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Growth curve analyses of the relationship between early maternal age and children's mathematics and reading performance ☆

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ABSTRACT

Regarding the methods used to examine the early maternal age-child academic outcomes relationship, the extant literature has tended to examine change using statistical analyses that fail to appreciate that individuals vary in their rates of growth. Of the one study I have been able to find that employs a true growth model to estimate this relationship, the authors only controlled for characteristics of the maternal household after family formation; confounding background factors of mothers that might select them into early childbearing, a possible source of bias, were ignored. The authors' findings nonetheless suggested an inverse relationship between early maternal age, i.e., a first birth between the ages of 13 and 17, and Canadian adolescents' mean math performance at age 10. Early maternal age was not related to the linear slope of age. To elucidate whether the early maternal age-child academic outcomes association, treated in a growth context, is consistent with this finding, the present study built on it using US data and explored children's mathematics and reading trajectories from age 5 on. Its unique contribution is that it further explicitly controlled for maternal background factors and employed a three-level growth model with repeated measures of children nested within their mothers. Though the strength of the relationship varied between mean initial academic performance and mean academic growth, results confirmed that early maternal age was negatively related to children's mathematics and reading achievement, net of post-teen first birth child-specific and maternal household factors. Once maternal background factors were included, there was no statistically significant relationship between early maternal age and either children's mean initial mathematics and reading scores or their mean mathematics and reading growth.

1. Introduction

Scholarship on the adverse effects of early maternal age (defined as a first birth in the teen years) on children's social, academic, behavioral, and health outcomes continues to be mixed. While some researchers find evidence in support of an association between early maternal age and many outcomes such as school dropout, delinquency, internalizing and externalizing behaviors, and lower reading and mathematics scores during childhood and adolescence—either directly or

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indirectly via the stunted schooling, low income, and poor parenting skills of young mothers, and often to the exclusion of mothers' background factors (Hardy et al., 1997; Hoffman and Maynard, 2008; Moore et al., 1997; Spieker et al., 1999)—others find that any negative relationship between early maternal age and children's outcomes is difficult to establish, or is spurious, once mothers' backgrounds are accounted for (Geronimus and Korenman, 1992; Geronimus et al., 1994; Hoffman, 1998; Hotz et al., 1997; Levine et al., 2007; Rosenzweig and Wolpin, 1995; Turley, 2003).

The life course theoretical framework (Neugarten et al., 1965) provides support for some of the earliest studies showing and inverse relationship between early maternal age and children's outcomes. Specifically, the reason why children of mothers who began childbearing in the teen years fare poorly is due both to the fact of their mother's early maternal age and its effect on the health of the maternal household as characterized by their mothers' completed education and income and their relationship to the availability or unavailability of social capital-producing resources. Some scholars argue, on the other hand, that early maternal age is itself an effect of the socioeconomic disadvantage that select young women into early childbearing, and, inasmuch as it is associated with poor outcomes among the children of mothers who had a teen first birth, it is not an additional cause of the difficulties that these young women face later in life (Edin and Kefalas, 2005; Kearney and Levine, 2011, 2012). The later disadvantage of teen mothers is actually part of the trajectory these women were already on prior to their early maternal age. The failure to account for the background characteristics of mothers who began their childbearing early, then, necessarily leads to overestimations of the early maternal age-child outcomes relationship.

Whether early maternal age is truly associated with young women's later difficulties and, hence, signals negative outcomes for their children, or whether it merely represents part of the normal path some young women travel given their family backgrounds, it is notable that, with respect specifically to issues of methods, typical longitudinal analyses of change, which often focus on score changes in a two-wave design, have been restricted to explicitly modeling aggregate-level growth, and thus fail to take into account that individuals vary in their rates of growth (Gibbons et al., 1993). Dahinten et al. (2007) provide the only study I could find that examines the effects of early maternal age in a growth context. The outcomes of interest, however, were primarily behavioral; only one outcome, i.e., children's performance on a math instrument, was academic. Also, the focus was on Canadian adolescents. Finally, because the authors controlled for characteristics of the maternal household after family formation and did not account for differences in the background factors of the women in their study, it is likely the case that the relationship between early maternal age and children's math achievement was overestimated.

The present study extends the current literature on the early maternal age-child outcomes relationship by replicating the Dahinten et al. (2007) study. Its unique contribution is that, in contrast to Dahinten et al. (2007), it (1) uses US data, (2) focuses on children's achievement on the Peabody Individual Achievement Test (PIAT) for mathematics, reading recognition, and reading comprehension, (3) follows children from age 5, the age at which the majority of US children enter formal schooling, to middle adolescence, (4) explicitly controls for maternal background factors in addition to accounting for post-teen first birth child-specific and maternal household factors, and (5) employs a three-level growth model to account for non-independence of children's achievement both across time and within families. The specific questions posed are (1) In the absence of controls, is early maternal age associated with children's mean initial and time-dependent mathematics and reading achievement? (2) Granting an association under the preceding question, does early maternal age continue to be related to children's mean initial and time-dependent mathematics and reading achievement, net of child-specific and maternal household controls? and (3) Granting an association under the preceding question, does early maternal age continue to be related to children's mean initial and time-dependent mathematics and reading achievement when further accounting for the background factors that might select young women into early childbearing? Given the extant literature on the early maternal age-child outcomes relationship, it is safe to hypothesize that early maternal age is in fact associated with children's mean achievement. Less clear is whether any association will hold once the unobserved heterogeneity in mothers' backgrounds is explicitly controlled for.

2. Background and significance

2.1. Theoretical framework

The association between early maternal age and children's outcomes may be explained theoretically by the life course framework, particularly its emphasis on age-specific expectations or "on-time transitions", and the inability of some, perhaps due to circumstances outside their control, to meet them (Neugarten et al., 1965). Childbearing, which ideally should occur in adulthood, and preferably after formal schooling and marriage, has long-term negative consequences when achieved in the teen years, both for young mothers and for the children born to them, because it adversely impacts resource allocation in the home and delays the psychological and emotional maturation young women need to be good parents (Mollborn and Dennis, 2012; Powell et al., 2006). A birth in the teen years is likely to disrupt young women's completion of education, which, in turn, is associated with penury and its concomitant social disadvantage in adulthood (Coley and Lindsay Chase-Lansdale, 1998; Furstenberg et al., 1990). For example, it has long been established that verbal facility, which is positively associated with reading ability, is highest among children born to and reared by older mothers, who tend also to have higher developed mental ability (Parcel and Menaghan, 1990).