcomes in terms of mean Formal individual ECEC use, with separate effects for the four disadvantage groups.**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* = p < 0.05, \*\* = p < 0.01, \*\*\* = p < 0.001.

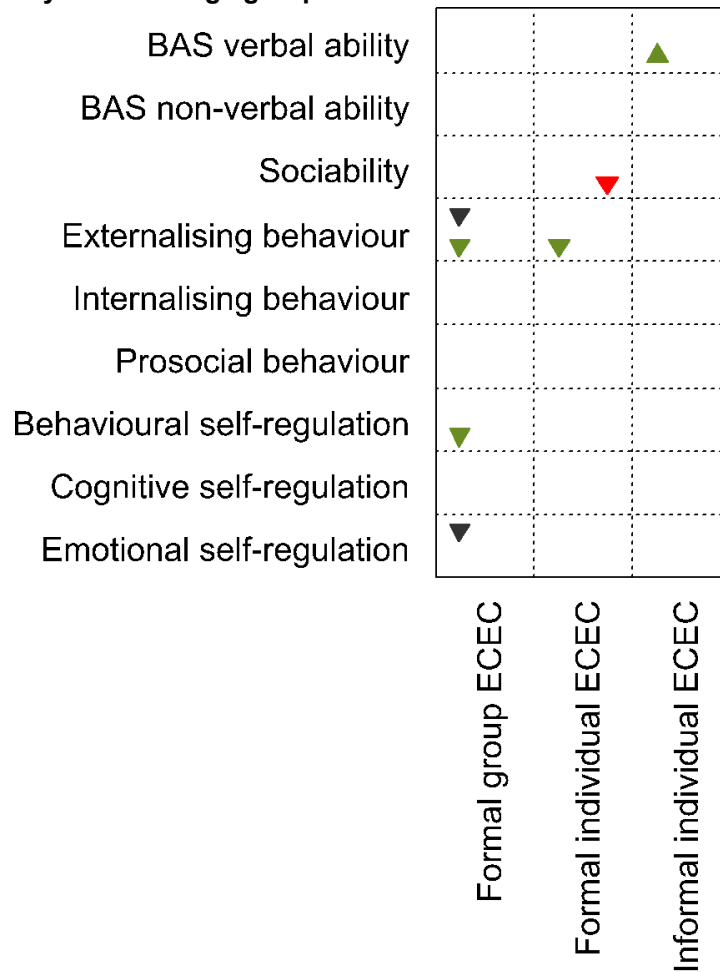


**Figure 7: Results of models of child outcomes in terms of mean Informal individual ECEC use, with separate effects for the four disadvantage groups.**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 8: Summary of significant associations between ECEC use and children's age 5 to 6 outcomes moderated by disadvantage group.**



Positive associations

- ▲ No disadvantage
- ▲ Home disadvantage only
- ▲ Economic disadvantage only
- ▲ Home and Economic disadvantage

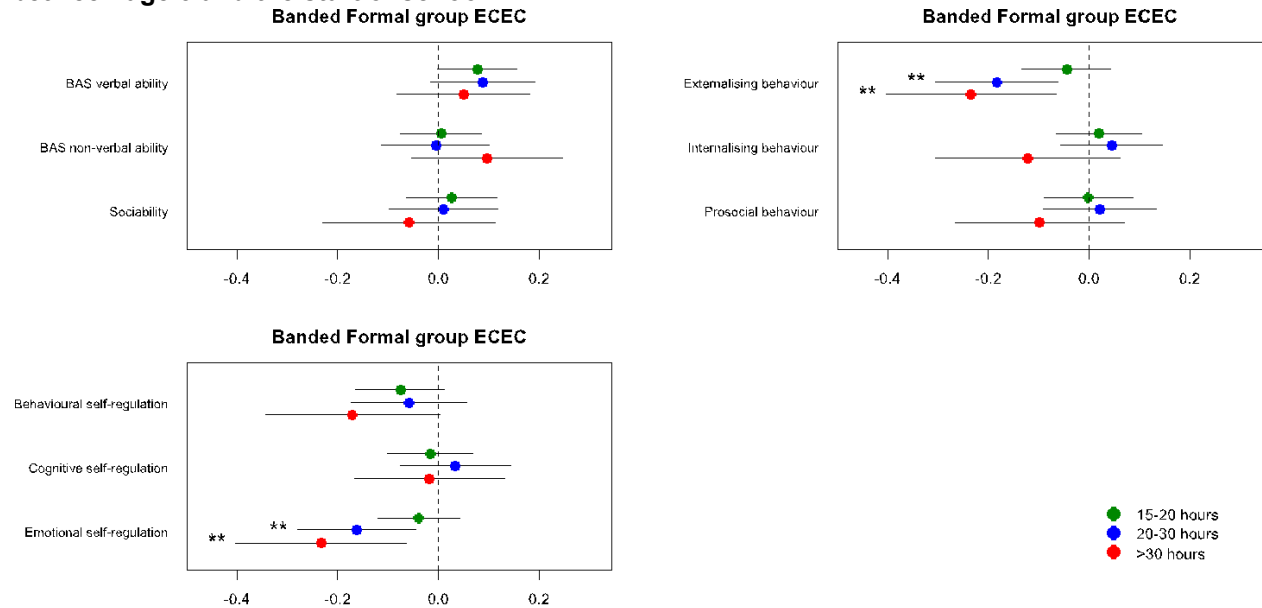
Negative associations

- ▼ No disadvantage
- ▼ Home disadvantage only
- ▼ Economic disadvantage only
- ▼ Home and Economic disadvantage

**Table 6: Breakdown of sample by Formal group ECEC use bands and disadvantage group.**

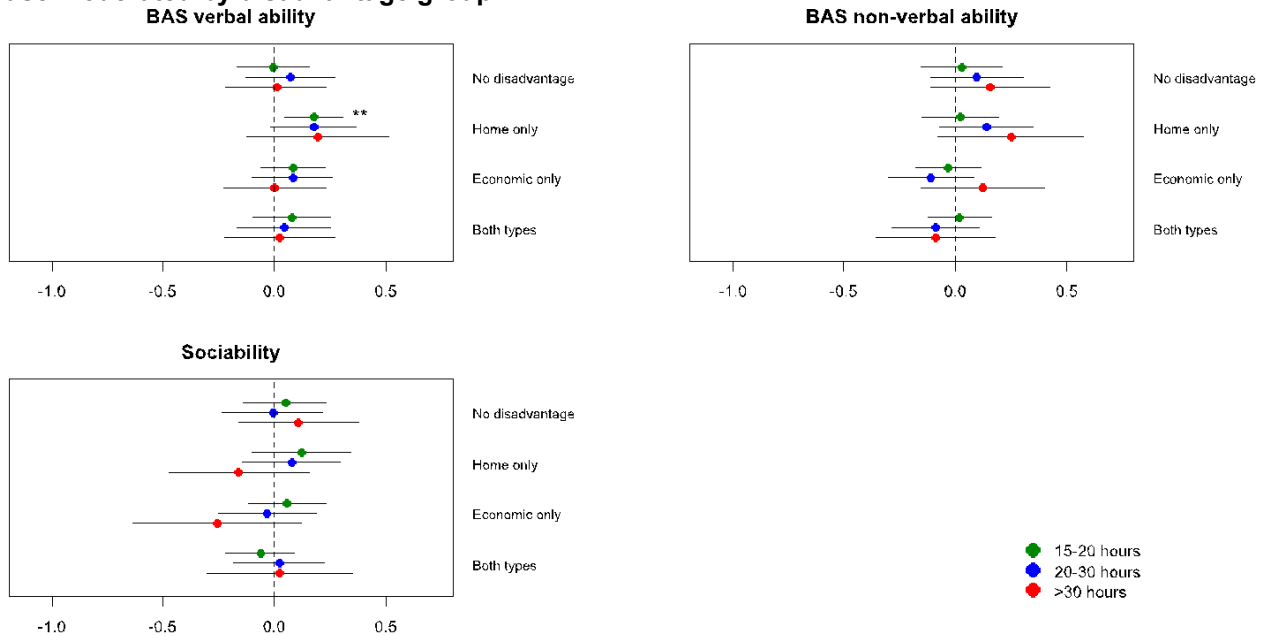
Formal group ECEC band	Disadvantage group				All children
	No disadvantage	Home only	Economic only	Both types	
Up to 15 hours per week	318	264	435	505	1522
15-20 hours per week	222	165	237	321	945
20-30 hours per week	132	107	127	144	510
>30 hours per week	79	48	57	57	241
All children	751	584	856	1027	3218

**Figure 9: Results of models of child outcomes in terms of banded mean Formal group ECEC use between age 3 and the start of school.**



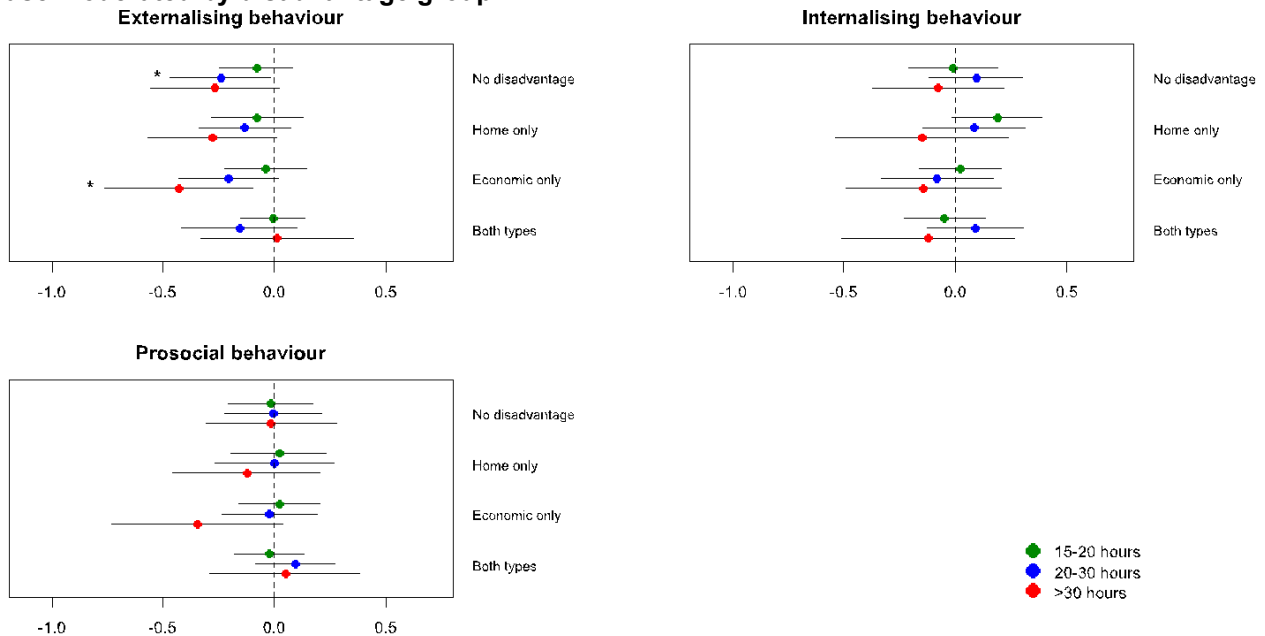
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 10(a): Results of models of child outcomes in terms of banded mean Formal group ECEC use moderated by disadvantage group.**



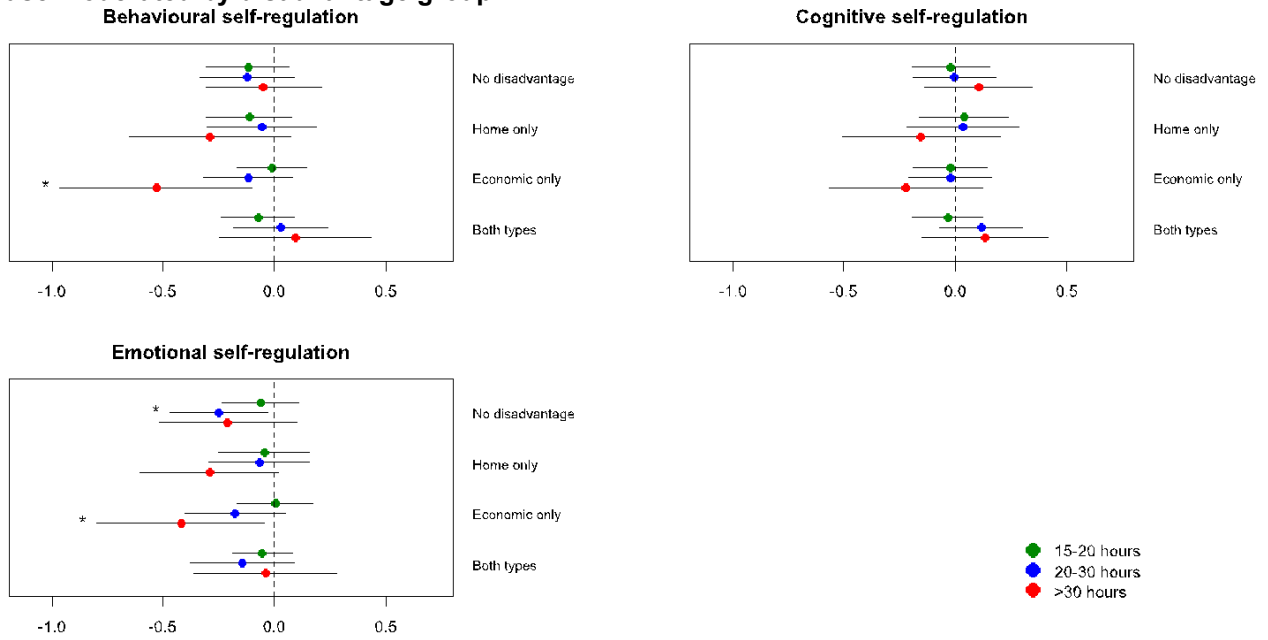
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 10(b): Results of models of child outcomes in terms of banded mean Formal group ECEC use moderated by disadvantage group.**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 10(c): Results of models of child outcomes in terms of banded mean Formal group ECEC use moderated by disadvantage group.**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

## **Discussion**

### **Models in terms of quantity of ECEC use**

A higher use of Formal group ECEC was associated with poorer socio-emotional outcomes at age five to six for Externalising behaviour, Behavioural self-regulation and Emotional self-regulation (Figure 3).

Higher use of Formal individual (childminder) ECEC was associated with poorer outcomes for Externalising behaviour (Figure 3).

Higher use of Informal individual ECEC was associated with better outcomes for child Verbal ability at age five to six (Figure 3).

### **Models in terms of quantity of ECEC use moderated by child disadvantage group**

There was evidence that the effects of ECEC use on child outcomes are moderated by child disadvantage group (see Figures 5 to 7 and summary in Figure 8).

#### **Formal group ECEC**

For children who experience no disadvantage, higher use of Formal group ECEC was associated with poorer outcomes for Externalising behaviour and Emotional self-regulation (Figure 5).

For children who experience home disadvantage only, there were no significant associations between Formal group ECEC use and the age five to six child outcomes (Figure 5).

For children who experience only economic disadvantage, higher Formal group ECEC use was associated with poorer outcomes for two of the seven socio-emotional measures (Externalising behaviour and Behavioural self-regulation) (Figure 5).

Children who experience both home and economic disadvantage showed no significant effects of Formal group ECEC use on their age five to six cognitive and socio-emotional outcomes (Figure 5).

#### **Formal individual (childminder) ECEC**

There were no significant effects of Formal individual (childminder) ECEC use on child outcomes for either the non-disadvantaged children (Figure 6), or for children who experience home disadvantage only.

Children who experience only economic disadvantage showed a significant association between higher use of Formal individual ECEC and poorer Externalising behaviour at age five to six (Figure 6).

Children who experienced both home and economic disadvantage showed a significant association between Formal individual ECEC use and poorer Sociability at age five to six (Figure 6).

### **Informal individual ECEC**

There were no significant effects of Informal individual ECEC on child outcomes, except for the children who experienced only economic disadvantage (Figure 7). These children showed an association between higher use of Formal individual ECEC and better Verbal ability at age five to six.

### **Models in terms of banded Formal group ECEC use**

Children who used a mean of greater than 20 hours per week Formal group ECEC between age three and the start of school showed poorer Externalising behaviour (Figure 9) and poorer Emotional self-regulation as compared to the reference group who used up to 15 hours per week Formal group ECEC.

### **Models in terms of banded Formal group ECEC use moderated by child disadvantage group**

Children who experienced only home disadvantage who used between 15 and 20 hours per week Formal group ECEC showed better Verbal ability at age five to six as compared to the up to 15 hours per week Formal group ECEC reference group (Figure 10(a)).

For non-disadvantaged children, there was evidence of poorer Externalising behaviour (Figure 10(b)) and Emotional self-regulation (Figure 10(c)) for children using 20 to 30 hours per week Formal group ECEC as compared to the up to 15 hours per week reference group.

Children experiencing only economic disadvantage and who used more than 30 hours per week Formal group ECEC showed poorer Externalising behaviour (Figure 10(b)), Behavioural self-regulation (Figure 10(c)) and Emotional self-regulation (Figure 10(c)) as compared to the up to 15 hours per week reference group.

## **Conclusion**

When children's cognitive and socio-emotional outcomes are analysed in terms of the amounts of different types of ECEC usage without taking account of children's disadvantage group or of specific bands of weekly Formal group ECEC usage, the picture appears fairly simple: more Formal group ECEC and, to a lesser extent, Formal individual (childminder) ECEC are associated with poorer child socio-emotional outcomes at age five to six, whilst more Informal individual ECEC (with family and friends) is associated with better child Verbal ability at this age.

Once the different effects found in the different disadvantage groups are taken account of, the deleterious effects associated with childminder ECEC are seen to be specifically for economically disadvantaged children (poorer Externalising behaviour) or for children experiencing both home and economic disadvantage (poorer Sociability). These results may partly reflect the poorer quality of childminder care that disadvantaged families may have accessed.

The beneficial effects of Informal individual ECEC on Verbal ability were found to be restricted to those who experience only economic disadvantage. These children's relatively good home environments may mean that they benefit from good quality care with family and friends, whilst their relative economic disadvantage means that they have more need of opportunities for learning than the economically non-disadvantaged children.

When both disadvantage group and specific usage bands are taken into account, a nuanced picture of the benefits, and potential disadvantages, of Formal group ECEC use emerges. For children experiencing only home disadvantage, between 15 and 20 hours per week in out-of-home, formal childcare had benefits for child Verbal ability. This indicates the way that out-of-home care can make up for some of the disadvantage for children who experience less advantageous home environments.

Children who experienced only economic disadvantage had some poorer socio-emotional outcomes associated with Formal group ECEC use, but only when usage exceeded 30 hours per week. Interestingly, children who experienced only home disadvantage or both home and economic disadvantage did not show these poorer socio-emotional outcomes even when Formal group ECEC usage was at this high level.

The only deleterious outcomes associated with Formal group ECEC usage of less than 30 hours per week were found for the non-disadvantaged children using 20 to 30 hours per week Formal group ECEC; these children had poorer Externalising behaviour and Emotional self-regulation scores than those using up to 15 hours per week Formal group ECEC. It is possible that for children with the richest home environments, out-of-home group ECEC is relatively less beneficial than spending time at home. It is probable that some of the poorer outcomes associated with out-of-home group ECEC are mitigated when the ECEC is of high quality; see Chapters 6 and 8.



# Chapter 5: Home disadvantage and economic disadvantage as moderators of the effects of the existing quality scales

## Key findings

- For children who did not experience disadvantage, there were no significant associations between the quality of Formal group ECEC settings that children attended at ages three to four and child outcomes at age five to six.
- For children who experienced only home disadvantage, there were significant associations between attending Formal group ECEC settings with higher quality scores on the ECERS-R and ECERS-E scales and better child Non-verbal ability at age five to six.
- For children who experienced only economic disadvantage, there was a significant association between attending Formal group ECEC settings with higher quality scores on the ECERS-R scale and better child Behavioural self-regulation at age five to six.
- For children who experienced both home and economic disadvantage, there were significant associations between attending higher quality Formal group ECEC and better child Prosocial behaviour (ECERS-R, ECERS-E and SSTEWS scales), better Behavioural self-regulation (ECERS-E scale) and better Cognitive self-regulation (ECERS-R, ECERS-E and SSTEWS scales).

## Introduction

Previous studies have shown that the quality of Formal group ECEC may be important for children's development to school age (Melhuish and Gardiner, 2023). In this chapter, we investigate the extent to which effects associated with the ECEC quality may be moderated by children's home and economic disadvantage.

## Method

In initial models, children's cognitive and socio-emotional outcomes were regressed on the quality of Formal group ECEC experienced aged three to four. Separate models were fitted for the three available quality measures:

1. ECERS-R.
2. ECERS-E.
3. SSTEWS.

Models controlled for ECEC quantity, HE/P covariates, demographic covariates and home and economic disadvantage.

A second set of models investigated the moderation of ECEC quality effects by child disadvantage. The previous analysis was repeated with separate effects of ECEC quality fitted for four groups of children:

- (a) Non-disadvantaged children.

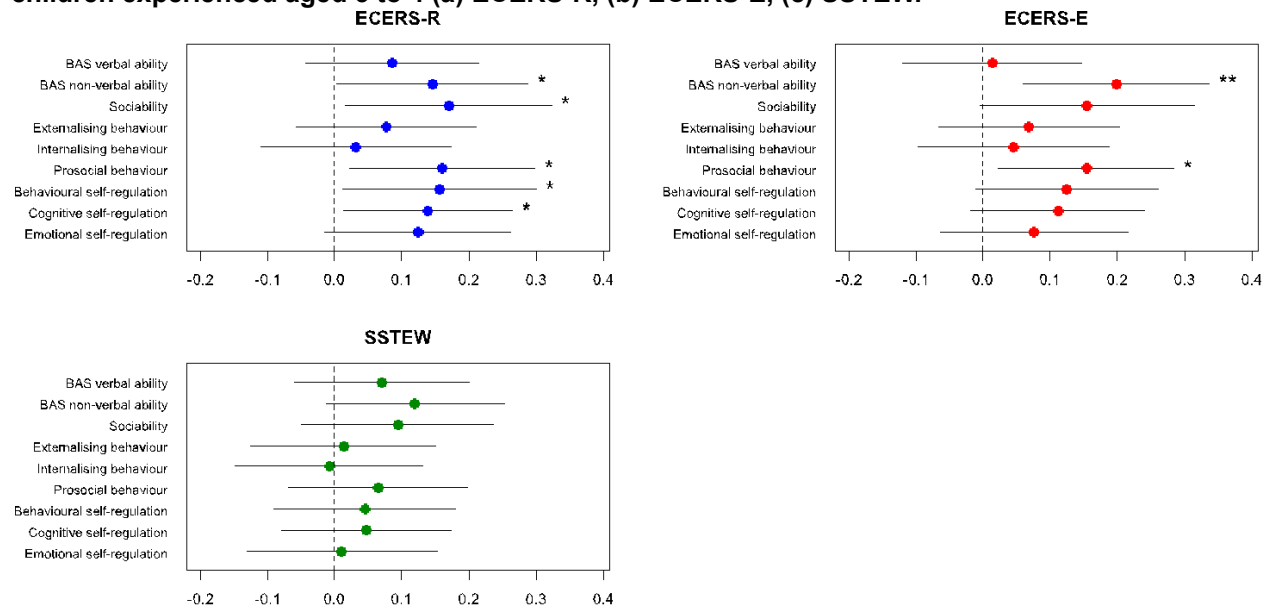
- (b) Children experiencing only home disadvantage.
- (c) Children experiencing only economic disadvantage.
- (d) Children experiencing both home and economic disadvantage.

## Results

The results of the initial models of child outcomes in terms of ECERS-R, ECERS-E and SSTEW quality are shown in Figure 11. A summary plot showing significant associations between ECEC quality and children’s outcomes is given in Figure 12.

The results of models showing the moderation of the effects of ECEC quality by child disadvantage group are shown in Figures 13 to 15. A summary plot showing significant associations between ECEC quality and children’s outcomes moderated by disadvantage group is shown in Figure 16.

**Figure 11: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4 (a) ECERS-R, (b) ECERS-E, (c) SSTEW.**



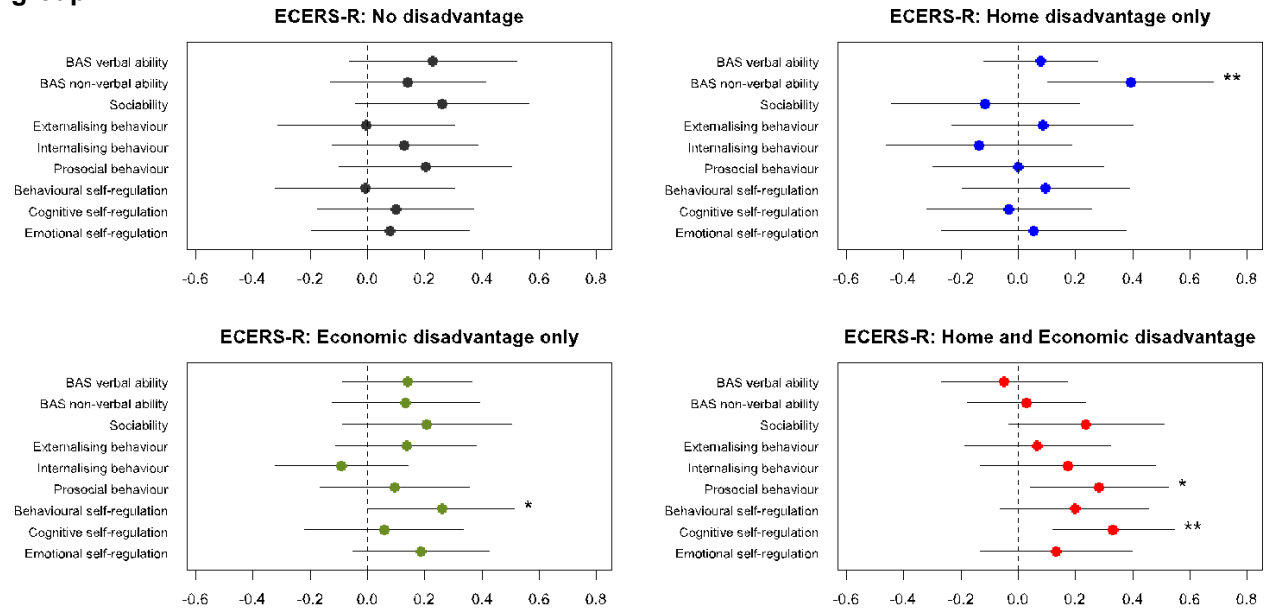
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 12: Summary of significant associations between ECEC quality and children's age 5 to 6 outcomes.**

BAS verbal ability			
BAS non-verbal ability	▲	▲	
Sociability	▲		
Externalising behaviour			
Internalising behaviour			
Prosocial behaviour	▲	▲	
Behavioural self-regulation	▲		
Cognitive self-regulation	▲		
Emotional self-regulation			
	ECERS-R	ECERS-E	SSTEW

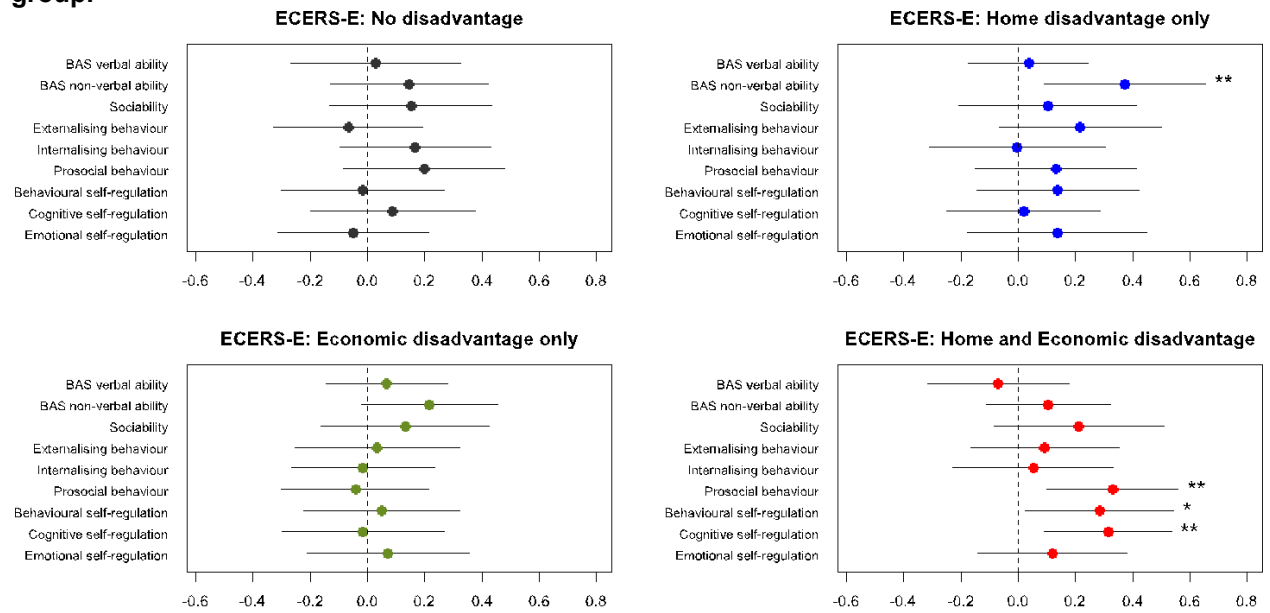
- ▲ Significant positive association
- ▼ Significant negative association

**Figure 13: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: ECERS-R quality, with separate effects for each disadvantage group.**



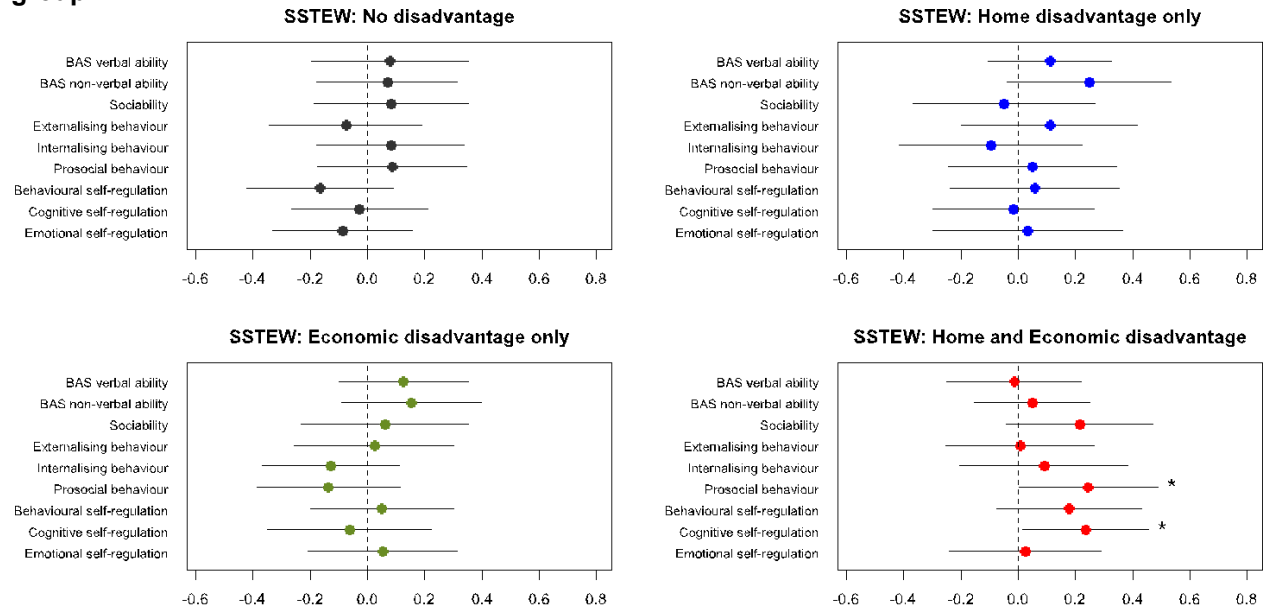
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 14: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: ECERS-E quality, with separate effects for each disadvantage group.**



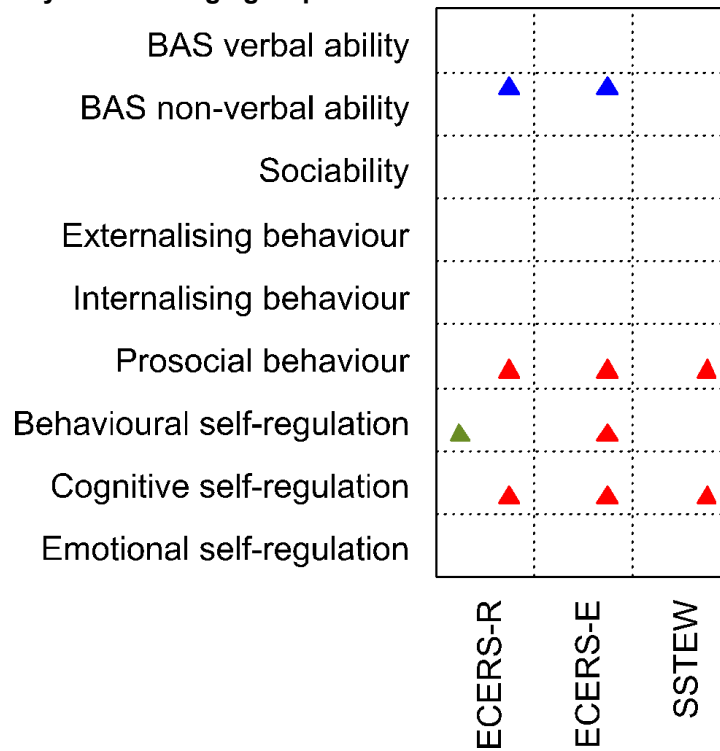
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 15: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: SSTEW quality, with separate effects for each disadvantage group.**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 16: Summary of significant associations between ECEC quality and children's age 5 to 6 outcomes moderated by disadvantage group.**



Positive associations

- ▲ No disadvantage
- ▲ Home disadvantage only
- ▲ Economic disadvantage only
- ▲ Home and Economic disadvantage

Negative associations

- ▼ No disadvantage
- ▼ Home disadvantage only
- ▼ Economic disadvantage only
- ▼ Home and Economic disadvantage

## Discussion

### Unmoderated models

A summary of the unmoderated associations between quality and child outcomes is shown in Figure 12.

#### ECERS-R

Attending ECEC settings with higher scores on ECERS-R quality was associated with better Non-verbal ability and better socio-emotional outcomes for Sociability, Prosocial behaviour, Behavioural self-regulation and Cognitive self-regulation (Figure 11).

#### ECERS-E

Attending ECEC settings with higher scores on ECERS-E quality had a significant association with better child Non-verbal ability at age five to six (Figure 11). There was also a significant association between this quality measure and better child Prosocial behaviour.

#### SSTEW

There were no statistically significant associations between scores on the SSTEW quality scale and child outcomes (Figure 11).

Overall, attending higher quality ECEC aged three to four was associated with better child Non-verbal ability and better outcomes for Sociability, Prosocial behaviour, Behavioural self-regulation and Cognitive self-regulation.

### Models moderated by disadvantage group

A summary of the associations between quality and child outcomes moderated by child disadvantage group is shown in Figure 16.

#### **Non-disadvantaged children**

There were no statistically significant associations between quality scores and child outcomes for the non-disadvantaged children.

#### **Children with only home disadvantage**

For children who experienced only home disadvantage, there were significant associations between the ECERS-R and ECERS-E quality measures and having better child Non-verbal ability at age five to six (Figures 13 and 14).

#### **Children with only economic disadvantage**

For children experiencing only economic disadvantage, there was a significant association between attending ECEC settings with higher ECERS-R scores and better child Behavioural self-regulation (Figure 13).

#### **Children with home and economic disadvantage**

For children who experienced both home and economic disadvantage, attending settings with higher ECERS-R quality was associated with better Prosocial behaviour and Cognitive self-regulation (Figure 13). For children in this group, attending settings with higher ECERS-E quality was also associated with better child Prosocial behaviour, Behavioural self-regulation and Cognitive self-regulation (Figure 14). Attending settings with better SSTEW quality was associated with better Prosocial behaviour and Cognitive self-regulation (Figure 15).

## **Conclusion**

Overall, this analysis suggests that there are differences in the effects of ECEC quality on children according to the type of disadvantage they experience. The quality of the ECEC attended appears to be of less significance for children who do not experience disadvantage and of most significance for children who experience both home and economic disadvantage.



# Chapter 6: Developing new scales from the quality data

## Key findings

- Exploratory factor analysis was carried out of the individual quality items from which the ECERS-R, ECERS-E and SSTEW scales are derived.
- This analysis suggested that there were six underlying quality factors: Overall quality, Diversity, Numeracy, Care, Shared thinking and Early literacy.

## Introduction

EFA of the quality data was carried out with the aim of extracting quality factors that might be better predictors of children's outcomes than the existing ECERS-R, ECERS-E and SSTEW scales. Such new factors may also shed further light on the moderation by child disadvantage group of ECEC quality effects on child outcomes.

## Method

The ECERS-R, ECERS-E and SSTEW quality data that were available were derived from 56 individual quality items. An initial analysis of the item-level quality data was carried out, and items with a large amount of missing data were dropped from this analysis. The correlations between the quality items were calculated. The optimum number of factors to be extracted was estimated using Horn's parallel analysis (Horn, 1965). EFA was performed using uncorrelated factors.<sup>8</sup> To simplify the final quality factors, items with loadings < 0.1 (including all negative loadings) were dropped. The items loading on each factor were tabulated and the factors were given shorthand names reflecting the aspect of quality they principally measure.

## Results

More details of the factor analysis are given in the Technical Appendix.

In order to refer to quality items succinctly, the subscales of the ECERS-R, ECERS-E and SSTEW scales have been abbreviated using the abbreviations shown in Table 7.

Three items from the ECERS-R scale were not applicable at many of the ECEC settings and were missing for >40% of the 598 settings:

1. ECERS-R: PCR; Nap and rest.
2. ECERS-R: ACT; Use of TV, video, and/or computers.
3. ECERS-R: PS; Provisions for children with disabilities.

These items were dropped from the analysis. The remaining 53 items are listed in Table 8. Of the 598 settings, 570 had complete data on these 53 quality items. These made up the analysis sample.

---

<sup>8</sup> The "varimax" rotation method was used.

**Table 7: Abbreviations for the subscales of ECERS-R, ECERS-E and SSTEW.**

<b>Scale</b>	<b>Subscale</b>	<b>Abbreviation</b>
ECERS-R	Personal care routines	PCR
	Language reasoning	LR
	Activities	ACT
	Interaction	INT
	Programme structure	PS
ECERS-E	Literacy	LIT
	Mathematics	MATH
	Diversity	DIV
SSTEW	Building trust, confidence and independence	BTCI
	Supporting and extending language and communication	SELC
	Supporting emotional Well-being	SEW
	Supporting learning and critical thinking	SLCT
	Assessing learning and language	ALL

The correlations between the individual quality items ranged from 0.128 to 0.799. EFA was carried out using six factors (the optimum number of factors suggested by Horn's parallel analysis). Item loadings on these six factors are shown in Tables 9 to 14. Quality items are sorted by loading from high to low and loadings < 0.1 are omitted.

Based on the items loading on the factors, the following shorthand names were adopted for the six quality factors:

1. Overall quality.
2. Diversity.
3. Numeracy.
4. Care.
5. Shared thinking.
6. Early literacy.

**Table 8: List of quality items.**

ECERS-R: PCR; Greeting and departing
ECERS-R: PCR; Meals/snacks
ECERS-R: PCR; Toilet/diapering
ECERS-R: PCR; Health practices
ECERS-R: PCR; Safety practices
ECERS-R: LR; Books and pictures
ECERS-R: LR; Encouraging children to communicate
ECERS-R: LR; Using language to develop reasoning skills
ECERS-R: LR; Informal use of language
ECERS-R: ACT; Fine motor
ECERS-R: ACT; Art
ECERS-R: ACT; Music/movement
ECERS-R: ACT; Blocks
ECERS-R: ACT; Sand/water
ECERS-R: ACT; Dramatic play
ECERS-R: ACT; Nature/science
ECERS-R: ACT; Math/number
ECERS-R: ACT; Promoting acceptance of diversity
ECERS-R: INT; Supervision of gross motor activities
ECERS-R: INT; General supervision of children
ECERS-R: INT; Discipline
ECERS-R: INT; Staff-child interactions
ECERS-R: INT; Interactions amongst children
ECERS-R: PS; Schedule
ECERS-R: PS; Free play
ECERS-R: PS; Group time
ECERS-E: LIT; Environment print: letters and words
ECERS-E: LIT; Book and literacy areas
ECERS-E: LIT; Adult reading with children
ECERS-E: LIT; Sounds in words
ECERS-E: LIT; Emergent writing/mark making
ECERS-E: LIT; Talking and listening
ECERS-E: MATH; Counting and the application of counting
ECERS-E: MATH; Reading and writing simple numbers
ECERS-E: MATH; Shape and space
ECERS-E: MATH; Sorting, matching and comparing
ECERS-E: DIV; Planning for individual learning needs
ECERS-E: DIV; Gender equality and awareness
ECERS-E: DIV; Race equality and awareness
SSTEWS: BTCL; Self-regulation and social development
SSTEWS: BTCL; Encouraging choices and independent play
SSTEWS: BTCL; Small group/individual interactions/adult deployment
SSTEWS: SELC; Encouraging children to talk with others
SSTEWS: SELC; Staff actively listen/encourage children to listen
SSTEWS: SELC; Staff support children's language use
SSTEWS: SELC; Sensitive responsiveness
SSTEWS: SEW; Supporting socio-emotional well-being
SSTEWS: SLCT; Supporting curiosity and problem solving
SSTEWS: SLCT; Shared thinking during story telling
SSTEWS: SLCT; Shared thinking in investigation and exploration
SSTEWS: SLCT; Supporting concept development/higher order thinking
SSTEWS: ALL; Using assessment to support learning/critical thinking
SSTEWS: ALL; Assessing language development

**Table 9: Factor loadings for Factor 1 “Overall quality”.**

<b>Factor 1</b>	
<b>Item</b>	<b>Loading</b>
SSTEWS: SLCT; Supporting curiosity and problem solving	+0.826
SSTEWS: SLCT; Supporting concept development/higher order thinking	+0.825
SSTEWS: BTCL; Self-regulation and social development	+0.820
SSTEWS: SLCT; Shared thinking in investigation and exploration	+0.818
SSTEWS: BTCL; Encouraging choices and independent play	+0.810
SSTEWS: SELC; Staff support children's language use	+0.806
SSTEWS: SEW; Supporting socio-emotional well-being	+0.804
ECERS-R: INT; Discipline	+0.795
SSTEWS: SELC; Staff actively listen/encourage children to listen	+0.792
ECERS-R: LR; Using language to develop reasoning skills	+0.786
SSTEWS: BTCL; Small group/individual interactions/adult deployment	+0.781
SSTEWS: ALL; Using assessment to support learning/critical thinking	+0.778
ECERS-R: LR; Encouraging children to communicate	+0.772
SSTEWS: SELC; Sensitive responsiveness	+0.766
SSTEWS: ALL; Assessing language development	+0.761
ECERS-R: INT; General supervision of children	+0.758
ECERS-R: PS; Free play	+0.728
ECERS-R: INT; Interactions amongst children	+0.727
ECERS-E: MATH; Counting and the application of counting	+0.727
ECERS-E: MATH; Sorting, matching and comparing	+0.723
SSTEWS: SLCT; Shared thinking during story telling	+0.716
ECERS-R: ACT; Nature/science	+0.713
ECERS-E: DIV; Planning for individual learning needs	+0.711
ECERS-E: MATH; Shape and space	+0.706
ECERS-E: LIT; Emergent writing/mark making	+0.703
ECERS-R: INT; Supervision of gross motor activities	+0.701
ECERS-R: INT; Staff-child interactions	+0.691
ECERS-R: ACT; Fine motor	+0.678
ECERS-E: LIT; Adult reading with children	+0.672
ECERS-R: ACT; Art	+0.670
ECERS-E: LIT; Environment print: letters and words	+0.670
ECERS-E: LIT; Book and literacy areas	+0.655
ECERS-R: PS; Schedule	+0.635
ECERS-E: MATH; Reading and writing simple numbers	+0.631
ECERS-R: PS; Group time	+0.629
ECERS-R: PCR; Safety practices	+0.628
ECERS-R: LR; Books and pictures	+0.615
ECERS-E: DIV; Gender equality and awareness	+0.593
ECERS-R: ACT; Sand/water	+0.577
ECERS-R: ACT; Music/movement	+0.572
ECERS-E: DIV; Race equality and awareness	+0.554
ECERS-R: ACT; Dramatic play	+0.553
ECERS-E: LIT; Sounds in words	+0.548
ECERS-R: ACT; Promoting acceptance of diversity	+0.528
ECERS-R: PCR; Health practices	+0.500
ECERS-R: PCR; Meals/snacks	+0.496
ECERS-R: PCR; Toilet/diapering	+0.494
ECERS-R: PCR; Greeting and departing	+0.474
ECERS-R: LR; Informal use of language	+0.460
ECERS-R: ACT; Math/number	+0.436
ECERS-E: LIT; Talking and listening	+0.409
SSTEWS: SELC; Encouraging children to talk with others	+0.360
ECERS-R: ACT; Blocks	+0.338

**Table 10: Factor loadings for Factor 2 “Diversity”.**

<b>Factor 2</b>	
<b>Item</b>	<b>Loading</b>
ECERS-E: DIV; Race equality and awareness	+0.683
ECERS-R: ACT; Promoting acceptance of diversity	+0.675
ECERS-E: DIV; Gender equality and awareness	+0.526
ECERS-R: ACT; Dramatic play	+0.244
ECERS-R: ACT; Music/movement	+0.230
ECERS-R: LR; Books and pictures	+0.182
ECERS-E: MATH; Sorting, matching and comparing	+0.168
ECERS-E: LIT; Book and literacy areas	+0.159
ECERS-E: DIV; Planning for individual learning needs	+0.157
ECERS-R: ACT; Nature/science	+0.151
ECERS-E: MATH; Shape and space	+0.149
ECERS-R: ACT; Blocks	+0.142
ECERS-E: LIT; Emergent writing/mark making	+0.141
ECERS-E: LIT; Sounds in words	+0.116
ECERS-R: ACT; Math/number	+0.103
ECERS-E: LIT; Environment print: letters and words	+0.103

**Table 11: Factor loadings for Factor 3 “Numeracy”.**

<b>Factor 3</b>	
<b>Item</b>	<b>Loading</b>
ECERS-E: MATH; Reading and writing simple numbers	+0.538
ECERS-E: MATH; Counting and the application of counting	+0.463
ECERS-E: MATH; Shape and space	+0.347
ECERS-E: MATH; Sorting, matching and comparing	+0.325
ECERS-E: LIT; Sounds in words	+0.317
ECERS-E: LIT; Emergent writing/mark making	+0.247
ECERS-E: LIT; Environment print: letters and words	+0.211
ECERS-R: ACT; Math/number	+0.147
ECERS-E: DIV; Gender equality and awareness	+0.126
ECERS-R: LR; Using language to develop reasoning skills	+0.119
ECERS-R: ACT; Music/movement	+0.116

**Table 12: Factor loadings for Factor 4 “Care”.**

<b>Factor 4</b>	
<b>Item</b>	<b>Loading</b>
ECERS-R: PCR; Safety practices	+0.386
ECERS-R: PCR; Health practices	+0.362
ECERS-R: PCR; Toilet/diapering	+0.352
ECERS-R: INT; Supervision of gross motor activities	+0.309
ECERS-R: PCR; Meals/snacks	+0.270
ECERS-R: ACT; Fine motor	+0.252
ECERS-R: INT; General supervision of children	+0.228
ECERS-R: ACT; Dramatic play	+0.209
ECERS-R: PCR; Greeting and departing	+0.201
ECERS-R: PS; Free play	+0.193
ECERS-R: INT; Discipline	+0.160
ECERS-R: ACT; Sand/water	+0.158
ECERS-R: ACT; Blocks	+0.122
ECERS-R: PS; Schedule	+0.113
ECERS-R: INT; Interactions amongst children	+0.109

**Table 13: Factor loadings for Factor 5 “Shared thinking”.**

Factor 5	
Item	Loading
SSTEWS: SLCT; Shared thinking in investigation and exploration	+0.268
ECERS-R: ACT; Nature/science	+0.248
ECERS-R: ACT; Music/movement	+0.219
ECERS-E: MATH; Sorting, matching and comparing	+0.215
SSTEWS: SLCT; Shared thinking during story telling	+0.214
SSTEWS: SLCT; Supporting concept development/higher order thinking	+0.213
ECERS-R: ACT; Sand/water	+0.185
ECERS-E: DIV; Gender equality and awareness	+0.144
ECERS-R: LR; Using language to develop reasoning skills	+0.140
ECERS-E: LIT; Emergent writing/mark making	+0.137
SSTEWS: SLCT; Supporting curiosity and problem solving	+0.128
ECERS-E: LIT; Sounds in words	+0.127
ECERS-R: ACT; Art	+0.110
ECERS-E: LIT; Adult reading with children	+0.105

**Table 14: Factor loadings for Factor 6 “Early literacy”.**

Factor 6	
Item	Loading
ECERS-R: LR; Books and pictures	+0.498
ECERS-E: LIT; Book and literacy areas	+0.409
ECERS-E: LIT; Adult reading with children	+0.371
SSTEWS: SLCT; Shared thinking during story telling	+0.229
ECERS-E: LIT; Emergent writing/mark making	+0.175
ECERS-E: LIT; Sounds in words	+0.165
ECERS-E: LIT; Environment print: letters and words	+0.146
ECERS-R: LR; Encouraging children to communicate	+0.112
ECERS-R: ACT; Blocks	+0.110
ECERS-R: ACT; Dramatic play	+0.108

## Discussion

With the exception of the first factor (“Overall quality”), which loads on all 53 quality items, the new factors load on between 10 and 16 quality items. Each factor appears to represent an identifiable aspect of ECEC settings quality, as reflected in the shorthand names adopted.

In the following chapter, the associations are explored between these new quality factors and children’s outcomes. The moderation of these effects by child disadvantage groups are also investigated. Finally, in Chapter 8, the relationship between these quality factors and structural aspects of the ECEC settings (eg, type of setting, size of setting, staff’s level of qualification) are investigated.

# Chapter 7: Home disadvantage and economic disadvantage as moderators of the effects of the new quality scales

## Key findings

- There is evidence that the new quality factors provide better predictors of children's cognitive and socio-emotional outcomes at age five to six than the ECERS-R, ECERS-E and SSTEW scales.
- Non-disadvantaged children showed benefits for Verbal ability and Prosocial behaviour associated with higher scores on the Care and Early literacy quality factors, respectively.
- Children who experienced only home disadvantage showed benefits from attending higher quality Formal group ECEC specifically for Non-verbal ability at age five to six.
- Children who experienced both home and economic disadvantage showed benefits from attending higher quality Formal group ECEC specifically for Prosocial behaviour, Behavioural self-regulation and Cognitive self-regulation.
- Children who experienced only economic disadvantage showed benefits for Non-verbal ability associated with the Shared thinking quality factor. They also showed socio-emotional benefits associated with the Early literacy quality factor. This may reflect the benefit that children from economically disadvantaged homes experience from access to high quality learning resources, such as books, pictures and drawing materials.

## Introduction

In this chapter we analyse child outcomes in terms of the new quality scales developed in Chapter 6. We examine how the effects of these quality scales are moderated by children's disadvantage group.

## Method

In initial models, children's age five to six cognitive and socio-emotional outcomes were regressed on the quality of Formal group ECEC experienced aged three to four as assessed by the newly developed quality scales. Separate models were fitted for the six quality factors:

1. Overall quality.
2. Diversity.
3. Numeracy.
4. Care.
5. Shared thinking.
6. Early literacy.

Models controlled for ECEC quantity, HE/P covariates, demographic covariates and home and economic disadvantage.

A second set of models investigated the moderation of these ECEC quality effects by child disadvantage. The previous analysis was repeated with separate effects of ECEC quality fitted for four groups of children:

- (a) Non-disadvantaged children.
- (b) Children experiencing only home disadvantage.
- (c) Children experiencing only economic disadvantage.
- (d) Children experiencing both home and economic disadvantage.

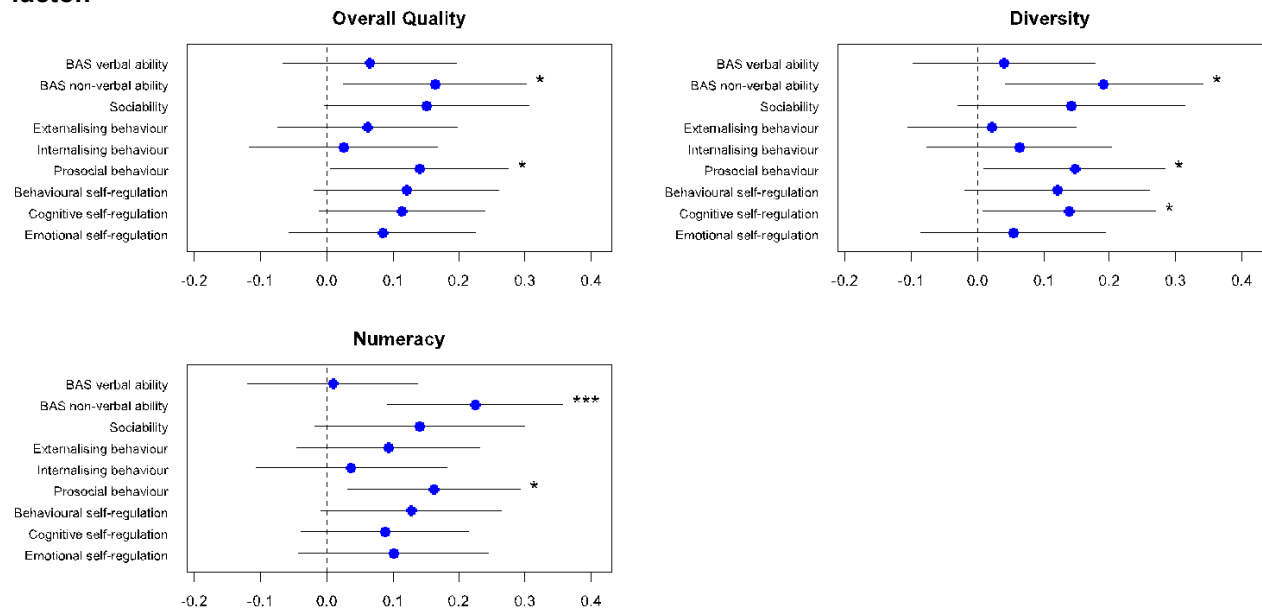
## **Results**

The results of the initial models of child outcomes in terms of the new quality factors are shown in Figures 17 and 18. A summary plot showing significant associations between the ECEC quality factors and children's outcomes is given in Figure 19.

Results of the models with the effects of the new quality factors moderated by child disadvantage group are shown in Figures 20 to 25. A summary plot showing significant associations between the ECEC quality factors and children's outcomes moderated by disadvantage group is given in Figure 26.

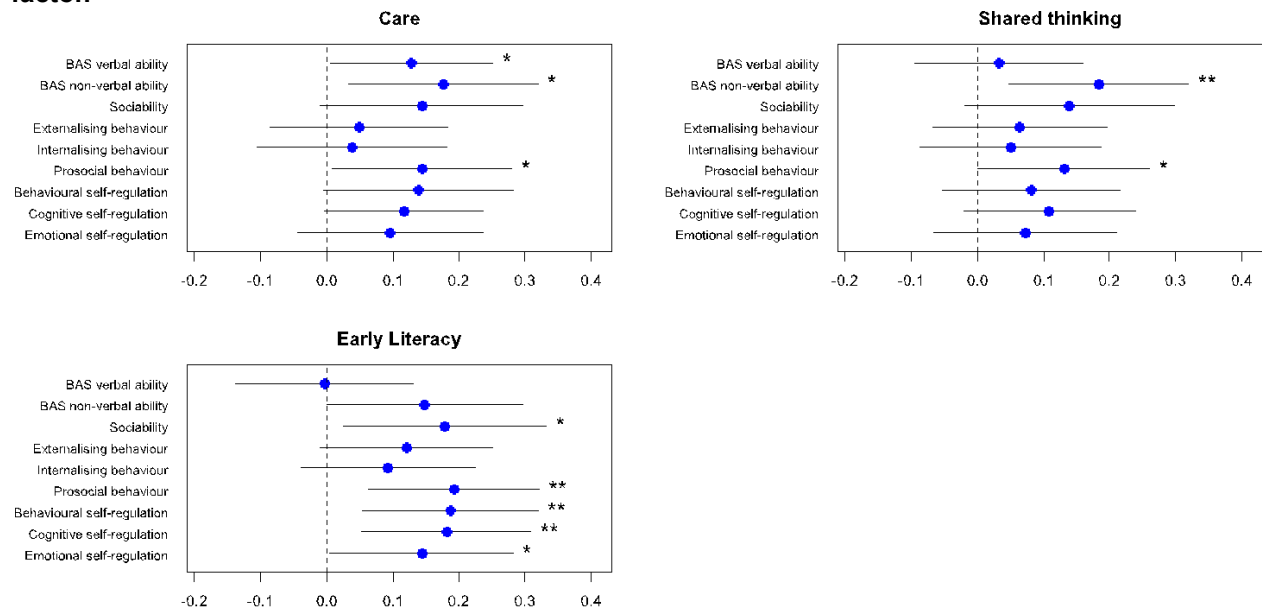


**Figure 17: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: (a) Overall quality factor, (b) Diversity factor, (c) Numeracy factor.**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 18: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: (a) Care factor, (b) Shared thinking factor, (c) Early literacy factor.**



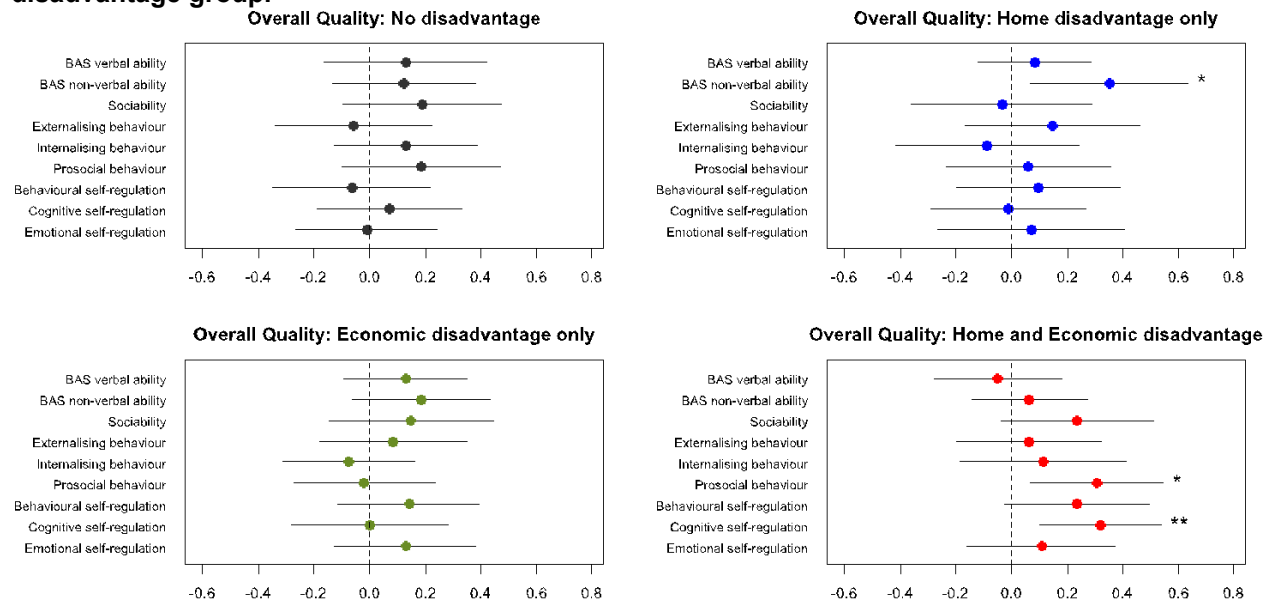
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 19: Summary of significant associations between the new ECEC quality factors and children’s age 5 to 6 outcomes.**

BAS verbal ability				▲		
BAS non-verbal ability	▲	▲	▲	▲	▲	
Sociability						▲
Externalising behaviour						
Internalising behaviour						
Prosocial behaviour	▲	▲	▲	▲	▲	▲
Behavioural self-regulation						▲
Cognitive self-regulation		▲				▲
Emotional self-regulation						▲
	Overall Quality	Diversity	Numeracy	Care	Shared thinking	Early Literacy

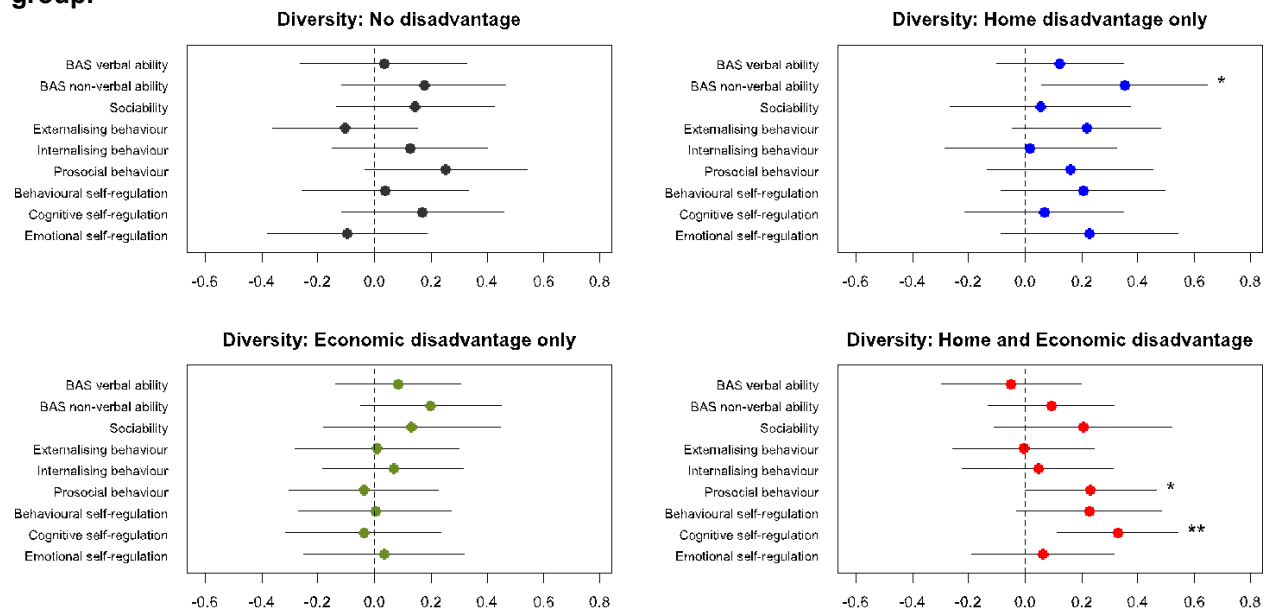
- ▲ Significant positive association
- ▼ Significant negative association

**Figure 20: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: Overall quality factor, with separate results by child disadvantage group.**



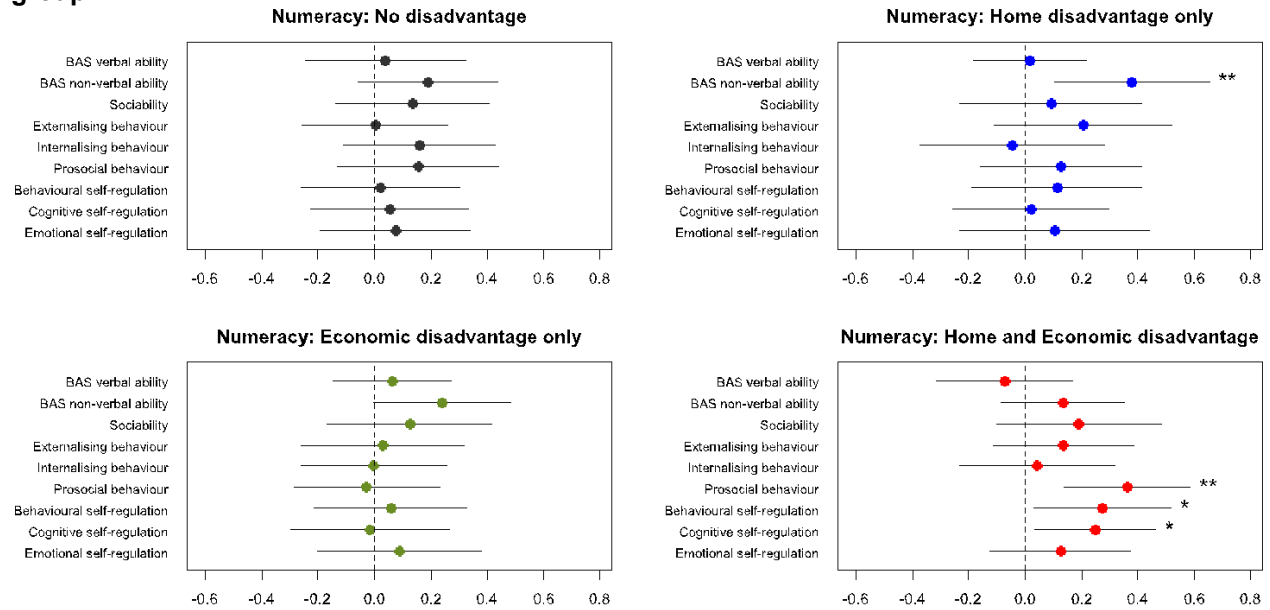
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 21: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: Diversity factor, with separate results by child disadvantage group.**



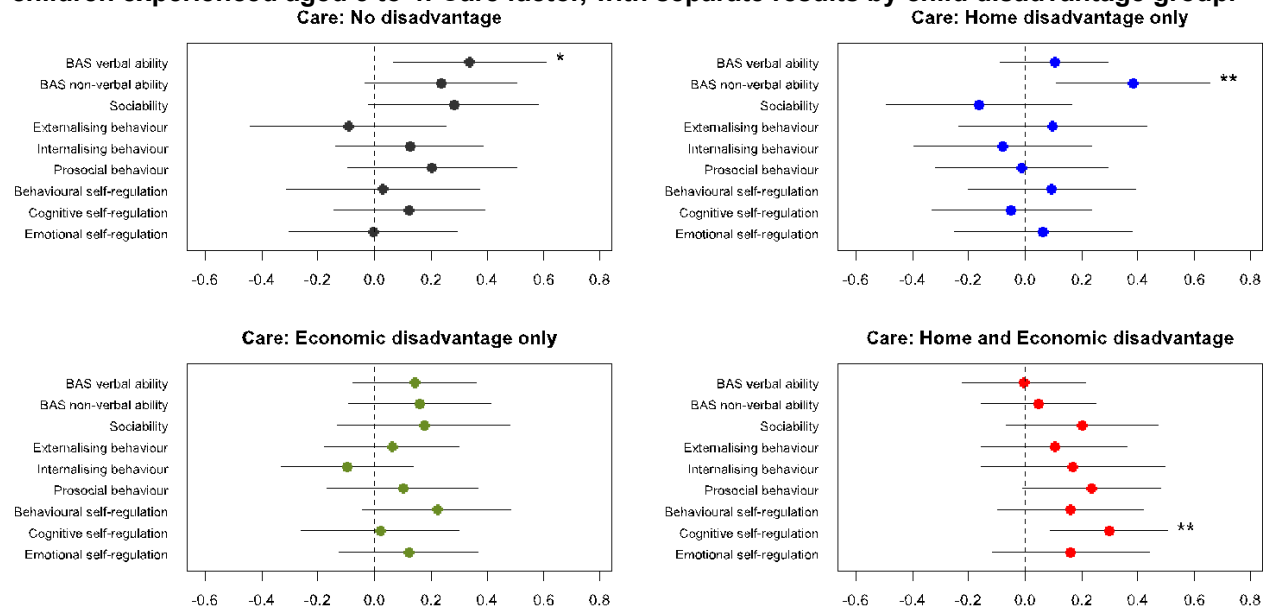
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 22: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: Numeracy factor, with separate results by child disadvantage group.**



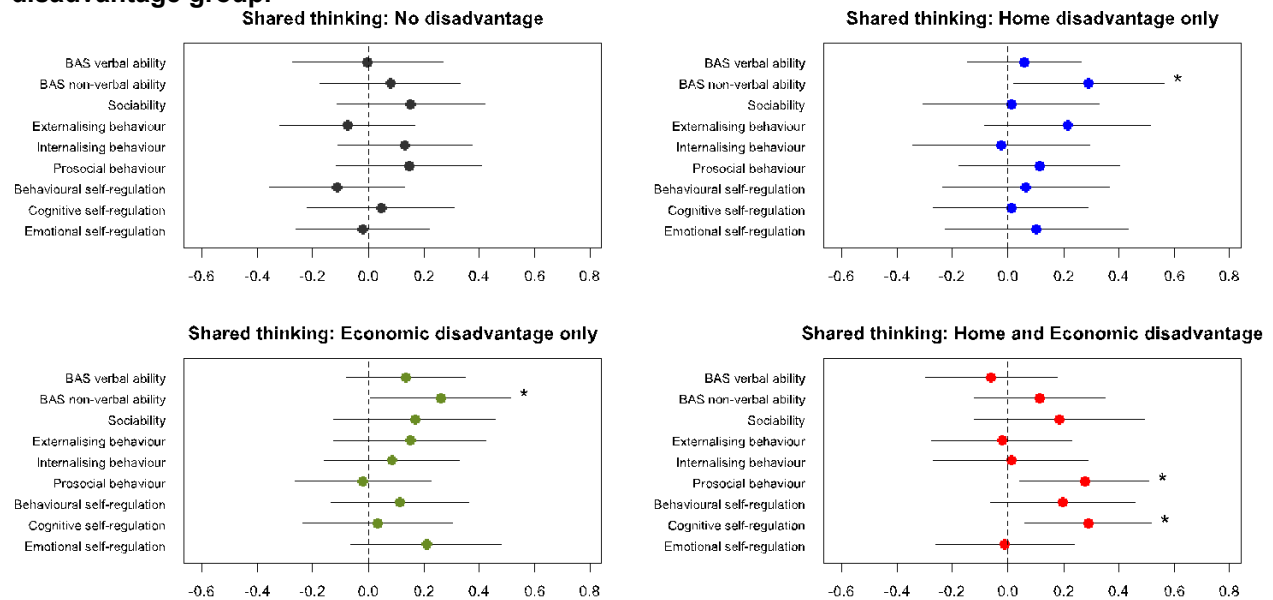
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 23: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: Care factor, with separate results by child disadvantage group.**



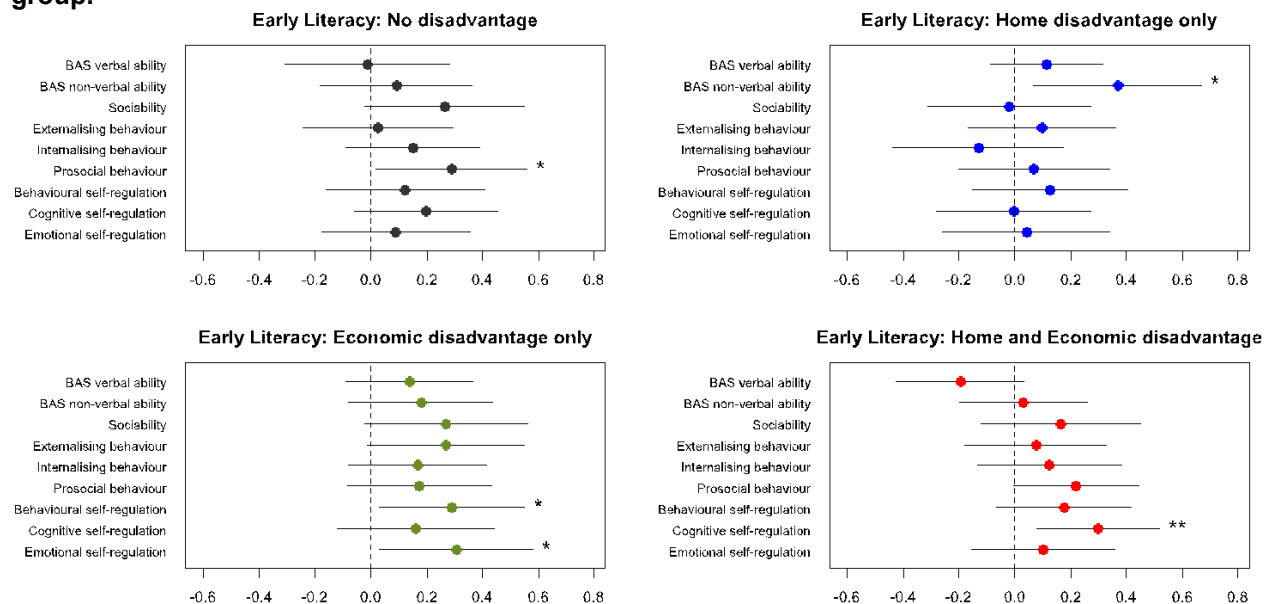
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 24: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: Shared thinking factor, with separate results by child disadvantage group.**



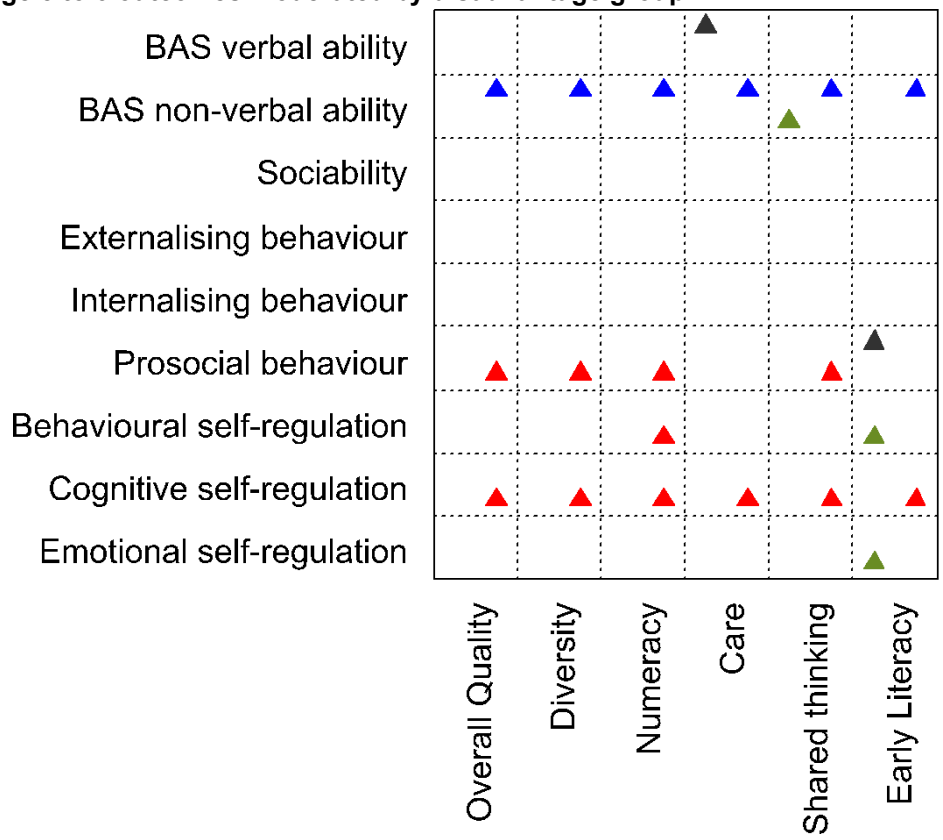
Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 25: Results of models of child outcomes in terms of the quality of Formal group ECEC children experienced aged 3 to 4: Early literacy factor, with separate results by child disadvantage group.**



Point estimates of standardised model coefficients are plotted with 95% confidence intervals shown by horizontal lines. Statistical significance is indicated: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Figure 26: Summary of significant associations between the new ECEC quality factors and children's age 5 to 6 outcomes moderated by disadvantage group.**



**Positive associations**

- ▲ No disadvantage
- ▲ Home disadvantage only
- ▲ Economic disadvantage only
- ▲ Home and Economic disadvantage

**Negative associations**

- ▼ No disadvantage
- ▼ Home disadvantage only
- ▼ Economic disadvantage only
- ▼ Home and Economic disadvantage

## **Discussion**

### **Unmoderated models**

The results of the unmoderated models are summarised in Figure 19.

#### Verbal ability

There was a significant association between attending settings with a higher score on the Care quality factor and better child Verbal ability at age five to six (Figure 18).

#### Non-verbal ability

There were associations between higher scores on all the quality factors except Early Literacy and better child Non-verbal ability (Figures 17 and 18).

#### Sociability

There was a significant association between higher scores on the Early Literacy factor and better child Sociability (Figure 18).

#### Externalising behaviour

There were no significant associations between the new quality factors and the Externalising behaviour outcome.

#### Internalising behaviour

There were no significant associations between the new quality factors and the Internalising behaviour outcome.

#### Prosocial behaviour

There were significant associations between higher scores on all the new quality factors and better child Prosocial behaviour (Figures 17 and 18).

#### Behavioural self-regulation

There was a significant association between higher Early literacy quality factor scores and better child Behavioural self-regulation (Figure 18).

#### Cognitive self-regulation

There were significant associations between higher scores on the Diversity and Early literacy factors and better child Cognitive self-regulation (Figures 17 and 18).

#### Emotional self-regulation

There was a significant association between higher scores on the Early literacy factor and better child Emotional self-regulation (Figure 18).

### **Models moderated by child disadvantage group**

The results of the models moderated by child disadvantage group are summarised in Figure 26.

#### **Non-disadvantaged children**

For non-disadvantaged children, there was a significant association between higher scores on the Care factor and better child Verbal ability (Figure 23). For this group of

children there was also a significant association between higher scores on the Early literacy factor and better child Prosocial behaviour (Figure 25).

#### **Children with only home disadvantage**

For children who experienced only home disadvantage, there were associations between all the quality factors and better child Non-verbal ability (Figures 20 to 25).

#### **Children with only economic disadvantage**

For children who experienced only economic disadvantage, there was an association between higher scores on the Shared thinking factor and better Non-verbal ability (Figure 24). There were also significant associations between higher scores on the Early literacy factor and better child Behavioural self-regulation and Emotional self-regulation (Figure 25).

#### **Children with both home and economic disadvantage**

For children who experienced both home and economic disadvantage, there were significant associations between Overall quality, Diversity, Numeracy and Shared thinking and better child Prosocial behaviour (Figures 20 to 24). There was a significant association between better scores on the Numeracy factor and better child Behavioural self-regulation (Figure 22). There were significant associations between all the quality factors and better child Cognitive self-regulation (Figures 20 to 25).

## **Conclusion**

A comparison of the results for the ECERS-R, ECERS-E and SSTEWS quality scales and the new quality factors (Overall quality, Diversity, Numeracy, Care, Shared thinking and Early literacy) suggests that the latter provide better predictors of children's age five to six cognitive and socio-emotional outcomes. Compare the summary Figure 12 (Chapter 5), giving results for ECERS-R, ECERS-E and SSTEWS as predictors of child outcomes, and summary Figure 19, which gives parallel results for the new quality factors.

The effects of the new quality factors appear to be moderated by child disadvantage group, as was found for the ECERS-R, ECERS-E and SSTEWS quality scales. (See summary Figure 26 for an overview of moderation of the new factors and summary Figure 16 (Chapter 5) for moderation of ECERS-R, ECERS-E and SSTEWS.)

Non-disadvantaged children showed benefits for Verbal ability and Prosocial behaviour associated with higher scores on the Care and Early literacy quality factors, respectively.

For children who experienced only home disadvantage, there were benefits associated with all the quality factors, specifically for the Non-verbal ability outcome.

For children who experience only economic disadvantage, better child Non-verbal ability was associated with the Shared thinking quality factor. There were socio-emotional benefits associated with the Early literacy quality factor. This may partly reflect the benefit that children from economically disadvantaged homes experience from access to high quality learning resources, such as books, pictures and drawing materials.



Finally, children who experience both home and economic disadvantage showed socio-emotional benefits associated with all the quality factors for the Cognitive self-regulation outcome. There were also benefits associated with some aspects of quality for Prosocial behaviour and Behavioural self-regulation.

# Chapter 8: Relating the new quality scales to structural aspects of ECEC settings

## Key findings

- Nursery classes and Nursery schools had higher mean scores on the quality factors than both Private and Voluntary settings.
- Higher quality at Private settings was associated with having a larger number of places, a higher minimum age for children, more highly qualified staff and having SEN/D provision. A higher overall staff to child ratio was associated with better scores on the Early literacy quality factor.
- For Voluntary settings, better Overall quality, Diversity and Care were associated with having higher staff to child ratios.
- For Nursery classes/schools the main predictors of settings quality were a narrower age range for children and having a training budget in place. A lower staff to child ratio for three to four year olds was associated with better quality on the Shared thinking quality factor.

## Introduction

The analysis of settings quality data in Chapter 6 led to the proposal of six new quality factors:

1. Overall quality.
2. Diversity.
3. Numeracy.
4. Care.
5. Shared thinking.
6. Early literacy.

The relationship between these factors and children's outcomes was explored in Chapter 7. In this chapter the relationship is explored between structural aspects of ECEC settings and settings quality, as measured by the new quality factors.

## Method

The analysis sample consisted of the 570 settings for which complete quality factor data was available.

The following structural aspects of settings were analysed:

1. Type of setting.
2. Setting on single/multiple sites.
3. Number of places provided.
4. Minimum age of children.
5. Maximum age of children.
6. SEN/D provision (yes/no).
7. Manager's highest qualification.
8. Number of staff.

9. Mean qualification level of staff.
10. Percentage of staff replaced during the last year.
11. Overall staff to child ratio.
12. Staff to child ratio for 3-4 year olds.
13. Frequency of staff CPD.
14. Frequency of staff supervision.
15. Training plan in place (yes/no).
16. Training budget in place (yes/no).

For the continuous structural measures, the relationship with the six quality factors was assessed using Kendall's Tau correlation coefficient.<sup>9</sup> For the binary measures, the quality factors were compared between the two groups using t-tests.

The remaining variable, setting type, is a categorical variable; see Table 15.

**Table 15: Breakdown of sample by settings type.**

Type	Number of settings
Private	287
Voluntary	137
Nursery class	104
Children's centre	25
Nursery school	13
Local authority nursery	4

The mean value of the quality factors was compared between each type of setting and Private settings; this was used as the reference level as this was the largest group. Local authority nurseries were omitted from this comparison because of small numbers.

Mean characteristics of settings were also tabulated by type of setting. Means for each type of setting were compared with those for Private settings using non-parametric Wilcoxon tests.

Finally, regression models of the quality factors were fitted in terms of the structural characteristics of the settings, separately by setting type. Children's centres and local authority nurseries were omitted due to small numbers. Nursery classes and Nursery schools were analysed together. Number of staff was omitted as a covariate, since including all three of Number of places, Number of staff and Staff to child ratio would make model interpretation difficult.

## Results

The correlations between the quality factors and continuous characteristics of settings are summarised in Figure 27. The associations between the quality factors and binary characteristics of settings are summarised in Figure 28.

Mean quality factor values by settings type are shown in Table 16. Mean setting characteristics by settings type are shown in Table 17.

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<sup>9</sup> This is a non-parametric correlation measure which does not assume that variables are Normally distributed.

The results of regression models of quality factors in terms of settings characteristics are summarised in Figures 29 to 31.

Significant relationships are highlighted in blue throughout.

**Figure 27: Significance and direction of Kendall Tau correlations between continuous structural characteristics of ECEC settings and quality factors.**

Number of places provided	▲	▲	▲		▲	▲
Minimum age of children	▲	▲	▲	▲	▲	▲
Maximum age of children	▼		▼	▼	▼	▼
Manager's highest qualification	▲	▲	▲	▲	▲	▲
Number of staff						
Mean qualification level of staff	▲	▲	▲	▲	▲	▲
Percentage of staff replaced during the last year	▼				▼	▼
Staff to child ratio			▼		▼	▼
Staff to child ratio 3-4 year olds	▼	▼	▼		▼	▼
Frequency of staff CPD	▲	▲	▲	▲	▲	▲
Frequency of staff supervision						▼
	Overall Quality	Diversity	Numeracy	Care	Shared thinking	Early Literacy

- ▲ Significant positive association
- ▼ Significant negative association

**Figure 28: Significant associations between binary structural characteristics of ECEC settings and quality factors, assessed using t-tests.**

Setting on single site						
SEN/D provision		▲				
Training plan in place	▲	▲	▲	▲	▲	▲
Training budget in place	▲	▲	▲	▲	▲	▲
	Overall Quality	Diversity	Numeracy	Care	Shared thinking	Early Literacy

- ▲ Significant positive association
- ▼ Significant negative association

**Table 16: Means of quality factors by type of childcare settings. Means are compared with the reference level (Private settings) using t-tests.**

Quality factor	Private	Voluntary	Nursery class	Children's centre	Nursery school
Fac 1: Overall quality	-0.069	-0.137	+0.238***	+0.254**	+0.468**
Fac 2: Diversity	-0.045	-0.173**	+0.175***	+0.415***	+0.520*
Fac 3: Numeracy	-0.061	-0.193**	+0.311***	+0.199*	+0.434*
Fac 4: Care	-0.048	-0.076	+0.134***	+0.226**	+0.262
Fac 5: Shared thinking	-0.054	-0.186**	+0.254***	+0.277**	+0.458**
Fac 6: Early literacy	-0.055	-0.180*	+0.253***	+0.232**	+0.526**
N	287	137	104	25	13

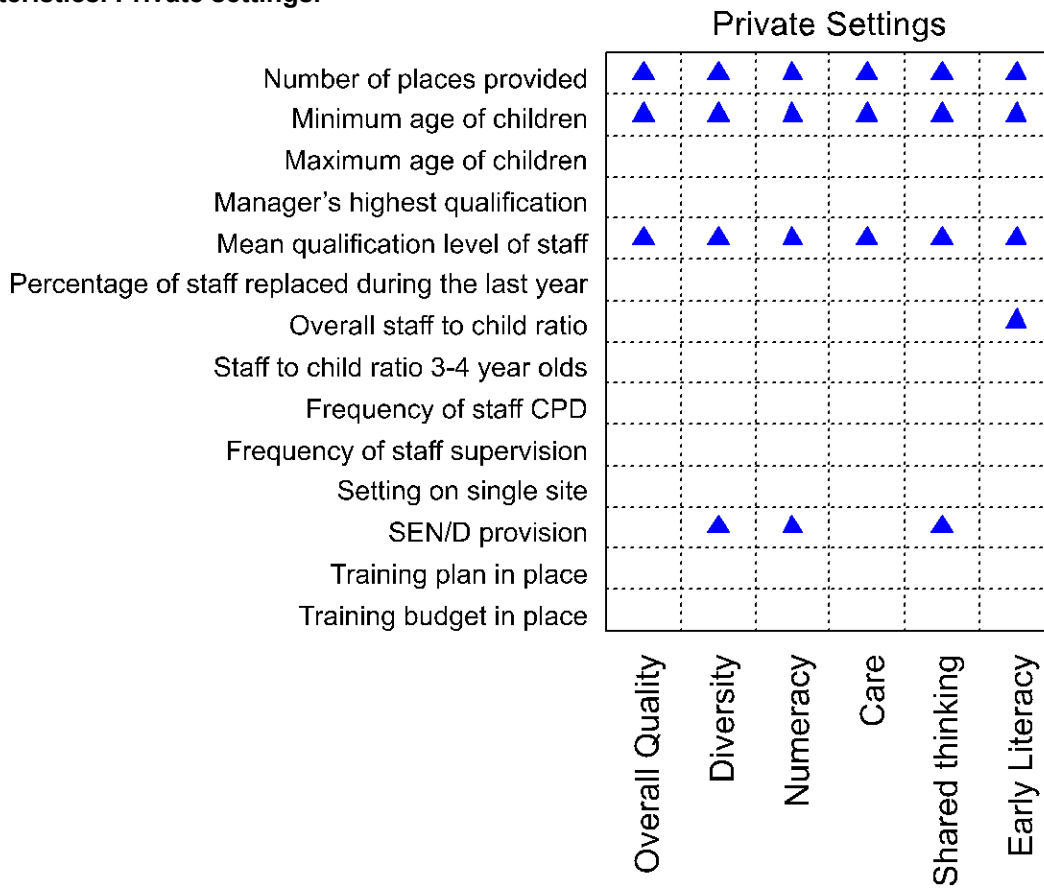
Statistical significance of t-test comparison shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 17: Means of settings characteristics by type of setting. Means are compared with the reference level (Private settings) using Wilcoxon rank sum tests.**

Variable	Private	Voluntary	Nursery class	Children's centre	Nursery school
Number of places provided	55.02	37.56***	50.30*	67.04*	69.69
Minimum age of children	0.67	1.56***	2.80***	0.76	2.31***
Maximum age of children	6.10	5.45**	5.65***	5.52	4.77**
Manager's highest qualification	4.92	4.49**	6.09***	6.00***	6.62***
Number of staff	13.96	9.93***	5.36***	16.92	12.85
Mean qualification level of staff	3.02	2.88	3.78***	3.44**	3.56**
Percentage of staff replaced during the last year	11.75	9.59*	9.68***	10.33	7.92
Overall staff to child ratio	0.26	0.26	0.12***	0.25	0.24**
Staff to child ratio 3-4 year olds	0.13	0.14*	0.11***	0.12**	0.11***
Frequency of staff CPD	4.39	3.59**	5.98**	8.72***	5.77*
Frequency of staff supervision	9.28	7.18*	9.98***	7.12	9.38
% on multiple sites	41.11	10.29***	2.91***	24.00	0.00**
% with SEN/D provision	61.92	67.16	63.73	64.00	61.54
% with Training plan in place	90.21	79.56**	82.52*	92.00	100.00
% with Training budget in place	50.70	43.07	81.55***	80.00**	92.31**

Statistical significance of Wilcoxon test comparison shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

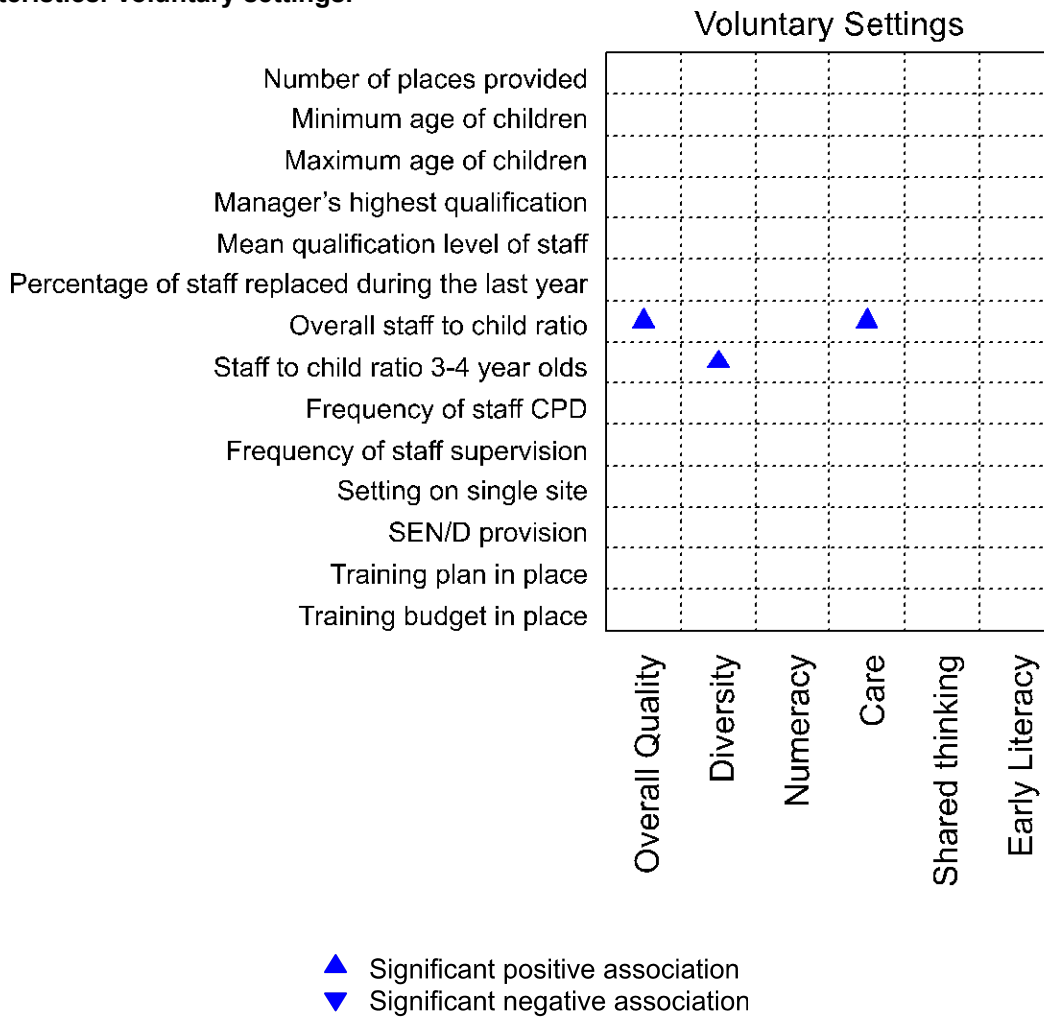
**Figure 29: Summary of results of linear regression models of quality factors in terms of settings characteristics. Private settings.**



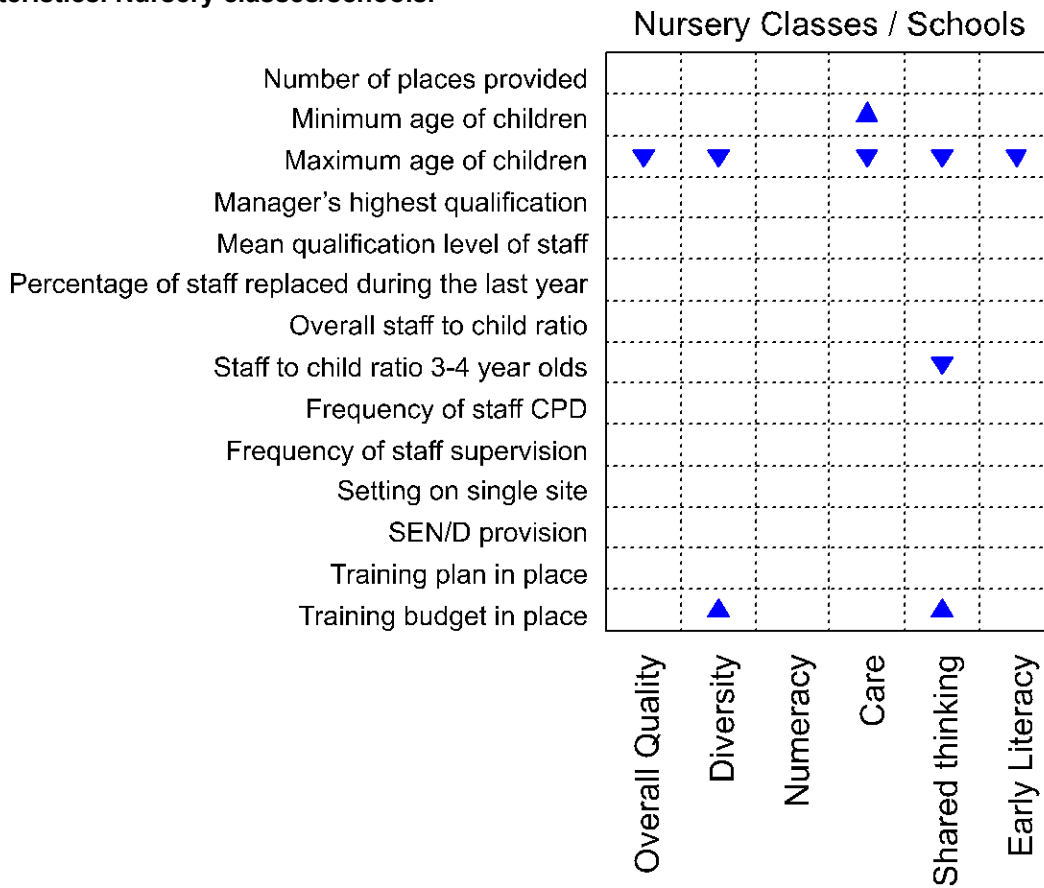
- ▲ Significant positive association
- ▼ Significant negative association



**Figure 30: Summary of results of linear regression models of quality factors in terms of settings characteristics. Voluntary settings.**



**Figure 31: Summary of results of linear regression models of quality factors in terms of settings characteristics. Nursery classes/schools.**



- ▲ Significant positive association
- ▼ Significant negative association

## Discussion

### Univariate relationship between characteristics of settings and quality factors

#### Number of places provided

Providing a larger number of places was significantly correlated with better quality scores, with the exception of the Care quality factor (Figure 27).

#### Minimum age of children

A higher minimum age for children was significantly correlated with better quality on all the quality factors (Figure 27).

#### Maximum age of children

A lower maximum age for children was significantly correlated with better scores on all quality factors, with the exception of the Diversity factor (Figure 27).

#### Manager's highest qualification

Having a more highly qualified manager was significantly correlated with better scores on all the quality factors (Figure 27).

#### Number of staff

There were no significant correlations between the number of staff and the quality factors (Figure 27).

#### Mean qualification level of staff

A higher mean level of staff qualification was significantly correlated with better scores on all the quality factors (Figure 27).

#### Percentage of staff replaced during the last year

A higher percentage of staff replaced during the previous year was significantly correlated with poorer scores for Overall quality, Shared thinking and Early literacy (Figure 27).

#### Overall staff to child ratio

A higher staff to child ratio (ie, more staff for a given number of children) was significantly correlated with poorer quality on the Numeracy, Shared thinking and Early literacy quality factors (Figure 27). This relationship is counterintuitive, and is probably due to confounding with settings type. This is discussed further below.

#### Staff to child ratio for three to four year olds

A higher staff to child ratio for three to four year olds was significantly associated with poorer quality for all measures except Care (Figure 27). As with overall staff to child ratio, this is probably due to confounding with settings type.

#### Frequency of staff CPD

A higher frequency of staff CPD was correlated with better scores on all quality factors (Figure 27).

### Frequency of staff supervision

A higher frequency of staff supervision was significantly correlated with poorer Early literacy (Figure 27). This is possibly because settings with quality issues may have increased their frequency of staff supervision as compared to settings with no such quality concerns.

### Single/multiple sites

There was no significant difference in the quality measures according to whether settings were on a single site or multiple sites (Figure 28).

### SEN/D provision

Settings with SEN/D provision had significantly higher scores on the Diversity quality factor (Figure 28).

### Training plan in place

Settings with a training plan in place had significantly higher scores on all quality measures compared to those that did not have a training plan in place (Figure 28).

### Training budget in place

Similarly, settings with a training budget in place had significantly higher scores on all quality measures compared to those that did not have a training budget in place (Figure 28).

## **Comparison of quality by settings type**

As compared to the Private settings reference group, Voluntary settings had significantly lower scores on the Diversity, Numeracy, Shared thinking and Early literacy quality measures (Table 16). Nursery classes and children's centres had significantly higher scores on all quality measures than the Private settings reference group. Nursery schools had significantly higher scores than the Private settings reference group for all measures except Care (Table 16).

## **Confounding of relationships by settings type**

It is notable that Nursery classes have higher mean quality scores than the Private and Voluntary setting which make up the majority of the childcare settings (Table 16). However, Nursery classes also have lower mean staff to child ratios than Private and Voluntary settings (Table 17). This confounding between staff to child ratio and settings type explains the unexpected negative correlations between some quality measures and staff to child ratios (Figure 27).

## **Results of linear models of quality factors in terms of structural characteristics of settings**

### **Private settings**

For Private settings, a larger number of places was significantly associated with higher quality scores on all factors (Figure 29). A higher minimum age for children was also

significantly associated with higher quality on all measures, as was a higher mean qualification level for staff.

A higher overall staff to child ratio had a significant association with better scores on the Early literacy quality factor. Having SEN/D provision in place was significantly associated with higher quality scores on the Diversity, Numeracy and Shared thinking quality measures.

### **Voluntary settings**

For Voluntary settings, a higher overall staff to child ratio was significantly associated with higher quality scores for the Overall quality and Care factors (Figure 30). A higher staff to child ratio specifically for three to four year olds was significantly associated with better quality scores on the Diversity factor.

### **Nursery class/school**

For nursery classes/schools, having a higher minimum age for children was significantly associated with higher scores on the Care quality factor (Figure 31). Having a lower maximum age for children was significantly associated with better scores on all quality factors except Numeracy.

There was a significant association between a lower staff to child ratio for three to four year olds (that is, more children per member of staff) and better scores on the Shared thinking quality measure. There were significant associations between having a training budget in place and having better scores on the Diversity and Shared thinking quality measures.

## **Conclusion**

High settings quality, as measured by the quality factors, showed significant associations with the structural quality of settings and with the type of settings. Higher settings quality was generally associated with settings with a larger number of places, a narrower age range and more highly qualified managers and staff. Other factors associated with better settings quality were a lower rate of staff turnover, a higher frequency of staff CPD and having a training plan and a training budget in place.

Quality was generally higher for Nursery classes and schools than for the Private and Voluntary settings that make up the majority of the settings that children attended.

In univariate analyses, lower staff to child ratios were associated with better settings quality, but this appears to be due to confounding between staff to child ratios and settings type.

In multivariate analysis of settings quality in terms of structural factors, better quality at Private settings was associated with having a larger number of places, a higher minimum age for children, more highly qualified staff, a higher staff to child ratio and having SEN/D provision. For Voluntary settings, higher staff to child ratios (both overall and specifically for three to four year olds) predicted better settings quality. For Nursery classes/schools the predictors of settings quality were a narrower age range for children and having a training budget in place. A lower staff to child ratio for three to four year

olds (that is, more children per member of staff) was associated with higher quality on the Shared thinking quality factor.

## **Chapter 9: Discussion and conclusions**

### **Disadvantage and child outcomes**

As discussed earlier, children from disadvantaged backgrounds are likely to have poorer outcomes in several ways. The existing evidence for this derives from measures of disadvantage based upon economic factors. However, it is possible to consider disadvantage in ways that are not economic. This paper demonstrates that home/parenting-related factors can be considered in terms of a single dimension that is here called “home disadvantage”. This measure of home disadvantage is only mildly associated with economic disadvantage, so that it is possible to analyse the potential independent effects of home and economic disadvantage with this large sample. Analyses have demonstrated how the two types of family disadvantage have differing relationships with child development.

Using children with neither form of disadvantage as a comparator, children who experience home disadvantage, but not economic disadvantage, were likely to exhibit poorer Verbal ability at age five to six than non-disadvantaged children, and also poorer outcomes for three of the seven socio-emotional/self-regulation measures. Whereas, children who experience economic disadvantage, but not home disadvantage, were likely to exhibit poorer outcomes for both Verbal and Non-verbal ability at age five to six, and poorer outcomes for Cognitive self-regulation. Some children experience both home and economic disadvantage and they were likely to show poorer outcomes at age five to six on all cognitive and socio-emotional/self-regulation measures.

### **Disadvantage interacts with amount of ECEC**

In addition, analyses show that the two types of disadvantage modulate associations with the amount of ECEC that children experienced, in that:

- For children experiencing only economic disadvantage, greater use of Informal individual ECEC was associated with better Verbal ability at age five to six.
- For children experiencing only economic disadvantage, use of Formal group ECEC of 30+ hours per week was associated with poorer outcomes for Externalising behaviour, Behavioural self-regulation and Emotional self-regulation.
- However, these associations between Formal group ECEC of 30+ hours per week and poorer socio-emotional outcomes were not found for children who experienced either only home disadvantage or both home and economic disadvantage.
- Non-disadvantaged children who used 20 to 30 hours per week Formal group ECEC had poorer Externalising behaviour and Emotional self-regulation than the up to 15 hours per week reference group.
- For children experiencing only home disadvantage, using 15-20 hours per week Formal group ECEC was associated with better Verbal ability at age five to six as compared to those using up to 15 hours per week.
- Children who experienced economic disadvantage and more Formal individual (childminder) ECEC use were likely at age five to six to have some poorer socio-emotional outcomes: specifically, more Externalising behaviour (children with

only economic disadvantage) and poorer Sociability (children with both economic and home disadvantage).

Since any deleterious effects associated with increased childminder ECEC are seen to be specifically for economically disadvantaged children (poorer Externalising behaviour) or for children experiencing both home and economic disadvantage (poorer Sociability), possibly these results reflect the poorer quality of childminder care to which economically disadvantaged families have access.

Some potential beneficial effects of more Informal individual ECEC on Verbal ability were found only for the economic disadvantage group. These children's relatively good home environment may mean that they benefit from good quality care with family and friends, whilst their relative economic disadvantage means that they have more need of opportunities for learning than the children who are not economically disadvantaged.

When both disadvantage group and specific ECEC usage bands are considered, a nuanced picture regarding Formal group ECEC use emerges. For children experiencing home but not economic disadvantage, between 15 and 20 hours per week in formal ECEC could potentially benefit Verbal ability. This shows that ECEC can make up for less advantageous home environments.

Children with only economic disadvantage had some poorer socio-emotional outcomes associated with Formal group ECEC use, but only when usage exceeded 30 hours per week. Interestingly, children who experienced only home disadvantage or both types of disadvantage did not show these poorer socio-emotional outcomes even when usage was at this high level. Maybe more out-of-home care is particularly beneficial for children who experience home disadvantage, as ECEC experience may be more developmentally enhancing than the home experience for these children. This would overcome any tendency for more group ECEC to be associated with poorer socio-emotional outcomes.

Deleterious outcomes were associated with Formal group ECEC usage of 20-30 hours per week but only for the non-disadvantaged group; these children were likely to have worse Externalising behaviour and Emotional self-regulation than those using up to 15 hours per week. It is possible that for children with the most favourable home environments, group ECEC is relatively less beneficial than spending time at home. It is probable that some of the poorer outcomes associated with group ECEC are mitigated when the ECEC is of high quality.

## **Disadvantage interacts with the quality of ECEC**

The results in Chapter 5 show that disadvantage interacts with ECEC quality.

- For children who did not experience any disadvantage, there were no significant associations between the quality of Formal group ECEC settings and child outcomes.



- For children who experienced only home disadvantage, there were significant associations between attending higher quality (ECERS-R, ECERS-E) Formal group ECEC and better Non-verbal ability.
- For children who experienced only economic disadvantage, there was a significant association between attending higher quality (ECERS-R) Formal group ECEC and better child Behavioural self-regulation.
- For children who experienced both home and economic disadvantage, there were significant associations between attending higher quality Formal group ECEC and better child Prosocial behaviour (ECERS-R, ECERS-E and SSTEWS), better child Behavioural self-regulation (ECERS-E) and better Cognitive self-regulation (ECERS-R, ECERS-E and SSTEWS).

Hence, there are differences in the effects associated with ECEC quality for child outcomes according to the type of disadvantage experienced. The quality of the ECEC appears to be of less significance for children who do not experience disadvantage and of most significance for children who experience both home and economic disadvantage.

## **Alternative measures of the quality of ECEC and interactions with disadvantage**

Factor analysis of ECEC quality data indicated six underlying quality factors: Overall quality, Diversity, Numeracy, Care, Shared thinking and Early literacy. With the exception of the first factor (“Overall quality”), which loads on all 53 quality items, the new factors load on between 10 and 16 quality items. Each factor appears to represent an identifiable aspect of ECEC quality, as reflected in the shorthand names adopted. All of these new quality factors showed associations with some child outcome (see Figure 19), and some of these factors provide better predictors of children’s outcomes than the total scores for the established quality measures (ECERS-R, ECERS-E and SSTEWS). In addition, it was found that:

- For non-disadvantaged children, Care and Early literacy quality factors are associated with better Verbal ability and Prosocial behaviour, respectively.
- For children who experienced only home disadvantage, attending higher quality ECEC (in terms of all quality factors) was associated with better Non-verbal ability.
- For children with only economic disadvantage, there were potential benefits associated with better Shared thinking and Early literacy scores. Possibly these children benefit from improved access to resources, such as books, pictures and drawing materials, which would be lacking in the disadvantaged home environment.
- For children with both home and economic disadvantage, attending higher quality ECEC was associated with better Prosocial behaviour (Overall quality, Diversity, Numeracy and Shared thinking factors), better Behavioural self-regulation (Numeracy factor) and better Cognitive self-regulation (all quality factors).

## **Are the new ECEC quality factors related to structural aspects of ECEC settings?**

Various aspects of high quality, as measured by the new quality factors, show significant associations with the structural quality of settings and with the type of settings. Higher quality was generally associated with larger settings (number of places), a narrower age range, and better qualified managers and staff. Other factors associated with better quality were a lower staff turnover, a higher frequency of staff CPD and having a training plan and a training budget in place.

Quality was generally higher for Nursery classes and schools, which tend to have the structural characteristics mentioned above, than for the Private and Voluntary settings, which make up the majority of the ECEC settings attended.

Multivariate analyses considered structural factors and ECEC quality separately for type of ECEC setting. Results revealed that better quality at private settings was associated with having a larger number of places, a higher minimum age for children, more highly qualified staff, a higher staff to child ratio and having SEN/D provision. While for Voluntary settings, higher staff to child ratios (both overall and specifically for three to four year olds) predicted better settings quality. For Nursery classes/schools, the predictors of settings quality were a narrower age range for children and having a training budget in place.

Somewhat unexpectedly, and only for Nursery schools/classes, a lower staff to child ratio (ie, more children per adult) was associated with higher quality on the Shared thinking quality factor. This may require further investigation but might indicate that more group work takes place.

In summary, the results reported here show that, considering home disadvantage separately from economic disadvantage gives a greater understanding of how children's environments may influence their development. In addition, the consequences for child development of both variations in amount and quality of ECEC differ according to the kind of disadvantage experienced by the child. New alternatives for considering quality offer some advantages over existing ECEC quality measures in understanding the consequences of ECEC experience for child development, and these alternative quality dimensions are clearly associated with ECEC structural factors.

## **Implications**

These results indicate that a wider perspective on disadvantage that includes consideration of the home environment may be useful in formulating policy for early childhood services. Economic disadvantage may be more straightforward to document but greater efforts are needed to gain more information about home disadvantage. This would require a substantial investment in services such as improving health visiting provision, family outreach, and possibly increasing children's centre or family hub provision, to allow better identification of children experiencing only home disadvantage. Once a more effective and consistent strategy to learn more about home environments

is developed, initiatives to improve the home environment for children can be better targeted.

Some recent developments have started, as in the DfE funding for the National Children's Bureau, National Literacy Trust, and the Foundation Years Trust to deliver a range of projects to support the HLE, particularly in disadvantaged areas of the UK. However, the results reported here indicate that, while such approaches may produce benefits, those benefits may increase should a wider range of parenting factors be considered in addition to the HLE. Overall, more needs to be discovered about the home environments of young children, prior to starting in reception classes, so that the potential impacts of disadvantage can be reduced.

Furthermore, it is clear that the quality of ECEC matters for children experiencing disadvantage. There should be further consideration of how ECEC is provided for children with differing experiences of disadvantage and of how to enhance quality. In particular, involving more staff with higher qualifications, giving them more opportunities for CPD, and enabling them to think about training and career progression, which together with better pay, should limit staff turnover.

Clearly, disadvantaged children benefit much more from high quality ECEC than non-disadvantaged children, for whom variations in ECEC quality appear to be of little consequence. Hence, supportive activities such as inspections and advice, and funding to support staff development, should be directed in particular to ECEC facilities that provide primarily for disadvantaged children.

It is seen from the analyses that structural factors affect ECEC quality. Structural factors are amenable to change through policy/legislative action. Hence, improvements in ECEC quality can be made through policy and legislative action on structural aspects of ECEC. These structural factors include setting size, age range, staff qualifications, staff turnover, staff CPD and training. All of these are open to change, but will require more funding. In view of the increased costs involved, these changes could be targeted particularly for ECEC used by disadvantaged groups. However, it should not be assumed that enhancing structural aspects would automatically lead to higher quality. The subtle aspects of quality identified in the new factors demonstrate that the experiences of the children and the nature of their interactions are vitally important, and programmes to develop these aspects of ECEC, both for Formal group ECEC and for childminders, would increase the likelihood that children experiencing disadvantage could develop as well as their non-disadvantaged peers. This will require improved pre-service training and more and better CPD.

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# Technical appendix

## Introduction

This technical appendix provides further details of the statistical methods used for the analyses in this report and additional results tables and figures. The appendix is divided into sections corresponding to Chapters 1 to 8 of the report.

## Chapter 1

### SEED disadvantage groups

The SEED sample was selected with children chosen in approximately equal numbers from three groups varying in level of disadvantage:

1. Most disadvantaged 20% who had a parent in receipt of one of:
  - Income-based Jobseeker's Allowance (JSA-IB)
  - Income-related Employment Support Allowance (ESA-IR)
  - Income Support (IS)
  - Guaranteed element of the State Pension Credit (PC with Guarantee Credit)
  - Child Tax Credit only (not in receipt of an accompanying Working Tax Credit award) with household gross earnings of less than £16,190.
2. Moderately disadvantaged 20%–40% who had a parent in receipt of Working Tax Credits with household gross earnings of less than £16,190.
3. Least disadvantaged 60% who had parents not in receipt of any of the qualifying benefits or tax credits.

By design, the most disadvantaged and moderately disadvantaged groups were over-represented in the sample.

### Summary statistics for study variables

Table 18: Summary statistics for outcome variables.

Outcome	Mean	SD	Min	Max	No. of observations	No. of missing values
BAS verbal ability	59.75	10.19	20.0	80.0	3164	54
BAS non-verbal ability	54.32	12.05	20.0	80.0	3165	53
Sociability	16.65	2.83	4.0	20.0	2566	652
Externalising behaviour	8.42	3.45	5.0	24.0	2566	652
Internalising behaviour	7.38	2.80	4.0	20.0	2566	652
Prosocial behaviour	32.36	5.38	11.0	40.0	2566	652
Behavioural self-regulation	20.67	3.86	5.0	25.0	2566	652
Cognitive self-regulation	29.54	6.40	8.0	40.0	2566	652
Emotional self-regulation	24.60	4.12	6.0	30.0	2566	652

SD = Standard Deviation  
Sample size N = 3218



**Table 19: Summary statistics for mean weekly ECEC usage between age 3 and the start of school (hours per week).**

Outcome	Mean	SD	Min	Max	No. of observations	No. of missing values
Formal group ECEC	17.18	8.44	0.0	109.9	3218	0
Formal individual ECEC	1.24	4.78	0.0	58.2	3218	0
Informal individual ECEC	4.60	8.42	0.0	72.4	3218	0

SD = Standard Deviation  
Sample size N = 3218

**Table 20: Summary statistics for HE/P variables.**

Outcome	Mean	SD	Min	Max	No. of observations	No. of missing values
HLE	30.00	6.83	6.4	46.7	3218	0
Household CHAOS	8.00	2.02	4.0	17.5	3218	0
Parent's psychological distress	9.29	3.45	6.0	30.0	3200	18
Limit setting	2.68	0.63	1.0	4.6	3199	19
MORS warmth	31.53	3.17	7.0	35.0	3169	49
MORS invasiveness	9.80	4.94	0.0	34.0	3169	49
Authoritative parenting	4.16	0.46	1.0	5.0	3174	44
Authoritarian parenting	1.63	0.40	1.0	4.9	3174	44
Permissive parenting	2.03	0.58	1.0	5.0	3174	44

SD = Standard Deviation  
Sample size N = 3218

**Table 21: Summary statistics for continuous demographic variables.**

Outcome	Mean	SD	Min	Max	No. of observations	No. of missing values
Child's age in school year (months)	6.53	3.27	0.50	11.50	3218	0
Child's birth weight (kg)	3.35	0.63	0.48	5.87	3212	6
Maternal age at birth of child (years)	29.80	5.82	14.00	50.00	3170	48

SD = Standard Deviation  
Sample size N = 3218

**Table 22: Summary statistics for ECEC settings quality variables.**

Outcome	Mean	SD	Min	Max	No. of observations	No. of missing values
ECERS-R	5.34	0.93	1.93	6.94	933	0
ECERS-E	4.23	1.10	1.56	6.61	933	0
SSTEW	4.80	1.12	1.57	6.88	933	0

SD = Standard Deviation  
Sample size N = 933

**Table 23: Breakdown of categorical demographic variables.**

Variable	Level	N	%
Child's sex	Male	1660	51.58
	Female	1558	48.42
	Missing	0	0.00
Child's ethnic group	White	2731	84.89
	Asian	199	6.19
	Black	112	3.48
	Mixed/other	175	5.44
	Missing	1	0.03
Disadvantage group	Disadvantaged	1883	58.51
	Least disadvantaged	1335	41.49
	Missing	0	0.00
Mother's highest qualification	No formal qual	205	6.66
	GCSE D-G	174	5.65
	GCSE A*-C	733	23.81
	A-Level	838	27.22
	1st degree	713	23.16
	Higher degree	416	13.51
	Missing	139	4.32
Highest parental socio-economic status	Not working	96	2.98
	Routine	677	21.04
	Lower supervisory	222	6.90
	Self-employed	246	7.65
	Intermediate	1417	44.05
	Professional	559	17.38
	Missing	1	0.03
Number of siblings living in the household	None	686	21.32
	1	1526	47.42
	2	645	20.04
	3+	361	11.22
	Missing	0	0.00
Couple or lone parent household	Couple	2484	77.19
	Lone parent	734	22.81
	Missing	0	0.00
Workless or working household	Working	2706	84.09
	Non-working	512	15.91
	Missing	0	0.00
Type of accommodation tenure	Home owning	1633	50.78
	Non-home owning	1583	49.22
	Missing	2	0.06
Household income	Less than £10,000	347	11.54
	£10,000 - £20,000	598	19.89
	£20,000 - £40,000	977	32.49
	£40,000 or more	1085	36.08
	Missing	211	6.56
Area deprivation	1 (least deprived)	614	19.08
	2	634	19.70
	3	652	20.26
	4	647	20.11
	5 (most deprived)	671	20.85
	Missing	0	0.00

Sample size N = 3218

Denominator for percentages of observations is the number of non-missing observations.

Denominator for percentage missing is all observations.

## Multiple imputation

Missing covariate data were imputed. Outcome variables were not imputed. All outcomes and covariates were included in the imputation model. Ten imputations were generated using the Amelia II package for R (Honaker, King and Blackwell, 2011). All regression models were fitted to the multiply imputed data and results were combined using Rubin’s rules (Rubin, 1987).

## Robust estimates of standard errors

By design, the SEED sample was clustered (Speight, Maisey et al., 2015). The Primary Sampling Units (PSUs) from which children were drawn were postcode districts. There were 111 PSUs in the SEED study, with between 10 and 51 children drawn from each (median cluster size 30).

The children for whom quality data was available attended 487 Formal group ECEC settings aged three to four with between one and 13 children attending each; see Table 24.

**Table 24: Number of ECEC settings with a given number of children.**

Number of children at setting	Number of settings with this number of children
1	270
2	97
3	66
4	27
5	14
6	6
7	5
8	0
9	1
10	0
11	0
12	0
13	1

In order for the analysis to be reliable, the clustered nature of the data was accounted for using robust standard error estimates within clusters. For the main models, the clusters used were PSUs. For the models of the quality data, the clusters were the Formal group ECEC settings which children attended aged three to four. Huber-White robust standard errors were used. These are implemented in the “mi.eval” R function from the “bucky” R package (Tahk, 2022).

## Standardisation of model coefficients

Results of regression models are reported as standardised model coefficients (“Beta”). For binary/categorical covariates, these give the change in the outcome variable, in standard deviation units, corresponding to the contrast between a given category and the reference level for the covariate (eg, the change in Verbal ability corresponding to the contrast between children who experience home disadvantage and those who do not). For continuous covariates, the standardised model coefficients give the change in the outcome variable, in standard deviation units, corresponding to a change of two

standard deviations in the covariate. Using a two standard deviation change in the covariate when calculating the standardised coefficient, rather than the one standard deviation change which is often used, makes the standardised coefficients for continuous covariates more comparable with those for binary/categorical coefficients (Tymms, 2004; Gelman, 2008).

## **Chapter 2**

### **HE/P data set for EFA**

EFA was applied to the nine HE/P variables to extract a single factor. Analysis was carried out on complete cases data. Of the 3,218 children in the sample, 3,146 had complete data on the eight HE/P variables (97.8%).

### **Suitability of HE/P data for EFA**

The absolute value of the correlations between the HE/P variables ranged from 0.056 to 0.451, showing no evidence of collinearity between variables. The result of the Kaiser-Meyer-Olkin test for factor adequacy was 0.78, which is acceptable (Kaiser and Rice, 1974). The null hypothesis for Bartlett's test for sphericity was rejected:  $\chi^2(28) = 3867.58$ ,  $p < 0.001$ , supporting the use of factor analysis (Bartlett, 1951).

### **Defining home disadvantage where there was missing HE/P data**

For the 72 children who had incomplete data on the HE/P variables, the classification of children as home disadvantaged made use of the multiply imputed data. Children were classified as home disadvantaged if their score on the disadvantage factor extracted from the HE/P data was above the median in five or more of the 10 multiply imputed data sets.

## Chapter 3

### Models in terms of home disadvantage

The results of the models of child outcomes in terms of home disadvantage are shown in Table 25.

**Table 25: Results of linear regression models of outcomes in terms of child home disadvantage.**

Outcomes	Effect of disadvantage	
	Home disadvantage	
	Beta	p-value
BAS verbal ability	-0.186	<0.001***
BAS non-verbal ability	-0.029	0.463
Sociability	-0.173	<0.001***
Externalising behaviour	-0.151	<0.001***
Internalising behaviour	-0.109	0.005**
Prosocial behaviour	-0.236	<0.001***
Behavioural self-regulation	-0.215	<0.001***
Cognitive self-regulation	-0.229	<0.001***
Emotional self-regulation	-0.165	<0.001***

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to the contrast between children experiencing home disadvantage and the reference group of those who do not experience home disadvantage.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

### Models in terms of economic disadvantage

The results of the models of child outcomes in terms of economic disadvantage are shown in Table 26.

**Table 26: Results of linear regression models of outcomes in terms of child economic disadvantage.**

Outcomes	Effect of disadvantage	
	Economic disadvantage	
	Beta	p-value
BAS verbal ability	-0.294	<0.001***
BAS non-verbal ability	-0.233	<0.001***
Sociability	-0.112	0.013*
Externalising behaviour	-0.084	0.066
Internalising behaviour	-0.102	0.033*
Prosocial behaviour	-0.122	0.012*
Behavioural self-regulation	-0.098	0.031*
Cognitive self-regulation	-0.173	<0.001***
Emotional self-regulation	-0.092	0.048*

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to the contrast between children experiencing economic disadvantage and the reference group of those who do not experience economic disadvantage.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

## Models in terms of home and economic disadvantage

The results of the models of child outcomes in terms of a four-level disadvantage factor are shown in Table 27.

**Table 27: Results of linear regression models of outcomes in terms of four-level child disadvantage factor.**

Outcomes	Home disadvantage only		Economic disadvantage only		Home and economic disadvantage	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	-0.202	<0.001***	-0.306	<0.001***	-0.465	<0.001***
BAS non-verbal ability	+0.006	0.916	-0.211	<0.001***	-0.251	<0.001***
Sociability	-0.106	0.071	-0.052	0.374	-0.270	<0.001***
Externalising behaviour	-0.072	0.113	-0.015	0.787	-0.221	<0.001***
Internalising behaviour	-0.013	0.805	-0.021	0.697	-0.198	<0.001***
Prosocial behaviour	-0.173	<0.001***	-0.064	0.217	-0.341	<0.001***
Behavioural self-regulation	-0.122	0.014*	-0.016	0.758	-0.295	<0.001***
Cognitive self-regulation	-0.162	0.004**	-0.114	0.036*	-0.383	<0.001***
Emotional self-regulation	-0.072	0.189	-0.012	0.841	-0.241	<0.001***

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to the contrast between each disadvantage level and the reference group of children who do not experience home or economic disadvantage.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

## Chapter 4

### Models in terms of mean ECEC use between age three and the start of school

The results of the regression models of child outcomes in terms of mean weekly ECEC use between age three and the start of school are shown in Table 28.

**Table 28: Results of linear regression models of outcomes in terms of ECEC use between age 3 and the start of school.**

Outcomes	ECEC use					
	Formal group		Formal individual		Informal individual	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.036	0.294	+0.034	0.337	+0.068	0.023*
BAS non-verbal ability	+0.056	0.155	+0.005	0.894	-0.009	0.836
Sociability	-0.046	0.322	-0.054	0.120	+0.003	0.942
Externalising behaviour	-0.179	<0.001***	-0.081	0.033*	+0.004	0.925
Internalising behaviour	-0.090	0.109	-0.035	0.380	+0.029	0.503
Prosocial behaviour	-0.070	0.128	+0.001	0.988	+0.009	0.812
Behavioural self-regulation	-0.124	0.007**	-0.025	0.513	-0.027	0.523
Cognitive self-regulation	-0.023	0.547	-0.004	0.905	-0.015	0.712
Emotional self-regulation	-0.176	<0.001***	-0.060	0.118	-0.020	0.631

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the ECEC covariate.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

### Models in terms of mean ECEC use between age three and the start of school moderated by disadvantage group

The results of the models of child outcomes in terms of mean weekly ECEC use moderated by disadvantage group are shown in Table 29 (children with no disadvantage), Table 30 (children with only home disadvantage), Table 31 (children with only economic disadvantage) and Table 32 (children with home and economic disadvantage).

**Table 29: Results of linear regression models of outcomes in terms of ECEC use between age 3 and the start of school; children with no disadvantage.**

No disadvantage						
Outcomes	ECEC use					
	Formal group		Formal individual		Informal individual	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	-0.050	0.455	+0.037	0.557	+0.068	0.248
BAS non-verbal ability	+0.038	0.627	-0.073	0.219	-0.063	0.438
Sociability	+0.023	0.793	+0.032	0.621	+0.022	0.760
Externalising behaviour	-0.222	0.006**	-0.112	0.137	+0.001	0.986
Internalising behaviour	-0.009	0.907	+0.008	0.889	+0.013	0.865
Prosocial behaviour	-0.030	0.721	+0.033	0.590	+0.039	0.512
Behavioural self-regulation	-0.068	0.377	+0.013	0.865	+0.002	0.974
Cognitive self-regulation	+0.021	0.762	+0.027	0.664	+0.049	0.415
Emotional self-regulation	-0.186	0.030*	-0.066	0.363	-0.011	0.878

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the ECEC covariate.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 30: Results of linear regression models of outcomes in terms of ECEC use between age 3 and the start of school; children with only home disadvantage.**

Only home disadvantage						
Outcomes	ECEC use					
	Formal group		Formal individual		Informal individual	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.093	0.232	+0.036	0.604	+0.016	0.774
BAS non-verbal ability	+0.144	0.116	+0.119	0.226	-0.083	0.324
Sociability	-0.092	0.345	-0.053	0.493	+0.042	0.605
Externalising behaviour	-0.173	0.057	-0.021	0.790	-0.090	0.249
Internalising behaviour	-0.133	0.226	-0.047	0.562	+0.009	0.912
Prosocial behaviour	-0.088	0.375	+0.032	0.679	+0.044	0.552
Behavioural self-regulation	-0.180	0.089	-0.042	0.594	-0.013	0.863
Cognitive self-regulation	-0.077	0.451	+0.069	0.356	-0.039	0.607
Emotional self-regulation	-0.169	0.067	-0.010	0.906	-0.095	0.222

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the ECEC covariate.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .



**Table 31: Results of linear regression models of outcomes in terms of ECEC use between age 3 and the start of school; children with only economic disadvantage.**

Only economic disadvantage						
Outcomes	ECEC use					
	Formal group		Formal individual		Informal individual	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.071	0.234	+0.050	0.438	+0.145	0.023*
BAS non-verbal ability	+0.077	0.254	+0.001	0.981	+0.063	0.435
Sociability	-0.041	0.615	-0.039	0.586	-0.004	0.955
Externalising behaviour	-0.187	0.026*	-0.143	0.010**	+0.124	0.085
Internalising behaviour	-0.063	0.395	+0.004	0.962	+0.032	0.593
Prosocial behaviour	-0.085	0.289	+0.003	0.956	+0.027	0.714
Behavioural self-regulation	-0.201	0.028*	-0.055	0.265	+0.021	0.773
Cognitive self-regulation	-0.052	0.463	-0.055	0.380	-0.061	0.456
Emotional self-regulation	-0.157	0.077	-0.082	0.200	+0.083	0.299

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the ECEC covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 32: Results of linear regression models of outcomes in terms of ECEC use between age 3 and the start of school; children with home and economic disadvantage.**

Home and economic disadvantage						
Outcomes	ECEC use					
	Formal group		Formal individual		Informal individual	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.045	0.474	+0.013	0.824	+0.030	0.627
BAS non-verbal ability	-0.009	0.885	+0.019	0.799	+0.050	0.450
Sociability	-0.079	0.415	-0.139	0.017*	-0.053	0.553
Externalising behaviour	-0.142	0.155	-0.037	0.614	-0.042	0.662
Internalising behaviour	-0.160	0.234	-0.093	0.221	+0.070	0.517
Prosocial behaviour	-0.074	0.500	-0.050	0.433	-0.085	0.269
Behavioural self-regulation	-0.065	0.514	-0.022	0.766	-0.141	0.094
Cognitive self-regulation	+0.001	0.993	-0.040	0.572	-0.015	0.853
Emotional self-regulation	-0.191	0.058	-0.064	0.381	-0.075	0.366

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the ECEC covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

### Models in terms of banded Formal group ECEC use

The results of the regression models of child outcomes in terms of banded mean weekly Formal group ECEC use between age three and the start of school are shown in Table 33.

**Table 33: Results of linear regression models of outcomes in terms of banded Formal group ECEC use between age 3 and the start of school.**

Outcome	Level	Beta	p-value
BAS verbal ability	Up to 15	Ref. level	
	15-20	+0.077	0.057
	20-30	+0.087	0.100
	>30	+0.049	0.466
BAS non-verbal ability	Up to 15	Ref. level	
	15-20	+0.006	0.892
	20-30	-0.006	0.918
	>30	+0.097	0.206
Sociability	Up to 15	Ref. level	
	15-20	+0.026	0.564
	20-30	+0.010	0.862
	>30	-0.059	0.504
Externalising behaviour	Up to 15	Ref. level	
	15-20	-0.045	0.314
	20-30	-0.184	0.003**
	>30	-0.235	0.006**
Internalising behaviour	Up to 15	Ref. level	
	15-20	+0.020	0.652
	20-30	+0.044	0.391
	>30	-0.123	0.192
Prosocial behaviour	Up to 15	Ref. level	
	15-20	-0.002	0.971
	20-30	+0.022	0.706
	>30	-0.098	0.253
Behavioural self-regulation	Up to 15	Ref. level	
	15-20	-0.076	0.089
	20-30	-0.060	0.312
	>30	-0.171	0.052
Cognitive self-regulation	Up to 15	Ref. level	
	15-20	-0.016	0.707
	20-30	+0.034	0.545
	>30	-0.018	0.810
Emotional self-regulation	Up to 15	Ref. level	
	15-20	-0.039	0.342
	20-30	-0.162	0.007**
	>30	-0.233	0.007**

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to the contrast between children with a given mean weekly level of Formal group ECEC use and the reference group of children with up to 15 hours per week Formal group ECEC use. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

## Models in terms of banded Formal group ECEC use moderated by disadvantage group

The results of the regression models of child outcomes in terms of banded mean weekly Formal group ECEC use between age three and the start of school moderated by child disadvantage are shown in Table 34 (children with no disadvantage), Table 35 (children with only home disadvantage), Table 36 (children with only economic disadvantage) and Table 37 (children with home and economic disadvantage).

**Table 34: Results of linear regression models of outcomes in terms of banded Formal group ECEC use between age 3 and the start of school; children with no disadvantage.**

No disadvantage			
Outcome	Level	Beta	p-value
BAS verbal ability	Up to 15	Ref. level	
	15-20	-0.008	0.927
	20-30	+0.071	0.492
	>30	+0.010	0.931
BAS non-verbal ability	Up to 15	Ref. level	
	15-20	+0.027	0.775
	20-30	+0.096	0.368
	>30	+0.156	0.252
Sociability	Up to 15	Ref. level	
	15-20	+0.049	0.609
	20-30	-0.007	0.953
	>30	+0.107	0.437
Externalising behaviour	Up to 15	Ref. level	
	15-20	-0.080	0.339
	20-30	-0.243	0.033*
	>30	-0.268	0.071
Internalising behaviour	Up to 15	Ref. level	
	15-20	-0.010	0.922
	20-30	+0.093	0.385
	>30	-0.079	0.597
Prosocial behaviour	Up to 15	Ref. level	
	15-20	-0.016	0.867
	20-30	-0.009	0.937
	>30	-0.015	0.921
Behavioural self-regulation	Up to 15	Ref. level	
	15-20	-0.120	0.213
	20-30	-0.121	0.262
	>30	-0.049	0.710
Cognitive self-regulation	Up to 15	Ref. level	
	15-20	-0.020	0.821
	20-30	-0.003	0.972
	>30	+0.104	0.402
Emotional self-regulation	Up to 15	Ref. level	
	15-20	-0.061	0.491
	20-30	-0.249	0.027*
	>30	-0.210	0.181

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation

units corresponding to the contrast between children with a given mean weekly level of Formal group ECEC use and the reference group of children with up to 15 hours per week Formal group ECEC use. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 35: Results of linear regression models of outcomes in terms of banded Formal group ECEC use between age 3 and the start of school; children with only home disadvantage.**

Only home disadvantage			
Outcome	Level	Beta	p-value
BAS verbal ability	Up to 15	Ref. level	
	15-20	+0.176	0.009**
	20-30	+0.177	0.070
	>30	+0.197	0.226
BAS non-verbal ability	Up to 15	Ref. level	
	15-20	+0.021	0.816
	20-30	+0.138	0.198
	>30	+0.249	0.135
Sociability	Up to 15	Ref. level	
	15-20	+0.121	0.288
	20-30	+0.075	0.501
	>30	-0.161	0.318
Externalising behaviour	Up to 15	Ref. level	
	15-20	-0.080	0.446
	20-30	-0.134	0.206
	>30	-0.281	0.059
Internalising behaviour	Up to 15	Ref. level	
	15-20	+0.187	0.074
	20-30	+0.083	0.481
	>30	-0.151	0.445
Prosocial behaviour	Up to 15	Ref. level	
	15-20	+0.019	0.862
	20-30	+0.001	0.994
	>30	-0.125	0.460
Behavioural self-regulation	Up to 15	Ref. level	
	15-20	-0.113	0.251
	20-30	-0.055	0.659
	>30	-0.290	0.118
Cognitive self-regulation	Up to 15	Ref. level	
	15-20	+0.037	0.717
	20-30	+0.034	0.792
	>30	-0.156	0.386
Emotional self-regulation	Up to 15	Ref. level	
	15-20	-0.046	0.657
	20-30	-0.070	0.543
	>30	-0.293	0.061

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to the contrast between children with a given mean weekly level of Formal group ECEC use and the reference group of children with up to 15 hours per week Formal group ECEC use. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 36: Results of linear regression models of outcomes in terms of banded Formal group ECEC use between age 3 and the start of school; children with only economic disadvantage.**

Only economic disadvantage			
Outcome	Level	Beta	p-value
BAS verbal ability	Up to 15	Ref. level	
	15-20	+0.084	0.260
	20-30	+0.081	0.375
	>30	+0.000	0.997
BAS non-verbal ability	Up to 15	Ref. level	
	15-20	-0.031	0.683
	20-30	-0.111	0.256
	>30	+0.120	0.398
Sociability	Up to 15	Ref. level	
	15-20	+0.058	0.513
	20-30	-0.032	0.775
	>30	-0.257	0.187
Externalising behaviour	Up to 15	Ref. level	
	15-20	-0.040	0.669
	20-30	-0.206	0.072
	>30	-0.432	0.012*
Internalising behaviour	Up to 15	Ref. level	
	15-20	+0.021	0.818
	20-30	-0.083	0.522
	>30	-0.143	0.421
Prosocial behaviour	Up to 15	Ref. level	
	15-20	+0.024	0.801
	20-30	-0.020	0.856
	>30	-0.345	0.079
Behavioural self-regulation	Up to 15	Ref. level	
	15-20	-0.012	0.876
	20-30	-0.117	0.255
	>30	-0.532	0.016*
Cognitive self-regulation	Up to 15	Ref. level	
	15-20	-0.022	0.795
	20-30	-0.024	0.797
	>30	-0.225	0.201
Emotional self-regulation	Up to 15	Ref. level	
	15-20	+0.003	0.971
	20-30	-0.178	0.121
	>30	-0.421	0.028*

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to the contrast between children with a given mean weekly level of Formal group ECEC use and the reference group of children with up to 15 hours per week Formal group ECEC use. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 37: Results of linear regression models of outcomes in terms of banded Formal group ECEC use between age 3 and the start of school; children with home and economic disadvantage.**

Home and economic disadvantage			
Outcome	Level	Beta	p-value
BAS verbal ability	Up to 15	Ref. level	
	15-20	+0.079	0.370
	20-30	+0.042	0.691
	>30	+0.024	0.849
BAS non-verbal ability	Up to 15	Ref. level	
	15-20	+0.017	0.819
	20-30	-0.092	0.356
	>30	-0.091	0.504
Sociability	Up to 15	Ref. level	
	15-20	-0.064	0.415
	20-30	+0.020	0.851
	>30	+0.024	0.884
Externalising behaviour	Up to 15	Ref. level	
	15-20	-0.006	0.937
	20-30	-0.158	0.232
	>30	+0.013	0.942
Internalising behaviour	Up to 15	Ref. level	
	15-20	-0.049	0.595
	20-30	+0.089	0.421
	>30	-0.121	0.544
Prosocial behaviour	Up to 15	Ref. level	
	15-20	-0.021	0.795
	20-30	+0.095	0.297
	>30	+0.048	0.780
Behavioural self-regulation	Up to 15	Ref. level	
	15-20	-0.074	0.380
	20-30	+0.027	0.803
	>30	+0.096	0.580
Cognitive self-regulation	Up to 15	Ref. level	
	15-20	-0.036	0.657
	20-30	+0.114	0.233
	>30	+0.134	0.353
Emotional self-regulation	Up to 15	Ref. level	
	15-20	-0.054	0.438
	20-30	-0.145	0.222
	>30	-0.042	0.798

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to the contrast between children with a given mean weekly level of Formal group ECEC use and the reference group of children with up to 15 hours per week Formal group ECEC use. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

## Chapter 5

### Models of outcomes in terms of ECERS-R, ECERS-E and SSTEW quality

The results of the regression models of child outcomes in terms of the quality of Formal group ECEC which they experienced aged three to four (ECERS-R, ECERS-E and SSTEW scales) are shown in Table 38.

**Table 38: Results of linear regression models of outcomes in terms ECEC quality.**

Outcomes	ECERS-R		ECERS-E		SSTEW	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.085	0.195	+0.013	0.844	+0.070	0.295
BAS non-verbal ability	+0.146	0.046*	+0.198	0.005**	+0.120	0.077
Sociability	+0.170	0.031*	+0.155	0.057	+0.094	0.203
Externalising behaviour	+0.076	0.265	+0.068	0.318	+0.013	0.858
Internalising behaviour	+0.031	0.664	+0.044	0.541	-0.009	0.902
Prosocial behaviour	+0.160	0.023*	+0.154	0.021*	+0.064	0.347
Behavioural self-regulation	+0.156	0.034*	+0.125	0.072	+0.045	0.518
Cognitive self-regulation	+0.139	0.030*	+0.112	0.091	+0.046	0.472
Emotional self-regulation	+0.124	0.079	+0.076	0.289	+0.010	0.891

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

### Models of outcomes in terms of ECERS-R, ECERS-E and SSTEW quality moderated by disadvantage group

The results of the regression models of child outcomes in terms of the quality of Formal group ECEC which they experienced aged three to four (ECERS-R, ECERS-E and SSTEW scales) moderated by child disadvantage group are shown in Table 39 (children with no disadvantage), Table 40 (children with only home disadvantage), Table 41 (children with only economic disadvantage) and Table 42 (children with home and economic disadvantage).



**Table 39: Results of linear regression models of outcomes in terms of ECEC quality; children with no disadvantage.**

No disadvantage						
Outcomes	ECERS-R		ECERS-E		SSTEW	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.229	0.125	+0.030	0.843	+0.078	0.575
BAS non-verbal ability	+0.142	0.306	+0.145	0.301	+0.070	0.579
Sociability	+0.261	0.091	+0.152	0.294	+0.084	0.543
Externalising behaviour	-0.004	0.977	-0.066	0.620	-0.076	0.579
Internalising behaviour	+0.130	0.318	+0.168	0.214	+0.081	0.539
Prosocial behaviour	+0.202	0.190	+0.198	0.169	+0.088	0.512
Behavioural self-regulation	-0.008	0.958	-0.017	0.905	-0.166	0.202
Cognitive self-regulation	+0.100	0.473	+0.089	0.548	-0.028	0.819
Emotional self-regulation	+0.080	0.570	-0.048	0.722	-0.086	0.485

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 40: Results of linear regression models of outcomes in terms of ECEC quality; children with only home disadvantage.**

Only home disadvantage						
Outcomes	ECERS-R		ECERS-E		SSTEW	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.079	0.435	+0.037	0.732	+0.112	0.308
BAS non-verbal ability	+0.393	0.008**	+0.373	0.010**	+0.248	0.089
Sociability	-0.114	0.495	+0.104	0.508	-0.051	0.754
Externalising behaviour	+0.086	0.593	+0.216	0.135	+0.110	0.483
Internalising behaviour	-0.137	0.409	-0.004	0.981	-0.095	0.559
Prosocial behaviour	-0.001	0.992	+0.133	0.354	+0.049	0.743
Behavioural self-regulation	+0.097	0.514	+0.137	0.344	+0.057	0.704
Cognitive self-regulation	-0.031	0.830	+0.019	0.889	-0.017	0.907
Emotional self-regulation	+0.052	0.750	+0.138	0.391	+0.032	0.847

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 41: Results of linear regression models of outcomes in terms of ECEC quality; children with only economic disadvantage.**

Only economic disadvantage						
Outcomes	ECERS-R		ECERS-E		SSTEW	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.139	0.223	+0.068	0.531	+0.126	0.273
BAS non-verbal ability	+0.133	0.313	+0.217	0.075	+0.153	0.219
Sociability	+0.209	0.169	+0.131	0.383	+0.061	0.683
Externalising behaviour	+0.135	0.285	+0.035	0.811	+0.023	0.872
Internalising behaviour	-0.089	0.449	-0.015	0.908	-0.128	0.299
Prosocial behaviour	+0.094	0.479	-0.043	0.746	-0.135	0.294
Behavioural self-regulation	+0.260	0.045*	+0.050	0.718	+0.051	0.687
Cognitive self-regulation	+0.058	0.681	-0.016	0.910	-0.061	0.674
Emotional self-regulation	+0.187	0.124	+0.071	0.625	+0.052	0.697

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 42: Results of linear regression models of outcomes in terms of ECEC quality; children with home and economic disadvantage.**

Home and economic disadvantage						
Outcomes	ECERS-R		ECERS-E		SSTEW	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	-0.049	0.666	-0.070	0.579	-0.013	0.912
BAS non-verbal ability	+0.029	0.780	+0.105	0.343	+0.050	0.625
Sociability	+0.236	0.088	+0.213	0.155	+0.216	0.098
Externalising behaviour	+0.068	0.604	+0.092	0.486	+0.008	0.955
Internalising behaviour	+0.174	0.267	+0.052	0.717	+0.092	0.540
Prosocial behaviour	+0.283	0.023*	+0.329	0.005**	+0.245	0.048*
Behavioural self-regulation	+0.198	0.134	+0.284	0.031*	+0.178	0.169
Cognitive self-regulation	+0.332	0.002**	+0.313	0.006**	+0.237	0.036*
Emotional self-regulation	+0.133	0.328	+0.121	0.362	+0.024	0.857

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

## **Chapter 6**

### **Quality item data set for EFA**

The quality item data consisted of data on 56 items from 598 settings. Summary statistics and the amount of missing data are shown in Table 43. Three items were missing at >40% of settings. These were dropped from the analysis. The remaining 53 items were complete at 570 of the 598 settings (95.3%). These settings/items made up the analysis data set for the EFA.

### **Suitability of quality item data for EFA**

The correlations between quality items were in the range 0.128 to 0.799. No items needed to be dropped due to colinearity. The result of the Kaiser-Meyer-Olkin test for factor adequacy was 0.98, which is good (Kaiser and Rice, 1974). The null hypothesis for Bartlett's test for sphericity was rejected:  $\chi^2(1378) = 22891.8$ ,  $p < 0.001$ , supporting the use of factor analysis (Bartlett, 1951). Horn's parallel analysis (Horn, 1965) suggested using six factors for the EFA. This is also supported by the scree plot Figure 32.

### **Correlated and uncorrelated factor models**

Two EFA analyses were carried out:

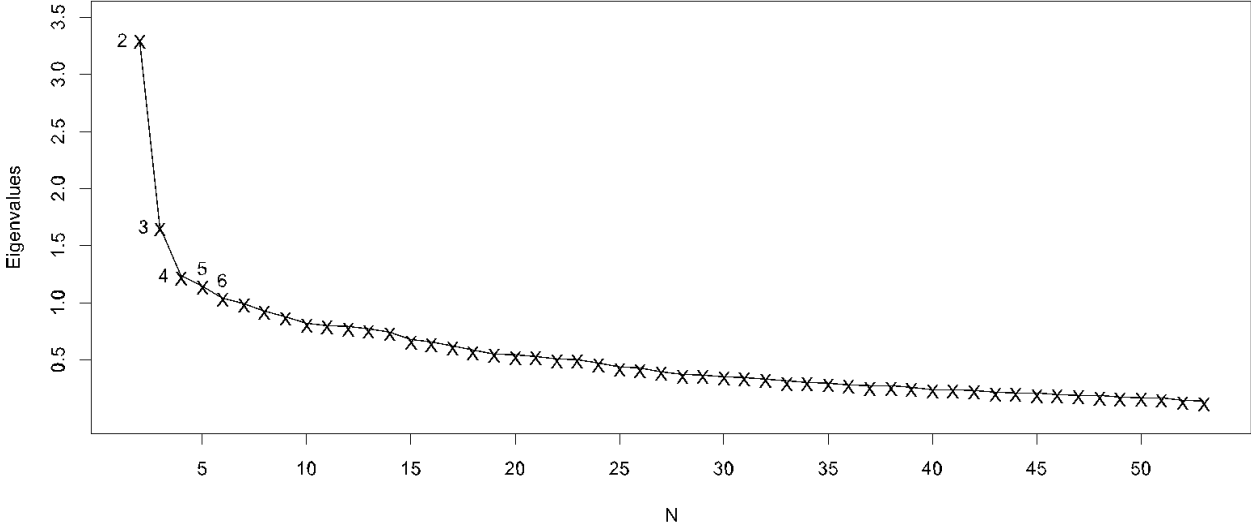
1. EFA with six correlated factors using the oblimin rotation.
2. EFA with six uncorrelated factors using the varimax rotation.

The factor loadings from these analyses are shown in Table 44 (correlated factors) and in Table 45 (uncorrelated factors).

**Table 43: Summary statistics for quality item data.**

Quality item	Mean	SD	N missing
ECERS-R: PCR; Greeting and departing	5.85	1.31	0
ECERS-R: PCR; Meals/snacks	5.12	1.52	1
ECERS-R: PCR; Nap and rest	4.40	2.01	493
ECERS-R: PCR; Toilet/diapering	5.77	1.55	0
ECERS-R: PCR; Health practices	5.34	1.47	0
ECERS-R: PCR; Safety practices	5.97	1.36	0
ECERS-R: LR; Books and pictures	4.74	1.46	3
ECERS-R: LR; Encouraging children to communicate	5.36	1.24	0
ECERS-R: LR; Using language to develop reasoning skills	4.67	1.53	0
ECERS-R: LR; Informal use of language	5.64	1.28	0
ECERS-R: ACT; Fine motor	5.48	1.49	0
ECERS-R: ACT; Art	5.03	1.43	0
ECERS-R: ACT; Music/movement	3.94	1.45	0
ECERS-R: ACT; Blocks	4.80	1.76	10
ECERS-R: ACT; Sand/water	5.04	1.51	1
ECERS-R: ACT; Dramatic play	4.88	1.24	1
ECERS-R: ACT; Nature/science	4.36	1.73	0
ECERS-R: ACT; Math/number	4.78	1.45	0
ECERS-R: ACT; Use of TV, video, and/or computers	4.80	1.43	267
ECERS-R: ACT; Promoting acceptance of diversity	3.88	1.43	3
ECERS-R: INT; Supervision of gross motor activities	5.46	1.29	4
ECERS-R: INT; General supervision of children	5.73	1.31	0
ECERS-R: INT; Discipline	5.47	1.13	0
ECERS-R: INT; Staff-child interactions	6.14	1.16	0
ECERS-R: INT; Interactions amongst children	5.79	1.20	0
ECERS-R: PS; Schedule	5.50	1.47	1
ECERS-R: PS; Free play	5.77	1.31	0
ECERS-R: PS; Group time	5.66	1.31	2
ECERS-R: PS; Provisions for children with disabilities	5.73	1.38	285
ECERS-E: LIT; Environment print: letters and words	4.49	1.30	5
ECERS-E: LIT; Book and literacy areas	4.93	1.49	0
ECERS-E: LIT; Adult reading with children	4.35	1.46	4
ECERS-E: LIT; Sounds in words	4.06	1.68	7
ECERS-E: LIT; Emergent writing/mark making	4.41	1.49	3
ECERS-E: LIT; Talking and listening	5.24	1.28	0
ECERS-E: MATH; Counting and the application of counting	4.50	1.53	2
ECERS-E: MATH; Reading and writing simple numbers	4.09	1.72	0
ECERS-E: MATH; Shape and space	3.89	1.53	1
ECERS-E: MATH; Sorting, matching and comparing	3.86	1.56	6
ECERS-E: DIV; Planning for individual learning needs	4.71	1.44	0
ECERS-E: DIV; Gender equality and awareness	3.59	1.30	0
ECERS-E: DIV; Race equality and awareness	3.76	1.39	1
SSTEWS: BTCL; Self-regulation and social development	5.48	1.43	1
SSTEWS: BTCL; Encouraging choices and independent play	5.10	1.23	0
SSTEWS: BTCL; Small group/individual interactions/adult deployment	5.14	1.51	0
SSTEWS: SELC; Encouraging children to talk with others	5.07	1.28	0
SSTEWS: SELC; Staff actively listen/encourage children to listen	5.19	1.36	0
SSTEWS: SELC; Staff support children's language use	5.09	1.37	0
SSTEWS: SELC; Sensitive responsiveness	5.47	1.39	0
SSTEWS: SEW; Supporting socio-emotional well-being	4.88	1.24	4
SSTEWS: SLCT; Supporting curiosity and problem solving	4.40	1.38	0
SSTEWS: SLCT; Shared thinking during story telling	3.93	1.59	9
SSTEWS: SLCT; Shared thinking in investigation and exploration	3.92	1.57	3
SSTEWS: SLCT; Supporting concept development/higher order thinking	3.98	1.60	3
SSTEWS: ALL; Using assessment to support learning/critical thinking	4.51	1.25	3
SSTEWS: ALL; Assessing language development	4.67	1.52	3

Figure 32: Scree plot for EFA of quality item data.



The largest eigenvalue was 24.5. This has been omitted from the plot to avoid compressing the y-axis excessively. Eigenvalues 2 to 6 have been numbered.

**Table 44: Factor loadings from 6 factor correlated factor model.**

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
ECERS-R: PCR; Greeting and departing	+0.235	-0.194	+0.317	+0.148	+0.131	
ECERS-R: PCR; Meals/snacks			+0.469		+0.116	+0.124
ECERS-R: PCR; Toilet/diapering			+0.506		+0.115	
ECERS-R: PCR; Health practices			+0.535		+0.108	
ECERS-R: PCR; Safety practices	+0.235	+0.116	+0.564			
ECERS-R: LR; Books and pictures				+0.767	+0.114	-0.124
ECERS-R: LR; Encouraging children to communicate	+0.269		+0.237	+0.299		+0.106
ECERS-R: LR; Using language to develop reasoning skills	+0.130	+0.283	+0.131	+0.143		+0.294
ECERS-R: LR; Informal use of language	+0.302			+0.141		+0.141
ECERS-R: ACT; Fine motor	+0.127	+0.108	+0.405	+0.187		
ECERS-R: ACT; Art			+0.285	+0.246		+0.226
ECERS-R: ACT; Music/movement	-0.174	+0.178	+0.197	+0.209	+0.223	+0.190
ECERS-R: ACT; Blocks			+0.185	+0.182	+0.170	
ECERS-R: ACT; Sand/water	-0.136	+0.191	+0.343	+0.185		+0.178
ECERS-R: ACT; Dramatic play	-0.111		+0.335	+0.191	+0.288	
ECERS-R: ACT; Nature/science		+0.163	+0.253	+0.155	+0.171	+0.338
ECERS-R: ACT; Math/number		+0.258	+0.112		+0.119	
ECERS-R: ACT; Promoting acceptance of diversity					+0.888	
ECERS-R: INT; Supervision of gross motor activities	+0.167		+0.556			+0.139
ECERS-R: INT; General supervision of children	+0.509		+0.406			
ECERS-R: INT; Discipline	+0.379		+0.349	+0.174		+0.112
ECERS-R: INT; Staff-child interactions	+0.818					-0.149
ECERS-R: INT; Interactions amongst children	+0.684		+0.190			
ECERS-R: PS; Schedule	+0.292	+0.100	+0.228	+0.113		
ECERS-R: PS; Free play	+0.368	+0.129	+0.368			
ECERS-R: PS; Group time	+0.568			+0.115		
ECERS-E: LIT; Environment print: letters and words	+0.108	+0.360		+0.274		
ECERS-E: LIT; Book and literacy areas			+0.112	+0.667	+0.123	
ECERS-E: LIT; Adult reading with children				+0.666		+0.130
ECERS-E: LIT; Sounds in words		+0.465		+0.282		
ECERS-E: LIT; Emergent writing/mark making		+0.390		+0.330		+0.107
ECERS-E: LIT; Talking and listening	+0.240			+0.130		
ECERS-E: MATH; Counting and the application of counting	+0.113	+0.770				
ECERS-E: MATH; Reading and writing simple numbers		+0.820				
ECERS-E: MATH; Shape and space		+0.568			+0.143	
ECERS-E: MATH; Sorting, matching and comparing		+0.535	+0.116		+0.157	+0.261
ECERS-E: DIV; Planning for individual learning needs	+0.245		+0.141		+0.296	+0.237
ECERS-E: DIV; Gender equality and awareness	-0.106	+0.149			+0.628	
ECERS-E: DIV; Race equality and awareness					+0.892	
SSTEWS: BTCL; Self-regulation and social development	+0.678		+0.120		+0.115	
SSTEWS: BTCL; Encouraging choices and independent play	+0.421		+0.164	+0.167		+0.230
SSTEWS: BTCL; Small group/individual interactions/adult deployment	+0.413		+0.171			+0.297
SSTEWS: SELC; Encouraging children to talk with others	+0.297					
SSTEWS: SELC; Staff actively listen/encourage children to listen	+0.699	+0.203				
SSTEWS: SELC; Staff support children's language use	+0.701	+0.103	-0.135			+0.163
SSTEWS: SELC; Sensitive responsiveness	+0.732					+0.145
SSTEWS: SEW; Supporting socio-emotional well-being	+0.499			+0.140	+0.113	+0.214
SSTEWS: SLCT; Supporting curiosity and problem solving	+0.283	+0.136		+0.106	+0.104	+0.418
SSTEWS: SLCT; Shared thinking during story telling		+0.156		+0.477		+0.302
SSTEWS: SLCT; Shared thinking in investigation and exploration	+0.112	+0.222				+0.534
SSTEWS: SLCT; Supporting concept development/higher order thinking	+0.188	+0.214			+0.121	+0.499

SSTEW: ALL; Using assessment to support learning/critical thinking	+0.321	+0.132			+0.154	+0.330
SSTEW: ALL; Assessing language development	+0.295		+0.106	+0.148	+0.121	+0.304

Factor loadings with an absolute value < 0.1 have been suppressed.

**Table 45: Factor loadings from 6 factor uncorrelated factor model.**

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
ECERS-R: PCR; Greeting and departing	+0.474		-0.208	+0.201	-0.101	
ECERS-R: PCR; Meals/snacks	+0.496			+0.270		
ECERS-R: PCR; Toilet/diapering	+0.494			+0.352		
ECERS-R: PCR; Health practices	+0.500			+0.362		
ECERS-R: PCR; Safety practices	+0.628	-0.107		+0.386	-0.139	
ECERS-R: LR; Books and pictures	+0.615	+0.182				+0.498
ECERS-R: LR; Encouraging children to communicate	+0.772					+0.112
ECERS-R: LR; Using language to develop reasoning skills	+0.786		+0.119		+0.140	
ECERS-R: LR; Informal use of language	+0.460	-0.107	-0.120			
ECERS-R: ACT; Fine motor	+0.678			+0.252		
ECERS-R: ACT; Art	+0.670				+0.110	
ECERS-R: ACT; Music/movement	+0.572	+0.230	+0.116		+0.219	
ECERS-R: ACT; Blocks	+0.338	+0.142		+0.122		+0.110
ECERS-R: ACT; Sand/water	+0.577			+0.158	+0.185	
ECERS-R: ACT; Dramatic play	+0.553	+0.244		+0.209		+0.108
ECERS-R: ACT; Nature/science	+0.713	+0.151			+0.248	
ECERS-R: ACT; Math/number	+0.436	+0.103	+0.147			
ECERS-R: ACT; Promoting acceptance of diversity	+0.528	+0.675				
ECERS-R: INT; Supervision of gross motor activities	+0.701			+0.309		-0.109
ECERS-R: INT; General supervision of children	+0.758	-0.178	-0.116	+0.228	-0.203	-0.108
ECERS-R: INT; Discipline	+0.795	-0.137		+0.160		
ECERS-R: INT; Staff-child interactions	+0.691	-0.202	-0.123		-0.422	
ECERS-R: INT; Interactions amongst children	+0.727	-0.185	-0.102	+0.109	-0.328	
ECERS-R: PS; Schedule	+0.635			+0.113		
ECERS-R: PS; Free play	+0.728	-0.170		+0.193	-0.113	
ECERS-R: PS; Group time	+0.629		-0.153		-0.247	
ECERS-E: LIT; Environment print: letters and words	+0.670	+0.103	+0.211			+0.146
ECERS-E: LIT; Book and literacy areas	+0.655	+0.159				+0.409
ECERS-E: LIT; Adult reading with children	+0.672			-0.113	+0.105	+0.371
ECERS-E: LIT; Sounds in words	+0.548	+0.116	+0.317		+0.127	+0.165
ECERS-E: LIT; Emergent writing/mark making	+0.703	+0.141	+0.247		+0.137	+0.175
ECERS-E: LIT; Talking and listening	+0.409					
ECERS-E: MATH; Counting and the application of counting	+0.727		+0.463			
ECERS-E: MATH; Reading and writing simple numbers	+0.631		+0.538			
ECERS-E: MATH; Shape and space	+0.706	+0.149	+0.347			
ECERS-E: MATH; Sorting, matching and comparing	+0.723	+0.168	+0.325		+0.215	
ECERS-E: DIV; Planning for individual learning needs	+0.711	+0.157				
ECERS-E: DIV; Gender equality and awareness	+0.593	+0.526	+0.126		+0.144	
ECERS-E: DIV; Race equality and awareness	+0.554	+0.683				
SSTEWS: BTC; Self-regulation and social development	+0.820		-0.148		-0.241	
SSTEWS: BTC; Encouraging choices and independent play	+0.810		-0.131			
SSTEWS: BTC; Small group/individual interactions/adult deployment	+0.781		-0.143			
SSTEWS: SELC; Encouraging children to talk with others	+0.360					
SSTEWS: SELC; Staff actively listen/encourage children to listen	+0.792	-0.111		-0.126	-0.228	-0.101
SSTEWS: SELC; Staff support children's language use	+0.806			-0.201	-0.190	
SSTEWS: SELC; Sensitive responsiveness	+0.766	-0.130	-0.186		-0.230	
SSTEWS: SEW; Supporting socio-emotional well-being	+0.804		-0.101			
SSTEWS: SLCT; Supporting curiosity and problem solving	+0.826			-0.150	+0.128	
SSTEWS: SLCT; Shared thinking during story telling	+0.716			-0.165	+0.214	+0.229
SSTEWS: SLCT; Shared thinking in investigation and exploration	+0.818			-0.179	+0.268	
SSTEWS: SLCT; Supporting concept development/higher order thinking	+0.825			-0.183	+0.213	



SSTEW: ALL; Using assessment to support learning/critical thinking	+0.778			-0.145		
SSTEW: ALL; Assessing language development	+0.761					

Factor loadings with an absolute value < 0.1 have been suppressed.

## Comparison of the correlated and uncorrelated EFA models

The performance of the correlated and uncorrelated factor models were compared in two ways:

1. Predictive power.
2. Efficiency.

The factors for the two models were calculated from the quality item data for the children in the quality sample. Factor loadings < 0.1 were suppressed. The child outcomes were regressed on the quality factors, with each outcome/factor combination in a separate model. Models controlled for ECEC use, HE/P variables and demographic covariates. Models were fitted to multiply imputed data. The predictive power was assessed as the total number of significance stars from the models of the nine outcome variables in terms of a given factor. The efficiency was assessed as the number of quality items required to calculate the factor, ie, the number of items with loadings on the factor with an absolute value >0.1. The predictive power and efficiency of the correlated and uncorrelated models are summarised in Table 46.

**Table 46: Comparison of correlated and uncorrelated 6 factor EFA models for predictive power and efficiency.**

Quality scale		Predictive power			Efficiency	Mean Efficiency
		Each factor	Max	Mean		
Correlated 6 factor model	Factor 1	0	7	2.8	35	27.5
	Factor 2	3			25	
	Factor 3	5			29	
	Factor 4	7			26	
	Factor 5	1			23	
	Factor 6	1			27	
Uncorrelated 6 factor model	Factor 1	2	8	3.2	53	26.8
	Factor 2	1			25	
	Factor 3	4			22	
	Factor 4	4			23	
	Factor 5	0			25	
	Factor 6	8			13	

The predictive power of the best factor and the mean predictive power of all factors were better for the uncorrelated model. This model also has a small advantage in efficiency.

The uncorrelated factor model was adopted.

## Streamlining the factors

All the quality items are correlated and higher values are associated with better quality ECEC. The negative loadings present in some of the uncorrelated factors are therefore

unlikely to make them better measures of ECEC quality. A revised (“streamlined”) version of the factors was calculated in which items with negative loadings were omitted. The predictive power and efficiency of the original factors and the streamlined factors were compared; see Table 47.

**Table 47: Comparison of predictive power and efficiency between original and streamlined factors.**

Measure	Factors	F	F	F	F	F	F	Mean	
		a	a	a	a	a	a		
		c	c	c	c	c	c		
		t	t	t	t	t	t		
		o	o	o	o	o	o		
		r	r	r	r	r	r		
		1	2	3	4	5	6		
Predictive power	Original factors	2	1	4	4	0	8	3.2	
	Streamlined factors	2	3	3	4	2	8	3.7	
Efficiency	Original factors	5	2	2	2	2	1	26.8	
	Streamlined factors	3	5	2	3	5	3	19.8	
		5	1	1	1	1	1		
		3	6	1	5	4	0		

Both the predictive power and the efficiency of the streamlined factors were superior to those of the original factors. The streamlined factors were adopted as the final ones. These were used in the analyses in Chapters 8 and 9.

The correlations between the final factors are shown in Table 48.

**Table 48: Correlation between final factors.**

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1	+1.000	+0.846	+0.882	+0.868	+0.932	+0.867
Factor 2	+0.846	+1.000	+0.840	+0.670	+0.873	+0.829
Factor 3	+0.882	+0.840	+1.000	+0.672	+0.907	+0.807
Factor 4	+0.868	+0.670	+0.672	+1.000	+0.721	+0.701
Factor 5	+0.932	+0.873	+0.907	+0.721	+1.000	+0.851
Factor 6	+0.867	+0.829	+0.807	+0.701	+0.851	+1.000

## Chapter 7

### Models of outcomes in terms of the new quality factors

The results of the regression models of child outcomes in terms of the quality of Formal group ECEC which they experienced aged three to four (new quality factor scales) are shown in Tables 49 to 50.

**Table 49: Results of linear regression models of outcomes in terms of new quality factors I.**

Outcomes	Overall quality		Diversity		Numeracy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.065	0.327	+0.040	0.568	+0.008	0.897
BAS non-verbal ability	+0.164	0.020*	+0.191	0.013*	+0.224	<0.001***
Sociability	+0.151	0.055	+0.142	0.106	+0.141	0.081
Externalising behaviour	+0.061	0.382	+0.022	0.737	+0.093	0.189
Internalising behaviour	+0.024	0.737	+0.063	0.378	+0.036	0.624
Prosocial behaviour	+0.140	0.043*	+0.147	0.036*	+0.162	0.015*
Behavioural self-regulation	+0.121	0.090	+0.120	0.091	+0.128	0.066
Cognitive self-regulation	+0.113	0.079	+0.139	0.038*	+0.087	0.178
Emotional self-regulation	+0.084	0.243	+0.054	0.450	+0.100	0.172

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 50: Results of linear regression models of outcomes in terms of new quality factors II.**

Outcomes	Care		Shared thinking		Early literacy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.128	0.042*	+0.033	0.616	-0.004	0.955
BAS non-verbal ability	+0.176	0.016*	+0.183	0.009**	+0.148	0.050
Sociability	+0.143	0.068	+0.139	0.087	+0.179	0.023*
Externalising behaviour	+0.049	0.476	+0.063	0.348	+0.121	0.071
Internalising behaviour	+0.038	0.605	+0.050	0.475	+0.092	0.170
Prosocial behaviour	+0.144	0.038*	+0.131	0.049*	+0.193	0.004**
Behavioural self-regulation	+0.138	0.060	+0.081	0.239	+0.186	0.006**
Cognitive self-regulation	+0.117	0.058	+0.108	0.101	+0.181	0.006**
Emotional self-regulation	+0.096	0.180	+0.073	0.302	+0.143	0.043*

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

### Models of outcomes in terms of the new quality factors moderated by child disadvantage

The results of the regression models of child outcomes in terms of the quality of Formal group ECEC which they experienced aged three to four (new quality factor scales) moderated by child disadvantage group are shown in Tables 51 and 52 (children with no disadvantage), Tables 53 and 54 (children with only home disadvantage), Tables 55 and 56 (children with only economic disadvantage) and Tables 57 and 58 (children with home and economic disadvantage).

**Table 51: Results of linear regression models of outcomes in terms of new quality factors; children with no disadvantage I.**

No disadvantage						
Outcomes	Overall quality		Diversity		Numeracy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.129	0.388	+0.032	0.834	+0.039	0.785
BAS non-verbal ability	+0.124	0.351	+0.176	0.239	+0.191	0.133
Sociability	+0.190	0.193	+0.145	0.310	+0.134	0.337
Externalising behaviour	-0.058	0.688	-0.106	0.421	+0.003	0.985
Internalising behaviour	+0.130	0.319	+0.125	0.371	+0.159	0.245
Prosocial behaviour	+0.185	0.207	+0.253	0.085	+0.157	0.282
Behavioural self-regulation	-0.064	0.656	+0.039	0.794	+0.020	0.888
Cognitive self-regulation	+0.070	0.599	+0.169	0.251	+0.053	0.711
Emotional self-regulation	-0.010	0.936	-0.096	0.503	+0.074	0.586

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 52: Results of linear regression models of outcomes in terms of new quality factors; children with no disadvantage II.**

No disadvantage						
Outcomes	Care		Shared thinking		Early literacy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.338	0.015*	-0.002	0.986	-0.011	0.939
BAS non-verbal ability	+0.235	0.087	+0.078	0.547	+0.092	0.505
Sociability	+0.280	0.068	+0.152	0.264	+0.265	0.071
Externalising behaviour	-0.094	0.595	-0.076	0.542	+0.025	0.855
Internalising behaviour	+0.124	0.356	+0.131	0.288	+0.152	0.218
Prosocial behaviour	+0.204	0.182	+0.145	0.277	+0.288	0.037*
Behavioural self-regulation	+0.032	0.857	-0.114	0.355	+0.123	0.397
Cognitive self-regulation	+0.123	0.368	+0.045	0.741	+0.198	0.129
Emotional self-regulation	-0.005	0.975	-0.022	0.859	+0.090	0.509

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 53: Results of linear regression models of outcomes in terms of new quality factors; children with only home disadvantage I.**

Only home disadvantage						
Outcomes	Overall quality		Diversity		Numeracy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.083	0.426	+0.124	0.280	+0.017	0.873
BAS non-verbal ability	+0.352	0.015*	+0.353	0.019*	+0.381	0.006**
Sociability	-0.036	0.830	+0.055	0.736	+0.091	0.580
Externalising behaviour	+0.147	0.361	+0.218	0.103	+0.207	0.198
Internalising behaviour	-0.087	0.605	+0.019	0.904	-0.046	0.784
Prosocial behaviour	+0.061	0.687	+0.162	0.282	+0.128	0.383
Behavioural self-regulation	+0.097	0.520	+0.205	0.166	+0.112	0.462
Cognitive self-regulation	-0.011	0.940	+0.068	0.636	+0.021	0.885
Emotional self-regulation	+0.071	0.678	+0.229	0.150	+0.105	0.542

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 54: Results of linear regression models of outcomes in terms of new quality factors; children with only home disadvantage II.**

Only home disadvantage						
Outcomes	Care		Shared thinking		Early literacy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.103	0.287	+0.059	0.576	+0.114	0.269
BAS non-verbal ability	+0.383	0.006**	+0.292	0.035*	+0.368	0.016*
Sociability	-0.165	0.325	+0.012	0.941	-0.021	0.889
Externalising behaviour	+0.099	0.562	+0.215	0.160	+0.095	0.481
Internalising behaviour	-0.080	0.619	-0.024	0.882	-0.132	0.392
Prosocial behaviour	-0.012	0.938	+0.113	0.441	+0.069	0.619
Behavioural self-regulation	+0.094	0.533	+0.064	0.674	+0.126	0.371
Cognitive self-regulation	-0.049	0.733	+0.011	0.938	-0.005	0.973
Emotional self-regulation	+0.063	0.697	+0.102	0.541	+0.040	0.792

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 55: Results of linear regression models of outcomes in terms of new quality factors; children with only economic disadvantage I.**

Only economic disadvantage						
Outcomes	Overall quality		Diversity		Numeracy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.130	0.251	+0.084	0.463	+0.064	0.551
BAS non-verbal ability	+0.184	0.147	+0.200	0.116	+0.240	0.052
Sociability	+0.148	0.328	+0.131	0.411	+0.126	0.398
Externalising behaviour	+0.085	0.529	+0.009	0.953	+0.031	0.834
Internalising behaviour	-0.074	0.540	+0.066	0.603	-0.003	0.985
Prosocial behaviour	-0.019	0.883	-0.037	0.785	-0.028	0.832
Behavioural self-regulation	+0.142	0.273	+0.003	0.980	+0.057	0.679
Cognitive self-regulation	+0.001	0.994	-0.040	0.778	-0.017	0.906
Emotional self-regulation	+0.130	0.318	+0.034	0.817	+0.089	0.546

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 56: Results of linear regression models of outcomes in terms of new quality factors; children with only economic disadvantage II.**

Only economic disadvantage						
Outcomes	Care		Shared thinking		Early literacy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	+0.143	0.200	+0.134	0.223	+0.139	0.231
BAS non-verbal ability	+0.160	0.210	+0.260	0.044*	+0.179	0.172
Sociability	+0.175	0.259	+0.167	0.262	+0.271	0.069
Externalising behaviour	+0.061	0.616	+0.150	0.289	+0.268	0.063
Internalising behaviour	-0.096	0.422	+0.083	0.507	+0.169	0.182
Prosocial behaviour	+0.099	0.464	-0.021	0.869	+0.174	0.188
Behavioural self-regulation	+0.221	0.098	+0.113	0.370	+0.289	0.030*
Cognitive self-regulation	+0.019	0.894	+0.033	0.808	+0.159	0.269
Emotional self-regulation	+0.121	0.335	+0.209	0.130	+0.305	0.030*

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate. Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 57: Results of linear regression models of outcomes in terms of new quality factors; children with home and economic disadvantage I.**

Home and economic disadvantage						
Outcomes	Overall quality		Diversity		Numeracy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	-0.049	0.679	-0.050	0.691	-0.073	0.555
BAS non-verbal ability	+0.065	0.544	+0.092	0.420	+0.135	0.224
Sociability	+0.237	0.091	+0.206	0.202	+0.191	0.203
Externalising behaviour	+0.064	0.631	-0.005	0.967	+0.135	0.288
Internalising behaviour	+0.114	0.454	+0.045	0.741	+0.043	0.759
Prosocial behaviour	+0.308	0.012*	+0.233	0.049*	+0.362	0.001**
Behavioural self-regulation	+0.235	0.078	+0.228	0.082	+0.273	0.028*
Cognitive self-regulation	+0.319	0.004**	+0.328	0.003**	+0.249	0.023*
Emotional self-regulation	+0.109	0.424	+0.062	0.630	+0.125	0.331

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 58: Results of linear regression models of outcomes in terms of new quality factors; children with home and economic disadvantage II.**

Home and economic disadvantage						
Outcomes	Care		Shared thinking		Early literacy	
	Beta	p-value	Beta	p-value	Beta	p-value
BAS verbal ability	-0.004	0.973	-0.062	0.613	-0.195	0.095
BAS non-verbal ability	+0.048	0.647	+0.114	0.342	+0.031	0.786
Sociability	+0.203	0.139	+0.186	0.234	+0.163	0.265
Externalising behaviour	+0.104	0.429	-0.023	0.861	+0.074	0.568
Internalising behaviour	+0.170	0.305	+0.011	0.941	+0.123	0.352
Prosocial behaviour	+0.236	0.060	+0.276	0.021*	+0.220	0.054
Behavioural self-regulation	+0.160	0.225	+0.197	0.137	+0.175	0.154
Cognitive self-regulation	+0.298	0.005**	+0.289	0.013*	+0.298	0.008**
Emotional self-regulation	+0.160	0.260	-0.011	0.933	+0.101	0.437

Standardised model coefficients, Beta, give the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate.

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

## Chapter 8

The associations between the quality factors and continuous characteristics of childcare settings are shown using non-parametric Kendall Tau correlations in Table 59.

**Table 59: Kendall Tau correlations between quality factors and continuous characteristics of childcare settings.**

Settings variable	Factor 1 Overall quality	Factor 2 Diversity	Factor 3 Numeracy	Factor 4 Care	Factor 5 Shared thinking	Factor 6 Early literacy
Number of places provided	+0.063*	+0.113***	+0.101***	+0.047	+0.096***	+0.081**
Minimum age of children	+0.157***	+0.086**	+0.169***	+0.087**	+0.147***	+0.161***
Maximum age of children	-0.090**	-0.048	-0.082*	-0.088**	-0.081*	-0.089**
Manager's highest qualification	+0.181***	+0.164***	+0.192***	+0.128***	+0.174***	+0.159***
Number of staff	-0.005	+0.051	-0.003	+0.023	+0.004	+0.002
Mean qualification level of staff	+0.185***	+0.130***	+0.155***	+0.134***	+0.181***	+0.161***
Percentage of staff replaced during the last year	-0.077*	-0.036	-0.050	-0.053	-0.072*	-0.066*
Staff to child ratio	-0.052	-0.024	-0.089**	-0.011	-0.071*	-0.058*
Staff to child ratio 3-4 year olds	-0.072*	-0.074*	-0.140***	-0.024	-0.123***	-0.088**
Frequency of staff CPD	+0.088**	+0.131***	+0.101**	+0.065*	+0.109***	+0.099**
Frequency of staff supervision	-0.055	-0.058	-0.035	-0.044	-0.048	-0.067*

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

The associations between the quality factors and binary characteristics of childcare settings is shown using t-tests in Table 60.

**Table 60: Associations between binary characteristics of childcare settings and quality factors.**

Variable	Factor 1 Overall quality		Factor 2 Diversity		Factor 3 Numeracy	
	Sites (Single/Multiple)	+0.019	-0.056	+0.001	+0.003	+0.017
SEN/D provision (Yes/No)	+0.023	-0.029	+0.035*	-0.055*	+0.032	-0.041
Training plan in place (Yes/No)	+0.023**	-0.146**	+0.024**	-0.151**	+0.019**	-0.130**
Training budget in place (Yes/No)	+0.066***	-0.087***	+0.063***	-0.083***	+0.060***	-0.081***
	Factor 4 Care		Factor 5 Shared thinking		Factor 6 Early literacy	
Sites (Single/Multiple)	-0.003	+0.008	+0.018	-0.050	+0.014	-0.038
SEN/D provision (Yes/No)	+0.015	-0.018	+0.035	-0.050	+0.019	-0.020
Training plan in place (Yes/No)	+0.020*	-0.119*	+0.020**	-0.136**	+0.019*	-0.124*
Training budget in place (Yes/No)	+0.054**	-0.068**	+0.061***	-0.082***	+0.057**	-0.077**

The means of the quality factor in group one (ie, setting is on single site, setting has SEN/D provision, setting has training plan in place, setting has training budget in place) are given in the left-hand columns. The means of the quality factor in group two (ie, setting is on multiple sites, setting does not have SEN/D provision, setting does not have training plan in place, setting does not have training budget in place) are given in the right-hand columns.

Statistical significance of t-test comparison between groups is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .



The results of linear regression models of quality factors in terms of settings characteristics are given in Tables 61 and 62 (Private settings), in Tables 63 and 64 (Voluntary settings) and in Tables 65 and 66 (Nursery classes/schools).

**Table 61: Results of regression models of quality factors in terms of characteristics of childcare settings: Private settings I.**

Private						
Outcome	Factor 1 Overall quality		Factor 2 Diversity		Factor 3 Numeracy	
	Beta	p-value	Beta	p-value	Beta	p-value
Number of places provided	+0.382	0.008**	+0.406	0.004**	+0.561	<0.001***
Minimum age of children	+0.513	0.004**	+0.367	0.035*	+0.507	0.003**
Maximum age of children	+0.045	0.709	+0.060	0.607	+0.089	0.437
Manager's highest qualification	-0.029	0.825	-0.009	0.940	-0.006	0.961
Mean qualification level of staff	+0.580	<0.001***	+0.431	0.008**	+0.458	0.004**
Percentage of staff replaced during the last year	-0.120	0.354	-0.105	0.409	-0.032	0.794
Overall staff to child ratio	+0.297	0.059	+0.296	0.054	+0.254	0.090
Staff to child ratio 3-4 year olds	-0.037	0.834	-0.153	0.377	-0.235	0.168
Frequency of staff CPD	-0.176	0.199	-0.010	0.942	-0.180	0.166
Frequency of staff supervision	-0.053	0.676	-0.054	0.662	-0.003	0.980
Setting on single site	-0.050	0.647	+0.005	0.959	-0.038	0.715
SEN/D provision	+0.180	0.140	+0.289	0.015*	+0.233	0.045*
Training plan in place	+0.094	0.511	+0.094	0.503	+0.098	0.472
Training budget in place	-0.045	0.712	-0.145	0.227	-0.166	0.156

Standardised model coefficients, Beta, give (a) the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate (continuous covariates), or (b) the change in the outcome variable in standard deviation units corresponding to the contrast between settings with the stated characteristic and settings without it (binary covariates – bottom four rows). Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 62: Results of regression models of quality factors in terms of characteristics of childcare settings: Private settings II.**

Private						
Outcome	Factor 4 Care		Factor 5 Shared thinking		Factor 6 Early literacy	
	Beta	p-value	Beta	p-value	Beta	p-value
Number of places provided	+0.369	0.014*	+0.385	0.005**	+0.379	0.005**
Minimum age of children	+0.428	0.023*	+0.475	0.006**	+0.621	<0.001***
Maximum age of children	+0.000	0.999	+0.115	0.320	+0.110	0.337
Manager's highest qualification	-0.021	0.878	-0.065	0.604	-0.015	0.904
Mean qualification level of staff	+0.484	0.006**	+0.503	0.002**	+0.467	0.003**
Percentage of staff replaced during the last year	-0.131	0.336	-0.058	0.643	-0.074	0.546
Overall staff to child ratio	+0.228	0.169	+0.280	0.065	+0.300	0.045*
Staff to child ratio 3-4 year olds	+0.028	0.881	-0.233	0.175	-0.176	0.299
Frequency of staff CPD	-0.197	0.170	-0.130	0.321	-0.133	0.306
Frequency of staff supervision	-0.142	0.284	-0.058	0.630	-0.054	0.652
Setting on single site	+0.077	0.503	-0.081	0.443	+0.018	0.864
SEN/D provision	+0.146	0.255	+0.272	0.020*	+0.180	0.119
Training plan in place	+0.001	0.993	+0.147	0.287	+0.087	0.521
Training budget in place	-0.002	0.987	-0.091	0.442	-0.092	0.430

Standardised model coefficients, Beta, give (a) the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate (continuous covariates), or (b) the change in the outcome variable in standard deviation units corresponding to the contrast between settings with the stated characteristic and settings without it (binary covariates – bottom four rows).

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 63: Results of regression models of quality factors in terms of characteristics of childcare settings: Voluntary settings I.**

Voluntary						
Outcome	Factor 1 Overall quality		Factor 2 Diversity		Factor 3 Numeracy	
	Beta	p-value	Beta	p-value	Beta	p-value
Number of places provided	+0.001	0.997	-0.119	0.732	-0.067	0.847
Minimum age of children	+0.089	0.778	-0.152	0.615	-0.213	0.480
Maximum age of children	+0.124	0.598	+0.155	0.489	+0.119	0.595
Manager's highest qualification	+0.076	0.694	-0.035	0.851	+0.083	0.653
Mean qualification level of staff	+0.134	0.575	+0.188	0.409	+0.006	0.980
Percentage of staff replaced during the last year	-0.139	0.430	-0.067	0.690	-0.034	0.837
Overall staff to child ratio	+0.516	0.036*	+0.296	0.207	+0.351	0.133
Staff to child ratio 3-4 year olds	+0.160	0.394	+0.405	0.026*	+0.319	0.076
Frequency of staff CPD	+0.180	0.427	+0.247	0.254	+0.339	0.117
Frequency of staff supervision	-0.172	0.461	-0.136	0.542	-0.088	0.691
Setting on single site	+0.251	0.361	+0.267	0.309	+0.123	0.638
SEN/D provision	-0.208	0.239	-0.195	0.249	-0.189	0.262
Training plan in place	+0.285	0.083	+0.213	0.177	+0.138	0.379
Training budget in place	-0.063	0.732	-0.007	0.967	-0.104	0.556

Standardised model coefficients, Beta, give (a) the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate (continuous covariates), or (b) the change in the outcome variable in standard deviation units corresponding to the contrast between settings with the stated characteristic and settings without it (binary covariates – bottom four rows).

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 64: Results of regression models of quality factors in terms of characteristics of childcare settings: Voluntary settings II.**

Voluntary						
Outcome	Factor 4 Care		Factor 5 Shared thinking		Factor 6 Early literacy	
	Beta	p-value	Beta	p-value	Beta	p-value
Number of places provided	-0.154	0.683	+0.083	0.819	+0.048	0.897
Minimum age of children	+0.079	0.809	+0.026	0.935	-0.045	0.889
Maximum age of children	+0.180	0.458	+0.016	0.945	+0.110	0.644
Manager's highest qualification	+0.048	0.813	-0.057	0.769	-0.171	0.388
Mean qualification level of staff	+0.142	0.565	+0.318	0.184	+0.257	0.291
Percentage of staff replaced during the last year	+0.015	0.935	-0.192	0.276	-0.210	0.241
Overall staff to child ratio	+0.560	0.028*	+0.312	0.203	+0.416	0.097
Staff to child ratio 3-4 year olds	-0.145	0.457	+0.272	0.149	+0.355	0.065
Frequency of staff CPD	+0.111	0.633	+0.254	0.261	+0.242	0.293
Frequency of staff supervision	-0.122	0.614	-0.121	0.604	-0.122	0.609
Setting on single site	+0.323	0.256	+0.221	0.421	+0.187	0.505
SEN/D provision	-0.219	0.231	-0.138	0.435	-0.228	0.204
Training plan in place	+0.328	0.055	+0.282	0.087	+0.243	0.147
Training budget in place	+0.091	0.634	-0.156	0.398	-0.096	0.609

Standardised model coefficients, Beta, give (a) the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate (continuous covariates), or (b) the change in the outcome variable in standard deviation units corresponding to the contrast between settings with the stated characteristic and settings without it (binary covariates – bottom four rows).

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 65: Results of regression models of quality factors in terms of characteristics of childcare settings: Nursery classes/schools I.**

Nursery class/school						
Outcome	Factor 1 Overall quality		Factor 2 Diversity		Factor 3 Numeracy	
	Beta	p-value	Beta	p-value	Beta	p-value
Number of places provided	+0.158	0.482	+0.466	0.078	+0.010	0.968
Minimum age of children	+0.546	0.094	+0.655	0.085	+0.600	0.111
Maximum age of children	-0.315	0.036*	-0.375	0.032*	-0.307	0.075
Manager's highest qualification	+0.316	0.456	+0.159	0.748	+0.582	0.235
Mean qualification level of staff	-0.006	0.970	-0.325	0.092	-0.080	0.674
Percentage of staff replaced during the last year	-0.211	0.141	-0.113	0.494	-0.120	0.464
Overall staff to child ratio	+0.253	0.125	+0.376	0.051	+0.276	0.146
Staff to child ratio 3-4 year olds	-0.065	0.642	-0.189	0.248	-0.262	0.108
Frequency of staff CPD	-0.052	0.739	-0.056	0.757	-0.045	0.802
Frequency of staff supervision	-0.096	0.452	-0.166	0.265	-0.021	0.884
Setting on single site	-0.127	0.807	+0.152	0.802	-0.149	0.805
SEN/D provision	+0.236	0.189	+0.367	0.081	+0.361	0.082
Training plan in place	+0.108	0.599	+0.002	0.993	+0.117	0.621
Training budget in place	+0.403	0.127	+0.690	0.026*	+0.341	0.262

Standardised model coefficients, Beta, give (a) the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate (continuous covariates), or (b) the change in the outcome variable in standard deviation units corresponding to the contrast between settings with the stated characteristic and settings without it (binary covariates – bottom four rows).

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .

**Table 66: Results of regression models of quality factors in terms of characteristics of childcare settings: Nursery classes/schools II.**

Nursery class/school						
Outcome	Factor 4 Care		Factor 5 Shared thinking		Factor 6 Early literacy	
	Beta	p-value	Beta	p-value	Beta	p-value
Number of places provided	+0.176	0.489	+0.230	0.334	+0.201	0.430
Minimum age of children	+0.735	0.047*	+0.381	0.266	+0.451	0.219
Maximum age of children	-0.353	0.037*	-0.334	0.035*	-0.400	0.019*
Manager's highest qualification	+0.090	0.851	+0.443	0.322	+0.327	0.495
Mean qualification level of staff	+0.000	0.998	+0.029	0.867	-0.043	0.818
Percentage of staff replaced during the last year	-0.079	0.625	-0.240	0.113	-0.176	0.275
Overall staff to child ratio	+0.296	0.111	+0.285	0.100	+0.344	0.065
Staff to child ratio 3-4 year olds	+0.158	0.318	-0.330	0.028*	-0.197	0.215
Frequency of staff CPD	-0.041	0.818	+0.093	0.572	+0.025	0.886
Frequency of staff supervision	-0.156	0.280	0.000	1.000	-0.184	0.206
Setting on single site	+0.028	0.962	-0.203	0.712	-0.189	0.749
SEN/D provision	+0.090	0.655	+0.284	0.133	+0.232	0.251
Training plan in place	+0.050	0.830	-0.078	0.718	+0.097	0.677
Training budget in place	+0.126	0.669	+0.652	0.020*	+0.233	0.432

Standardised model coefficients, Beta, give (a) the change in the outcome variable in standard deviation units corresponding to a two standard deviation change in the covariate (continuous covariates), or (b) the change in the outcome variable in standard deviation units corresponding to the contrast between settings with the stated characteristic and settings without it (binary covariates – bottom four rows).

Statistical significance is shown using stars: \* =  $p < 0.05$ , \*\* =  $p < 0.01$ , \*\*\* =  $p < 0.001$ .