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Cognitive development in children of adolescent mothers: The impact of socioeconomic risk and maternal sensitivity

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ABSTRACT

Background: Adolescent motherhood is accompanied by a constellation of risk factors that translate into developmental risk for the off-spring. Socioeconomic risk that is associated with adolescent motherhood as well as maternal interactive behaviors may contribute to the impact of adolescent motherhood on children's developmental outcome.
Objective: Therefore, the aim of the current study was to investigate differences in children's cognitive development between children of adolescent and adult mothers in their first two years of life and to examine whether socioeconomic risk (e.g. such as educational and financial problems) and/or maternal sensitivity mediate developmental differences between children of adolescent and adult mothers.
Methods: Adolescent mothers (< 21 years; N = 64) and adult mothers (> 25 years; N = 34) and their infants were included in the current study. Child cognitive development and maternal sensitivity were assessed at three different time points (T1: mean child age 5.26 months; T2: mean child age 14.69 months; T3: mean child age 21.16 months).
Results: Children of adult mothers showed better cognitive performance at T3 compared to children of adolescent mothers but not at T1 and T2. A multiple mediation model including socioeconomic risk and maternal sensitivity as serial mediators demonstrated that the effect of adolescent motherhood on cognitive development was mediated in a causal effect chain with socioeconomic risk negatively affecting maternal sensitivity and maternal sensitivity affecting children's cognitive development.
Discussion: The present findings demonstrate that maternal interactive behaviors are not only a simple predictor of cognitive development but may also act as a mediator of the association between more distal variables such as socioeconomic risk and cognitive development in adolescent mothers. This supports the need to promote prevention and intervention programs for adolescent mothers during the early postpartum period to reduce socioeconomic problems and enhance maternal interactive behaviors.

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1. Introduction

Although numbers of adolescent pregnancies have declined in Germany and other developed nations, adolescent motherhood is accompanied by a constellation of risk factors that translate into developmental risk of those children (Dahmen, Firk, Konrad, & Herpertz-Dahlmann, 2013; Jaffee, Caspi, Moffitt, Belsky, & Silva, 2001). Previous studies have shown that adolescent mothers are at increased risk for limited educational opportunities, unemployment and single parenthood, which are often accompanied by high financial burdens (Coley & Chase-Lansdale, 1998; Coyne & D'Onofrio, 2012).

As a consequence, children of adolescent mothers present a high-risk group for poorer development outcomes. Previous studies have shown that children of adolescent mothers show less socio-emotional skills and display more externalizing and aggressive behaviors than children of adult mothers (D'Onofrio et al., 2009). Further, their cognitive and language skills are lower compared to children of adult mothers (Fagan & Lee, 2013; Geronimus, Korenman, & Hillemeier, 1994; Hofferth & Reid, 2002; Keown, Woodward, & Field; Lemelin, Tarabulsy, & Provost, 2006; Levine, Pollack, & Comfort, 2001; Oxford & Spieker, 2006; Turley, 2003). Many studies have shown that socioecomomic problems (such as economic deprivation) are associated with negative developmental outcome in the offspring (Duncan, Brooks-Gunn, & Klebanov, 1994; Duncan, Magnuson, & Votruba-Drzal, 2017; Kiernan & Huerta, 2008). This may be due to low cognitive stimulation in the home, including toys, books, and learning opportunities that shape the developing brain (Johnson, Riis, & Noble, 2016). The first two years of life are one of the most active stages of brain development and shape the neural architecture necessary for cognitive functioning (Nyaradi, Li, Hickling, Foster, & Oddy, 2013; Pujol et al., 2006). Sensitivity to environmental influences is heightened during periods of rapid brain development (Johnson et al., 2016). Therefore, the extent to which individual differences in cognitive development can be explained by adolescent motherhood at these early ages requires further investigation.

Although some studies found that differences in child development become insignificant after controlling for socioeconomic risk factors (Geronimus et al., 1994; Hofferth & Reid, 2002; Levine et al., 2001; Turley, 2003), other studies found that developmental differences persist after controlling for social background characteristics (Keown et al., 2001; Terry-Humen, Manlove, & Moore, 2005; Wadsworth, Taylor, Osborn, & Butler, 1984), suggesting that developmental differences between children of adolescent mothers compared to adult mothers might also be related to age-dependent developmental differences between their mothers. Neuroimaging studies have shown that during adolescence a basic reorganization of the brain occurs with prefrontal brain areas – underlying higher cognitive functions such as behavioural and emotional control- maturing later than subcortical brain structures (Casey, Getz, & Galvan, 2008; Giedd et al., 1999; Konrad, Firk, & Uhlhaas, 2013). This neural imbalance might explain behavioural differences between adolescents and adults particularly in emotional situations. These age-related developmental differences between adolescent and adult mothers might also impact the quality of maternal parenting behaviors. Particularly in times when the infant is distressed successful parental emotional control is critical for sensitive parenting (Crandall, Deater-Deckard, & Riley, 2015; Rutherford, Wallace, Laurent, & Mayes, 2015).

Previous studies have shown that adolescent mothers show less sensitive and more intrusive and hostile interactive behaviors and less frequently engage in synchronous interactions with their children (Krpan, Coombs, Zinga, Steiner, & Fleming, 2005; Lee, 2009; Madigan, Moran, & Pederson, 2006). As parenting quality has an important impact on child development (Macdonald, 1992), the reduced quality of maternal parenting behaviors in adolescent compared to adult mothers might also contribute to the impact of adolescent motherhood on offspring's developmental outcome. Although numerous studies have found developmental differences in children of adolescent and adult mothers, as well as in maternal parenting behaviors, fewer studies have explored the association between maternal parenting behaviors and developmental differences between children of adolescent and adult mothers (Rafferty, Griffin, & Lodise, 2011). Interestingly, Rafferty et al. (2011) showed that cognitive developmental differences in 3-year-old children of adolescent and adult mothers were indirectly mediated by maternal parenting behaviors.

Thus, differences in the quality of maternal parenting behaviors might play an important role in developmental differences between children of adolescent and adult mothers. Maternal sensitivity has previously been shown to be of major significance for children's attachment and social-emotional development (De Wolff & van Ijzendoorn, 1997) and has also been associated with children's cognitive development (Mills-Koonce et al., 2015). Moreover, maternal sensitivity may play an important mediating role between socioeconomic or psychosocial problems and child outcome (Malmberg et al., 2016; Raviv, Kessenich, & Morrison, 2004).

The aim of the current study was to replicate and extend previous research (Rafferty et al., 2011) on the impact of adolescent motherhood on child development by investigating differences in children's cognitive development between children of adolescent and adult mothers in their first two years of life and to examine whether maternal parenting qualities, in particular maternal sensitivity mediates developmental differences between children of adolescent and adult mothers. Based on previous research (Malmberg et al., 2016; Raviv et al., 2004) we intended to test the hypothesis whether maternal socioeconomic problems have a direct effect on child outcome or whether this effect is mediated by maternal sensitivity. To control for genetic influences on child cognitive development, maternal IQ was measured and controlled for in all analyses as previous studies have shown that cognitive development is driven by both genetic and environmental influences (Turkheimer, Haley, Waldron, D'Onofrio, & Gottesman, 2003).

2. Methods

2.1. Participants

Mother-child dyads were recruited within a project on adolescent parenting (Firk et al., 2015) in cooperation with the local youth welfare system, obstetric clinics, midwife practices and paediatrician practices in the catchment area of Aachen city, Germany.