Maternal socioeconomic resources and child's language development: The role of prenatal environment

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Abstract

Children's early language ability is related to later educational achievements. The aim of this study is to assess how maternal education and economic wellbeing are associated with the child's early language development and whether this association is mediated by mother's prenatal distress. Using the FinnBrain Cohort Study on pregnancy and early life outcomes linked to Finnish longitudinal registers, we apply linear regression models to analyse 994 mothers and their children. Children's language development was assessed with the child's vocabulary size at the age of 30 months using MCDI (MacArthur Communicative Development Inventory). Mother's prenatal stress was measured as symptoms of depression, anxiety and pregnancy-related anxiety. Our preliminary results show that both the mother's level of education and economic wellbeing were positively associated with the child's language development, but prenatal distress did not mediate these connections. In the fully adjusted models, the association remained significant for the mother's education but not for the economic wellbeing. Additionally, male sex, being bilingual and having siblings were associated with a smaller number of words. The precise mechanisms on how parental resources are related to child's early development still need to be elucidated.

Introduction

Child's early environment is one of the fundamental drivers of later psychosocial development and socioeconomic wellbeing as well as the key period regarding intergenerational influences. Children from higher socioeconomic families are healthier (Case and Paxson 2011) and achieve a higher level of socioeconomic position (Erola, Jalonen, and Lehti 2016). One possible mediating factor between socioeconomic status in childhood and later achievements and wellbeing is early language ability. Children's language ability predicts higher-order cognitive skills, such as relational reasoning, planning, and calculation skills, which further predict, for example, school achievements (Blums et al. 2017). Previous studies have linked high maternal education and income to higher language abilities, through a better home environment (Blums et al. 2017). However, studies on the socioeconomic differences in child language development are scarce. Furthermore, the explanations for these differences are not well-understood.

In this study, we examine the role of prenatal environment, in particular maternal distress during pregnancy, as a possible mechanism between parental socioeconomic resources and child's early language development. A vast empirical literature exists on the relationship between higher educational and economic resources and lower prevalence of anxiety and depressive disorders (Fryers, Melzer, and Jenkins 2003). This socioeconomic gradient exists already in the prenatal settings; mothers with lower education and lower economic resources experience higher and more persistent prenatal distress (Korja et al. 2018; Leigh and Milgrom 2008). Further, stressful experiences and unhealthy behaviour during pregnancy can have significant and long-lasting effects on the development of the offspring through prenatal programming effects on the foetus (Entringer, Buss, and Wadhwa 2017). Prenatal stress has been associated with, for example, preterm birth, low birth weight, and alterations in brain development, which are regarded as risk factors for later cognitive, health and behavioural problems (Van den Bergh et al. 2005; Dunkel Schetter 2011). Prenatal stress has also been linked to poorer cognitive and social/emotional development, IQ, health and lower educational attainment, and the effect has been found to be stronger among mothers with low level of education (Aizer, Stroud, and Buka 2016; Talge, Neal, and Glover 2007; Torche 2018). To our knowledge, one study reported an association between prenatal stress and language ability at the age of 2 (Laplante et al. 2008).

In this paper, we analyse whether maternal socioeconomic resources, i.e. the mother's education and subjective economic wellbeing predict child's language development at the age of 30 months. Secondly, we examine whether this connection is mediated by mother's psychological distress symptoms during pregnancy.

Data and methods
We use the FinnBrain Cohort Study which is an observational follow-up study on pregnancy and early life outcomes, conducted at the University of Turku. The original sample consists of 3808 pregnant women and their partners living in South-Western Finland. Recruitment took place at the first ultrasound visit at gestational week 12 between December 2011 and April 2015. The FinnBrain questionnaire data were linked to register-based longitudinal data on socioeconomic and birth outcome variables, derived from the Statistics Finland and the National Institute for Health and Welfare. Our analytical sample included 994 mother-child pairs.

We use linear regression analysis to estimate the link between maternal education and economic wellbeing on a child's language development. First, we add the maternal resources into the model; second, we include important confounders; third, we add information on prenatal distress, and in the fourth model, we add the additional independent variables.

Variables
The child's language development was assessed with Finnish and Swedish versions of the *MCDI* (MacArthur Communicative Development Inventory) filled in by the parents at the child's age of 30 months. The MCDI is one of the most common tools used to assess infants and toddlers' total vocabulary sizes and their development relative to other infants and toddlers (Mayor and Plunkett 2011). We use the information on child's vocabulary size (number of understood and produced words), with a theoretical range 0–594.

Prenatal socioeconomic resources were measured by *mother's educational level* (1=Secondary or lower, 2=Higher vocational, 3=Higher university), measuring the last completed educational degree before childbirth (register information, following the International Standard Classification of Education, ISCED 2011) and by *mother's subjective economic wellbeing* (values ranging from 0=Low to 10=High) which was collected through a questionnaire in the first pregnancy trimester. Maternal prenatal distress was measured with *the anxiety subscale of the Symptom Checklist -90* (SCL-90), with *the Edinburgh Postnatal Depression Scale* (EPDS), which also has been validated for prenatal use, and with *the Pregnancy-Related Anxiety Questionnaire* (PRAQ-R2), measuring especially fears and worries of the pregnancy and child. Each measure is widely used, standardised, and validated for the FinnBrain cohort (Huizink et al. 2016; Korja et al. 2018). Anxiety and depressive symptoms were observed at gestational weeks 14, 24, and 34 and pregnancy anxiety at weeks 24 and 34, using self-report questionnaires. We calculated means for each measure of distress and used them as continuous measures.

We control for mother's age, child's sex, bilingual home environment, having siblings (parity), smoking in the 1st pregnancy trimester, and birth weight. Girls have better language skills from a very early age, growing in bilingual family can delay language development at early ages, and having older siblings can slow down this development. Further, mother's detrimental prenatal health habits such as smoking has been shown to be more common in lower socioeconomic positions and have deteriorating effects on a child's language development. Being born preterm or low weight have been related to difficulties in language development.

Results

Our preliminary results showed that both maternal education and subjective economic wellbeing are positively associated with a child's vocabulary size and that education is a stronger socioeconomic predictor of child's language development (Figure 1, M1). These associations remained significant, especially for education, after adjusting for important confounders and covariates in the second model (M2). Further, maternal prenatal anxiety and depressive symptoms and pregnancy-specific anxiety did not mediate between mother's socioeconomic resources and child's early language development in our sample (M3). In the fully adjusted models including all the control variables (M4), low maternal education, having siblings, being from a bilingual family and being a female were associated with a higher vocabulary size at the age of 30 months.
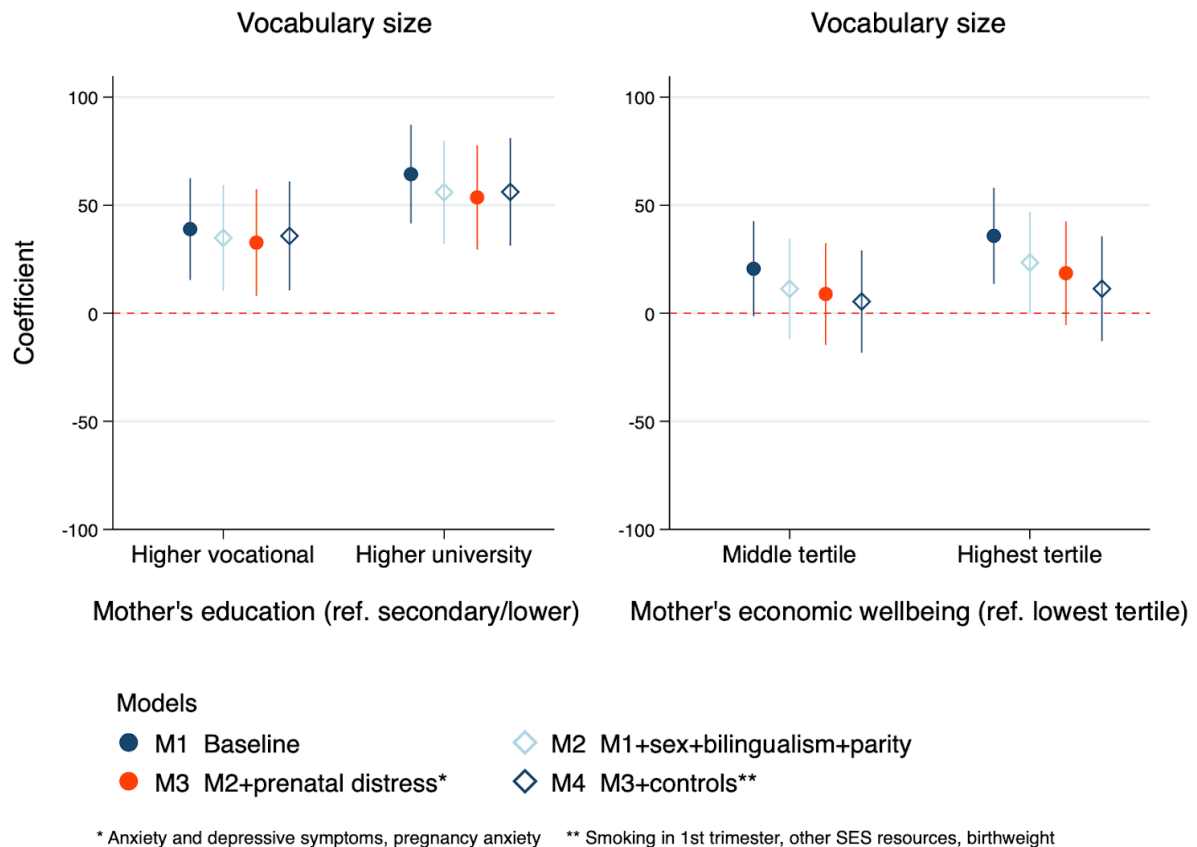

Figure 1. Mother's education (on left) and subjective economic wellbeing (on right) predicting child's vocabulary size at the age of 30 months. Coefficients from linear regression, N=994. Ref. categories: secondary or lower education; the lowest tertile of subjective economic wellbeing.

Conclusion

Our results showed that mother's level of education and prenatal economic wellbeing were positively associated with the child's language development, and this association remained for education after controlling for several socio-demographic and prenatal characteristics. Further, prenatal distress symptoms did not mediate these connections. In future, we will examine possible interaction effects between child's gender and maternal socioeconomic resources. Further, we will test whether the quality of postnatal environment (e.g. attending daycare), including additional measures for language development and measured at different child's age, add to these results on socioeconomic resources and child's language development. The precise pathways through which parental resources are related to child's early development need to be better understood.

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