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## **Child care services, socioeconomic inequalities, and academic performance**

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**Short title:** Child care and academic performance

**Abbreviations:** CCS – child care services, SES – socioeconomic status, ES – Effect Size

**Key Words:** Academic Achievement, Cognition, Prevention, Social Class, Child care

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### **What's Known on This Subject**

Previous studies indicate that higher quality of child care services (CCS) have long-lasting cognitive benefits, regardless of SES. However, there is disparity between studies as to whether childcare intensity and type can reduce these social inequalities up to adolescence.

### **What This Study Adds**

At a population level, childcare services were shown to have either reduced or eliminated the social inequalities in academic achievement up to adolescence after careful control of selection bias and attrition.

**Contributors' Statement :**

Julie C. Laurin, Dr. Laurin carried out all analyses, drafted the manuscript and approved the final manuscript as submitted.

Marie-Claude Geoffroy and Marie-France Raynault, Drs. Geoffroy and Raynault reviewed the manuscript and approved the final manuscript as submitted.

Michel Boivin and Christa Japel, Drs. Boivin and Japel designed the data collection instruments, reviewed the manuscript and approved the final manuscript as submitted.

Richard E. Tremblay, Dr. Tremblay conceptualized, designed the study, designed the data collection instruments, reviewed the manuscript and approved the final manuscript as submitted.

Sylvana M. Côté, Dr. Côté conceptualized and designed the study, critically reviewed the analyses and the manuscript, and approved the final manuscript as submitted.

## Abstract

**Objective.** To determine if child care services (CCS) at a population level can reduce social inequalities in academic performance until early adolescence.

**Method.** A 12-year population-based prospective cohort study of families with a newborn ( $n = 1269$ ). Two CCS variables were estimated: ‘intensity’ (low, moderate and high number of hours) and ‘Center-Based CCS Type’ (early-, late-onset, and never exposed to center-based CCS).

**Results.** Children from low socioeconomic status (SES) families who received high-intensity CCS (any type), compared to those who received low-intensity CCS, had significantly better reading (Standardized Effect Size [ES]= .37), writing ( $ES=.37$ ), and mathematics ( $ES=.46$ ) scores. Children from low-SES families who received center-based CCS, compared to those who never attended center-care, had significantly better reading ( $ES_{early-onset}=.68$ ;  $ES_{late-onset}=.37$ ), writing ( $ES_{early-onset}=.79$ ), and mathematics ( $ES_{early-onset}=.66$ ;  $ES_{late-onset}=.39$ ) scores. Furthermore, early participation in center-based CCS eliminated the differences between children of low- and adequate-SES on all three exams ( $ES = -.01, .13, \text{ and } -.02$  for reading, writing and mathematics, respectively). These results were obtained while controlling for a wide range of child and family variables from birth to school entry.

**Conclusion.** Child care services (any type) can reduce the social inequalities in academic performance up to early adolescence, while early participation in center-based CCS can eliminate this inequality. CCS use, especially early participation in center-based CCS should be strongly encouraged for children growing up in a low-SES family.

## Introduction

Socially disadvantaged children are at high risk for poor academic achievement and school dropout<sup>1-3</sup>. The most robust evidence that Child Care Services (CCS) promote academic achievement for these children comes from experimental programs designed to serve the most disadvantaged children<sup>4-6</sup>. However, it is not clear whether CCS widely available in communities, which are typically of lower quality than experimental child care programs, can have comparable effects. Furthermore, large-scale longitudinal studies have shown that, under some circumstances (e.g., initiation in infancy), CCS can have a negative impact\* on children's cognitive development<sup>7,8</sup>. Thus, CCS have tremendous potential for reducing social inequalities, but the conditions under which positive and negative impacts are observed need to be better documented and understood in order to foster population-wide positive outcomes and avoid iatrogenic effects.

A small number of population-based studies have shown that CCS can reduce the socioeconomic disparities in school readiness and school performance at school entry<sup>9-12</sup>. However, it is unclear to what extent these benefits extend beyond the first few years of primary school, and which type and intensity of CCS are needed to achieve these long-term effects. The evidence regarding the short- and medium-term impact of CCS on cognitive outcomes for low socioeconomic status (SES) children is mixed. For instance, a study with a large UK sample ( $N \sim 13,000$ ) found that CCS exposure -any type- starting in infancy was positively associated with cognitive outcomes for 3-year-old children of low-educated mothers<sup>12</sup>. However, these benefits were not observed at 5- and 7-years. Positive outcomes associated with center-based CCS lasted longer -until 5-years- but disappeared by 7-years. In two Canadian population-based

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\* Of note, although the term *impact* is used throughout to simplify the text, it does not imply causal effects.

birth cohort studies, the CCS effects on cognitive outcomes for low-SES children were observed at school-entry<sup>10</sup> and maintained into grade 1 and 2<sup>11</sup>. This suggests that, for socially disadvantaged children, positive CCS contributions can persist into early elementary school years.

A few large scale longitudinal studies in the U.S. have shown that the quality of CCS is positively associated with academic achievement up to adolescence<sup>9,13-15</sup>. However, these studies have not shown specifically that CCS had reduced the socioeconomic inequalities in academic achievement. Also, we do not know which intensity and type of CCS exposure can reduce or eliminate the social inequality gap in the long-term. Information on the conditions under which CCS –i.e., type and intensity- may serve as a potential equalizer of academic opportunities is necessary to design better CCS.

## **Study Objectives**

The goals of this study were to test 1) whether, in the long-term (i.e., the end of 6<sup>th</sup> grade, 12-years), CCS leads to higher academic achievements for low-SES children relative to adequate-SES children; 2) which intensity and type of CCS exposure are necessary to achieve these long-term benefits. One major challenge in assessing exposure to CCS types is that children typically transition across types during early childhood. To address this issue, we estimated group-based developmental trajectories of CCS ‘intensity’ (i.e., number of hours-per-week) and ‘type’ (i.e., center-based versus never center-based CCS). We tested for interactions between SES and CCS trajectories in predicting province-wide school performance exams (12-years). Close attention was paid to selection bias by controlling for a host of child, parent and family confounders across early childhood.

## **Methods**

## Participants

Data from the Quebec Longitudinal Study of Child Development (QLSCD) was used. Through birth registries, the QLSCD selected 2120 singleton newborns representative of the Quebec (Canada) newborns between 1997 and 1998. This study was initiated during the implementation of CCS (family-based or center-based settings) offered at a very low cost (5\$-per-day) to families throughout the province. Ethics approval and informed consent were obtained at each data collection year (5-months, 1.5-, 2.5-, 3.5-, 4.5- and 12-years). Full information maximum likelihood (FIML) dealt with missing data when estimating our CCS trajectories and family variables ( $N=2120$ ). Sample sizes varied thereafter for specific outcomes and predictors. A total of 1077 (reading), 1137 (writing) and 1112 (mathematics) children had Quebec government exams data<sup>16</sup>. To address attrition, two sets of multiple imputations were calculated. The first was calculated on our ‘full sample’, i.e., participants with at least one available Quebec government exam score ( $n=1269$ ). The second is a subsample of the first ( $n=1119$ ), dropping those who did not receive CCS during the preschool years ( $n=150$ ).

## Measures

**Child Care Services (CCS).** At each assessment, mothers were asked about the number of hours and the type of CCS exposure. The weekly number of hours range from 0, ‘in parental care’ to 60-hours (mode=40-hours). Analyses comparing exposure to center-based CCS excluded children who remained in parental care during the preschool years ( $n=150$ ; Table 1). The center-based CCS type variable distinguished (a) ‘center-based CCS’ [coded as 1], provided by mostly trained educators in a non-residential environment<sup>16</sup>, from (b) ‘never exposed to center-based CCS’ -i.e., other CCS types provided by a non-relative (nanny or family-based CCS) or a relative (i.e., grandparent or sibling) in a residential home or in the child’s home [coded as 0]<sup>16</sup>.

Group-based developmental trajectories were estimated for CCS intensity and center-based type. CCS intensity trajectories were estimated using a nonparametric model for difficult-to-specify data distributions (KML, R project<sup>17</sup>, published in<sup>18</sup>), while the center-based type trajectories were estimated using a semi-parametric mixture model (PROC Traj, SAS<sup>16,19</sup>). The trajectory methods allowed using all early childhood developmental data points (5-months to 4.5-years; FIML; Figure 1). The CCS intensity variable relied on the mean number of hours-per-week spent in CCS (0= in parental care), yielding *Low, Moderate, High Intensity* trajectories. The center-based type variable estimated the level of exposure to ‘center-based care’, and excluded children who remained in parental care ( $n=150$ ), yielding *Early-, Late-Onset, Never Exposed to Center-Based CCS* trajectories (see Figure 1 notes).

**Provincial Government Exams.** Every Quebec student must write Ministry of Education exams at the end of grade 6 (12-years). The results of the reading, writing and mathematics’ exams were marked and made accessible by the Quebec’s Institute of Statistic<sup>16</sup>. The scores are percentages and range from 6 to 100. QLSCD participants who did not write these exams at 12-years because they were previously held back a grade ( $n=97$ ) were given a score of zero for each exam<sup>16</sup>.

**Accounting for Selection Bias: Controlling for Confounders.** Child, parent and family characteristics at birth and during the preschool years were considered as potential confounding variables. Unless otherwise indicated, all variables were reported by the mother.

**Child Characteristics.** The child’s sex (1: boys), birth order (0: 1<sup>st</sup> born; onward), Cumulative Score for Neonatal Risk (CSNR) and difficult temperament were used in the analyses. The CSNR, created from medical records, is related to other indicators of birth health, including the duration of hospital stay (see <sup>20</sup> and Table 1 for further details). The infancy difficult temperament subscale was taken from the Infant Characteristic Questionnaire<sup>21</sup>.



**Early Family Environment (5-months).** Child bearing age and family status (1: intact family; 0: non-intact [blended or single-parent families]) were measured. The 12-item family functioning scale assesses communication, problem resolution, and expression of affect in the family<sup>22</sup>. Higher scores reflect family relationship difficulties. Neighborhood perception was assessed via two variables (0 to 4)<sup>23</sup>. Higher scores on the 7-item neighborhood safety and cohesion measure (e.g., “safe to walk alone”) indicate lower safety. Higher scores on the 6-item social problems variable (e.g., drug selling in the neighborhood) indicate fewer issues.

**Preschool Environment (birth to 5-years).** We summarized the information of 108 family variables, collected from both parents from birth to 5-years (438 items)<sup>16,24</sup>, into six preschool environmental adversity factors which were created through exploratory and confirmatory factor analyses<sup>16,24</sup>: i) SES (i.e., parental education, income, occupational prestige), ii) negative parenting, iii) positive parenting, iv) parent’s deviant behavior (e.g., alcohol and drug use, antisocial behaviors), v) parent’s mental health (e.g., depression, anxiety), vi) child-peer relationships (e.g., victimization, bullying). SES, considered as the moderator variable, was split at the 25th percentile to form two groups (0: 75% adequate-SES; 1: 25% low-SES).

## **Statistical Analyses**

### **Accounting for Attrition.**

**Propensity Score Sample Weights.** Propensity score sample weights were calculated to address sample attrition, with the goal of matching the study sample to the original sample [recruited at 5-months]) on demographic characteristics<sup>16</sup>. Weights were calculated as follows. First the best predictors of missingness on the provincial exam were identified: parents’ education and occupational prestige, family’s income and home stimulation level, frequency of

reading to one's child, and children's sex. Then each participant was attributed a weight which was inversely proportional to the probability of having a score on the provincial exams.

**Data Imputation.** To address data attrition, multiple imputation by chained equations (SPSS) imputed missing values on covariates and outcomes for participants with at least one provincial exam score ( $n=1269$ ). A second imputation was calculated for participants who received CCS ( $n=1119$ ), excluding the  $n=150$  who remained in parental care. Fewer than 15% of observations were imputed. We created 100 datasets, and conducted regression analyses that pooled results from them.

### **Confounding Variables**

Fifteen potential confounding variables were tested for their bivariate association with academic achievement scores. Those significantly associated with academic achievements were selected as control variables in both regression models (Table 2). Because children of this sample who receive early CCS had different personal and family characteristics than those who did not<sup>25</sup>, (i.e., there was a selection bias of families using the services) we also searched for differences between child care groups on these 15 variables. Those significantly associated with both child care participation and academic performance at 12 years were considered a selection bias confounding factor (Table 2).

### **Modeling Associations Between Each CCS Trajectories and Academic Achievement Scores**

Finally, to investigate which CCS intensity and type trajectory best predicted academic achievement scores and whether SES moderated the association, a multiple regression analysis was conducted for each CCS variable. In each model, predictors included (a) child, family and preschool environment confounders, and either the CCS intensity or center-based variable (Step

1), (b) the interaction between the CCS variable and SES (Step 2). The respective reference groups were ‘Low-Intensity’ and ‘Never exposed to Center-Based care’ groups. Effect sizes were calculated using the following formula:  $B(\text{traj}) / SD(Y)$ . Values of .10, .30 and .50 represent small, medium and large effect sizes (standardized coefficient)<sup>26</sup>.

## **Results**

### **Confounding Variables**

The positive parenting factor was unrelated to the academic achievement scores and was dropped from further analyses. A total of 14 confounding variables were included in each model and are shown in Table 2 and 3.

### **Modeling CCS Trajectories**

Both models comprised 3 trajectories of (a) CCS intensity and (b) level of exposure to center-based CCS during preschool. See depiction in Figure 1.

### **Modeling Associations Between CCS Trajectories and Academic Achievement Scores**

Table 3 presents the results of the two sets of multiple regressions. Because results for complete and imputed data were equivalent<sup>16</sup>, only the latter is reported. The model with CCS intensity trajectories distinguished participants’ reading, writing, and mathematic academic achievement score at 12-years (Table 3). There was a significant interaction between SES and CCS intensity, indicating that low-SES children who received high-intensity CCS (any type) had moderately better reading and writing scores (both effect size [ES] =.37), and largely higher scores in mathematics (ES=.46) than low-SES children who received moderate- or low-intensity CCS (Figure 2a).

The second model with Center-Based CCS trajectories also distinguished children's reading, writing, and mathematics scores and focussed on the potential benefit for children who were exposed to center-based CCS versus those never exposed to it (Table 3). Both interaction terms of SES and Center-based CCS (i.e., SES X early-onset center and SES X late-onset center) were significant for reading and mathematics, while only early-onset was significant for writing (Figure 2b). These results suggest that exposure to early-onset center-based CCS for low-SES children is associated with large gains in reading, writing and mathematics scores (respective ES: .68, .79, .66), while late-onset center-based CCS is associated with moderately better reading and mathematics scores (respective ES: .37, .39).

### **Supplemental Analysis**

We decomposed the CCS interactions by assessing SES 'within effects' on each level of the trajectories. Akin to an ANOVA (GLM), the three interaction terms shown in Table 4 indicate if there are significant mean differences remaining between children of different socioeconomic background within each trajectory level. While high-intensity CCS completely eliminated the SES gap in mathematics (ES: -.20), only early-onset exposure to center-care did so in every discipline (respective reading, writing and mathematics ES: .00, .13, -.02).

We also undertook supplemental analyses in which we controlled for children's cognitive assessments at 7-years, for maternal IQ, and for the level of stimulation in the child's home environment (Home Observation for Measurement of the Environment Inventory Short-Form; Verbalization and Stimulation subscales<sup>27</sup>) to examine whether associations between CCS intensity or type and achievement at 12-years could be explained by these factors. Controlling for either did not alter associations of CCS intensity and center-based type with academic achievements<sup>16</sup>.

## Discussion

We examined the long-term associations between child care services (CCS) during early childhood and academic achievement in early adolescence, with a specific focus on the educational benefits of CCS for low-SES youth. Results revealed that for low-SES children, exposure to CCS (any type) over 35-hours a week was associated with better academic achievement in all disciplines –reading, writing and mathematics- at 12-years. We also found that low-SES children exposed to center-based CCS earlier in life (i.e., from 5-months) had better reading, writing and mathematics scores than low-SES children never exposed to center-based CCS, while those exposed to center-based CCS later (i.e., from 1.5-years) only had better reading and mathematics scores. These results were obtained while accounting for selection bias into CCS over the first 5-years of life, attrition, and missing data.

Effect size analyses revealed that when low-SES children received intensive CCS (over 35 hours a week), academic achievements were moderately (reading, writing) to largely improved (mathematics). Similarly, when low-SES children receive center-based CCS later (i.e., from 1.5- years), their scores were moderately improved. Importantly, when low-SES children received center-based CCS early (i.e., from 5-months), the gains were large enough to perform at the same level as children from higher SES.

We found that CCS were not associated with academic achievement for children who were from an adequate-SES family (75% of the sample), which is consistent with previous results with this sample<sup>10,11</sup>. Together, the results support the notion that for children who are growing-up in an adequate-SES family environments, CCS do not make a significant difference –positive or negative– on their long-term academic performance. However, for children from

low-SES background, CCS -in general and center-based CCS in particular- promote higher academic performance.

It is important to note that in the present study, the CCS that were not center-based were mainly family-based (varied from 10 to 30% from 5-months to 4.5-years)<sup>16</sup>. These services are usually provided in a home-like setting to children of different ages, and with less focus on structured activities than in center-based CCS. Center-based CCS are provided to groups of children of similar ages in an educational setting<sup>28,29</sup>. There is evidence that age segregation promotes higher quality care and education<sup>30</sup> and this may be one of the reasons why larger effects are achieved for center-based CCS.

Previous publications from US-based NICHD ECCS reported associations between higher child care quality and academic achievement at 15-years<sup>13,14</sup>, as well as a higher cognitive performance among low-SES children at 4.5-11years<sup>31</sup>. However, to our knowledge, there is no NICHD ECCS reporting of differential effects of CCS for low- and adequate-SES children comparing different features of CCS such as intensity and type.

Our interaction results are consistent with, and extend longitudinally, previous reports on this sample of cognitive benefits of CCS at school entry<sup>10-12</sup>, and at 3- to 7-years among children of low-educated mothers<sup>10-12</sup>. Not only were the benefits of CCS for low-SES children maintained until the end of 6<sup>th</sup> grade (12-years) and unexplained by cognition (7-year-old; mothers') or the home environment<sup>16</sup>, but they were substantial and eliminated the disparities in academic performance between low- and adequate-SES children<sup>16</sup>.

### **Strengths and Limitations**

This study has many strengths. As sample sizes are often relatively small in CCS studies<sup>7</sup>, the large population-based sample allowed detection of SES moderation effects, while also controlling for a large array of confounding factors. Also, using early childhood adversity factors enabled us to include a comprehensive number of longitudinally pertinent selection bias factors (or confounders). Having access to standardized population-based exams substantially increased the reliability of our outcomes. Finally, with the repeated CCS assessments during early childhood, we were able to take into account time-specific missing data and transitions across CCS types by measuring CCS developmental trajectories. Beyond providing a time-sensitive pictorial display of CCS data, these analyses use FIML and thus include subjects with at least one assessment point. Note also that attrition before age 5 was only 2%.

The study is not without limitations. First, as with all longitudinal studies, there was differential attrition over time associated with socio-demographic characteristics. To address this issue, we calculated propensity score weights to make the analysis sample comparable to the original sample (at 5-months) on demographic characteristics<sup>16</sup>. Another limitation relates to selection effects, which may partly explain the findings, as families who use CCS can be different from those who do not on unmeasured variables. Randomly assigning children to different types of care would better control for selection bias, yet such trials are difficult to conduct for ethical reasons. Consequently, results of correlational studies carefully controlling for selection bias represent a good approximation to the true effects of child care.

To address the limitations, we controlled for a careful selection of confounders. The breadth of our control variables (e.g., 108 family variables summarized in factor scores<sup>16</sup>), the quality of our outcome variables (three standardized ministerial exam), the longitudinal nature of our CCS predictors, as well as the fact that our pattern of results was previously found with

school entry academic performance<sup>11</sup>, comforts us in the validity of our findings. Still, the correlational design prevents us from making causal inferences, and generalization of findings should be limited to populations with similar CCS (e.g., low multiplicity in child care arrangements).

### **Conclusion**

Altogether, high-intensity CCS exposure (any type) and early-onset center-based CCS were associated with better academic achievement scores in reading, writing, and mathematics among low-SES children at 12-years, thus reducing or eliminating –in the case of center-based CCS- the differences in academic achievement between children of low- and adequate-SES background. These results confirm the importance of social policies that will facilitate access to CCS for socially disadvantaged children, and thus rebuke against child care cuts as currently seen in Canada and the US.

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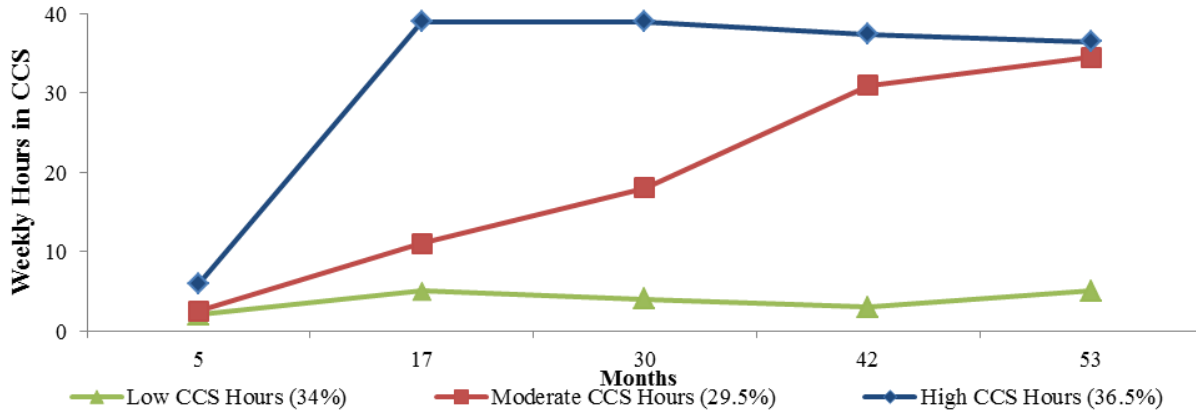
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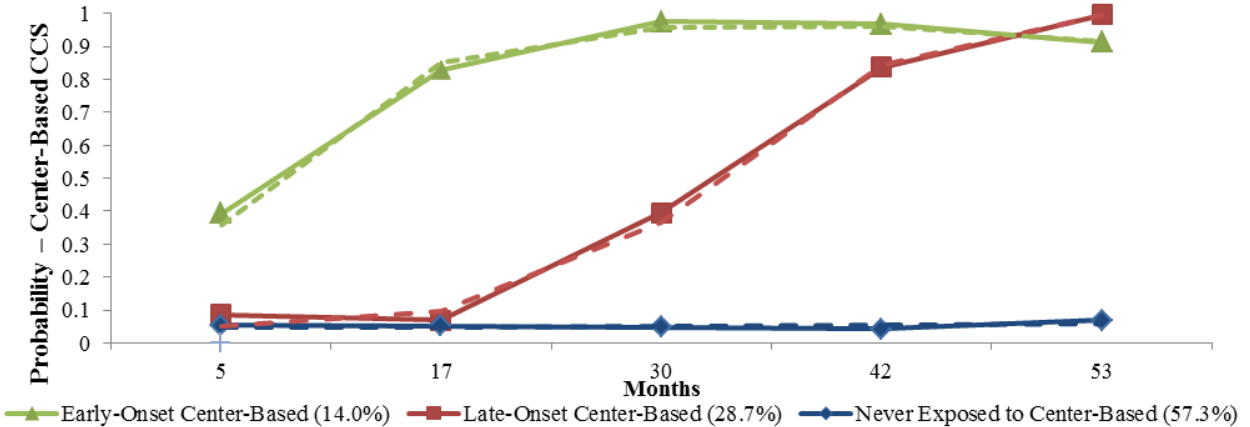
**Figure 1. Child Care Trajectories**

**a. Intensity (n=2120)**



**Notes.** CCS (Child Care Services). The first trajectory is the most common and exhibits a sharp increase in childcare attendance intensity within the 1<sup>st</sup> year and remains stable, with high childcare attendance until 4-years (> 35 hours per week); approximately 36.5% of the children follow the ‘high intensity’ (number of hours) trajectory. The next trajectory exhibits a gradual increase in childcare hours over the years. Approximately 29.5% of children follow the ‘moderate intensity’ trajectory. The final trajectory is relatively low and stable, with children demonstrating a very ‘low number of hours’ in childcare attendance (< 5 hours per week). An estimated proportion of 34% of the children follow this lowest number of hour trajectory.

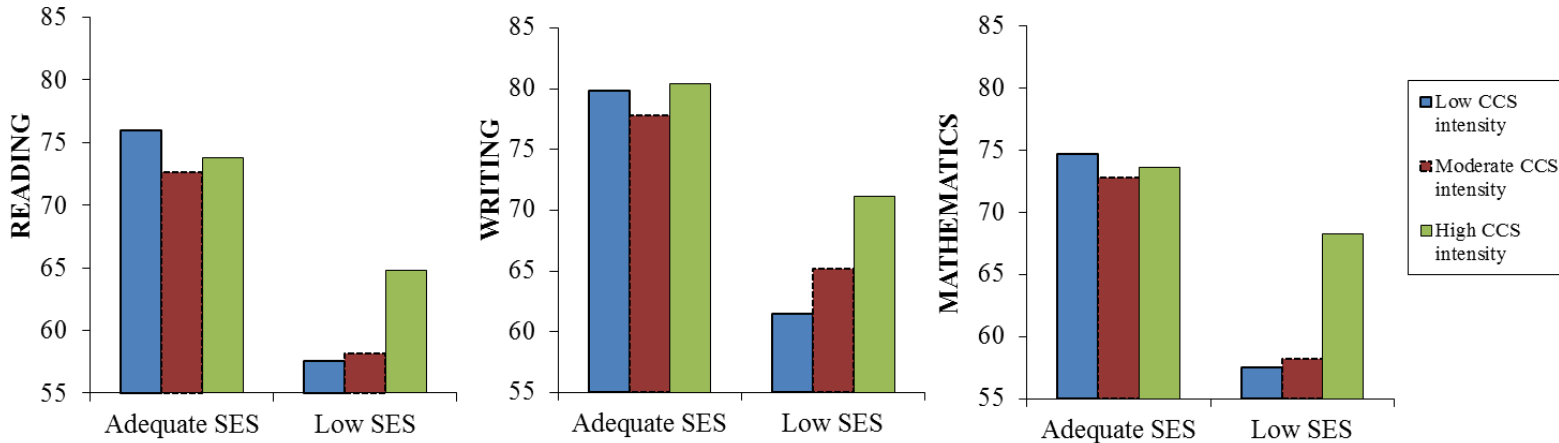
**b. Center-Based CCS (n = 1800)**



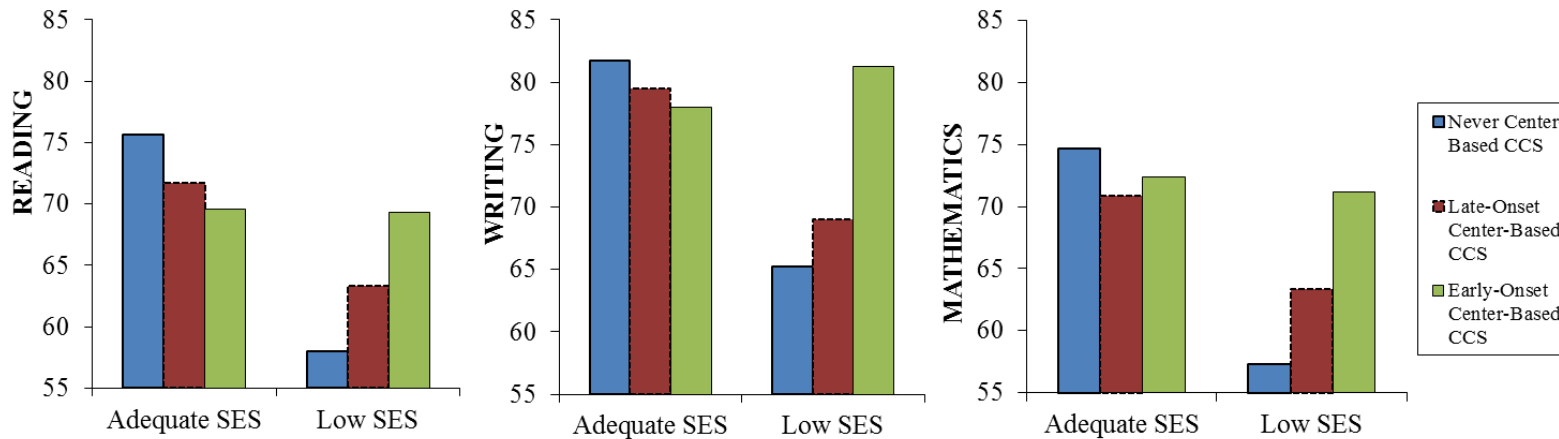
**Notes.** CCS (Child Care Services). Solid lines represent observed values. Dashed lines represent predicted values. The first trajectory includes children who have a high probability of attending center-care early (~ at about 1.5 years). Approximately 14% of our sample followed the ‘early-onset center-care’ trajectory. In the next trajectory, children have a high probability of being enrolled in other child care services until 17-months and then gradually increase in their enrollment in center-based care (beginning ~ at 2.5-years). Approximately 28.7% of children follow the ‘late-onset center care’ trajectory. Finally, 57.3% of our sample have a high probability of never being exposed to center-based care during the preschool years (i.e., enrolled in other child care services), and this was depicted by the low and stable trajectory.

**Figure 2. Interaction Between CCS Trajectories and SES on Reading, Writing, and Mathematic Academic Achievement Scores**

**A) Intensity**



**B) Center-Based CCS**



**Notes.** CCS (Child care services), SES (socio economic background); Confounding variables in each model includes the child's sex and temperament, birth order and Cumulative Score for Neonatal Risk (includes birth weight, gestational age, intrauterine growth retardation, retardation of cranial perimeter growth, congenital abnormalities, APGAR score and neonatal complications), maternal childbearing age, family status and functioning, neighborhood safety and social problems, and five of the preschool environment factors (SES, negative parenting, family deviancy, mental health, child-peer relationship).

**Table 1. Descriptive Statistics**

	Age	Total (Percents)	Mean (SD)	Min	Max
<b>Control Variables</b>					
Child's Sex	5-months	1269			
0 girl		597 (47.0%)			
1 boy		672 (53.0%)			
Child's Birth Order	5-months	1269			
1 1st born		576 (45.4%)			
2 had one sibling at birth		514 (40.5%)			
3 had two siblings at birth		132 (10.4%)			
4 had three siblings at birth		30 (2.3%)			
5 had at least four siblings at birth		17 (1.3%)			
Family Status	5-months	1266			
0 non-intact family					
1 intact family					
SES Factor	5- to 53-months	1269			
0 adequate-SES		941 (74.1%)			
1 low-SES (bottom 25th quartile)		328 (25.9%)			
CSNR	birth	1169	.90 (1.17)	.00	4.88
Difficult Temperament	5-months	1264	2.72 (1.58)	.00	8.00
Child Bearing Age	5-months	1269	29.00 (5.37)	16.40	44.50
Family Dysfunction	5-months	1257	1.70 (1.40)	.00	6.55
Neighbourhood Safety	5-months	1200	1.81 (.61)	1.00	3.80
Neighborhood Social Problems	5-months	1249	2.79 (.36)	1.57	3.00
Negative Parenting Factor	5- to 53-months	1269	.06 (.62)	-1.54	2.15
Family Deviancy Factor	5- to 53-months	1269	.01 (.20)	-.20	.71
Parent Mental Health Factor	5- to 53-months	1269	.02 (.55)	-1.03	1.91
Child Peer Relationship Factor	5- to 53-months	1269	-.02 (.30)	-1.00	.55
<b>Independent Variables</b>					
CCS Intensity	5- to 53-months	1269			
1 Low CCS Hours		416 (32.8%)			
2 Moderate CCS Hours		394 (31.0%)			
3 High CCS Hours		459 (36.2%)			

Center-Based CCS Type	5- to 53-months	1119
3 Early-Onset Center-Based CCS		133 (11.9%)
2 Late-Onset Center-Based CCS		292 (26.1%)
1 Never Center-Based CCS		694 (62.0%)

**Dependent Variables**

Reading (0=repeated a grade)	12-years	1075	62.50 (26.44)	0.00	100.00
Writing (0=repeated a grade)	12-years	1136	65.55 (25.64)	0.00	100.00
Mathematic (0=repeated a grade)	12-years	1110	65.57 (26.74)	0.00	99.65

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**Notes.** The SES Factor variable is shown in its categorical formats as used in the analyses; CSNR (Cumulative Score for Neonatal Risk; includes birth weight, gestational age, intrauterine growth retardation, retardation of cranial perimeter growth, congenital abnormalities, APGAR score and neonatal complications); CCS (Child Care Services).

**Table 2. Bivariate Associations Between Potential Confounders and the Study's Dependent, Independent and Moderator Variables.**

	CCS Intensity Sample (n = 1269)												
	Dependent Variables: 12yo Government Exams						Independent Variable: CCS Intensity Trajectories				Moderator: Socioeconomic Status		
	Reading		Writing		Mathematics		Low Hours	Moderate	High	p	Adequate	Low SES	p
	r	p	r	p	r	p	(n= 416)	Hours (n=	Hours (n=		SES (n=	(n= 328)	
	value		value		value		394)	459)	value	941)		value	
Reading							60.01 (28.13)	61.62 (26.74)	66.47 (23.41)	.001	67.73 (23.22)	48.85 (29.09)	< .001
Writing							61.00 (27.68)	64.72 (25.17)	70.31 (22.76)	< .001	70.43 (22.20)	51.45 (28.87)	< .001
Mathematics							62.36 (28.83)	64.92 (26.45)	69.96 (23.58)	< .001	70.59 (23.21)	52.47 (30.35)	< .001
CCS Intensity Trajectories	.10	< .001	.15	< .001	.12	< .001					2.19 (.81)	1.60 (.72)	< .001
Sex	-.16	< .001	-.23	< .001	-.09	.003	.53 (.50)	.50 (.50)	.56 (.50)	.27	.54 (.50)	.51 (.50)	.48
Birth Order	-.05	.12	-.08	.01	-.08	.01	1.91 (.96)	1.68 (.79)	1.62 (.73)	< .001	1.72 (.79)	1.79 (.95)	.20
Family Status	.17	< .001	.18	< .001	.19	< .001	.78 (.42)	.80 (.40)	.84 (.37)	.08	.88 (.33)	.61 (.49)	.00
CSNR	-.06	.05	-.06	.07	-.05	.12	.94 (1.19)	.85 (1.18)	.90 (1.13)	.51	.85 (1.16)	1.04 (1.18)	.02
Difficult Temperament	.07	.01	.08	.008	.06	.03	2.64 (1.62)	2.77 (1.57)	2.73 (1.56)	.51	2.73 (1.59)	2.68 (1.55)	.66
Maternal age	.16	< .001	.14	< .001	.11	< .001	28.64 (5.93)	28.18 (5.31)	30.02 (4.71)	< .001	29.91 (4.76)	26.37 (6.13)	< .001
Family Dysfunction	-.09	.003	-.09	.002	-.08	.006	1.80 (1.42)	1.70 (1.36)	1.62 (1.41)	.20	1.55 (1.31)	2.15 (1.55)	< .001
Neighbourhood Safety	-.08	.007	-.10	< .001	-.09	.002	1.88 (.64)	1.84 (.64)	1.73 (.56)	< .001	1.76 (.59)	1.98 (.65)	< .001
Social Problems in Neighbourhood	.08	.007	.11	< .001	.10	.001	2.73 (.42)	2.78 (.35)	2.84 (.30)	< .001	2.83 (.31)	2.67 (.45)	< .001
T1 - SES Factor	-.32	< .001	-.33	< .001	-.30	< .001	.43 (.50)	.27 (.44)	.10 (.30)	< .001			
T1 - Positive Parenting Factor	.01	.74	.01	.68	.00	.87	-.03 (.39)	-.02 (.34)	-.07 (.35)	.09	-.04 (.35)	-.04 (.39)	.74
T1 - Negative Parenting Factor	-.06	.06	-.05	.08	-.03	.25	.05 (.66)	.08 (.60)	.05 (.61)	.83	.06 (.60)	.07 (.69)	.71
T1 - Family Deviancy Factor	-.06	.06	-.07	.02	-.05	.11	.01 (.19)	.02 (.21)	.00 (.19)	.60	-.01 (.18)	.06 (.23)	< .001
T1 - Parent Mental	-.16	< .001	-.17	< .001	-.16	< .001	.10 (.58)	.04 (.54)	-.08 (.51)	< .001	-.09 (.51)	.31 (.56)	< .001

Health Factor		.001		.001		.001								
T1 - Child Peer relationships Factor	.09	.004	.09	.003	.10	<.001	-.02 (.33)	-.03 (.29)	.00 (.29)	.36	.00 (.30)	-.05 (.32)	.01	

Center-Based CCS Sample (n = 1119)

	Dependent Variables: 12yo Government Exams						Independent Variable: Center-Based CCS Trajectories				Moderator: Socioeconomic Status		
	Reading		Writing		Mathematics		Never Center-Based CCS (n = 694)	Late-Onset Center-Based CCS (n = 292)	Early-Onset Center-Based CCS (n = 133)	p value	Adequate SES (n = 876)	Low SES (n = 243)	p value
	r	p value	r	p value	r	p value							
Reading							64.47 (25.61)	62.66 (25.37)	62.38 (25.86)	.47	67.45 (23.36)	50.37 (28.61)	<.001
Writing							66.99 (24.84)	66.10 (24.91)	67.43 (24.91)	.80	70.39 (22.38)	53.88 (28.78)	<.001
Mathematics							67.19 (25.80)	65.53 (25.61)	68.11 (25.83)	.53	70.62 (23.26)	53.33 (29.53)	<.001
Center-Based CCS Trajectories											1.52 (.71)	1.40 (.64)	.02
Sex	-.03	.28	.00	.94	.00	.92							
Birth Order	-.16	<.001	-.23	<.001	-.08	.01	.52 (.50)	.55 (.50)	.50 (.50)	.63	.54 (.50)	.47 (.50)	.05
Family Status	-.02	.57	-.05	.11	-.05	.11	1.68 (.80)	1.68 (.72)	1.82 (.98)	.17	1.70 (.78)	1.70 (.91)	.90
CSNR	.16	<.001	.15	<.001	.19	<.001	.84 (.37)	.80 (.40)	.76 (.43)	.07	.88 (.33)	.60 (.49)	<.001
Difficult Temperament	-.05	.17	-.04	.28	-.03	.31	.93 (1.17)	.81 (1.17)	.80 (1.13)	.19	.85 (1.17)	1.01 (1.13)	.06
Maternal age	.08	.01	.07	.02	.07	.03	2.73 (1.63)	2.78 (1.64)	2.69 (1.34)	.80	2.73 (1.60)	2.78 (1.59)	.71
Family Dysfunction	.17	<.001	.16	<.001	.12	<.001	28.76 (5.32)	29.26 (5.11)	29.86 (5.60)	.06	29.85 (4.70)	26.03 (6.25)	<.001
Neighbourhood Safety	-.07	.03	-.07	.03	-.06	.07	1.63 (1.42)	1.69 (1.35)	1.83 (1.37)	.20	1.55 (1.30)	2.10 (1.63)	<.001
Social Problems in Neighbourhood	-.07	.02	-.10	.003	-.09	.01	1.79 (.61)	1.82 (.61)	1.76 (.57)	.57	1.76 (.59)	1.93 (.65)	<.001
T1 - SES Factor	.09	.003	.12	<.001	.12	<.001	2.80 (.35)	2.78 (.37)	2.77 (.33)	.56	2.82 (.31)	2.67 (.45)	<.001
T1 - Positive Parenting Factor	-.28	<.001	-.27	<.001	-.28	<.001	.24 (.43)	.20 (.40)	.15 (.36)	.06			
T1 - Negative	.03	.34	.03	.31	.01	.64	-.03 (.35)	-.08 (.35)	-.07 (.36)	.11	-.04 (.35)	-.08 (.36)	.12
	-.08	.01	-.08	.01	-.04	.18	.04 (.60)	.14 (.62)	.07 (.64)	.04	.05 (.59)	.13 (.67)	.08



Parenting Factor													
T1 - Family Deviancy Factor	-.06	.09	-.07	.04	-.05	.14	.01 (.20)	.01 (.20)	.01 (.20)	.99	-.01 (.18)	.08 (.25)	< .001
T1 - Parent Mental Health Factor	-.15	<	-.16	<	-.16	<	-.04 (.51)	.09 (.59)	.04 (.62)	.003	-.09 (.51)	.35 (.56)	< .001
T1 - Child Peer relationships Factor	.09	.004	.10	.002	.10	.003	.00 (.30)	-.04 (.31)	-.05 (.32)	.07	.00 (.30)	-.08 (.32)	< .001

**Notes.** Data are presented as r, means and (SD). CCS (Child Care services); The Center-Based CCS sample eliminates those who remained in parental care (n=150), thus comparing only children who attend CCS; Among the variables tested as potential selection bias factors, only the positive parenting factor was not related to child care, socioeconomic status or academic achievement. It was thus dropped from our analyses, leaving 14 confound variables in the analyses. Also, children in either child care trajectory (independent variables) differed on 1 individual (birth order) and 6 family variables (maternal age, neighbourhood safety, social problems in neighbourhood, socioeconomic status, negative parenting and parental mental health). These seven selection bias variables were used as controls in the analyses.

**Table 3. Child Care Trajectories (Intensity & Center-Care) Predicting Pre-Adolescents Academic Achievement Scores Using Multiple Linear Regressions**

	Model with CCS Intensity (n=1269)											
	Reading				Writing				Mathematics			
	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size
<b>Step 1</b>												
Sex	-8.53	[-11.42, -5.64]	<.001	-.34	-11.73	[-14.43, -9.03]	<.001	-.47	-4.78	[-7.73, -1.84]	.001	-.18
Birth Order	-1.91	[-3.84, 0.01]	.05	-.08	-2.42	[-4.22, -0.62]	.008	-.10	-2.05	[-4.00, -0.10]	.04	-.08
Family Status	4.82	[1.02, 8.63]	.01	.19	4.58	[0.97, 8.19]	.01	.19	6.53	[2.57, 10.50]	.001	.25
CSNR	-0.97	[-2.52, 0.58]	.22	-.04	-0.73	[-2.19, 0.73]	.33	-.03	-.68	[-2.28, 0.92]	.40	-.03
Difficult Temperament	1.91	[0.45, 3.36]	.01	.08	1.93	[0.56, 3.31]	.006	.08	1.60	[0.11, 3.09]	.04	.06
Maternal age	2.14	[0.56, 3.73]	.008	.08	1.62	[0.13, 3.11]	.03	.07	1.11	[-0.55, 2.76]	.19	.04
Family Dysfunction	-0.46	[-2.16, 1.23]	.59	-.02	-0.37	[-1.94, 1.20]	.64	-.02	.09	[-1.60, 1.78]	.92	.00
Neighbourhood Safety	-0.26	[-1.86, 1.34]	.75	-.01	-0.65	[-2.11, 0.82]	.39	-.03	-.81	[-2.42, 0.80]	.32	-.03
Social Problems in Neighbourhood	-0.11	[-1.77, 1.54]	.90	.00	0.28	[-1.26, 1.82]	.72	.01	.23	[-1.42, 1.87]	.79	.01
T1 - SES Factor	-15.32	[-19.19, -11.45]	<.001	-.60	-14.68	[-18.28, -11.08]	<.001	-.59	-14.13	[-18.06, -10.20]	<.001	-.54
T1 - Negative Parenting Factor	-0.54	[-2.56, 1.48]	.60	-.02	-0.2	[-2.08, 1.67]	.83	-.01	.39	[-1.66, 2.45]	.71	.02
T1 - Family Deviancy Factor	0.68	[-1.05, 2.40]	.44	.03	0.32	[-1.28, 1.92]	.70	.01	.87	[-0.85, 2.59]	.32	.03
T1 - Parent Mental Health Factor	-0.91	[-3.18, 1.36]	.43	-.03	-0.92	[-3.01, 1.17]	.39	-.04	-.97	[-3.23, 1.29]	.40	-.04
T1 - Child Peer relationships Factor	0.44	[-1.52, 2.39]	.66	.02	0.32	[-1.49, 2.14]	.73	.01	1.49	[-0.47, 3.45]	.14	.06
CCS Intensity Trajectory Contrasts												
High vs Low CCS Hours	-0.28	[-3.97, 3.42]	.88	-.01	2.67	[-0.79, 6.13]	.13	.10	1.06	[-2.62, 4.73]	.57	.05
Moderate vs Low CCS Hours	-1.81	[-5.47, 1.85]	.33	-.07	0.09	[-3.27, 3.45]	.96	.00	-.76	[-4.42, 2.89]	.68	-.03
<b>Step 2</b>												
SES Interactions with CCS Intensity Trajectory Contrasts												
High vs Low CCS intensity X SES	9.49	[0.06, 18.92]	.05	.37	9.15	[0.25, 18.05]	.04	.37	11.81	[2.23, 21.38]	.02	.46
Moderate vs Low CCS intensity X SES	4.00	[-3.60, 11.60]	.30	.16	5.78	[-1.35, 12.91]	.11	.24	2.57	[-5.26, 10.40]	.52	.10
	<i>R</i> <sup>2</sup>	.154	<.001		.189		<.001		.128		<.001	
	<i>F</i>	14.21	<		18.26		<		11.53		<	

			.001		.001		.001
$\Delta R^2$	.003		.12	.004	.08	.005	.05
$\Delta F$	2.408			2.837		3.407	

**Model with Center-Based CCS Type (n=1119)**

	Reading				Writing				Mathematics			
	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size
<b>Step 1</b>												
Sex			<	-.34			<	-.46	-4.80	[-7.82, -1.78]	.002	-.18
	-8.78	[-11.82, -5.73]	.001		-11.67	[-14.51, -8.83]	.001					
Birth Order	-1.59	[-3.65, 0.46]	.13	-.06	-2.64	[-4.54, -0.73]	.007	-.10	-1.90	[-3.95, 0.14]	.07	-.07
Family Status	4.32	[0.14, 8.51]	.04	.17	3.70	[-0.23, 7.63]	.07	.15	6.60	[2.36, 10.85]	.002	.26
CSNR	-0.68	[-2.33, 0.97]	.42	-.03	-.37	[-1.93, 1.19]	.64	-.01	-.37	[-2.05, 1.31]	.67	-.01
Difficult Temperament	2.21	[0.68, 3.73]	.004	.09	2.03	[0.62, 3.44]	.005	.08	1.82	[0.28, 3.36]	.02	.07
Maternal age	2.62	[0.90, 4.33]	.003	.10	2.38	[0.79, 3.98]	.003	.09	1.30	[-0.41, 3.01]	.13	.05
Family Dysfunction	-0.25	[-2.02, 1.52]	.78	-.01	-.13	[-1.82, 1.55]	.88	.00	.53	[-1.24, 2.30]	.56	.02
Neighbourhood Safety	-0.39	[-2.07, 1.29]	.65	-.02	-.75	[-2.31, 0.82]	.35	-.03	-.77	[-2.47, 0.92]	.37	-.03
Social Problems in Neighbourhood	0.51	[-1.23, 2.25]	.57	.02	1.27	[-0.38, 2.93]	.13	.05	1.07	[-0.71, 2.84]	.24	.04
T1 - SES Factor			<	-.54			<	-.54	-13.59	[-17.87, -9.31]	<	-.53
	-13.92	[-18.10, -9.73]	.001		-13.33	[-17.25, -9.42]	.001				.001	
T1 - Negative Parenting Factor	-0.66	[-2.75, 1.42]	.53	-.03	-.43	[-2.43, 1.57]	.67	-.02	.54	[-1.58, 2.66]	.62	.02
T1 - Family Deviancy Factor	0.61	[-1.22, 2.43]	.52	.03	.41	[-1.23, 2.05]	.62	.02	.89	[-0.87, 2.65]	.32	.03
T1 - Parent Mental Health Factor	-0.69	[-3.07, 1.68]	.57	-.03	-.79	[-3.01, 1.42]	.48	-.03	-1.33	[-3.70, 1.04]	.27	-.05
T1 - Child Peer relationships Factor	0.19	[-1.88, 2.27]	.85	.01	-.05	[-1.99, 1.89]	.96	.00	.79	[-1.28, 2.87]	.46	.03
Center-Based CCS Trajectory Contrasts												
Early-Onset vs Never Center-Based CCS	-3.19	[-7.91, 1.53]	.19	-.12	-.49	[-4.95, 3.97]	.83	-.02	.45	[-4.34, 5.24]	.85	.02
Late-Onset vs Never Center-Based CCS	-2.02	[-5.57, 1.53]	.27	-.08	-.95	[-4.23, 2.32]	.57	-.04	-1.70	[-5.24, 1.83]	.35	-.07
<b>Step 2</b>												
SES Interactions with Center-Based CCS Trajectory Contrasts												
Early-Onset vs Never Center-Based CCS X SES	17.42	[5.10, 29.74]	.006	.68	19.71	[7.77, 31.64]	.001	.79	16.18	[2.22, 30.13]	.02	.66
Late-Onset vs Never Center-Based CCS X SES	9.21	[0.66, 17.76]	.03	.37	5.94	[-2.22, 14.10]	.15	.24	9.82	[0.97, 18.68]	.03	.39

$R^2$	.140	<	.164	<	.118	<
$F$	11.18	<	13.56	<	9.22	<
$\Delta R^2$	.009	.001	.009	.001	.006	.001
$\Delta F$	5.581	.006	6.063	.003	3.038	.01

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**Notes.** Effect Size (Standardized Coefficients); CCS (Child Care Services); Sex (1=boys; 0=girls); Birth order (0: First Born; 1: Has Siblings) Family Status (1: Intact Family; 0: Non-Intact [Blended or Single-Parent Families]); SES (Socioeconomic Status; 0= Adequate [top 75th quartile]; 1 = Non-Adequate [bottom quartile]); CSNR (Cumulative Score for Neonatal Risk).

ONLINE SUPPLEMENT

**Table 4. SES Within Effects for Child Care Trajectories (Intensity & Center-Based Type): Predicting SES Differences in Pre-Adolescents Academic Achievement Scores Using Multiple Linear Regressions**

	Model with CCS Intensity (n = 1269)											
	Reading				Writing				Math			
	B	95% CI	<i>p</i>	Effect Size	B	95% CI	<i>p</i>	Effect Size	B	95% CI	<i>p</i>	Effect Size
Sex	-8.52	[-11.41, -5.63]	.00	-.34	-11.72	[-14.42, -9.03]	.00	-.47	-4.77	[-7.71, -1.83]	.00	-.18
Birth Order	-1.92	[-3.85, 0.00]	.05	-.08	-2.42	[-4.22, -0.62]	.01	-.10	-2.08	[-4.02, -0.13]	.04	-.08
Family Status	4.89	[1.09, 8.69]	.01	.19	4.63	[1.03, 8.24]	.01	.19	6.63	[2.67, 10.59]	.00	.25
CSNR	-1.03	[-2.59, 0.53]	.19	-.04	-.77	[-2.23, 0.69]	.30	-.03	-.78	[-2.38, 0.82]	.34	-.03
Difficult Temperament	1.91	[0.45, 3.36]	.01	.08	1.94	[0.57, 3.32]	.01	.08	1.59	[0.10, 3.08]	.04	.06
Maternal age	2.17	[0.58, 3.76]	.01	.08	1.63	[0.15, 3.12]	.03	.07	1.15	[-0.50, 2.80]	.17	.05
Family Dysfunction	-.49	[-2.18, 1.20]	.57	-.02	-.38	[-1.95, 1.19]	.64	-.02	.04	[-1.65, 1.73]	.96	.00
Neighbourhood Safety	-.18	[-1.78, 1.42]	.82	.00	-.58	[-2.04, 0.88]	.44	-.02	-.71	[-2.32, 0.91]	.39	-.03
Social Problems in Neighbourhood	-.16	[-1.81, 1.50]	.85	.00	.22	[-1.32, 1.76]	.78	.01	.19	[-1.46, 1.84]	.82	.01
T1 - Negative Parenting Factor	-.60	[-2.62, 1.42]	.56	-.02	-.26	[-2.14, 1.61]	.78	-.01	.33	[-1.72, 2.39]	.75	.01
T1 - Family Deviancy Factor	.58	[-1.15, 2.31]	.51	.02	.23	[-1.37, 1.83]	.78	.01	.74	[-0.98, 2.47]	.40	.03
T1 - Parent Mental Health Factor	-.93	[-3.20, 1.34]	.42	-.04	-.95	[-3.04, 1.14]	.37	-.04	-.98	[-3.24, 1.28]	.40	-.04
T1 - Child Peer relationships Factor	.42	[-1.53, 2.38]	.67	.02	.33	[-1.48, 2.15]	.72	.01	1.45	[-0.51, 3.41]	.15	.05
CCS Intensity Trajectory Contrasts												
High vs Low CCS Hours	-2.23	[-6.39, 1.93]	.29	-.09	.56	[-3.36, 4.49]	.78	.02	-1.10	[-5.29, 3.09]	.61	-.04
Moderate vs Low CCS Hours	-3.37	[-7.83, 1.10]	.14	-.13	-2.03	[-6.16, 2.10]	.33	-.09	-1.93	[-6.37, 2.51]	.39	-.07
SES Interactions with CCS Intensity Trajectories												
High CCS intensity X SES	-8.94	[-17.25, -0.63]	.03	-.35	-9.22	[-17.01, -1.42]	.02	-.37	-5.33	[-13.60, 2.94]	.21	-.20
Moderate CCS intensity X SES	-14.43	[-20.38, -8.47]	.00	-.56	-12.59	[-18.16, -7.02]	.00	-.50	14.57	[-20.73, -8.41]	.00	-.56
Low CCS intensity X SES	-18.43	[-23.75, -13.11]	.00	-.72	-18.37	[-23.35, -13.39]	.00	-.74	17.14	[-22.58, -11.69]	.00	-.66
<i>R</i> <sup>2</sup>	.16				.19				.13			
<i>F</i>			<				<				<	
	12.93		.001		16.60		.001		10.67		.001	

Model with Center-Based CCS Type (n = 1119)

	Reading				Writing				Math			
	B	95% CI	<i>p</i>	Effect Size	B	95% CI	<i>p</i>	Effect Size	B	95% CI	<i>p</i>	Effect Size
Sex	-8.73	[-11.76, -5.69]	.00	-.33	-11.63	[-14.46, -8.80]	.00	-.46	-4.75	[-7.76, -1.74]	.00	-.18
Birth Order	-1.73	[-3.79, 0.32]	.10	-.07	-2.85	[-4.75, -0.94]	.00	-.11	-2.02	[-4.07, 0.02]	.05	-.08
Family Status	4.34	[0.17, 8.51]	.04	.17	3.76	[-0.16, 7.68]	.06	.15	6.61	[2.38, 10.84]	.00	.26
CSNR	-.68	[-2.32, 0.97]	.42	-.03	-.34	[-1.89, 1.21]	.67	-.01	-.37	[-2.05, 1.30]	.66	-.01
Difficult Temperament	2.38	[0.86, 3.90]	.00	.09	2.15	[0.73, 3.56]	.00	.09	2.00	[0.46, 3.54]	.01	.08
Maternal age	2.59	[0.87, 4.30]	.00	.10	2.42	[0.83, 4.01]	.00	.09	1.26	[-0.45, 2.97]	.15	.05
Family Dysfunction	-.34	[-2.10, 1.42]	.70	-.01	-.21	[-1.89, 1.47]	.81	-.01	.43	[-1.33, 2.19]	.63	.01
Neighbourhood Safety	-.45	[-2.13, 1.23]	.60	-.02	-.82	[-2.38, 0.74]	.30	-.03	-.83	[-2.53, 0.87]	.34	-.03
Social Problems in Neighbourhood	.47	[-1.27, 2.21]	.60	.02	1.20	[-0.46, 2.85]	.16	.05	1.04	[-0.74, 2.82]	.25	.04
T1 - Negative Parenting Factor	-.69	[-2.77, 1.39]	.52	-.03	-.43	[-2.42, 1.57]	.67	-.02	.51	[-1.61, 2.62]	.64	.02
T1 - Family Deviancy Factor	.78	[-1.04, 2.60]	.40	.03	.61	[-1.03, 2.25]	.47	.02	1.06	[-0.70, 2.81]	.24	.04
T1 - Parent Mental Health Factor	-.90	[-3.27, 1.47]	.46	-.03	-.98	[-3.19, 1.23]	.38	-.04	-1.53	[-3.90, 0.83]	.20	-.05
T1 - Child Peer relationships Factor	.13	[-1.94, 2.19]	.90	.00	-.10	[-2.03, 1.84]	.92	.00	.72	[-1.35, 2.78]	.50	.03
Center-Based CCS Trajectory Contrasts												
Early-Onset vs Never Center-Based CCS	-6.11	[-11.27, -0.95]	.02	.24	-3.71	[-8.55, 1.13]	.13	.15	-2.29	[-7.46, 2.88]	.39	.10
Late-Onset vs Never Center-Based CCS	-3.94	[-7.90, 0.02]	.05	.08	-2.22	[-5.86, 1.43]	.23	.06	-3.74	[-7.66, 0.18]	.06	-.05
SES Interactions with CCS Type Trajectories												
Never Center-Based CCS X SES	-17.65	[-22.58, -12.72]	.00	-.69	-16.45	[-21.04, -11.87]	.00	-.66	-	[-22.31, -12.42]	.00	-.68
Late-Onset Center-Based CCS X SES	-8.44	[-15.98, -0.89]	.03	-.32	-10.52	[-17.76, -3.27]	.00	-.42	-7.54	[-15.50, 0.41]	.06	-.29
Early-Onset Center-Based X SES	-.23	[-11.92, 11.47]	.97	.00	3.25	[-8.11, 14.61]	.57	.13	-1.19	[-14.60, 12.21]	.86	-.02
<i>R</i> <sup>2</sup>	.15				.17				.13			
<i>F</i>			<				<				<	
	10.64		.001		12.83		.001		8.85		.001	

## Methods

### Participants

Of the 1771 QLSCD participants admissible to obtain access to their Quebec government exams at the 2010 data collection year, parental consent was obtained for 1485 participants. Of these, some had to be excluded because a) it was impossible to obtain or correct their tests (school refusal, tests not completed or incomplete, illegible copies), b) some were enrolled in a higher or lower grade-level and did not write the test, or c) those not enrolled in a French school did not write the same language exams, and their reading and writing tests were not deemed comparable ( $n=88$  and  $n=79$ , respectively)<sup>1,2</sup>. Thus, the analyses using the Quebec government exams are based on data from 980 children (reading), 1040 children (writing) and 1015 children (mathematic). Participants who did not write the 2010 Quebec government exams ( $n = 97$ ) because they were enrolled in a lower grade level from previously failing an academic year were added in our final outcome measures and coded as '0' (reading  $n = 1077$ ; writing  $n = 1137$ ; mathematic  $n = 1112$ ).

### Measures

#### Early Childhood Adversity Factors

Six distinct preschool environment adversity factors were created using exploratory factor analysis, followed by a confirmatory factor analysis (M Plus - Maximum likelihood ratio,  $\chi^2[309]=2860.36$ ,  $p < .00$ , RMSEA  $< .06$ ; SRMR  $< .09$ ). These include i) Socioeconomic status of the parents, ii) negative parenting, iii) positive parenting, iv) parent's deviant behavior, v) parent's mental health, vi) child-peer relationships. A total of 108 variables (grouping 438 items) were used to create 27 family adversity indicators. Each adversity indicator was computed by averaging the available scores of the same variables measured at different assessment times (i.e., at the 5-months, 1.5-, 2.5-, 3.5-, 4.5- and 5-years assessments). The 27 indicators were factored onto the above mentioned six family adversity factors (see eTable 1 for respective loadings onto each factor). Missing data was treated with (full information maximum likelihood (FIML).

#### Socioeconomic Factor (SES)

A total of five indicators loaded onto the SES factor, including maternal and paternal education (2) and occupational prestige (2), as well as family income (1) (Correlations range from  $|.72$  to  $.85$ ], all  $ps < .0001$ ). The maternal and paternal education variables were their highest achieved diploma. These variables ranged from 1 (no high school diploma) to 4 (university diploma), and were collected at each assessment times (5-months, 1.5-, 2.5-, 3.5-, 4.5- and 5-years). The annual family income variables assessed the total revenue for the family and ranged from 1 ( $< \$10,000$ ) to 9 ( $> \$80,000$ ), and were collected at each assessment times (5-months, 1.5-, 2.5-, 3.5-, 4.5- and 5-years). The maternal and paternal occupational prestige variables were measured via a modified scale developed by Pineo, Porter, and McRoberts<sup>3</sup>, which relies on Statistics Canada Standard occupational classification 1980<sup>4</sup> and were collected at each assessment year (5-months, 1.5-, 2.5-, 3.5-, 4.5- and 5-years). Finally, for each of the 5 assessment year, an SES indicator was computed and standardized<sup>5</sup>. In total, these five SES adversity indicators summarized 30 variables.

Of note, a 6<sup>th</sup> indicator, family status, was also computed and included in the exploratory factor analyses, but was not retained in the confirmatory factor analyses. The original variables had three family category labels (1: intact; 2: blended; 3: single-parent) and were collected each year (5-months, 1.5-, 2.5-, 3.5-, 4.5- and 5-years; 6 variables). In this study, we controlled for family status separately from the SES factor.

#### Positive Parenting Factor

Four indicators loaded onto the positive parenting factor, including both parents' positive interaction indicators (2) and warmth/affectivity indicators (2) (Correlations range from  $.35$  to  $.82$ , all  $ps < .0001$ ). The

positive interactions variables were measured from 5-items from the Parent Practices Scale (PPS<sup>6</sup>) and indicate how warm and involved a parent was with their child. While the mother's rating were collected at each of the six assessment years (Cronbach alphas range from .55 to .64), the father's ratings were collected at four of the six assessment points (1.5-, 3.5-, 4.5-, 5-years; Cronbach alphas range from .71 to .83). A positive interaction indicator was computed for each parent, averaging together each available assessment year. Moreover, the parental warmth/affectivity variable pertains to the parent's experienced and expressed pleasure/affection when interacting with their child. Maternal and paternal reports were respectively collected from 5-items and 7-items from the Parental Cognitions and Conduct Towards the Infant Scale (PACOTIS<sup>7</sup>), solely at 5-months (respective maternal and paternal Cronbach alphas .76 and .84). Thus, both parents' warmth/affectivity indicator represented their respective 5-months variable. Overall, these four adversity indicators summarized a total of 12 variables (from 62 items).

Of note, a 5<sup>th</sup> and 6<sup>th</sup> indicator, both parents' meaningful interactions, was also computed and included in the exploratory factor analyses, but were not retained in the confirmatory factor analyses. The original variable was measured from 4-items from the PPS<sup>6</sup> and relates to parental disciplinary tactics. The mothers' meaningful interaction indicator averaged four of the six assessment times (2.5-, 3.5-, 4.5-, 5-years; Cronbach alphas range from .61 to .70), while the fathers' indicator averaged three of the six assessment points (3.5-, 4.5-, 5-years; Cronbach alphas range from .57 to .62). In total, these two adversity indicators summarized 7 variables (computed from 41 items).

### Negative Parenting Factor

Six indicators load onto the negative parenting factor, including both parents' coercive interactions indicators (2), intrusive interactions indicators (2), and coercive parenting behaviors indicators (2) (Correlations range from .11 to .86, all  $ps < .0001$ ). Both the intrusive and the coercive interaction variables were measured from 4-items from the PPS<sup>6</sup>. The intrusive interaction reflected a tendency to intrude on children's psychological world and impose on how children ought to behave and think. This indicator relies solely on one assessment time (5-years; respective maternal and paternal Cronbach alphas .41 and .55). The coercive interaction indicator refers to harsher parent-child interactions (e.g., getting angry, corporal punishment). The mothers' coercive interaction indicator averaged four of the six assessment times (2.5-, 3.5-, 4.5- and 5-years; Cronbach alphas range from .68 to .72), while the fathers' indicator averaged three of the six assessment times (3.5-, 4.5- and 5-years; Cronbach alphas range from .71 to .73). Consequently, a coercive interaction indicator was computed for each parent, averaging together their respective assessment years. To complement this older toddler/preschooler coercive interaction assessment, the coercion indicator represented a measure of harsh parenting. Each parents' coercion indicator averaged three of the six earlier assessment times (5-months, 1.5-, 2.5-years; Maternal Cronbach alphas range from .69 to .85; Paternal Cronbach alphas range from .78 to .84). This coercion indicator was collected from 3-items from the PACOTIS<sup>7</sup> (Cronbach alphas range from .69 to .85). Overall, these six adversity indicators summarized a total of 15 variables (grouping 54 items).

### Parental Mental Health Factor

Three indicators load onto the parental mental health factor, including a maternal anxiety indicator (1) as well as both parents' depression indicators (2) (Correlation range from .40 to .90, all  $ps < .0001$ ). The maternal anxiety indicator was collected at 4.5-years (Cronbach alpha .86). This parental anxiety screening instrument<sup>8</sup> consists of 10-items representing manifestations of anxiety disorders as described in DSM-IV. The parental depressive symptoms were measured from 6 to 13-items the Center for Epidemiologic Studies Depression Scale (CES-D Scale<sup>9</sup>). The maternal depression indicators averaged four out of six assessment times (5-months, 1.5- 3.5-, 5-years; Cronbach alpha's range from .80 to .81), while the paternal depression indicator relied on one assessment times (5-months; Cronbach alpha .74). Overall, these three adversity indicators summarized 6 variables (grouping 59 items).

### Family Deviancy Factor

Six indicators load onto the family deviancy factor, including both parents' antisocial behaviors (2), alcohol (2) and drug consumption indicators (2) (Correlation range from .31 to .87, all  $ps < .0001$ ). The antisocial behaviour indicators relied on a questionnaire (8-items for fathers and 9-items for mothers,



respective Cronbach alphas are .59 and .54) collected at 5-months only. The questionnaire included items related to childhood/adolescence (i.e., the period before the end of high school) and items related to adulthood<sup>10,11</sup>, and was largely derived from the NIMH-Diagnostic Interview Schedule<sup>12</sup>. Childhood/adolescence items included 'starting fights,' theft, involvement with youth protection or police, expulsion or suspension from school, truancy, and running away from home. Adult items included arrests (other than for traffic violations), being fired from a job (excluding layoffs for lack of work), trouble at work, with family, or with the police due to drug or alcohol abuse, 'starting fights' (fathers), and 'hitting or throwing things at the spouse or partner' (mothers). Scores were summed allowing two missing values.

The alcohol and drug indicators were each created from scales that first determined whether or not the parent drinks or uses drugs, next they establish the frequency of the use of these substances. For alcohol use, both indicators averaged scales at five of the six assessment points (5-months, 1.5-, 2.5- 3.5- & 5-years; mothers' and father's respective Cronbach alphas range from .51 to .83 and from .67 to .74). At 5-months, the frequency of alcohol consumption, the frequency of drinking in excess (five drinks or more), and finally the largest number of drinks consumed on one occasion were averaged together to create the 5-months scale. At 1.5-years, the three previously mentioned items were averaged with additional ones which related the extent of the alcohol abuse (e.g., drinking over 20 consumptions in one day, drinking seven drinks per day during two weeks or more, alcohol consumption being criticized by family, friends, boss, medical professional, having fought when under the influence, being arrested over consumption, having attempted to cease alcohol usage and having reached out to receive help to cease) to create the 1.5-years scale. At 2.5- and at 5-years, the frequency of alcohol consumption and the frequency of drinking in excess (five drinks or more) were averaged together to create the respective 2.5- and 5-years scales. Meanwhile, at 3.5-years, the same two items were averaged with another item on the mean consumption of alcohol to create the 3.5-years scale. After creating each assessment year variable (from 18 and 19-items for mother and father, respectively), the five yearly variables were averaged together to create each parent's alcohol use indicators. Consequently, an alcohol indicator was computed for each parent, grouping respective five assessment years. In turn, for drug use, both parents' indicators averaged scales at five of the six assessment points (5-months, 1.5-, 2.5- 3.5- & 5-years; mothers' and father's respective Cronbach alphas range from .70 to .73 and from .70 to .76). At 5-months, 2.5-, 3.5-, and 5-years, the scales consisted of averaging items on drug usage, including whether they had used non-prescription drugs, their frequency of use, and the types of drugs used over the last year. Conversely, at 1.5-years, the previously mentioned variables were averaged with additional ones which quantified the severity of drug use (i.e., five usages or more, daily usage over two weeks, being high an entire day) and the severity of the drug habit (inability to cease drug use). After creating each assessment year variables (mother and father: 54-items each), these five variables were averaged together to create each parent's drug use indicators.

Overall, these six family deviancy adversity indicators summarized a total of 22 variables (computed from 162 items).

### **Child Peer Relationship Factor**

Three indicators load onto the child peer relationship factor, including both parents' perception of their child's victimization indicators (2) and maternal perception of the quality of her child's friendship indicator (1) (Correlations range from .27 to .86, all  $ps < .0001$ ). Both parents' perception of their child's victimization indicators were collected at three of the six assessment points (3.5-, 4.5- and 5-years). The questions asked about general victimization, including whether their child was being made fun of, pushed or hit, and called names by other children. Within each year, these items were averaged to obtain a global variable of peer victimization (mothers' and father's respective Cronbach alphas range from .40 to .60 and from .35 to .63). These three yearly variables were then averaged together to create each parent's peer victimization indicators. Conversely, the mother's perception of the quality of her child's peer relationships

was measured from 3-items at four of the six assessment points (1.5-, 3.5-, 4.5, and 5-years). The questions referred to amount of time spent with friends, the number of close friendships, and how well their child got along with his or her friends (Cronbach alpha .45). Within each year, these items were averaged to obtain a global variable of peer relationship quality. In turn, these four yearly variables were then averaged together to create mothers' peer relationship quality indicator. In total, these three adversity indicators summarized 10 variables (computed from 30-items).

**Context of child care services (CCS) in Québec.** In the Canadian province of Québec where the study was conducted, more than 80% of children receive child care services (CCS) before they start full time kindergarten at 5-years<sup>13</sup>. The vast majority of children receive CCS in center-based or family-based settings, with a minority receiving individual care by a family member (e.g., grandmother) or a nanny. The likelihood of receiving center-based CCS is higher for older children<sup>14</sup>. This is mainly due to the increasing availability of center-based spaces as the teacher:child ratios change with age. In center-based care, children are grouped with others of similar ages and these groups have the following ratios: 1:5 between the ages of 3-months and 1.5-years; 1:8 between the ages of 1.5- and 4-years. In family-based settings, children vary in age, usually between 1- and 4-years, and the ratio is 1:6. In most family-based settings, two child care workers are present (the owner of the house and an assistant) and the groups vary between six and 12 children.

Recall that children of the present study were born in 1997 and 1998. In 1997, the provincial government gradually implemented a network of publicly funded and regulated child care services '**the early childhood centers**'. Services were available at a low cost -5\$ per day initially, now 7\$ per day- in family-based or center-based settings. When comparing the level of quality of child care services in this sample with guidelines for quality offered by the Early Childhood Environmental Rating Scale Revised (ECERS-R)<sup>15</sup> and its associated instruments, the Infant Toddler Environmental Rating Scale Revised (ITERS)<sup>16</sup> and the Family Day Care Rating Scale (FDCRS)<sup>15,17</sup>, we note that most children were exposed to minimal to good quality. Both the structural and process quality of CCS in Québec is, on average, the highest in **center-based early childhood centers**, followed by **family-based early childhood centers**, followed by private center-based CCS without subsidies from the government. The lowest CCS quality is found in family-based private settings<sup>14</sup>. The roll out of the program was gradual, starting with 4-year-old children in 1997-1998; 3-year-old in 1999-2000; 2-year-old in 2001-2002 and 1-year-old children in 2003-2004. QLSCD families benefited from the low-cost spaces from the ages of 2.5 to 5-years. Despite an increase over the years in the global number of places in CCS of all types (private, public, family- or center-based), the number of places in the public network (governmentally funded) was always lower than the demand, especially for center-based spaces, and the selection bias of families into the low cost spaces was similar to the selection operating before the public network. That is, families with more personal and financial resources succeeded in accessing the highly coveted and low cost '**early childhood centers**'<sup>14,18</sup>. Indeed, Japel et al<sup>14</sup> found that a larger proportion of high-SES children of this sample (upper quartile[4<sup>th</sup>]) were enrolled in subsidized center-based child care (47%) than low-SES children (38%; 1<sup>st</sup> quartile)<sup>14</sup>. Conversely, a larger proportion of low-SES children were enrolled in family-centers (27%) compared to high-SES children (19%)<sup>14</sup>. Moreover, there were differences in the quality of the different types of care: family-based child care was of lower quality for low-SES children as compared to high-SES children. We note, however, that the quality of center-based care did not vary by SES. That is to say, children receiving care in a center-based setting were exposed to the same mean level of quality, regardless of their family SES. This finding indicates that center-based settings succeeded in reducing SES-inequality in child care quality, probably because the level of training of educator and the quality of the infrastructure is the same across all centers, regardless of the neighbourhood SES. This is not the case with family-based child care settings, which are correlated with the SES of the neighbourhood, probably because neighbourhoods of different SES have different levels of resource availability. Please see eTable 2 to examine the distribution of maternal and child care attendance from 5-months to 4.5-years in our full sample.

**Quebec Government Exams.** Every Quebec student must write government exams (created by the Ministry of Education) at the end of grade 6 (12-years) in order to be admissible to enter high school. The results of the tests were made accessible and corrected by the Quebec Statistics Institute (QSI). Using the terms and guidelines established by Ministry, the QSI's centralized correction was supervised by four people and conducted by a team consisting mostly of retired teachers or new teaching graduates. Inter-judge reliability assessments were also conducted<sup>19-21</sup>. **Reading exam** corrections relied on three evaluation criteria: 1)

Extraction of pertinent explicit and implicit information (75% of grade); 2) Text interpretation (8% of grade); 3) Pertinent reactions to literary and informational texts (17% of grade). Each response was judged as being satisfactory, acceptable or unsatisfactory (3, 2, or 0 points, respectively) and summed to a total of 36 points. **Writing exam** correction relied on five evaluation criteria: 1) Relevance and adequacy of ideas; 2) Appropriate organization of the text; 3) Syntax and punctuation; 4) Vocabulary; 5) Spelling. Each criterion was rated on an A-to-E scale according to the MERS evaluation grid, where A = 20 points; B = 16 points; C = 12 points; D = E = 8 points and 4 points. An overall score of 100 can then be calculated by adding the points obtained in each test. Finally, **mathematic exam** correction relied on two skills. The mathematic problem solving questions (30%) relied on three evaluation criteria: 1) Task comprehension; 2) Mobilizing concepts and processes; 3) Solution explanation. The mathematical concept and process reasoning (70%) depended on three evaluation criteria: 1) Analyze and make informed choices; 2) Apply solution; 3) Justify. Each evaluation criteria was rated on an A-to-E scale outlined in the Ministry's evaluation grid. The grades in each academic achievement exam ranged as follows: reading comprehension (6 to 100), writing (32 to 100) and mathematics (22 to 100). The scores are percentages. QLSCD participants who did not write these exams at age 12-years because they were held back a grade on a preceding year ( $n = 97$ ) were added to each the variable and given a score of zero (see eTable 3).

### Modeling Semiparametric Trajectories

One major difficulty in assessing child care types is the reality that children typically transition frequently across child care types during early childhood. There are different ways to address this issue. One is to report on one time-point, rather than across early childhood. A second way, used in Burchinal et al.'s study<sup>22</sup>, was to compute children's proportion of time in center-based services across their early childhood. This method addresses the problem of child care type transitions well. A third possibility, which we adopt in the present study, is to estimate group-based developmental trajectories of child care intensity and type (i.e., center-based versus other type of child care [i.e., 'never center-based CCS']). The clustering of children with similar probabilities addresses child care transitions and listwise deletion well (missing data are dealt with FIML).

More specifically, the semiparametric mixture model assigns individuals to categories on the basis of posterior probability rule. Resulting groups are approximations of underlying continuous processes<sup>23,24</sup>. Following the Bayesian Information Criterion (lowest BIC<sup>23</sup>), selection of the best fitting model was determined between models with two or three center-based CCS type trajectory groups. Semiparametric mixture model estimation yields output identifying each trajectory (patterns of stability and variations), the respective estimated proportion of the population belonging to each of them, as well as the estimated posterior probability of participants belonging to each trajectory group. Therefore, the model coefficients indicate, for each child, the estimated probability that she or he would follow each trajectory. Finally, each child was assigned to the group for which she or he had the highest posterior probability estimate.

As can be seen in the materials section and Figure 1a of the main article, the CCS intensity variable relied on the mean number of hours per week spent in CCS (0= in parental care), yielding *Low*, *Moderate*, *High Intensity* trajectories. ). The first trajectory is the most common and exhibits a sharp increase in childcare attendance intensity within the 1<sup>st</sup> year and remains stable, with high childcare attendance until 4-years (> 35 hours per week); approximately 36.5 % of the children follow the 'high intensity' (number of hours) trajectory. The next trajectory exhibits a gradual increase in child care hours over the years. Approximately 29.5% of children follow the 'moderate intensity' trajectory. The final trajectory is relatively low and stable, with children demonstrating a very 'low number of hours' in childcare attendance (< 5 hours per week). An estimated proportion of 34 % of the children follow this lowest number of hour trajectory.

Similarly, as can be seen in the materials section and Figure 1b of the main article, the center-based type variable estimated the probability of children being enrolled in 'center-based care' or 'never center-based CCS', and excluded those who remained in parental care ( $n = 150$ ), yielding *Early-*, *Late-Onset*, and *Never exposed to Center-Based CCS* trajectories. The first trajectory includes children who have a high probability of attending center-care early (~ at about 1.5 years). Approximately 14% of our sample followed the 'early-onset center-care' trajectory. In the next trajectory, children have a high probability of being

enrolled in other child care services until 17-months and then gradually increase in their enrollment in center-based care (beginning ~ at 2.5-years). Approximately 28.7% of children follow the 'late-onset center care' trajectory. Finally, 57.3% of our sample have a high probability of never being exposed to center-based care during the preschool years (i.e., enrolled in other child care services), and this was depicted by the low and stable trajectory.

### Statistical Analyses

#### Propensity Score Sample Weights.

In order to address sample attrition, we used propensity score weights to make our study sample comparable to the targeted population (original sample [5-months]) on demographic characteristics. This procedure estimates a weight for every participant in the sample which is inversely proportional to the probability of being in the 12-year-old's data collection and providing government exam scores, with reference to a given demographic characteristics. The demographic characteristics used to calculate the weight reflect the likelihood of participating in the age 5-months data collection year: parents' education and occupational prestige, family income, family's home stimulation level, frequency of reading to one's child, and children's sex. The weighting procedure was done in order to take into account selective non-response on each academic achievement scores.

### Preliminary Results

To support our decision to group together other types of CCS into one category (never center-based CCS), we ran analyses comparing family-based CCS to Center-based CCS and to individual CCS types (i.e., relative- & nanny-care) across each early childhood data collection year (N = 1119).

eTable 4 presents the results from CCS type regression models at 1.5-, 2.5, 3.5, 4.5-years.

eFigure1 depicts the interaction effects of CCS type regression models at 1.5-, 2.5-, 3.5- and 4.5-years.

Results indicate that low-SES children in center-based CCS had marginally to significantly higher academic achievement scores than those in family-based child care at both 2.5- and 4.5years. A similar pattern of results was also depicted graphically at 3.5-years (see eFigure1) although the effects did not reach significance due to the restricted sample used in these analyses. Importantly, low-SES children enrolled in individual types of care (i.e., relative- & nanny-care) were not significantly different from those in family-based CCS at 2.5-, 3.5-, 4.5-years.

Only at 1.5-years did family-based CCS predicted (marginally or significantly) higher academic achievement scores than center-based CCS or individual types of care (i.e., relative- & nanny-care). These results need to be taken with caution. At 1.5-years, there was only 1.2% of our sample that were low-SES participants in family-based CCS (as compared to 10.5% adequate-SES family-based CCS). Conclusions drawn from this data-collection year will likely be biased by a misrepresented sample due to an insufficient number of participants (16 predictors in our model). Similarly, our 5-months data could not be specifically tested, because of the low representation of participants in child care at that age (Center-Based CCS: total 2.2%, adequate-SES 1.4%, low-SES 0.8%; Family-Based CCS: total 2.1%, adequate-SES 1.9%, low-SES 0.3%). Most participants (82%) were cared for by their parents at the 5-months data collection year.

Moreover, the pattern of results differs somewhat across time because of the smaller sample (model's listwise deletion, n = 380 to 568) and because the nature of the variables are different. The article's analyses uses trajectories which represents clusters of children with similar patterns of probabilities of being on one specific trajectory. In contrast, the above mentioned analyses rely on children's actual child care placement at each data collection year. Overall, the results in our article depict global effects of center-care, rather than effects specific to one assessment-year. In other words, it refers to the quantity of exposure to center-care services across early-childhood. To quantify child care exposure to each of the center-care trajectories, we have calculated center-care exposure scores and tabulated their distribution in eFigure2.

Early-onset Center-Based CCS: On average, low-SES children following the early-onset trajectory are exposed to center-based CCS on 2.8 out of 5 child care assessment times. This translates to 55% of their early-childhood being spent in center-based CCS. As can be seen on eFigure2, while 24% to 35% of this sub-sample are enrolled in center-based CCS at 5-months and 1.5-years, the vast majority are in center-based CCS between 2.5- and 4.5-years (65% to 76%).

Late-onset Center-Based CCS: On average, low-SES children following the late-onset trajectory are exposed to center-based CCS on 1.7 out of 5 child care assessment times. This translates to 34% of their early-childhood being spent in center-based CCS. As can be seen on eFigure2, while 0% to 4% of this sub-sample are enrolled in center-based CCS at 5-months, 1.5- and 2.5-years, the vast majority are in center-based CCS between 3.5- and 4.5-years (71% to 90%, respectively).

eTable 5 presents the data with listwise deletion. Listwise results indicate that none of the main effects for CCS intensity are significant. This reveals that the intensity of CCS does not have an effect on the prediction of academic achievements, population-wide. Yet, the interaction term between SES and the High intensity CCS predicted large improvements for low SES children in mathematics (Effects size [ES] = .56). The same interaction term (SES X High intensity CCS) predicted marginal improvements for reading (ES = .41) and mathematics (ES = .39) for low SES children. Similarly, listwise results for Center-Based CCS Types reveal no significant main effects. Thus the center-based type of CCS does not predict population-wide academic achievement. However, the interaction terms between SES and early-onset as well as SES and late-onset center-based CCS significantly predicted large improvements in reading ( $ES_{\text{early-onset}} = .76$ ;  $ES_{\text{late-onset}} = .62$ ), writing ( $ES_{\text{early-onset}} = .92$ ;  $ES_{\text{late-onset}} = .52$ ), mathematics ( $ES_{\text{early-onset}} = .66$ ;  $ES_{\text{late-onset}} = .59$ ).

### Results

eTable 6 presents data when controlling for children's cognition at 7-years. The cognition variable consists of mean of the two K-ABC subtests (reading & decoding;  $r = .78$ ), after controlling for the child's age when cognition was assessed (residuals). Although 7-year-old children cognition was a moderate predictor of reading (ES = .32), writing (ES = .37) and mathematics (ES = .32) scores, the results with CCS intensity are exactly the same as the ones presented in the main article. The interaction term between SES and the High intensity CCS predicted moderate improvements for low SES children in reading (ES = .35), writing (ES = .35) and mathematics (ES = .45). Similarly, although 7-year-old children cognition was a moderate predictor of reading (ES = .32), writing (ES = .37) and mathematics (ES = .32) scores, the results with center-based CCS are exactly the same as the ones presented in the main article. The interaction terms between SES and early-onset as well as SES and late-onset center-based CCS significantly predicted improvements in reading ( $ES_{\text{early-onset}} = .54$ ;  $ES_{\text{late-onset}} = .33$ ), writing ( $ES_{\text{early-onset}} = .67$ ;  $ES_{\text{late-onset}} = .21$ ), mathematics ( $ES_{\text{early-onset}} = .54$ ;  $ES_{\text{late-onset}} = .34$ ).

eTable 7 presents the associations between child care and school performance at 12 years while controlling for maternal verbal IQ. The maternal verbal IQ (assessed when children were 5 years) is a multiple choice test where mothers fill in 14 sentences (e.g., lemons are sour but sugar is (a. bitter; b. sweet; c. fattening; d. white;  $\alpha = .53^{11}$ ). The effect sizes for the associations between maternal verbal IQ and reading (ES = .10), writing (ES = .07), and mathematics (ES = .07) scores were small but significant in the first model (CCS intensity). A similar pattern of results emerged for the CCS intensity trajectories when adding maternal IQ to the model. Specifically, for low-SES children, high-intensity CCS significantly predicted moderately better writing (ES = .43) and mathematics scores (ES = .43), and marginally improved reading scores ( $p = .08$ , ES = .32). The maternal verbal IQ remained a small, significant predictor of reading (ES = .10), writing (ES = .07), and marginally significant predictor of mathematics ( $p = .06$ , ES = .07) scores in the second model. The results with center-based CCS are exactly the same as the ones presented in the main article. The interaction terms between SES and early-onset as well as SES and late-onset center-based CCS significantly predicted improvements in reading ( $ES_{\text{early-onset}} = .69$ ;  $ES_{\text{late-onset}} = .37$ ), and mathematics ( $ES_{\text{early-onset}} = .67$ ;  $ES_{\text{late-onset}} = .39$ ), while only early-onset also significantly predicted writing scores ( $ES_{\text{early-onset}} = .80$ ;  $ES_{\text{late-onset}} = .24$ ).

eTable 8 presents data when controlling for the child's home environment quality (i.e., Home Observation for Measurement of the Environment Inventory Short-Form; HOME<sup>25</sup>). The QLSCD collected HOME data from two standardized subscales (Verbalization and Stimulation<sup>25</sup>) at 5-months, 1.5- and 2.5-years of age. The verbalization subscale describes the degree and quality of the verbal exchanges between the child and the parent, while the stimulation subscale refers to the level of cognitive stimulation to which the child is exposed. As the highest correlations with our outcome variables were found at 2.5-years for the

Verbalization variable and 5-months for the stimulation variable, these were chosen as confounds and included in the models. The results with CCS intensity and center-based CCS type are very similar to those presented in the main article. Specifically, for low SES children, high-intensity CCS was associated with higher reading (ES = .37), writing (ES = .37) and mathematics scores (ES = .46). Similarly, early-onset center-care was associated with higher reading (ES = .68), writing (ES = .80), and mathematics (ES = .67) scores for low-SES children, while late-onset was only associated with higher reading (ES = .37) and mathematics scores (ES = .39).

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**eTable 1. Early-Childhood Adversity Factors with Respective Indicators and Loadings**

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
T1 - SES Factor's Indicators				
Maternal Education	1	0	999	999
Paternal Education	0.95	0.033	28.491	< .0001
Family Income	1.942	0.058	33.6	< .0001
Maternal Occupational Prestige	-3.812	0.105	-36.33	< .0001
Paternal Occupational Prestige	-3.668	0.15	-24.417	< .0001
T1 - Negative Parenting Factor's Indicators				
Maternal Coercive Interaction	1	0	999	999
Maternal Intrusive Interaction	0.389	0.067	5.781	< .0001
Paternal Coercive Interaction	0.843	0.069	12.145	< .0001
Paternal Intrusive Interaction	0.233	0.084	2.762	0.006
Maternal Coercion	1.386	0.071	19.54	< .0001
Paternal Coercion	1.103	0.119	9.254	< .0001
T1 - Positive Parenting Factor's Indicators				
Maternal Positive Interaction	1	0	999	999
Paternal Positive Interaction	1.604	0.224	7.158	< .0001
Maternal Warmth / Affectivity	0.36	0.081	4.43	< .0001
Paternal Warmth / Affectivity	0.935	0.202	4.622	< .0001
T1 - Family Deviancy Factor's Indicators				
Maternal Antisocial Behaviours	1	0	999	999
Paternal Antisocial Behaviours	1.027	0.118	8.704	< .0001
Maternal Alcohol Use	0.153	0.023	6.545	< .0001
Paternal Alcohol Use	0.247	0.038	6.553	< .0001
Maternal Drug Use	0.138	0.016	8.656	< .0001
Paternal Drug Use	0.207	0.023	8.962	< .0001
T1 - Parent Mental Health Factor's Indicators				
Maternal Anxiety Symptoms	1	0	999	999
Maternal Depressive Symptoms	1.27	0.095	13.359	< .0001
Paternal Depressive Symptoms	0.471	0.058	8.168	< .0001
T1 - Child Peer relationships Factor's Indicators				
Child's Peer Relationship Quality (mother report)	1	0	999	999
Child's Peer Victimization (mother report)	-2.11	0.47	-4.488	< .0001
Child's Peer Victimization (father report)	-1.699	0.307	-5.528	< .0001

**Note.** SES (Socioeconomic Status)

**eTable 2. Care Type Attendance Throughout Early-Childhood (N = 1270)**

	5-months		1.5-years		2.5-years		3.5-years		4.5-years	
	N	%	N	%	N	%	N	%	N	%
Mother care	1073	84.5	497	39.1	473	37.2	331	26.1	276	21.7
Child Care Total	197	15.5	769	60.6	787	62.0	916	72.1	972	76.5
Family-based	24	1.9	130	10.2	137	10.8	425	33.5	405	31.9
i)subsidized		87.5		93.1		96.4		49.2		50.9
ii)private		0.0		0.0		0.0		48.9		42.7
Center-Based	25	2.0	122	9.6	214	16.9	363	28.6	434	34.2
i)subsidized		44.0		46.7		93.5		89.0		87.8
ii)private		28.0		43.4		5.1		11.0		8.1
Individual care	148	12	517	40.7	436	34.3	128	10.1	133	10.5

Note. Individual Types of Care includes relative and nanny-care.

<b>eTable 3. Descriptive Statistics - Outcome variables</b>						
	Age	N	Mean	SD	Min	Max
<b>Original Outcome Variables</b>						
Reading	12- years	965	69.61	16.84	5.56	100.00
Writing	12- years	1027	72.56	14.78	32.00	100.00
Mathematic	12- years	1000	72.77	16.40	22.28	99.65
<b>Outcome Variables with the Addition of Children who had Previously Repeated a Grade (n=97)</b>						
Reading (0=repeated a grade)	12- years	1075	62.50	26.44	0.00	100.00
Writing (0=repeated a grade)	12- years	1136	65.55	25.64	0.00	100.00
Mathematic (0=repeated a grade)	12- years	1110	65.57	26.74	0.00	99.65

**eTable 4. Center-Based Child Care Types Across Time (Reference group: Family-based CCS) Predicting Pre-Adolescents Academic Achievement Scores Using Multiple Linear Regressions (N = 1119)**

<b>Model with 1.5-years CCS (listwise deletion, n=376)</b>						
	<b>Reading</b>		<b>Writing</b>		<b>Mathematics</b>	
<b>B</b>	<b>Effect</b>	<b>Effect</b>	<b>Effect</b>	<b>Effect</b>	<b>Effect</b>	<b>Effect</b>

		95% CI	p	Size	B	95% CI	p	Size	B	95% CI	p	Size
<b>Step 1</b>												
Sex	-13.83	[-18.49,-9.16]	<	-.52	-15.32	[-19.82,-10.82]	<	-.60	-9.90	[-14.73,-5.08]	<	-.37
Birth Order	-1.71	[-5.26,1.83]	.34	-.06	-3.72	[-7.14,-0.30]	.03	-.15	-2.16	[-5.82,1.50]	.25	-.08
Family Status	4.20	[-3.04,11.45]	.25	.16	1.65	[-5.34,8.63]	.643	.06	5.91	[-1.57,13.40]	.121	.22
CSNR	-.18	[-2.77,2.41]	.89	-.01	.25	[-2.25,2.74]	.85	.01	-.20	[-2.88,2.47]	.88	-.01
Difficult Temperament	1.52	[-0.87,3.90]	.21	.06	1.76	[-0.54,4.06]	.13	.07	1.76	[-0.70,4.23]	.16	.07
Maternal age	2.55	[-0.30,5.39]	.08	.10	3.07	[0.33,5.81]	.03	.12	.98	[-1.96,3.92]	.51	.04
Family Dysfunction	.34	[-2.36,3.05]	.80	.01	.27	[-2.34,2.88]	.84	.01	-.27	[-3.06,2.53]	.85	-.01
Neighbourhood Safety	-.16	[-2.68,2.36]	.90	-.01	.09	[-2.34,2.52]	.94	.00	-.05	[-2.65,2.55]	.97	.00
Social Problems in Neighbourhood	.72	[-2.04,3.49]	.61	.03	2.41	[-0.26,5.07]	.08	.09	2.80	[-0.06,5.65]	.05	.10
T1 - SES Factor	-16.03	[-24.11,-7.95]	<	-.61	-18.79	[-26.58,-10.99]	<	-.73	-13.26	[-21.61,-4.91]	.002	-.50
T1 - Negative Parenting Factor	-2.67	[-5.93,0.59]	.11	-.10	-2.23	[-5.37,0.92]	.16	-.09	-1.70	[-5.07,1.67]	.32	-.06
T1 - Family Deviancy Factor	1.21	[-1.83,4.25]	.44	.05	.43	[-2.50,3.36]	.77	.02	1.35	[-1.79,4.49]	.40	.05
T1 - Parent Mental Health Factor	-2.75	[-6.37,0.87]	.14	-.10	-.71	[-4.20,2.78]	.69	-.03	-1.81	[-5.54,1.93]	.34	-.07
T1 - Child Peer relationships Factor	-1.16	[-4.24,1.93]	.46	-.04	-1.83	[-4.81,1.14]	.23	-.07	-1.50	[-4.69,1.69]	.36	-.06
Center-Based CCS Contrasts												
Center-Based vs Family-Based CCS	-4.58	[-12.83,3.67]	.28	-.17	-1.80	[-9.75,6.16]	.66	-.07	1.58	[-6.94,10.10]	.72	.06
Individual CCS Types vs Family-Based CCS	.47	[-5.84,6.78]	.88	.02	3.30	[-2.78,9.38]	.29	.13	4.73	[-1.79,11.24]	.15	.18
<b>Step 2</b>												
SES Interactions with Contrasts												
Center-Based vs Family-Based CCS X SES	-41.31	[-79.58,-3.03]	.03	-1.56	-33.00	[-69.99,3.99]	.08	-1.29	-43.51	[-83.04,-3.97]	.03	-1.63
Individual CCS Types vs Family-Based CCS X SES	-36.97	[-69.45,-4.48]	.03	-1.40	-29.38	[-60.78,2.01]	.07	-1.15	-38.87	[-72.43,-5.32]	.02	-1.45
R <sup>2</sup>	.22		<		.25		<		.15		<	
F	6.22				7.39				3.88			
Δ R <sup>2</sup>	.011		.07		.007		.17		.013		.06	
Δ F	2.66				1.80				2.76			

Model with 2.5-years CCS (listwise deletion, n=380)												
	Reading				Writing				Mathematics			
	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size
<b>Step 1</b>												
Sex	-13.83	[-18.49,-9.16]	<	-.52	-14.30	[-19.02,-9.57]	<	-.56	-9.34	[-14.37,-4.31]	<	-.35
Birth Order	-1.71	[-5.26,1.83]	.34	-.06	-4.22	[-7.50,-0.94]	.01	-.16	-2.34	[-5.83,1.16]	.19	-.09
Family Status	4.20	[-3.04,11.45]	.25	.16	2.43	[-4.74,9.60]	.51	.09	3.11	[-4.53,10.75]	.42	.12
CSNR	-.18	[-2.77,2.41]	.89	-.01	.08	[-2.49,2.65]	.95	.00	-0.50	[-3.24,2.24]	.72	-.02
Difficult Temperament	1.52	[-0.87,3.90]	.21	.06	2.18	[-0.16,4.52]	.07	.08	2.11	[-0.38,4.60]	.10	.08
Maternal age	2.55	[-0.30,5.39]	.08	.10	3.12	[0.34,5.89]	.03	.12	0.96	[-2.00,3.91]	.52	.04
Family Dysfunction	.34	[-2.36,3.05]	.80	.01	.94	[-1.80,3.67]	.50	.04	0.00	[-2.91,2.91]	1.00	.00
Neighbourhood Safety	-.16	[-2.68,2.36]	.90	-.01	.03	[-2.64,2.71]	.98	.00	1.06	[-1.79,3.91]	.46	.04
Social Problems in Neighbourhood	.72	[-2.04,3.49]	.61	.03	2.27	[-0.52,5.05]	.11	.09	2.25	[-0.72,5.22]	.14	.08
T1 - SES Factor	-16.03	[-24.11,-7.95]	<	-.61	-20.83	[-28.34,-13.32]	<	-.81	-19.26	[-27.26,-11.27]	<	-.72
T1 - Negative Parenting Factor	-2.67	[-5.93,0.59]	.11	-.10	-1.90	[-5.26,1.47]	.27	-.07	-0.78	[-4.36,2.80]	.67	-.03
T1 - Family Deviancy Factor	1.21	[-1.83,4.25]	.44	.05	.13	[-3.14,3.40]	.94	.01	1.49	[-1.99,4.98]	.40	.06
T1 - Parent Mental Health Factor	-2.75	[-6.37,0.87]	.14	-.10	.15	[-3.34,3.64]	.93	.01	-0.88	[-4.61,2.84]	.64	-.03
T1 - Child Peer relationships Factor	-1.16	[-4.24,1.93]	.46	-.04	-1.80	[-5.03,1.44]	.28	-.07	-1.75	[-5.19,1.70]	.32	-.07
Center-Based CCS Contrasts												
Center-Based vs Family-Based CCS	-4.58	[-12.83,3.67]	.28	-.17	2.39	[-4.66,9.44]	.50	.09	1.57	[-5.93,9.08]	.68	.06
Individual CCS Types vs Family-Based CCS	.47	[-5.84,6.78]	.88	.02	4.46	[-1.86,10.78]	.17	.17	4.71	[-2.02,11.45]	.17	.18
<b>Step 2</b>												
SES Interactions with Contrasts												
Center-Based vs Family-Based CCS X SES	19.46	[-2.07,40.99]	.08	.74	28.76	[8.07,49.45]	.01	1.12	18.69	[-3.51,40.90]	.10	.70
Individual CCS Types vs	-1.31	[-	.89	-.05	1.48	[-	.86	.06	-2.18	[-20.50,16.15]	.82	-.08

Family-Based CCS X SES		19.07,16.46]		15.59,18.55]												
	R <sup>2</sup>	F	Δ R <sup>2</sup>	Δ F												
	.19	5.27	.01	2.69	<	.001	.07	<	.001	.14	3.60	.012	2.51	<	.001	.08
Model with 3.5-years CCS (listwise deletion, n=452)																
Reading				Writing				Mathematics								
	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size				
<b>Step 1</b>																
Sex	-12.08	[-16.66,-7.50]	.001	-.46	-14.34	[-18.81,-9.86]	.001	-.56	-9.50	[-14.21,-4.78]	.001	-.36				
Birth Order	-1.93	[-5.07,1.21]	.23	-.07	-3.69	[-6.76,-0.62]	.02	-.14	-2.40	[-5.63,0.83]	.15	-.09				
Family Status	1.89	[-4.67,8.46]	.57	.07	1.86	[-4.55,8.28]	.57	.07	3.75	[-3.01,10.51]	.276	.14				
CSNR	-.88	[-3.39,1.63]	.49	-.03	-.15	[-2.60,2.31]	.91	-.01	-.12	[-2.70,2.46]	.93	.00				
Difficult Temperament	1.75	[-0.49,4.00]	.13	.07	2.37	[0.18,4.57]	.03	.09	2.02	[-0.29,4.34]	.09	.08				
Maternal age	3.06	[0.41,5.70]	.02	.12	2.65	[0.07,5.24]	.04	.10	1.32	[-1.40,4.03]	.34	.05				
Family Dysfunction	.43	[-2.23,3.09]	.75	.02	1.19	[-1.41,3.79]	.37	.05	.45	[-2.28,3.19]	.74	.02				
Neighbourhood Safety	.09	[-2.36,2.53]	.94	.00	-.12	[-2.51,2.26]	.92	.00	.39	[-2.12,2.91]	.76	.01				
Social Problems in Neighbourhood	-.20	[-2.90,2.50]	.89	-.01	1.80	[-0.84,4.44]	.18	.07	1.66	[-1.12,4.44]	.24	.06				
T1 - SES Factor	-18.12	[-24.70,-11.54]	.001	-.69	-17.56	[-24.00,-11.13]	.001	-.69	-17.48	[-24.26,-10.71]	.001	-.65				
T1 - Negative Parenting Factor	-.99	[-4.30,2.32]	.56	-.04	-.31	[-3.55,2.93]	.85	-.01	.44	[-2.97,3.85]	.80	.02				
T1 - Family Deviancy Factor	.02	[-3.06,3.10]	.99	.00	-.92	[-3.93,2.09]	.55	-.04	-.06	[-3.24,3.11]	.97	.00				
T1 - Parent Mental Health Factor	-1.25	[-4.67,2.18]	.48	-.05	-.64	[-3.99,2.71]	.71	-.02	-1.21	[-4.74,2.32]	.50	-.05				
T1 - Child Peer relationships Factor	.56	[-2.66,3.78]	.73	.02	.44	[-2.70,3.59]	.78	.02	.39	[-2.93,3.70]	.82	.01				
Center-Based CCS Contrasts																
Center-Based vs Family-Based CCS	-5.81	[-10.69,-0.93]	.02	-.22	-.15	[-4.91,4.62]	.95	-.01	-2.57	[-7.60,2.45]	.31	-.10				
Individual CCS Types vs Family-Based CCS	2.79	[-4.34,9.93]	.44	.11	4.84	[-2.13,11.82]	.17	.19	3.77	[-3.57,11.12]	.31	.14				
<b>Step 2</b>																
SES Interactions with Contrasts																



**Step 2**

SES Interactions with  
Contrasts

Center-Based vs Family- Based CCS X SES	15.07	[2.99,27.14]	.01	.57	13.83	[1.96,25.70]	.02	.54	12.39	[-0.05,24.84]	.05	.46
Individual CCS Types vs Family-Based CCS X SES	2.83	[-12.37,18.03]	.71	.11	6.13	[-8.81,21.07]	.42	.24	-1.52	[-17.18,14.14]	.85	-.06
			<				<				<	
$R^2$	.18		.001		.20		.001		.14		.001	
$F$	7.21				8.28				5.42			
$\Delta R^2$	.009		.05		.008		.07		.007		.11	
$\Delta F$	3.05				2.64				2.19			

**Notes.** Effect Size (Standardized Coefficients); CCS (Child Care Services); Individual CCS Types (relative- and nanny-care) Sex (1=boys; 0=girls); Birth order (0: First Born; 1: Has Siblings) Family Status (1: Intact Family; 0: Non-Intact [Blended or Single-Parent Families]); SES (Socioeconomic Status; 0= Adequate [top 75th quartile]; 1 = Non-Adequate [bottom quartile]); CSNR (Cumulative Score for Neonatal Risk). Listwise Deletion.



**eTable 5. Results with Listwise Deletion: Child Care Trajectories (Intensity & Center-Based Type) Predicting Pre-Adolescents Academic Achievement Scores Using Multiple Linear Regressions**

	Model with CCS Intensity ( <i>n</i> =1269, with listwise deletion <i>n</i> = 822)											
	Reading				Writing				Mathematics			
	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size
<b>Step 1</b>												
Sex	-	[-13.47, -	<	-.39	-	[-16.74, -	<	-.54	-7.74	[-11.27, -	<	-.30
	10.05	6.63]	.001		13.40	10.07]	.001			4.21]	.001	
Birth Order	-2.18	[-4.48, 0.12]	.06	-.08	-3.31	[-5.55, -1.06]	.004	-.13	-2.52	[-4.89, -0.15]	.04	-.10
Family Status	3.15	[-1.48, 7.78]	.18	.12	2.90	[-1.63, 7.42]	.209	.12	4.85	[0.07, 9.63]	.05	.19
CSNR	-1.00	[-2.82, 0.81]	.28	-.04	-.63	[-2.40, 1.14]	.48	-.03	-.80	[-2.67, 1.08]	.40	-.03
Difficult Temperament	1.24	[-0.49, 2.98]	.16	.05	1.38	[-0.31, 3.07]	.11	.06	1.51	[-0.28, 3.30]	.10	.06
Maternal age	2.32	[0.38, 4.25]	.02	.09	2.29	[0.41, 4.18]	.02	.09	1.28	[-0.72, 3.27]	.21	.05
Family Dysfunction	.02	[-1.95, 1.98]	.99	.00	.10	[-1.82, 2.02]	.92	.00	-.28	[-2.31, 1.75]	.79	-.01
Neighbourhood Safety	.22	[-1.61, 2.05]	.81	.01	.10	[-1.69, 1.88]	.92	.00	-.07	[-1.97, 1.82]	.94	.00
Social Problems in Neighbourhood	-.25	[-2.19, 1.70]	.80	-.01	.51	[-1.39, 2.40]	.60	.02	1.06	[-0.95, 3.06]	.30	.04
T1 - SES Factor	-	[-22.17, -	<	-.69	-	[-21.50, -	<	-.69	-	[-22.17, -	<	-.68
	17.63	13.08]	.001		17.07	12.64]	.001		17.48	12.79]	.001	
T1 - Negative Parenting Factor	-.64	[-3.05, 1.77]	.60	-.02	-.01	[-2.36, 2.35]	1.00	.00	.19	[-2.30, 2.68]	.88	.01
T1 - Family Deviancy Factor	.59	[-1.49, 2.67]	.58	.02	.15	[-1.88, 2.18]	.88	.01	.76	[-1.39, 2.90]	.49	.03
T1 - Parent Mental Health Factor	-.82	[-3.47, 1.83]	.54	-.03	-.73	[-3.32, 1.86]	.58	-.03	-.49	[-3.23, 2.24]	.72	-.02
T1 - Child Peer relationships Factor	1.23	[-1.09, 3.56]	.30	.05	.91	[-1.35, 3.18]	.43	.04	1.38	[-1.01, 3.78]	.26	.05
CCS Intensity Trajectory Contrasts												
High vs Low CCS Hours	1.13	[-3.26, 5.52]	.61	.04	3.01	[-1.28, 7.29]	.17	.12	2.14	[-2.39, 6.67]	.35	.08
Moderate vs Low CCS Hours	.69	[-3.57, 4.96]	.75	.03	1.68	[-2.49, 5.84]	.43	.07	1.20	[-3.21, 5.61]	.59	.05
<b>Step 2</b>												
SES Interactions with CCS Intensity Trajectory Contrasts												
High vs Low CCS intensity X SES	10.61	[-0.77, 21.99]	.07	.41	9.69	[-1.41, 20.80]	.09	.39	14.56	[2.83, 26.29]	.02	.56
Moderate vs Low CCS intensity X SES	5.62	[-3.42, 14.67]	.22	.22	7.16	[-1.66, 15.99]	.11	.29	5.63	[-3.70, 14.95]	.24	.22

R <sup>2</sup>	.178	<	.212	<	.162	<
F	10.91	<	13.58	<	9.75	<
Δ R <sup>2</sup>	.004	.15	.004	.13	.006	.05
Δ F	1.875		2.044		3.038	

**Model with Center-Based CCS Type (n=1119, with listwise deletion n = 717)**

	Reading				Writing				Mathematics			
	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size
<b>Step 1</b>												
Sex	-	[-13.82, -6.68]	<	-.40	-	[-16.61, -9.61]	<	-.53	-	[-11.03, -3.67]	<	-.28
Birth Order	10.25		.001		13.11		.001		7.352		.001	
Family Status	-1.99	[-4.40, 0.43]	.11	-.08	-3.63	[-6.00, -1.27]	.00	-.15	-2.31	[-4.80, 0.17]	.07	-.09
Family Status	2.62	[-2.40, 7.64]	.31	.10	2.21	[-2.71, 7.13]	.38	.09	4.17	[-1.01, 9.34]	.11	.16
CSNR	-0.61	[-2.54, 1.31]	.53	-.02	-0.22	[-2.11, 1.67]	.82	-.01	-0.36	[-2.35, 1.62]	.72	-.01
Difficult Temperament	1.72	[-0.09, 3.52]	.06	.07	1.71	[-0.06, 3.47]	.06	.07	1.64	[-0.22, 3.50]	.08	.06
Maternal age	2.90	[0.87, 4.94]	.005	.11	3.03	[1.03, 5.02]	.003	.12	1.59	[-0.51, 3.69]	.14	.06
Family Dysfunction	-0.19	[-2.25, 1.87]	.86	-.01	.02	[-2.00, 2.04]	.98	.00	-0.33	[-2.45, 1.80]	.76	-.01
Neighbourhood Safety	.23	[-1.70, 2.15]	.82	.01	.06	[-1.83, 1.94]	.95	.00	.02	[-1.96, 2.00]	.99	.00
Social Problems in Neighbourhood	.84	[-1.22, 2.90]	.42	.03	1.96	[-0.05, 3.98]	.06	.08	2.12	[0.00, 4.24]	.05	.08
T1 - SES Factor	-	[-21.30, -11.36]	<	-.64	-	[-20.38, -10.65]	<	-.62	-	[-21.94, -11.70]	<	-.65
T1 - Negative Parenting Factor	16.33		.001		15.51		.001		16.82		.001	
T1 - Family Deviancy Factor	-0.88	[-3.39, 1.64]	.50	-.03	-0.42	[-2.89, 2.05]	.74	-.02	-0.02	[-2.62, 2.57]	.99	.00
T1 - Parent Mental Health Factor	.61	[-1.51, 2.74]	.57	.02	.35	[-1.73, 2.43]	.74	.01	.90	[-1.29, 3.08]	.42	.03
T1 - Child Peer relationships Factor	-0.61	[-3.37, 2.15]	.67	-.02	-0.39	[-3.09, 2.31]	.78	-.02	-0.40	[-3.24, 2.44]	.78	-.02
T1 - Child Peer relationships Factor	.80	[-1.64, 3.23]	.52	.03	.44	[-1.94, 2.83]	.71	.02	.54	[-1.97, 3.04]	.67	.02
Center-Based CCS Trajectory Contrasts												
Early-Onset vs Never Center-Based CCS	-2.51	[-8.08, 3.06]	.38	-.10	.12	[-5.34, 5.58]	.97	.00	-0.21	[-5.95, 5.53]	.94	-.01
Late-Onset vs Never Center-Based CCS	-1.47	[-5.65, 2.71]	.49	-.06	.71	[-3.38, 4.80]	.73	.03	-0.96	[-5.27, 3.34]	.66	-.04

**Step 2**

SES Interactions with Center-Based CCS Trajectory

Contrasts

Early-Onset vs Never Center-Based CCS X SES	19.52	[0.00, 0.00]	.02	.76	22.85	[7.15, 38.55]	.004	.92	17.10	[0.56, 33.64]	.04	.66
Late-Onset vs Never Center-Based CCS X SES	16.05	[0.00, 0.00]	.004	.62	12.88	[2.31, 23.44]	.02	.52	15.32	[4.19, 26.45]	.007	.59
R <sup>2</sup>	.165		<		.192		<		.140		<	
F	8.65		.001		10.42		.001		7.13		.001	
Δ R <sup>2</sup>	.014		<				<				<	
Δ F	6.156		.001				.001				.001	
			.002		.014		.003		.012		.007	
					5.992				4.948			

**Notes.** Effect Size (Standardized Coefficients); CCS (Child Care Services); Sex (1=boys; 0=girls); Birth order (0: First Born; 1: Has Siblings) Family Status (1: Intact Family; 0: Non-Intact [Blended or Single-Parent Families]); SES (Socioeconomic Status; 0= Adequate [top 75th quartile]; 1 = Non-Adequate [bottom quartile]); CSNR (Cumulative Score for Neonatal Risk)

**eTable6. Child Care Trajectories (Intensity & Center-Based Type) Predicting Pre-Adolescents Academic Achievement Scores Using Multiple Linear Regressions when 7yo Cognition is Included**

	Model with CCS Intensity (n=1269)											
	Reading				Writing				Mathematics			
	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size
<b>Step 1</b>												
Sex	-8.18	[-10.95, -5.41]	<.001	-.32	-	[-13.90, -8.77]	<.001	-.46	-4.43	[-7.27, -1.60]	.002	-.17
Birth Order	-1.26	[-3.12, 0.59]	.18	-.05	-1.69	[-3.40, 0.02]	.05	-.07	-1.40	[-3.28, 0.48]	.14	-.06
Family Status	4.30	[0.64, 7.96]	.02	.17	3.99	[0.59, 7.40]	.02	.16	6.01	[2.18, 9.83]	.002	.23
CSNR	-.58	[-2.08, 0.93]	.451	-.02	-.29	[-1.66, 1.08]	.68	-.01	-.29	[-1.83, 1.26]	.72	-.01
Difficult Temperament	1.48	[0.08, 2.88]	.04	.06	1.45	[0.15, 2.76]	.03	.06	1.17	[-0.26, 2.61]	.11	.05
Maternal age	2.05	[0.53, 3.57]	.008	.08	1.52	[0.13, 2.91]	.03	.06	1.01	[-0.57, 2.59]	.21	.04
Family Dysfunction	.04	[-1.60, 1.69]	.96	.00	.20	[-1.29, 1.69]	.79	.01	.60	[-1.04, 2.24]	.47	.02
Neighbourhood Safety	-.44	[-1.99, 1.10]	.57	-.01	-.86	[-2.25, 0.54]	.23	-.03	-1.00	[-2.54, 0.55]	.21	-.04
Social Problems in Neighbourhood	-1.02	[-2.64, 0.61]	.22	-.04	-.74	[-2.21, 0.74]	.33	-.03	-.68	[-2.28, 0.92]	.41	-.03
T1 - SES Factor	-	[-16.05, -8.43]	<.001	-.48	-	[-14.66, -7.77]	<.001	-.45	-	[-14.87, -7.20]	<.001	-.42
T1 - Negative Parenting Factor	-.70	[-2.65, 1.24]	.48	-.03	-.39	[-2.15, 1.38]	.67	-.02	.23	[-1.75, 2.21]	.82	.01
T1 - Family Deviancy Factor	.21	[-1.44, 1.87]	.80	.01	-.20	[-1.71, 1.30]	.79	-.01	.40	[-1.25, 2.06]	.63	.01
T1 - Parent Mental Health Factor	-.65	[-2.82, 1.53]	.56	-.02	-.62	[-2.60, 1.36]	.54	-.02	-.70	[-2.88, 1.47]	.53	-.03
T1 - Child Peer relationships Factor	.39	[-1.49, 2.27]	.69	.01	.27	[-1.44, 1.98]	.76	.01	1.44	[-0.44, 3.32]	.13	.05
Reading Achievement (K-ABC;	8.21	[6.59, 9.84]	<	.32	9.26	[7.77,	<	.37	8.25	[6.61, 9.90]	<	.32

7yo)			.001			10.76]	.001				.001	
CCS Intensity Trajectory Contrasts												
High vs Low CCS Hours	- .64	[-4.19, 2.92]	.73	-.02	2.26	[-1.01, 5.53]	.18	.09	.69	[-2.82, 4.20]	.70	.03
Moderate vs Low CCS Hours	-1.64	[-5.15, 1.87]	.36	-.07	.28	[-2.86, 3.43]	.86	.01	-.59	[-4.11, 2.92]	.74	-.02
<b>Step 2</b>												
SES Interactions with CCS Intensity Trajectory Contrasts												
High vs Low CCS intensity X SES	9.10	[-0.03, 18.24]	.05	.35	8.72	[0.29, 17.15]	.04	.35	11.42	[2.27, 20.58]	.01	.45
Moderate vs Low CCS intensity X SES	2.74	[-4.60, 10.09]	.46	.11	4.37	[-2.37, 11.10]	.20	.18	1.31	[-6.19, 8.80]	.73	.06
R <sup>2</sup>	.24		<		.30		<		.21		<	
F	23.21		<		32.23		<		19.98		<	
Δ R <sup>2</sup>	.00		.13		.00		.09		.01		.04	
Δ F	2.44				2.73				3.69			

Model with Center-Based CCS Type (n=1119)

	Reading				Writing				Mathematics			
	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size
<b>Step 1</b>												
Sex	-8.53	[-11.48, -5.58]	<	-.32	-	[-14.05, -8.70]	<	-.45	-4.55	[-7.48, -1.63]	.002	-.17
Birth Order	-1.06	[-3.06, 0.93]	.30	-.05	-2.01	[-3.83, -0.20]	.029	-.08	-1.38	[-3.37, 0.62]	.175	-.06
Family Status	3.94	[-0.11, 7.98]	.06	.17	3.24	[-0.48, 6.96]	.088	.16	6.22	[2.08, 10.37]	.003	.23
CSNR	-.31	[-1.89, 1.26]	.70	-.02	.06	[-1.41, 1.52]	.94	-.01	-.01	[-1.63, 1.61]	.99	-.01
Difficult Temperament	1.85	[0.38, 3.32]	.01	.06	1.61	[0.28, 2.95]	.02	.06	1.47	[-0.02, 2.95]	.05	.05
Maternal age	2.43	[0.78, 4.08]	.004	.08	2.16	[0.65, 3.67]	.005	.07	1.12	[-0.54, 2.77]	.19	.04

Family Dysfunction	.16	[-1.55, 1.87]	.86	.00	.35	[-1.28, 1.97]	.68	.01	.93	[-0.80, 2.66]	.29	.02
Neighbourhood Safety	-.56	[-2.21, 1.09]	.51	-.01	-.94	[-2.43, 0.55]	.22	-.04	-.94	[-2.61, 0.73]	.27	-.04
Social Problems in Neighbourhood	-.39	[-2.10, 1.32]	.65	-.04	.22	[-1.36, 1.79]	.79	-.03	.18	[-1.55, 1.90]	.84	-.02
T1 - SES Factor	-	[-15.26, -7.08]	<	-.47	-	[-13.82, -6.37]	<	-.46	-	[-15.07, -6.68]	<	-.43
T1 - Negative Parenting Factor	-.87	[-2.88, 1.13]	.39	-.03	-.68	[-2.57, 1.21]	.48	-.01	.33	[-1.72, 2.39]	.75	.01
T1 - Family Deviancy Factor	.20	[-1.58, 1.99]	.82	.01	-.06	[-1.62, 1.51]	.94	-.01	.49	[-1.23, 2.21]	.57	.01
T1 - Parent Mental Health Factor	-.31	[-2.61, 1.98]	.79	-.02	-.35	[-2.45, 1.76]	.75	-.02	-.95	[-3.24, 1.34]	.41	-.02
T1 - Child Peer relationships Factor	.27	[-1.75, 2.29]	.79	.02	.04	[-1.82, 1.89]	.97	.01	.87	[-1.15, 2.88]	.40	.06
Reading Achievement (K-ABC; 7yo)	7.51	[5.80, 9.23]	<	.32	8.85	[7.29, 10.41]	<	.37	7.44	[5.71, 9.17]	<	.32
Center-Based CCS Trajectory Contrasts												
Early-Onset vs Never Center-Based CCS	-1.62	[-6.17, 2.93]	.49	-.04	1.36	[-2.85, 5.58]	.53	.05	2.00	[-2.66, 6.67]	.40	.08
Late-Onset vs Never Center-Based CCS	-1.66	[-5.08, 1.75]	.34	-.07	-.54	[-3.64, 2.57]	.73	-.03	-1.35	[-4.77, 2.07]	.44	-.06
<b>Step 2</b>												
SES Interactions with Center-Based CCS Trajectory Contrasts												
Early-Onset vs Never Center-Based CCS X SES	13.32	[1.40, 25.23]	.03	.54	14.86	[3.50, 26.22]	.01	.67	12.11	[-1.60, 25.81]	.08	.54
Late-Onset vs Never Center-Based CCS X SES	8.42	[0.12, 16.71]	.05	.33	5.00	[-2.75, 12.76]	.21	.21	9.04	[0.41, 17.66]	.04	.34
	R <sup>2</sup>	.21	<	.001	.27	<	.001	.19	<	.001		
	F	17.61	<	.001	24.33	<	.001	15.16	<	.001		
	Δ R <sup>2</sup>	.01	.020		.01	.03		.01		.03		
	Δ F	4.14			4.10			4.06				

**Notes.**

Effect Size (Standardized Coefficients); CCS (Child Care Services); Sex (1=boys; 0=girls); Birth order (0: First Born; 1: Has Siblings) Family Status (1: Intact Family; 0: Non-Intact [Blended or Single-Parent])

Families]); SES (Socioeconomic Status; 0= Adequate [top 75th quartile]; 1 = Non-Adequate [bottom quartile]); CSNR (Cumulative Score for Neonatal Risk); Cognition variable consists of mean of the two K-ABC subtests (reading & decoding;  $r = .78$ ), after controlling for the child's age when cognition was assessed (residuals).

**eTable 7. Child Care Trajectories (Intensity & Center-Based Type) Predicting Pre-Adolescents Academic Achievement Scores Using Multiple Linear Regressions when Maternal Verbal IQ is Included**

	Model with CCS Intensity ( $n=1269$ )											
	Reading				Writing				Mathematics			
	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size
<b>Step 1</b>												
Sex	-8.35	[-11.22, -5.48]	<.001	-.33	-11.58	[-14.28, -8.87]	.002	-.18	-4.66	[-7.62, -1.71]	.002	-.18
Birth Order	-2.00	[-3.92, -.08]	.04	-.08	-2.50	[-4.30, -.70]	.03	-.08	-2.11	[-4.05, -.17]	.03	-.08
Family Status	4.82	[1.01, 8.63]	.01	.19	4.58	[.97, 8.19]	.001	.25	6.53	[2.57, 10.49]	.001	.25
CSNR	-.97	[-2.52, .58]	.22	-.04	-.73	[-2.19, .73]	.40	-.03	-.68	[-2.28, .92]	.40	-.03
Difficult Temperament	1.81	[.36, 3.26]	.01	.07	1.85	[.47, 3.22]	.04	.06	1.53	[.04, 3.02]	.04	.06
Maternal age	2.13	[.55, 3.71]	.01	.08	1.61	[.12, 3.10]	.19	.04	1.10	[-.56, 2.75]	.19	.04
Family Dysfunction	-.26	[-1.97, 1.45]	.76	-.01	-.20	[-1.77, 1.38]	.79	.01	.23	[-1.47, 1.93]	.79	.01
Neighbourhood Safety	-.36	[-1.96, 1.24]	.66	-.01	-.74	[-2.20, .72]	.29	-.03	-.88	[-2.50, .74]	.29	-.03
Social Problems in Neighbourhood	-.11	[-1.77, 1.55]	.90	.00	.28	[-1.26, 1.83]	.78	.01	.23	[-1.42, 1.88]	.78	.01
T1 - SES Factor	-14.30	[-18.19, -10.40]	<.001	-.56	-13.80	[-17.47, -10.14]	.001	-.52	-13.43	[-17.42, -9.44]	.001	-.52
T1 - Negative Parenting Factor	-.61	[-2.64, 1.41]	.55	-.02	-.27	[-2.14, 1.60]	.74	.01	.34	[-1.71, 2.40]	.74	.01
T1 - Family Deviancy Factor	.50	[-1.23, 2.23]	.57	.02	.16	[-1.44, 1.76]	.40	.03	.75	[-.98, 2.47]	.40	.03
T1 - Parent Mental Health Factor	-.60	[-2.89, 1.68]	.60	-.02	-.65	[-2.75, 1.45]	.51	-.03	-.76	[-3.03, 1.51]	.51	-.03
T1 - Child Peer relationships Factor	.28	[-1.67, 2.24]	.78	.01	.19	[-1.62, 2.01]	.17	.05	1.39	[-.57, 3.35]	.17	.05
Maternal Verbal IQ	2.58	[.94, 4.23]	.00	.10	2.23	[.67, 3.79]	.04	.07	1.78	[.09, 3.47]	.04	.07
CCS Intensity Trajectory Contrasts												
High vs Low CCS Hours	-.73	[-4.44, 2.98]	.70	-.03	2.28	[-1.18, 5.74]	.69	.04	.75	[-2.94, 4.43]	.69	.04
Moderate vs Low CCS	-1.73	[-5.38, 1.92]	.35	-.07	.16	[-3.19, 3.51]	.70	-.02	-.71	[-4.37, 2.95]	.70	-.02

Step 2		Hours											
SES Interactions with CCS Intensity Trajectory Contrasts													
High vs Low CCS intensity X SES		8.28	[-1.11, 17.68]	.08	.32	8.13	[-.77, 17.04]	.03	.43	11.01	[1.34, 20.67]	.03	.43
Moderate vs Low CCS intensity X SES		3.22	[-4.36, 10.80]	.41	.13	5.11	[-2.01, 12.24]	.61	.08	2.04	[-5.80, 9.89]	.61	.08
R <sup>2</sup>				<				<				<	
F		.16		.001		.20		.001		.13		.001	
Δ R <sup>2</sup>		14.39				18.05				11.30			
Δ F		.002		.19		.003		.13		.004		.07	
		1.85				2.26				3.01			

Model with Center-Based CCS Type (n=1119)

Step 1	Reading				Writing				Mathematics			
	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size
	Sex	-8.64	[-11.68, -5.60]	<	-.33	-11.53	[-14.37, -8.70]	<	-.46	-4.70	[-7.72, -1.68]	.002
Birth Order	-1.60	[-3.65, .46]	.13	-.06	-2.64	[-4.55, -.73]	.01	-.11	-1.91	[-3.95, .14]	.07	-.07
Family Status	4.37	[.19, 8.54]	.04	.17	3.74	[-.19, 7.66]	.06	.15	6.63	[2.39, 10.88]	.002	.26
CSNR	-.65	[-2.29, .99]	.44	-.02	-.34	[-1.89, 1.21]	.67	-.01	-.34	[-2.02, 1.33]	.69	-.01
Difficult Temperament	2.12	[.60, 3.64]	.01	.08	1.95	[.54, 3.36]	.01	.08	1.76	[.22, 3.29]	.03	.07
Maternal age	2.49	[.78, 4.21]	.004	.10	2.27	[.68, 3.86]	.01	.09	1.22	[-.50, 2.93]	.16	.05
Family Dysfunction	-.12	[-1.89, 1.64]	.89	.00	-.01	[-1.70, 1.67]	.99	.00	.62	[-1.15, 2.39]	.49	.02
Neighbourhood Safety	-.49	[-2.17, 1.19]	.57	-.02	-.84	[-2.40, .72]	.29	-.03	-.85	[-2.54, .85]	.33	-.03
Social Problems in Neighbourhood	.46	[-1.28, 2.20]	.60	.02	1.23	[-.43, 2.88]	.15	.05	1.03	[-.74, 2.81]	.25	.04
T1 - SES Factor	-13.29	[-17.49, -9.08]	<	-.51	-12.73	[-16.65, -8.80]	<	-.51	-13.13	[-17.42, -8.84]	<	-.51
T1 - Negative Parenting Factor	-.75	[-2.83, 1.33]	.48	-.03	-.51	[-2.51, 1.49]	.61	-.02	.48	[-1.64, 2.59]	.66	.02
T1 - Family Deviancy Factor	.46	[-1.36, 2.28]	.62	.02	.28	[-1.36, 1.91]	.74	.01	.79	[-.97, 2.54]	.38	.03
T1 - Parent Mental Health Factor	-.32	[-2.71, 2.07]	.79	-.01	-.44	[-2.66, 1.79]	.70	-.02	-1.06	[-3.44, 1.32]	.38	-.04
T1 - Child Peer relationships Factor	.09	[-1.97, 2.15]	.93	.00	-.15	[-2.09, 1.78]	.88	-.01	.71	[-1.36, 2.79]	.50	.03



<b>Step 2</b>	Maternal Verbal IQ	2.27	[.51, 4.02]	.01	.09	2.18	[.58, 3.77]	.01	.09	1.66	[-.06, 3.39]	.06	.07
	Center-Based CCS												
	Trajectory Contrasts												
	Early-Onset vs Never												
	Center-Based CCS	-3.38	[-8.10, 1.33]	.16	-.13	-.67	[-5.12, 3.78]	.77	-.03	.30	[-4.47, 5.08]	.90	.01
	Late-Onset vs Never												
	Center-Based CCS	-2.23	[-5.79, 1.33]	.22	-.09	-1.16	[-4.43, 2.11]	.49	-.05	-1.86	[-5.39, 1.68]	.30	-.07
	SES Interactions with												
	Center-Based												
	CCSTrajectory												
	Contrasts												
	Early-Onset vs Never												
	Center-Based CCS X												
SES	8.28	[5.37, 29.96]	.005	.69	19.94	[8.01, 31.88]	.001	.80	16.35	[2.40, 30.30]	.02	.67	
Late-Onset vs Never													
Center-Based CCS X													
SES	3.22	[.72, 17.77]	.03	.37	5.96	[-2.20, 14.13]	.15	.24	9.84	[1.03, 18.66]	.03	.39	
$R^2$	.13		<.001		.17		<.001		.12		<.001		
F	11.20				13.45				9.03				
$\Delta R^2$	.01		.005		.01		.003		.01		.01		
$\Delta F$	5.74				6.25				5.41				

**Notes.**

Effect Size (Standardized Coefficients); CCS (Child Care Services); Sex (1=boys; 0=girls); Birth order (0: First Born; 1: Has Siblings) Family Status (1: Intact Family; 0: Non-Intact [Blended or Single-Parent Families]); SES (Socioeconomic Status; 0= Adequate [top 75th quartile]; 1 = Non-Adequate [bottom quartile]); CSNR (Cumulative Score for Neonatal Risk); Maternal verbal IQ.

**eTable 8. Child Care Trajectories (Intensity & Center-Based Type) Predicting Pre-Adolescents Academic Achievement Scores Using Multiple Linear Regressions when HOME is Included**

	Model with CCS Intensity (n=1269)											
	Reading				Writing				Mathematics			
	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size	B	95% CI	p	Effect Size
<b>Step 1</b>												
Sex	-8.48	[-11.37,-5.60]	.00	-.34	-11.70	[-14.40,-9.00]	.000	-.47	-4.75	[-7.70,-1.81]	.002	-.18
Birth Order	-1.64	[-3.58,0.29]	.10	-.07	-2.27	[-4.08,-0.46]	.01	-.09	-1.92	[-3.89,0.04]	.05	-.08
Family Status	4.66	[0.86,8.45]	.02	.18	4.49	[0.87,8.10]	.015	.18	6.45	[2.49,10.42]	.001	.25
CSNR	-.96	[-2.52,0.59]	.22	-.04	-.73	[-2.19,0.74]	.33	-.03	-.68	[-2.28,0.92]	.40	-.03
Difficult Temperament	1.96	[0.50,3.42]	.01	.08	1.96	[0.58,3.34]	.01	.08	1.60	[0.10,3.09]	.04	.06
Maternal age	1.86	[0.24,3.47]	.02	.07	1.45	[-0.06,2.97]	.06	.06	1.01	[-0.66,2.69]	.24	.04
Family Dysfunction	-.39	[-2.11,1.32]	.65	-.01	-.33	[-1.92,1.27]	.69	-.01	.06	[-1.66,1.77]	.95	.00
Neighbourhood Safety	-.22	[-1.83,1.38]	.78	-.01	-.62	[-2.09,0.85]	.41	-.02	-.82	[-2.44,0.79]	.32	-.03
Social Problems in Neighbourhood	-.21	[-1.87,1.44]	.80	-.01	.22	[-1.32,1.77]	.78	.01	.18	[-1.48,1.83]	.83	.01
T1 - SES Factor	-15.30	[-19.17,-11.43]	.00	-.60	-14.66	[-18.29,-11.04]	.00	-.58	-14.20	[-18.15,-10.26]	.00	-.55
T1 - Negative Parenting Factor	-.45	[-2.48,1.57]	.66	-.02	-.15	[-2.03,1.73]	.88	-.01	.40	[-1.66,2.47]	.70	.02
T1 - Family Deviancy Factor	.53	[-1.20,2.25]	.55	.02	.23	[-1.37,1.84]	.78	.01	.79	[-0.93,2.52]	.37	.03
T1 - Parent Mental Health Factor	-.75	[-3.02,1.53]	.52	-.03	-.83	[-2.93,1.27]	.44	-.03	-.86	[-3.14,1.41]	.46	-.03
T1 - Child Peer relationships Factor	.60	[-1.36,2.56]	.55	.02	.42	[-1.40,2.23]	.65	.02	1.57	[-0.40,3.53]	.12	.06
HOME environment - Verbalization	.22	[-1.67,2.11]	.82	.01	.17	[-1.59,1.94]	.85	.01	-.40	[-2.27,1.48]	.68	-.01
HOME environment - Stimulation	1.67	[-0.09,3.43]	.06	.07	.93	[-0.73,2.58]	.27	.04	1.05	[-0.77,2.87]	.26	.04

CCS Intensity Trajectory Contrasts												
High vs Low CCS Hours	- .48	[-4.18,3.21]	.80	-.02	2.55	[-0.92,6.01]	.15	.10	.99	[-2.70,4.67]	.60	.04
Moderate vs Low CCS Hours	-2.00	[-5.66,1.66]	.28	-.08	-.02	[-3.39,3.34]	.99	.00	-.80	[-4.46,2.86]	.67	-.03
<b>Step 2</b>												
SES Interactions with CCS Intensity Trajectory Contrasts												
High vs Low CCS intensity X SES	9.46	[0.04,18.87]	<b>.05</b>	.37	9.13	[0.23,18.04]	<b>.04</b>	.37	11.85	[2.27,21.43]	<b>.02</b>	.46
Moderate vs Low CCS intensity X SES	3.72	[-3.88,11.33]	.34	.15	5.63	[-1.50,12.76]	.12	.23	2.43	[-5.40,10.27]	.54	.10
			<				<				<	
R <sup>2</sup>	.16		.001		.19		.001		.13		.001	
F	13.09				16.39				10.36			
Δ R <sup>2</sup>	.003		.12		.004		.08		.005		.05	
Δ F	2.38				2.78				3.44			

**Model with Center-Based CCS Type (n=1119)**

	Reading				Writing				Mathematics			
	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size	<i>B</i>	95% CI	<i>p</i>	Effect Size
	<b>Step 1</b>											
Sex			<				<					
	-8.78	[-11.82,-5.73]	.001	-.34	-11.64	[-14.48,-8.80]	.001	-.46	-4.78	[-7.81,-1.76]	.002	-.18
Birth Order	-1.46	[-3.53,0.61]	.17	-.06	-2.48	[-4.41,-0.56]	.01	-.10	-1.83	[-3.90,0.23]	.08	-.07
Family Status	4.30	[0.11,8.49]	.04	.17	3.71	[-0.22,7.65]	.06	.15	6.61	[2.36,10.86]	.002	.26
CSNR	-.64	[-2.29,1.01]	.45	-.02	-.31	[-1.87,1.25]	.70	-.01	-.34	[-2.02,1.34]	.69	-.01
Difficult Temperament	2.25	[0.72,3.77]	.00	.09	2.03	[0.62,3.44]	.005	.08	1.82	[0.27,3.36]	.02	.07
Maternal age	2.40	[0.66,4.14]	.007	.09	2.20	[0.57,3.83]	.01	.09	1.23	[-0.52,2.97]	.17	.05
Family Dysfunction	-.10	[-1.88,1.67]	.91	.00	-.03	[-1.74,1.67]	.97	.00	.57	[-1.21,2.36]	.53	.02
Neighbourhood Safety	-.34	[-2.03,1.34]	.69	-.01	-.75	[-2.32,0.82]	.35	-.03	-.78	[-2.47,0.92]	.37	-.03
Social Problems in Neighbourhood	.47	[-1.27,2.22]	.60	.02	1.22	[-0.44,2.88]	.15	.05	1.04	[-0.74,2.82]	.25	.04
T1 - SES Factor			<				<				<	
	-13.73	[-17.93,-9.54]	.001	-.53	-13.19	[-17.12,-9.26]	.001	-.53	-13.53	[-17.82,-9.24]	.001	-.52
T1 - Negative Parenting Factor	-.49	[-2.60,1.61]	.65	-.02	-.26	[-2.28,1.76]	.80	-.01	.62	[-1.53,2.76]	.57	.02
T1 - Family Deviancy Factor	.58	[-1.24,2.40]	.53	.02	.38	[-1.26,2.02]	.65	.02	.88	[-0.88,2.64]	.33	.03
T1 - Parent Mental Health Factor	-.70	[-3.07,1.68]	.57	-.03	-.76	[-2.98,1.45]	.50	-.03	-1.31	[-3.69,1.06]	.28	-.05
T1 - Child Peer relationships Factor	.26	[-1.82,2.33]	.81	.01	.00	[-1.94,1.95]	1.00	.00	.82	[-1.26,2.90]	.44	.03

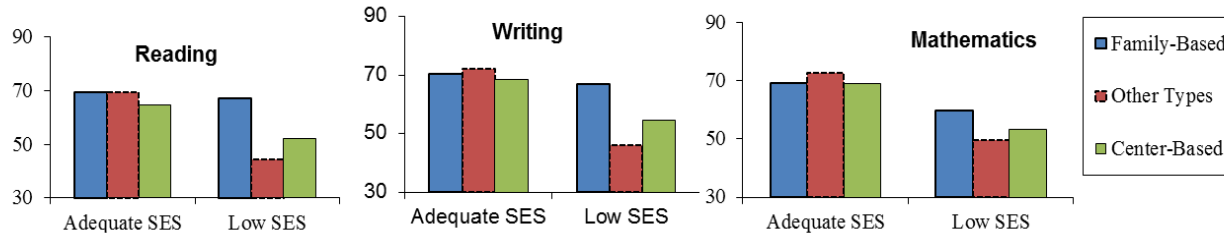
HOME environment - Verbalization	1.04	[-0.65,2.73]	.23	.04	.59	[-1.03,2.20]	.48	.02	.25	[-1.47,1.96]	.78	.01
HOME environment - Stimulation	.32	[-1.23,1.87]	.69	.01	.69	[-0.79,2.16]	.36	.03	.32	[-1.23,1.87]	.68	.01
Center-Based CCS Trajectory Contrasts												
Early-Onset vs Never Center-Based CCS	-3.04	[-7.77,1.69]	.21	-.12	-.34	[-4.81,4.13]	.88	-.01	.52	[-4.29,5.32]	.83	.02
Late-Onset vs Other Never Center-Based CCS	-2.07	[-5.63,1.49]	.25	-.08	-1.07	[-4.35,2.22]	.52	-.05	-1.76	[-5.30,1.79]	.33	-.07
<b>Step 2</b>												
SES Interactions with Center-Based CCS Trajectory Contrasts												
Early-Onset vs Never Center-Based CCS X SES	17.33	[5.00,29.66]	.006	.68	19.80	[7.86,31.74]	.001	.80	16.35	[2.40, 30.30]	.02	.67
Late-Onset vs Never Center-Based CCS X SES	9.23	[0.66,17.79]	.03	.37	5.74	[-2.44,13.93]	.17	.23	9.84	[1.03, 18.66]	.03	.39
			<				<				<	
<i>R</i> <sup>2</sup>	.14		.001		.17		.001		.12		.001	
<i>F</i>	10.08				12.17				8.22			
Δ <i>R</i> <sup>2</sup>	.009		.006		.009		.003		.008		.01	
Δ <i>F</i>	5.55				6.07				5.29			

**Notes.**

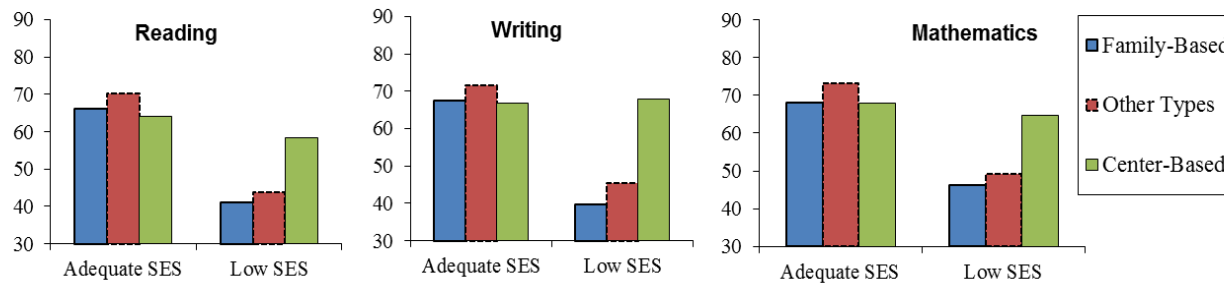
Effect Size (Standardized Coefficients); CCS (Child Care Services); Sex (1=boys; 0=girls); Birth order (0: First Born; 1: Has Siblings) Family Status (1: Intact Family; 0: Non-Intact [Blended or Single-Parent Families]); SES (Socioeconomic Status; 0= Adequate [top 75th quartile]; 1 = Non-Adequate [bottom quartile]); CSNR (Cumulative Score for Neonatal Risk); **Home Environment : Verbalization (2.5-years) & Stimulation (5-months).**

eFigure 1. Interaction Between Types of CCS and SES on Reading, Writing, and Mathematic Academic Achievement Scores

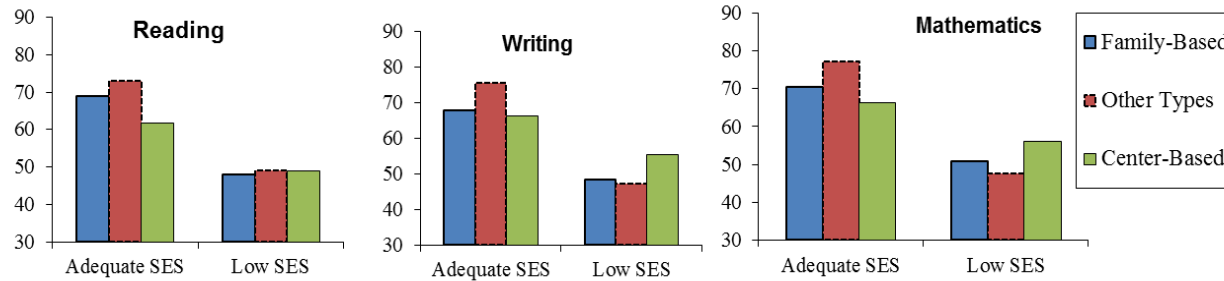
A) 17M



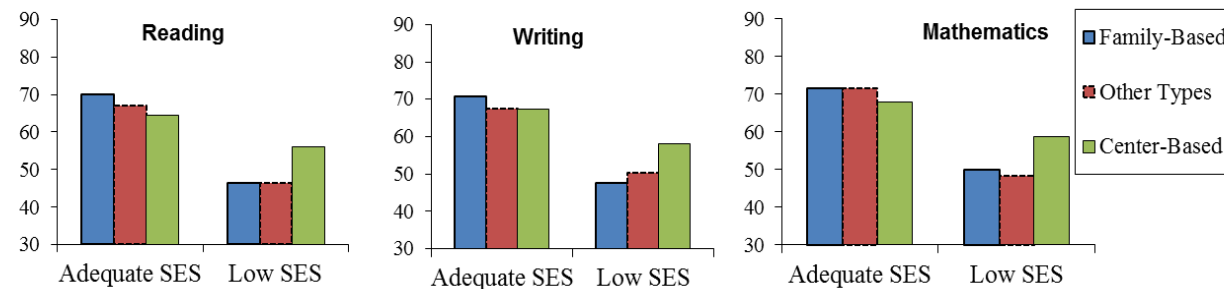
B) 30M



C) 42 M



D) 54 M



**eFigure 2. Distribution of Low SES children in Center-Care Trajectories Across Time**

