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The association between prenatal exposure to cigarettes and infant and maternal negative affect

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Abstract

This study examined the association between prenatal exposure to cigarettes and infant and maternal negative affect. Participants were 115 mother–infant dyads (69 prenatally exposed to cigarettes and 46 nonexposed). Infant and maternal negative affect were both assessed during the neonatal period (2–4 weeks of age) and again at 7 months of infant age. Results indicated that only prenatal exposure to cigarettes predicted infant negative affect. Infants who were prenatally exposed to more cigarettes had higher levels of negative affect at both time points. Furthermore, regression analyses indicated that both infant and maternal negative affect during the neonatal period predicted maternal negative affect at 7 months of age. These results highlight the importance of considering the reciprocal relationship between infant and maternal behavior when examining developmental outcomes among infants prenatally exposed to cigarettes.

Keywords: Prenatal exposure to cigarettes; Infant negative affect; Maternal negative affect; Cross-lagged panel design

Prenatal exposure to cigarettes has consistently been associated with adverse perinatal outcomes (Abel, 1980; Fried & O'Connell, 1987; Fried & Oxorn, 1980; Olsen, Pereira, & Olsen, 1991). In addition, a growing body of research has documented an association between prenatal exposure to cigarettes and deficits in affective behaviors and regulation. Exposed infants have been found to show deficits in arousal and attention throughout the first year of life (Franco et al., 1999; Franco, Chabanski, Szliwowski, Dramaix, & Kahn, 2000; Fried & Makin, 1987; Jacobson, Fein, Jacobson, Schwartz, & Dowler, 1984; Picone, Allen, Olsen, & Ferris, 1982; Saxton, 1978; Schuetze & Eiden, 2006; Schuetze & Zeskind, 2001; Streissguth, Barr, & Martin, 1983). Studies have also found differences in affective behaviors among exposed infants as compared to nonexposed infants as early as the neonatal period and persisting into childhood. Specifically, studies with infants and toddlers who were prenatally exposed to cigarettes have found evidence of increased irritability (Brook, Brook & Whiteman, 2000; Jacobson et al., 1984; Johnson, Vicary, Heist, & Corneal, 2001; Ramsay, Bendersky, & Lewis, 1996; Schuetze & Zeskind, 2001). The extent to which these effects are due to the direct, teratological impact of prenatal exposure to cigarettes or are mediated by other maternal factors that are associated with maternal smoking is not clear.

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Previous studies highlight the importance of examining both direct and indirect pathways to the development of affect among cigarette-exposed infants. In fact, investigators have recently suggested that one trajectory to later developmental problems among cigarette-exposed infants may be through problematic maternal characteristics (Wakschlag & Hans, 2002). Maternal negative affect may be particularly relevant when examining affect among infants prenatally exposed to cigarettes. For example, cigarette smoking has consistently been associated with higher levels of depressive symptomatology (Anda et al., 1990; Breslau, Kilbey, & Andreski, 1990, 1993; Fergusson, Goodwin, & Horwood, 2003) among adolescents and adults in the general population, particularly among heavy smokers (>20 cigarettes per day). Fewer studies have examined levels of depression or anxiety among pregnancy smokers, although several studies have found evidence of higher rates of depression among pregnant smokers as compared to nonsmokers (Pritchard, 1994; Schuetze & Eiden, 2006; Zhu & Valbo, 2002). A fairly large body of literature also suggests that smoking is positively associated with hostility in the general population. Hostility is characterized by negative attitudes and beliefs towards other people and frequent and intense bouts of anger (Houston & Vavak, 1991; Miller, Smith, Turner, Guijarro, & Hallet, 1996). Trait hostility consistently predicts higher smoking rates in both men and women (e.g., Lipkus, Barefoot, Williams, & Siegler, 1994; Siegler, Person, Barefoot, & Williams, 1992; Whiteman, Fowkes, Deary, & Lee, 1997). In addition, one recent study found that hostility during the first trimester predicted smoking during the second and third trimesters (Rodriquez, Bohlin, & Lindmark, 2000).

The importance of considering negative affect of pregnant smokers is underscored by the rapidly increasing body of literature that shows a range of nonoptimal developmental outcomes among the infants and children of women with increased levels of depression and hostility. Independent of cigarette smoking, parents who exhibit higher levels of depression are less sensitive caregivers, more likely to display flatter affect during mother–child interactions and to provide less stimulation to their infants (Cohn & Campbell, 1992; del Carmen, Pederson, Huffman, & Bryan, 1993; Field, 1992; Howard et al., 1995; Jameson, Gelfand, Kuczar, & Teti, 1997; Weinberg & Tronick, 1998). Similarly, maternal anger/hostility has been found to increase negative maternal behavior among substance-using women (Eiden, Chavez, & Leonard, 1999; Hans, Bernstein, & Henson, 1999). Thus, one pathway to altered infant affect may be through maternal negative affect. This is particularly true given that investigators have speculated that there is a strong neurobiologic and genetic basis to "affective temperament" (Kovacs and Devline, 1998).

The purpose of this study was to test a conceptual model examining concurrent and longitudinal associations between infant and maternal negative affect as a function of maternal cigarette smoking during pregnancy at 2–4 weeks and 7 months of infant ages. Specifically, we hypothesized that cigarette exposed infants would have higher levels of negative affect. We also explored the possibility that maternal negative affect would explain this association and examined potential bidirectional associations between maternal and infant negative affect longitudinally.

1. Method

1.1. Participants

Participants consisted of 116 mother–infant dyads recruited into a longitudinal study of cigarette exposure and infant development who completed laboratory visits at both 2–4 weeks and 7 months of age. Of these dyads, 69 consisted of infants who were prenatally exposed to cigarettes through maternal smoking during pregnancy (prenatal exposure [PE] group), and 46 consisted of infants who were not prenatally exposed to cigarettes (nonexposed group [NE]) and whose mothers were not exposed to environmental tobacco smoke (ETS) during pregnancy (see Tables 1 and 2). An outreach worker on the project staff recruited all participants after delivery from one local area hospital. Mothers ranged in age from 18 to 42 ($M = 27.82$, S.D. = 6.65). Twelve percent of mothers were primiparous. The remaining mothers had between two and eight children. The majority of mothers were African-American (68%), had high school or below education (77%) and were single (72%). The Hollingshead two-factor index was used to calculate socioeconomic status (SES; Hollingshead, 1975). The average SES was 2.91 (S.D. = 1.56). Thus, the sample consisted of predominantly low-income families with single mothers.

Only mothers who reported using no illicit drugs (other than occasional marijuana) and no more than moderate amounts of alcohol (Average Daily Alcohol consumption of less than .50 ounces of ethanol or 1 drink a day) during pregnancy were recruited for the study. Maternal report of no illicit substance use during pregnancy was confirmed via urine toxicologies which were available for 111 of the mothers in the study. Urine screens are routinely conducted on all mothers who receive prenatal care through the hospital's prenatal clinic and are obtained at birth for the remaining