Original

The role of parental social class, education and unemployment on child cognitive development

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A B S T R A C T

Objective: Assessing the association between socioeconomic gradient and cognitive development among children of a Spanish birth cohort aged 5-6 years from a gender perspective.
Method: Cognitive development was assessed on 525 children aged 5-6 years in the INMA-Valencia cohort, with the Global Cognitive Score (GCS) from McCarthy Scales of Children's Abilities. Information on social class, education level and employment was collected for both parents in addition to other sociodemographic factors, parental, family and child characteristics. The relationship between maternal and paternal socioeconomic gradient and cognitive development was assessed by linear regressions and comparing the variance explained by each indicator measured in the mother and father.
Results: Maternal socioeconomic gradient indicators explained more variance on GCS than paternal. Maternal education and paternal social class had an important individual effect that stayed after adjusting by other parental, child and family determinants. In the multivariable analysis, maternal education, age and intelligence, paternal social class and the child's age and sex were significantly associated with cognitive development.
Conclusions: Diverse socioeconomic gradient factors have an important influence on cognitive development, maternal education being the strongest determinant. Policies should be implemented to mitigate the negative effects of this gradient on child development.

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El rol de la clase social, la educación y el desempleo parentales en el desarrollo cognitivo infantil

R E S U M E N

Objetivo: Evaluar la asociación del gradiente socioeconómico y el desarrollo cognitivo en niños y niñas de una cohorte española a los 5-6 años de edad desde una perspectiva de género.
Método: Se evaluó el desarrollo cognitivo en 525 niños/as de 5-6 años de la cohorte INMA-Valencia, mediante la Puntuación Global Cognitiva (PGC) de las Escalas McCarthy para niños y niñas. Se recogió información de ambos progenitores sobre clase social, nivel de estudios y empleo, además de otros factores sociodemográficos, características parentales, de la familia y del niño o la niña. La relación entre el gradiente socioeconómico materno y paterno y el desarrollo cognitivo se evaluó mediante modelos de regresión lineal y comparando la varianza explicada por cada uno de los indicadores medidos en la madre y en el padre.
Resultados: Los indicadores de gradiente socioeconómico de la madre explicaron más varianza del índice de PGC que los del padre. La educación materna y la clase social paterna tuvieron un importante efecto individual, que se mantuvo tras ajustar por otros determinantes de los progenitores, del niño o de la niña, y del entorno familiar. En el análisis multivariante, la educación, la edad y la inteligencia maternas, la clase social paterna, y la edad y el sexo del infante se asociaron significativamente con el desarrollo cognitivo.
Conclusiones: Distintos factores del gradiente socioeconómico tienen influencia en el desarrollo cognitivo, siendo la educación materna el determinante más fuerte. Deberían implementarse políticas para paliar los efectos negativos de este gradiente en el desarrollo infantil.

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Introduction

Cognitive development in early childhood is crucial: it has been considered the most important period of development during a person's lifespan,[1] and it influences adaptation skills and predicts academic performance and educational attainment.

Health inequalities are highly avoidable differences (based on personal, demographic or social characteristics) among diverse population groups. One of the most described factor producing health inequalities is socio-economic position in the family context: it could determine child's physical and cognitive development[2]. Socio-economic gradient refers to the classification of individuals along a gradation of economic, working or educational attributes such as income, occupation or education. Socioeconomic determinants of health find different pathways to express influence on cognitive development. Households with restricted economic resources could have worse conditions: low investment on offspring's education, poor housing, and living in neighbourhoods with less community services.[3,4] Parental working status could trigger parental stress, and more stressed parents usually display more problematic interactions with their children.[5] Parental education level reflect parents' personal resources and problem-solving abilities.[3] These three determinants (income, working status, and education) generate a unique cognitive stimulation that affect children's cognitive development.[6] Therefore, assessing different indicators of socio-economic gradient and their relationship to child's cognitive development could be a more comprehensive approach.

In addition to this, a gender perspective should be considered when assessing the differences in social class,[7] employment and time use[8] of mothers and fathers according to gender roles. Due to gender inequalities, the effect of socio-economic gradient indicators on offspring development is likely to be different for fathers and mothers.[9] It is suggested that fathers usually provide material assets while mothers' endowments are based on their own academic achievement.[9] Additionally, it seems that education play different roles: mother's education is relevant for academic achievement at child's early years, while father's is more important at youth.[9,10] However, measurement of these characteristics could be affected by gender bias: usually, due to heteropatriarchal values, paternal socioeconomic position has been considered, as a more stable way to measure familiar social class (traditionally, men have spent more time in labour market than women).[9,11] For this reason, a gender perspective could help to visualize the differential pattern of mother's and father's socio-economic gradient indicators within the family and to compare their relative contribution to child's development.

Furthermore, cognitive development may be influenced by factors that can mitigate or interact with the effect of social disadvantage. Some factors commonly studied in association with child cognitive development are: parental age, family structure, immigrant condition,[12–15] maternal intelligence, mental health, and lifestyles,[16,17] child's sex and perinatal outcomes,[13,18] caregiving, parenting stress, and practices and home environment (cognitive stimulation).[17] However, few studies have considered a wide range of these factors when assessing the relationship between socio-economic gradient and child cognitive development.

Spanish children are at increased risk of poverty since the start of the economic crisis (2008),[19] and at a greater risk of worse health.[20] In Spain, 33.4% of children are at risk of poverty and social exclusion,[21] this reinforces the need of assessing the relationship between socio-economic gradient and child cognitive development. Moreover, the high unemployment rate in Spain over the last years,[22] justifies the exploration of employment situation as an additional indicator of socio-economic gradient

and its relationship with child cognitive development. However, recent evidence on the effects of socio-economic gradient on cognitive development of preschool children in Spain is scarce and relies mainly on occupational social class as an indicator of socio-economic position.[13,16,17] Additionally, the exploration of parental characteristics from a gender approach seems basic to understand family dynamics deeply.[10] As far as we know, this is the first work to assess child cognitive development from a parental socioeconomic and gender perspective.

The aim of the present study is to compare the contribution of maternal and paternal occupational social class, education and employment situation to cognitive development of children of the INMA (INfancia y Medio Ambiente - Environment and Childhood) cohort in Valencia (Spain) at age 5-6 years, taking into account other socio-demographic, socio-familial, parental, and child factors.

Method

Study design and population

INMA Project is a Spanish population-based mother-and-child multicenter cohort set up in 2003 and composed by seven cohorts (Ribera d'Ebre, Granada, Menorca, Valencia, Sabadell, Asturias, and Gipuzkoa). This study uses data from INMA-Valencia cohort. Recruitment process and subsequent procedures are described in more detail elsewhere.[23] Briefly, women were recruited during their first prenatal visit to their reference hospital (La Fe, in Valencia) before week 13 of gestation by consecutive sampling of those who met the inclusion criteria ($\geq$16 years old, singleton pregnancy, non-assisted conception, delivery at the reference hospital, and no communication handicap). Out of 1578 eligible women, 855 accepted to participate and were included in the study between November 2003 and June 2005. Participants were more likely to be employed and slightly older than non-participants. Cognitive development was assessed in 525 children aged 5.5-6.5. The flow chart of the INMA participants included in the study is shown in Figure 1.

All participating families gave their written informed consent. This study was approved by the Ethics Committee of La Fe Hospital and conforms to the principles embodied in the Declaration of Helsinki.
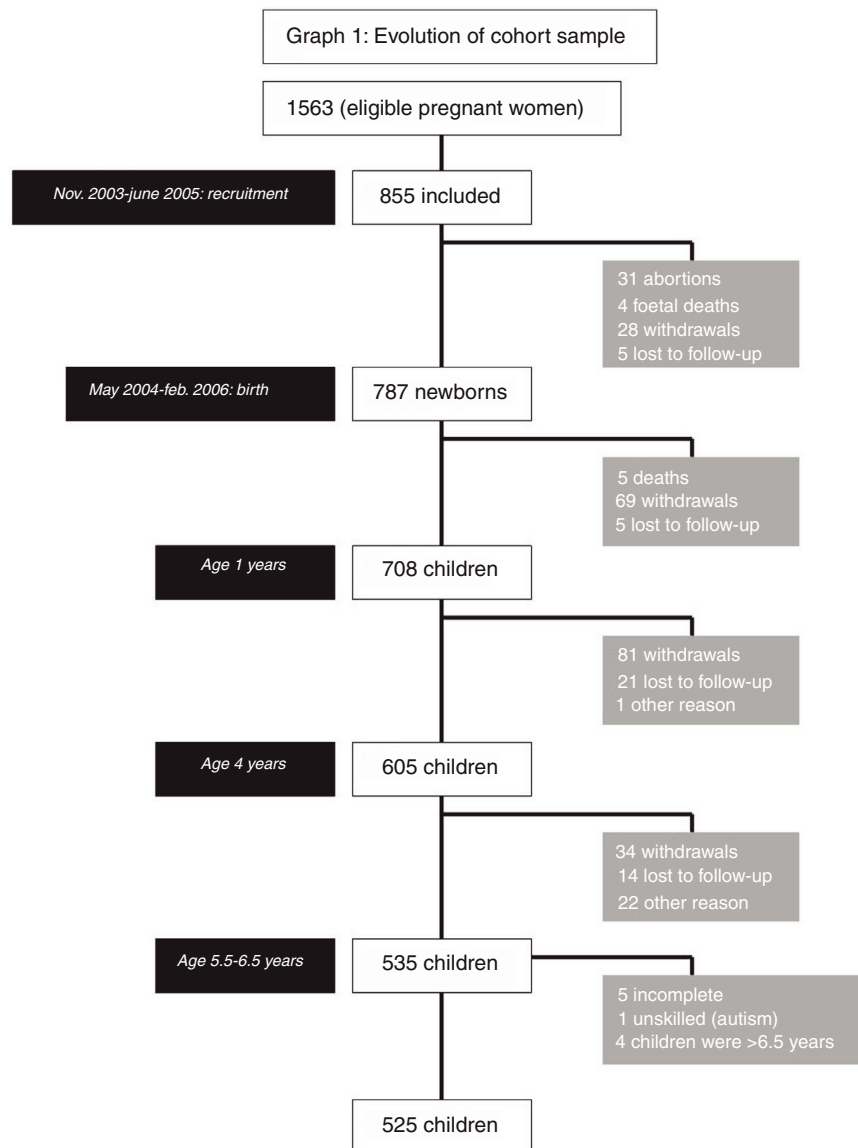
Cognitive development assessment

Child cognitive development was assessed using a Spanish adapted version of the McCarthy Scales of Children's Abilities (MSCA).[24] Two trained psychologists administered and interpreted the MSCA, following a strict protocol to avoid inter-observer variability. Scale alpha coefficients were >0.70, except for MSCA motor subscale 0.64 (good to moderate). The interrater reliability was estimated by intraclass correlation with coefficients >0.77.[25] The MCSA contains eighteen subtests grouped into three global sub-scales (verbal, perceptive-performance, numeric). The General Cognitive Score (GCS) is obtained by summing up their direct punctuation. Raw GCS, adjusted for child sex and age at evaluation, were used in the analyses.

Information on socio-economic gradient and other variables were collected applying structured questionnaires by experienced interviewers. Information was collected independently to family structure, by obtaining it from the parent who brought the child to the follow-up visit or by telephone contact.

Socio-economic gradient variables

Socio-economic gradient was measured for mothers and fathers through three variables: occupational social class, widely used in

Graph 1: Evolution of cohort sample

1563 (eligible pregnant women)

Nov. 2003-june 2005: recruitment | 855 included

31 abortions
4 foetal deaths
28 withdrawals
5 lost to follow-up

May 2004-feb. 2006: birth | 787 newborns

5 deaths
69 withdrawals
5 lost to follow-up

Age 1 years | 708 children

81 withdrawals
21 lost to follow-up
1 other reason

Age 4 years | 605 children

34 withdrawals
14 lost to follow-up
22 other reason

Age 5.5-6.5 years | 535 children

5 incomplete
1 unskilled (autism)
4 children were >6.5 years

525 children

Figure 1. Flow chart of the population included in the present study. INMA-Valencia cohort. No differences by child's sex were found in participation process and follow-up.

Spain as a measure of socioeconomic position:[26] it was defined using a Spanish adaptation of the British social class classification. In this study, we used the abbreviated version, with five classes, recoded in three categories: higher (I+II), medium (III) and lower (IV+V). Social class and educational level (primary or less, secondary or university) were requested during pregnancy. Employment situation (employed, unemployed and homemaker or student) was collected at 4 and 5 years of age, and was recombined reflecting stability or instability at both time points as follows: employed at 4 and 5, homemaker or student at 4 and 5, employed at 4 or 5, and unemployed at 4 and 5. When homemaker or student positions were combined at one time point with employed or unemployed status in the other time point, cases were reassigned as employed or unemployed.

Other variables

- Other sociodemographic factors: country of origin and age of both parents was requested at child's birth.
- Parental psychological characteristics: intelligence and mental health were assessed at five years for both parents. The former was assessed using the Similarities Subtest of the Wechsler

Adult Intelligence Scale, a consolidated scale which showed correlations of 0.90 and 0.82 regarding reliability and validity respectively, in comparison to Stanford-Binet.[27] Similarities sub-test has been considered a good predictor of the global intelligence quotient (it shows a correlation of 0.76 with the scale total score).[28] Mental health was evaluated using the Spanish adaptation of the Symptom Checklist-90 Revised, which showed good psychometric properties.[29] We used detection criteria for non-clinical population, identifying cases at risk as those who had a Global Severity Index ≥ 1.5 standard deviations above the mean.

- Socio-familial environment: number of siblings <12 years of age and family structure were collected at age 5, classifying families as nuclear (both parents living with children), monomarental (only mother living with the children) and other type of family (mother living with her children and parents). Day-care attendance was collected at age 2. Domestic work (mean hours per day) was obtained for mother and father at age 4 and comprised: a) child care, b) household tasks, c) dependent care and d) total work (a+b+c).
- Exposure during pregnancy: women's smoking and alcohol consumption was obtained during the third trimester of pregnancy.

Table 1
Characteristics of the study population of 525 families from INMA-Valencia cohort (2010-2012).

Variables		Mother N[a] (%)	Father N[a] (%)
Socio-economic factors			
Social class	I+II (higher)	100 (19.0)	85 (16.3)
	III	139 (26.5)	104 (19.9)
	IV+V (lower)	286 (54.5)	334 (63.9)
Employment situation	Employed	354 (67.7)	425 (81.9)
	Homemaker or student	46 (8.8)	1 (0.2)
	Unemployed at 4 or 5	67 (12.8)	65 (12.5)
	Unemployed	56 (10.7)	28 (5.4)
Educational level	Primary school	145 (27.6)	232 (44.2)
	Secondary school	230 (43.8)	202 (38.5)
	University degree	150 (28.6)	91 (17.3)
Age at delivery (years)	<25	38 (7.2)	18 (3.4)
	25-29	181 (34.5)	134 (25.5)
	30-34	216 (41.1)	220 (41.9)
	≥35	90 (17.1)	153 (29.1)
Country of origin	Spain	483 (92.0)	467 (89.0)
	Latin American	26 (5.0)	28 (5.3)
	Others	16 (3.0)	30 (5.7)
Psychological characteristics			
Mental health (at risk)	Yes	41 (7.9)	32 (7.6)
	No	479 (92.1)	391 (92.4)
Intelligence	(WAIS-III score)	16.03 (4.49)[c]	15.25 (5.55)[c]
Socio-familial environment			
Domestic work (hours/day)	Household tasks	2.33 (1.18)[c]	0.70 (0.77)[c]
	Child care	3.33 (1.63)[c]	1.94 (1.33)[c]
	Dependent care	0.04 (0.35)[c]	0.01 (0.10)[c]
	Total work	5.69 (2.21)[c]	2.64 (1.82)[c]
Family structure[b]	Nuclear	467 (89.0)	
	Monomarental	32 (6.1)	
	Others	26 (5.0)	
Siblings <12 years	0	205 (39.0)	
	1	286 (54.5)	
	2+	34 (6.5)	
Day care attendance (2 y)	Yes	400 (76.5)	
	No	123 (23.5)	
Exposure during pregnancy			
Maternal smoking	Non-smoker	326 (62.1)	
	First trimestre	80 (15.2)	
	All pregnancy	119 (22.7)	
Maternal alcohol intake	Yes	93 (17.7)	
	No	432 (82.3)	
Variables related to the child			
Age	(years)	5.76 (0.14)[c]	
Sex	Boys	270 (51.4)	
	Girls	255 (48.6)	
Breast feeding (weeks)	0	87 (16.7)	
	>0-16	127 (24.3)	
	16-24	78 (14.9)	
	>24	230 (44.1)	
Small for gestational age	Yes	58 (11.1)	
	No	466 (88.9)	
Preterm (<37 weeks)	Yes	28 (5.3)	
	No	496 (94.5)	

[a] Differences in the number of observations for some of the variables presented in the table are due to missing values.

[b] Type of family. Nuclear: Both progenitors with children. Monomarental: Mother with children. Others: Cohabiting with grandfathers or other relatives, with other mother's couple, or shared custody.

[c] Values represent mean (standard deviation).

• Child's characteristics: age at evaluation, sex, being preterm (<37 gestational weeks), and small for gestational age were collected from medical records. Breastfeeding duration in weeks was requested by questionnaire at age 1.

Statistical analysis

Basal linear regression models adjusted for child's sex and age were fitted to evaluate the association between child's GCS and the study variables, in particular, the differential role of maternal and paternal characteristics was evaluated and graphically represented.

Subsequently, the proportion of residual variance explained by maternal and paternal socioeconomic characteristics (education, social class and employment status) was assessed after adjusting a basal model including only the control variables: child's sex, age at evaluation, and maternal age. By means of sequential models, we decomposed the explained variance into independent or direct effects and shared or common effects. The parts of the shared effect that were related to each combination of the three variables was represented with the aid of Venn diagrams by means of the "eulerr" package of R.[30]

Multivariate linear models were also built to determine the relationship of socio-economic gradient indicators with the child GCS, adjusting for the other potential determinants. The first model (1) included sociodemographic factors and socio-economic gradient variables excluding sequentially those variables not related at p <0.10 in the adjusted model following a backward stepwise selection procedure. The subsequent models included the variables retained in model (1) and all the variables considered in each block: (2) parental psychological characteristics; (3) variables related to the socio-familial environment; (4) Pregnancy exposure to toxic substances; and (5) child's characteristics. A complete final model (6) was also fitted considering the variables from all groups (1-5) and excluding sequentially those variables not related at p

<0.10 following a backward stepwise selection procedure. All models were adjusted by child's sex and age. Residual analysis was conducted to check for model assumptions. Effect modification between maternal and paternal occupational social class, education, and employment situation was finally evaluated by including both variables in the models and an interaction term between them. In order to avoid overfitting, these additional models were not simultaneously adjusted for other socio-economic gradient variables. Statistical analysis was carried out using the statistical software R, version 3.4.0.

Results

Descriptive analyses are shown in Table 1. The mean (SD) age of children was 5.8 (0.1) years (range: 5.5-6.4), 51.4% were boys and 48.6% were girls. Concerning socio-economic gradient indicators, 54.5% of mothers and 63.9% of fathers belonged to the lowest social class, respectively. Regarding employment situation, 67.7% of mothers and 81.9% of fathers were employed at 4 and at 5 years, and 10.7% of mothers and 5.4% of fathers were long-term unemployed. Mothers showed a higher educational level as compared to fathers (about 72.4% of mothers completed secondary or university education vs. 55.8% of fathers). Mean GCS was 174 (SD: 19.4; range: 90-229).

Comparative regressions adjusted by child's sex and age are shown for mother and father in Figure 2. A strong gradient between social class and GCS was shown for both mothers and fathers, being stronger for fathers. Regarding employment situation, mothers who were either unemployed at 4 or 5 years of age had children with a 6.8 points lower GCS than those with a sustained employment. For fathers, the increased risk for their children was when they were long-term unemployed ($\beta = -7.8$). Educational level for both mother and father had a strong relationship with child's GCS, being stronger for mothers. Considering the rest of variables in
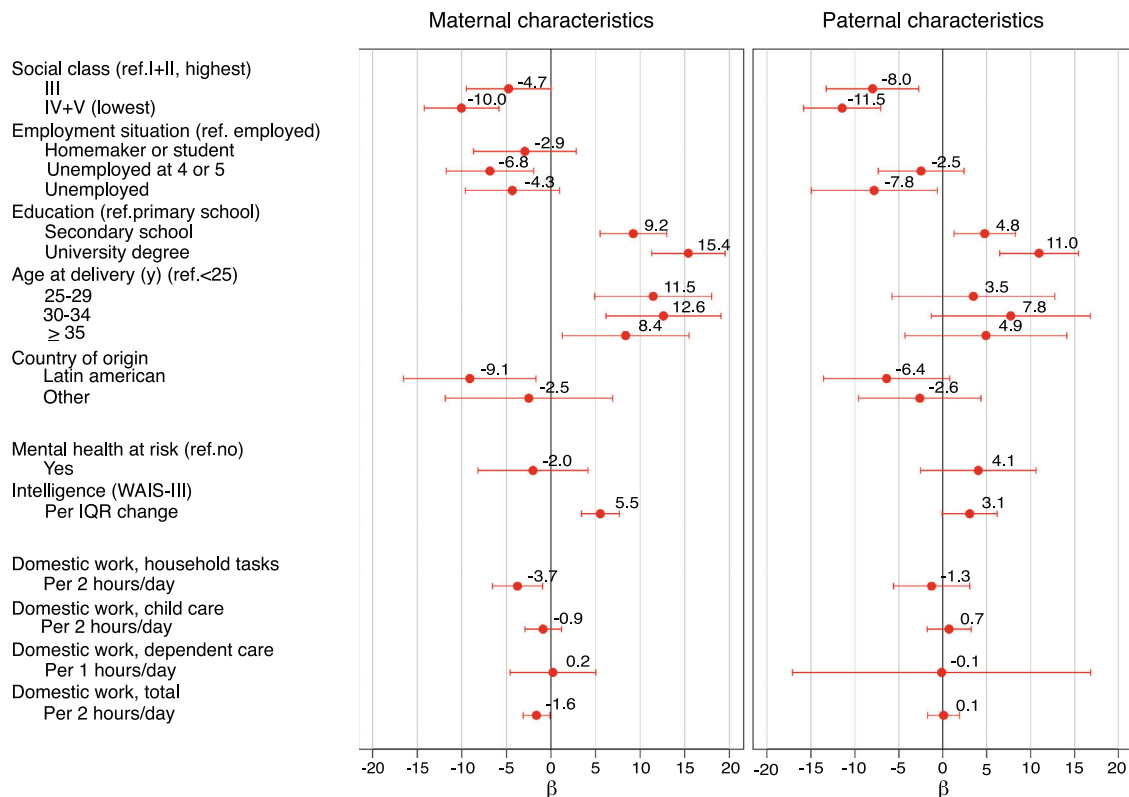
Figure 2. Comparative analysis of maternal and paternal characteristics and association to GCS: separated regressions models adjusted for child's sex and age.

General characteristics
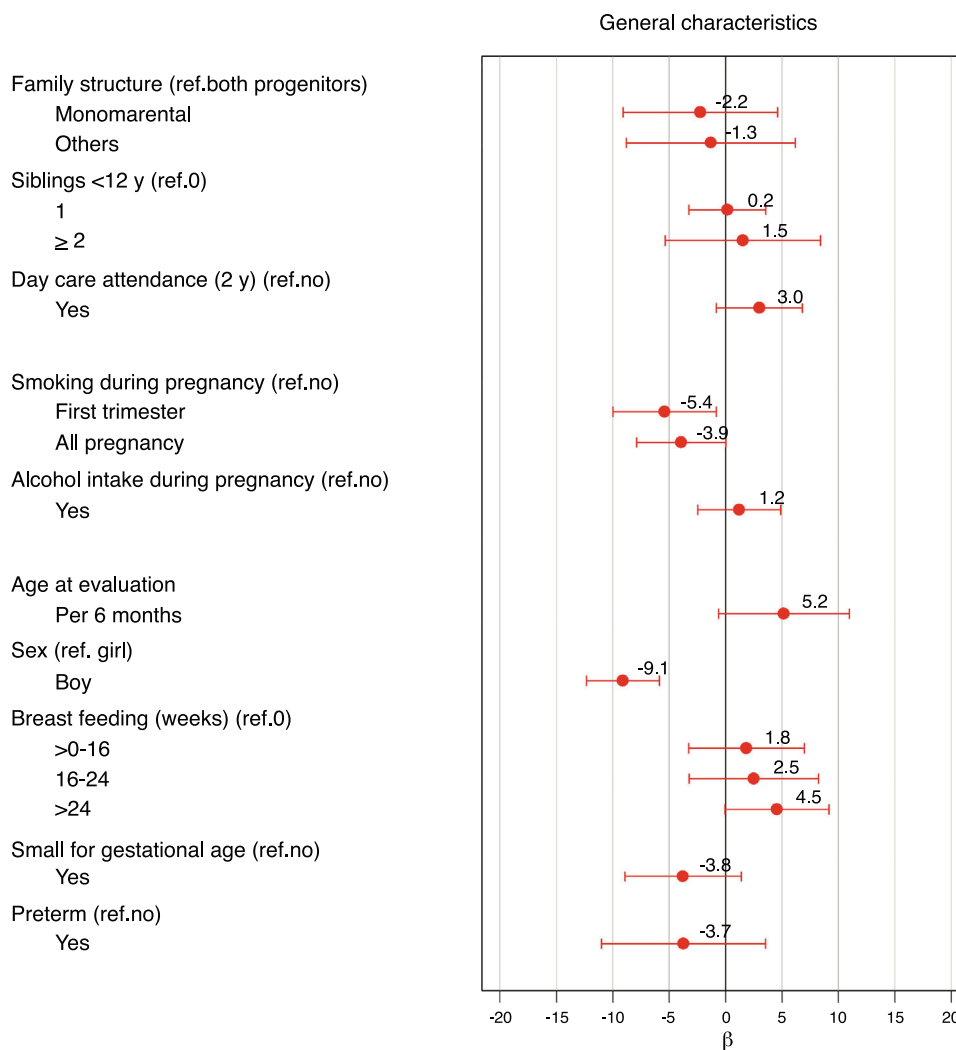
Figure 3. General characteristics and association to GCS: separated regressions models adjusted for child's sex and age.

Figure 2, intelligence of mothers and fathers were positively related to child's GCS, although stronger and statistically significant only in mothers (β = 5.5). Maternal time devoted to household tasks (β = −3.7) was inversely associated with the GCS, while no relationship was observed with the time spent by fathers.

The association between child's GCS and other general characteristics (family organization, maternal exposure to toxicants in pregnancy, and child's characteristics) are shown in Figure 3. Only smoking in the first trimester of pregnancy (β = −5.4) and being a boy (β = −9.1) were found to have an association.

Individual and shared effects for maternal and paternal socioeconomic gradient indicators are represented in Figure 4. The mother was the biggest individual contributor to socio-economic gradient effect on child's GCS with a 5.2% of the variance independently explained, while father accounted for only 1.9%. Shared contributions to socio-economic gradient influence on GCS reached 3.5%, leaving a residual variance of 80.2%.

Considering those variables composing socio-economic gradient, education is the biggest individual contributor to maternal socio-economic gradient (4.4% of variance explained with direct effects and 3.6% with shared effects), while the same was true for paternal social class (1.6% and 2.5%). In both cases, the variance directly explained by employment situation was similar and of low magnitude (0.5% and 0.4%, respectively).

Figure 5 represents the sequential models exploring predictors of cognitive development. Paternal intelligence and mental health were excluded due to missing data. Model 1 shows the relationship between the socio-economic gradient and other sociodemographic factors and child GCS. Paternal occupational social class as well as maternal age and education were significantly related to child GCS. Sequential adjustment for parental psychological characteristics (model 2), socio-familial environment (model 3), pregnancy use of toxic substances (model 4) and child's characteristics (model 5) did not change substantially the magnitude of these estimates, in fact they remained very stable along the subsequent analyses. In the final model adjusted by child's age and sex, only paternal social class, maternal education, age and intelligence, and being small for gestational age were associated.

Discussion

The present study assessed socio-economic gradient (parental social class, education and working status) and its relationship to child cognitive development from a gender perspective, considering other additional relevant factors existing in the children's environment. Comparative analyses were performed between maternal and paternal characteristics to estimate their common and individual weight on child's cognitive development. The
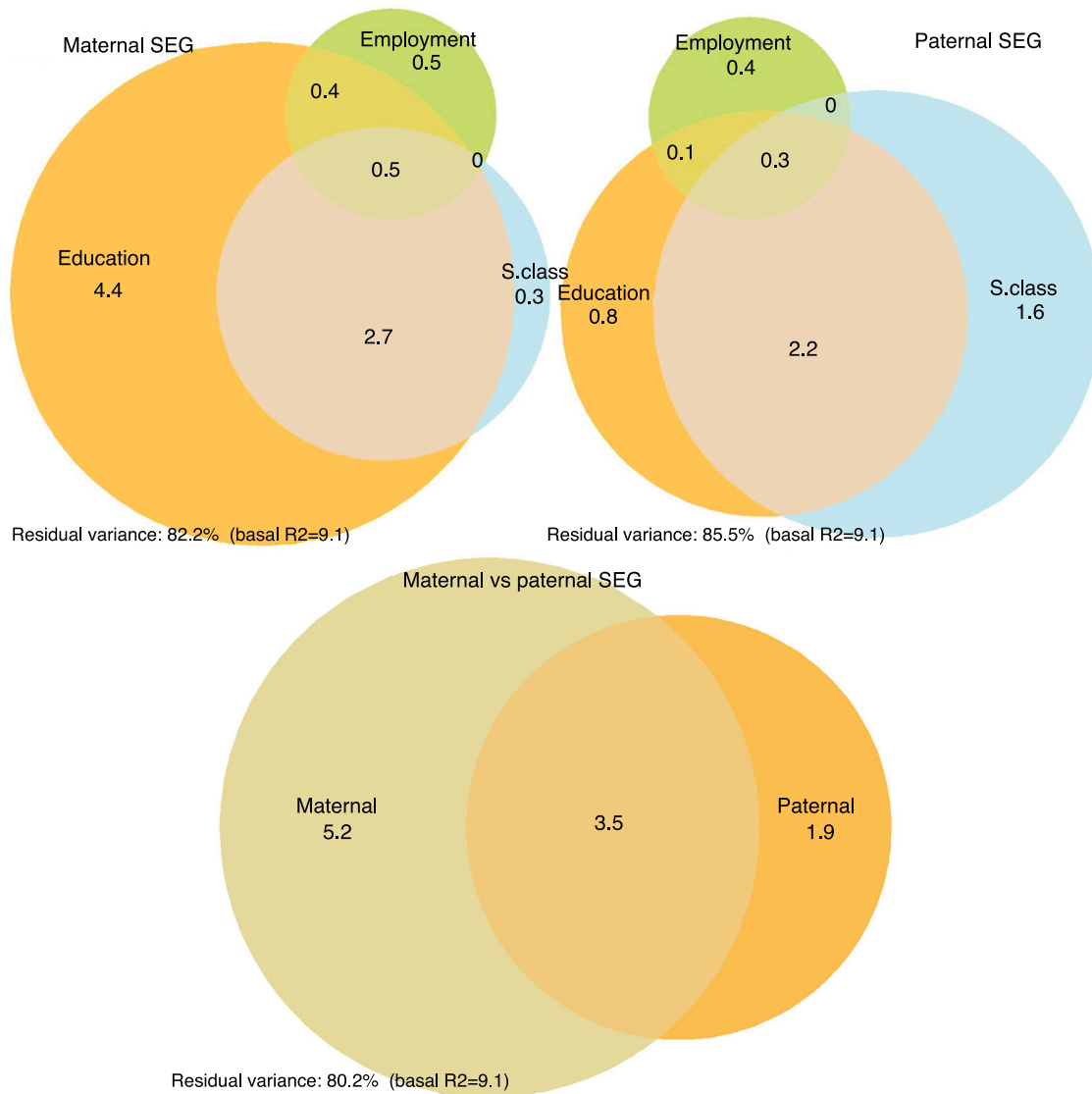
Figure 4. Shared and individual variance of GCS explained by socio-economic gradient variables for mother and father.

observed trends on socio-economic gradient variables have shown lower scores on cognitive development at lower social class and education in both mothers and fathers. Regarding employment situation, lower cognitive development scores were found for those children whose mothers were unemployed at 4 or 5 years of age, while the same was true for those children whose fathers were unemployed at both time points. In order to compare the relative contribution of socio-economic gradient indicators, we decomposed the variance of child cognitive development according to social class, education and working status of each parent. The results suggest that the mother was bigger individual contributor than the father to socio-economic gradient effect on child's GCS. Furthermore, education matters most in the maternal socioeconomic gradient, while the same was true for social class in the paternal socio-economic gradient. Employment situation had lower impact in both cases. After adjusting for other potential determinants, the same pattern was observed: maternal educational level and paternal social class were found to play the most important role on of the social gradient of child cognitive development.

Firstly, regarding parental education, few studies considered separately maternal and paternal schooling. Some found that maternal but not paternal education had an important effect on infant neurodevelopment;[31,32] however, in one of them data on paternal schooling was not available.[32] A study comprising four low-income countries[33] found association with the education of both parents, but in most of them, mothers' schooling had the strongest influence. In our study population there is a strong association in the unadjusted basic models with both maternal and paternal education, but with a higher influence of maternal education. This is in line with other studies,[28–30] and reinforces the theory which defends that maternal rather than paternal education seems more influential to child's cognitive development at young ages.[9] Women usually tend to assume gender roles with reproductive and domestic unpaid tasks.[34] Reconciling this gender role with an increasing presence in labour market is often complicated, and usually women have to cope with both roles in paid (labour market) and unpaid (homemaker) work.[35] For this reason, usually women decide to stay outside the labour market during early years of their offspring, offering them a permanent cognitive stimulation.[11] This fact could explain that maternal education has a stronger weight on child's neurodevelopment.[9,31,33]

Regarding occupational social class, a meta-analysis using composite measures of family socio-economic gradient[36] reported
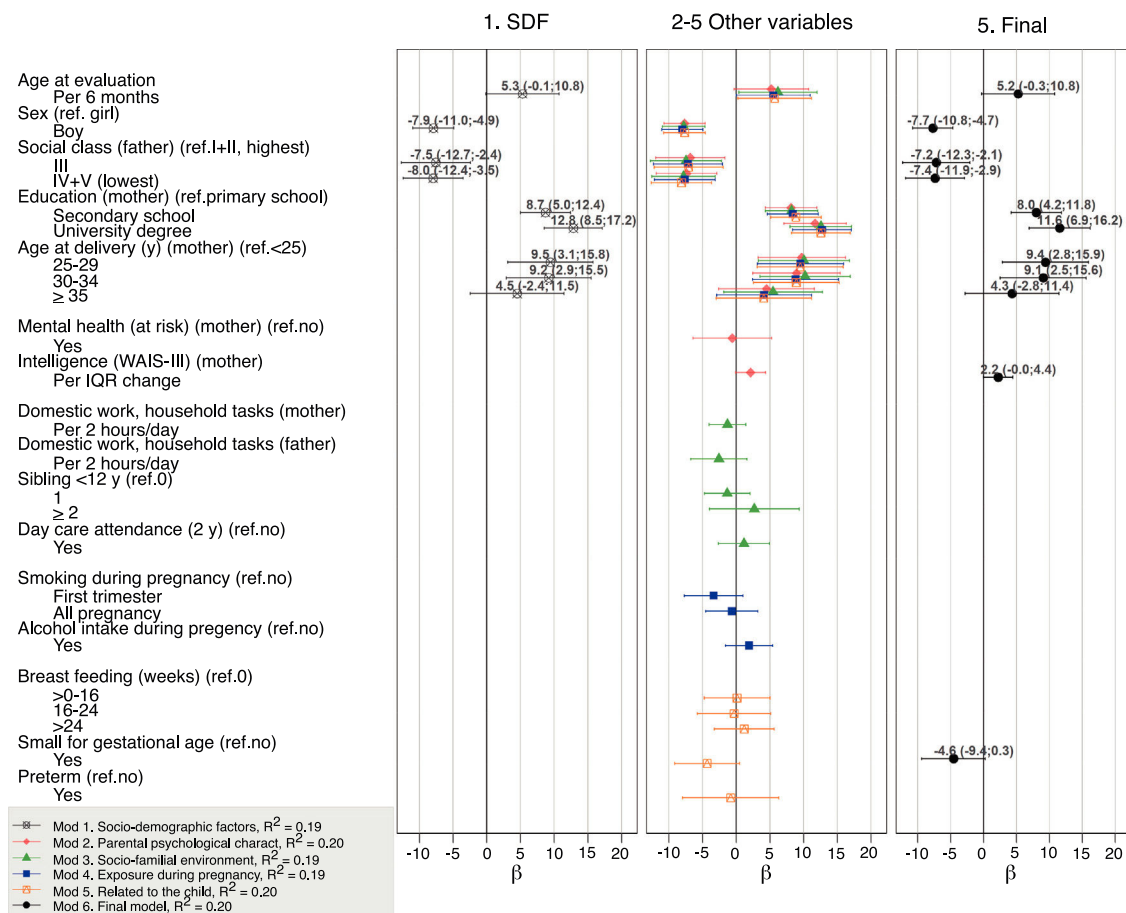
Figure 5. Multivariable models of the association between the GCS and socio-economic gradient and other potential determinants.

a significant relationship with child cognitive development, however, several important confounders were not considered. In our study, after adjusting for a wide range of potential confounders, paternal occupational social class was positively related to child's cognitive development. Although maternal occupational social class did not enter the adjusted models, this could be due to its high correlation with maternal education. Additionally, we employed an occupation-based indicator of social class measured in pregnancy, considering the longest employment in the previous nine months.[37] In our sample, we have observed high rates on job instability in women, who tend to accept more precarious jobs.[7] Our data could suggest that women's reinsertion in labour market could eventually provoke possible changes in social class that have been unmeasured. High rate of father's employment in comparison to mother's,[9] could supply a more accurate measure to assess its effect on child's cognitive development. Indicators of socio-economic gradient such as occupation or education do not determine simply the household's income, they could be also defining economic environment at neighbourhood level,[4] psychosocial stimulation,[36] home environment or routines,[32] and quality of parenting, which are related to cognitive development.

Employment situation in both parents had a relatively low contribution to cognitive development variability and did not stay as a predictor in our final model. However, its comparative analysis deserves our attention. Maternal employment situation showed that children with lower cognitive development were those whose mothers had been unemployed at 4 or 5 years of age. Women but not men were at a significative risk of having mental health problems when they are in a temporary job,[38] this could be damaging mother-child communication, and affecting child's cognitive

development.[5] Child's cognitive development was not affected very deeply by temporary jobs in fathers: in fact, lowest scores on cognitive development were registered in those children whose fathers were long-term unemployed. It could be thought that these fathers could be using their time in unpaid work at home; however, additional analyses of our data have not shown differences of paternal time devoted to domestic work according to working situation. A study described this behaviour by stating that unemployed men have a decline in their well-being and rather than employing more time in house tasks, they tend to make less unpaid work than their employed counterparts.[39]

This study has several strengths: firstly, we considered different socio-economic gradient variables (social class, education, and employment disaggregated by mother and father), which give a richer representation of socio-economic gradient. Secondly, a wide range of variables describing the children's environment and its potential influence on cognitive development were also considered. Thirdly, its prospective nature allows the use of data collected at different stages enabling the study of the long-term effects of diverse factors measured since the beginning of life. Finally, the cognitive development was assessed by trained psychologists and using a widely recognised and validated instrument.

One of the limitations of this study lies in the fact that some factors potentially influencing on child cognitive development have been unmeasured, e.g. parenting conditions, family routines, psychosocial stimulation, or community resources. Moreover, several variables were available but insufficient for the father, such as paternal intelligence or paternal mental health, and could not be included in multivariate analysis. Future designs must consider information of both parents for the whole sample. Finally, our

results might not be generalizable to other settings due to sample attrition. Participant families could have special characteristics, such as being more concerned about cognitive development or having higher socio-economic gradient. In fact, participant families at age five had higher social class and educational level than non-participant, and these differences were evident both in the case of men and women (data not shown). Despite this, we observed a social gradient, which might be deeper in the general population.

Knowledge about the magnitude of the effects of socio-economic gradient on cognitive development and its differential pattern from a gender perspective could help planning interventions aimed to mitigating the negative impact of disadvantaged socioeconomic conditions on child development. Implementation of income equalization to avoid uneven wealth distribution, community programs to support disadvantaged families, and ensuring a public and free access to high education could optimize offspring's cognitive development. Since women appears to have a greater impact on social gradient of cognitive development, public policy interventions aimed to reduce social gender inequalities should be reinforced to improve womens' health and child development.

Future analysis will be performed in order to disentangle the impact of socio-economic gradient (including poverty and social exclusion indicators) on cognitive development and the presence of internalizing and externalizing problems in our cohort. Additionally, family dynamics and home organization will be represented to assess their mediating roles.

In conclusion, indicators of socio-economic condition (parental education and social class) have a differential effect on child's cognitive development, being the mother the greater contributor at the age of 5-6 years in Spanish children from the general population. Findings might be used to implement policies that mitigate the impact of adverse socio-economic gradient on child cognitive development.

What is known about the topic

Socio-economic gradient influences child's cognitive development. It has been studied using composite measures or information of only one parent. From gender perspective, both parents need to be considered to assess the role of differential influence of indicators of socio-economic gradient on children's cognitive development.

What does this study add to the literature?

Maternal and paternal socio-economic gradient indicators had a shared effect, but maternal education, and paternal social class had an important individual effect on cognitive development at the age of 5-6 years in Spanish children. Additional relevant factors from the children's immediate and family environment were taken into account, but socio-economic gradient showed a stronger effect on child's cognitive development.

Editor in charge

María Teresa Ruiz Cantero.

Transparency declaration

The corresponding author on behalf of the other authors guarantee the accuracy, transparency and honesty of the data and information contained in the study, that no relevant information has been omitted and that all discrepancies between authors have been adequately resolved and described.

Authorship contributions

R. Cortés-Sancho contributed to the manuscript by acquisition of data, analysis and interpretation of data, drafting the article, approving the final version for its publication. L. González contributed to the manuscript by analysis and interpretation of data, drafting the article, approving the final version for its publication. M. Murcia contributed to the manuscript by the design of the study, analysis and interpretation of data, critical review, approving the final version for its publication. F. Ballester contributed to the manuscript by conception and design of the study, critical review, approving the final version for its publication. M. Rebagliato contributed to the manuscript by conception and design of the study, data interpretation, critical review, approving the final version for its publication. C.L. Rodríguez-Bernal contributed to data interpretation, drafting and critical review, approving the final version for its publication.

Conflicts of interests

None.

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