

School achievement in 14-year-old youths prenatally exposed to marijuana

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ABSTRACT

The relation between prenatal marijuana exposure (PME) and school achievement was evaluated in a sample of 524 14-year-olds. Women were recruited during pregnancy and assessed, along with their offspring, at multiple phases from infancy to early adulthood. The sample represents a low-income population. Half of the adolescents are male and 55% are African American. School achievement was assessed with the Wechsler Individual Achievement Test (WIAT) Screener (Psychological Corporation, 1992).

A significant negative relation was found between PME and 14-year WIAT composite and reading scores. The deficit in school achievement was mediated by the effects of PME on intelligence test performance at age 6, attention problems and depression symptoms at age 10, and early initiation of marijuana use. These findings suggest that the effects of PME on adolescent achievement are mediated by the earlier negative effects of PME on child characteristics.

The negative impact of these characteristics on adolescent achievement may presage later problems in early adulthood.

Excerpt from Discussion

We further hypothesized that if there was a significant association between PME and academic performance, this significant relation would be explained by the earlier effects of PME on the cognitive, emotional, and behavioural development of the children. We demonstrated in earlier analyses that PME predicted IQ deficits at age 6 (Goldschmidt et al., 2008), attention problems at 10 years (Goldschmidt et al., 2000), a higher rate of depressive symptoms in offspring at age 10 (Gray et al., 2005), and an earlier onset of marijuana use (Day et al., 2006). When these variables were considered as mediators, the direct associations between PME and the composite scale and the reading subscale of the WIAT were no longer significant. The effects of PME on academic achievement were mediated by the earlier effects of PME on IQ, attention problems, depressive symptoms, and an early age of marijuana initiation.

These findings are unique, as the only other study of PME did not evaluate the potential for mediating effects on academic achievement. Pre-clinical studies with animals have shown

that PME affects CNS development by disrupting the development and functioning of the fetal endocannabinoid system (Fride, 2008; Harkany et al., 2008). Prenatal exposure to THC disrupts the position, postsynaptic target selectivity, and differentiation of the developing axons in fetal brain (Berghuis et al., 2005). Exposure affects dopamine activity (Navarro et al., 1994) and processes in the prefrontal cortical dopamine system (Fride and Mechoulam, 1996). The resultant changes in the endocannabinoid system, in turn, lead to behavioral sequelae in animals such as responses to stress and novelty, emotional reactivity, and drug sensitivity (Harkany et al., 2007; Willford et al., in press). Thus, these pre-clinical studies support our findings that PME affects the domains of mood, attention, and drug use.

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