



# Maternal prenatal stress and infant regulatory capacity in Mexican Americans



Betty Lin\*, Keith A. Crnic, Linda J. Luecken, Nancy A. Gonzales

Arizona State University, USA

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## ABSTRACT

The early postpartum period lays important groundwork for later self-regulation as infants' dispositional traits interact with caregivers' co-regulatory behaviors to produce the earliest forms of self-regulation. Although emerging literature suggests that fetal exposure to maternal stress may be integral in determining child self-regulatory capacity, the complex pathways that characterize these early developmental processes remain unclear. The current study considers these complex, transactional processes in a low income, Mexican American sample. Data were collected from 295 Mexican American infants and their mothers during prenatal, 6- and 12-week postpartum home interviews. Mother reports of stress were obtained prenatally, and mother reports of infant temperament were obtained at 6 weeks. Observer ratings of maternal sensitivity and infant regulatory behaviors were obtained at the 6- and 12-week time points. Study results indicate that prenatal stress predicts higher levels of infant negativity and surgency, both of which directly or interactively predict later engagement in regulatory behaviors. Unexpectedly, prenatal stress also predicted more engagement in orienting, but not self-comforting behaviors. Advancing understandings about the nature of these developmental pathways may have significant implications for targets of early intervention in this high risk population.

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## 1. Prenatal stress and infant regulatory capacity in Mexican Americans

The study of self-regulation has been regarded as “the single most crucial goal for advancing an understanding of development and psychopathology” (Posner & Rothbart, 2000, p. 427). Self-regulation is believed to have roots in infancy, emerging as a result of interactions between infant dispositional regulation and caregiver co-regulatory functions (Calkins, 1994; Rothbart, 2011). Regulatory behaviors in turn have been linked to children's later social skills, academic competence, behavior problems, and even psychopathology in adulthood (Althoff, Verhulst, Rettew, Hudziak, & van der Ende, 2010; Eisenberg, Liew, & Pidada, 2004; Eisenberg et al., 2009). Mexican American youths are at disproportionate risk for many of these adverse adjustment outcomes, and yet relatively little is known about the extent to which these risks may begin to accumulate as early as the prenatal period. Although prior studies have linked prenatal stressors to infant temperament and socioemotional development (e.g., Gutteling et al., 2005), the nature of relations in Mexican American families remains relatively unexplored. The current study addresses these critical questions in a sample of low-income Mexican American mothers and infants.

\* Corresponding author at: Department of Psychology, Arizona State University, 950 S. McAllister Dr., Box 871104, Tempe, AZ 85287, USA. Tel.: +1 5102541266.

E-mail addresses: [betty.lin@asu.edu](mailto:betty.lin@asu.edu), [blin3388@gmail.com](mailto:blin3388@gmail.com) (B. Lin).

### 1.1. Regulatory behaviors in infancy

Although scholars disagree about when children are first capable of purposeful self-regulation, behaviors such as orienting and self-comforting are thought to serve regulatory functions beginning in early infancy (Rothbart, Ziaie, & O'Boyle, 1992). *Orienting*, or direction of attention toward or away from distressing objects in the environment, is considered fundamental to the development of self-regulation (Ruff & Rothbart, 1996). Infants who can more readily disengage gaze from distressing objects are less susceptible to negative affect, are easier to soothe, and evidence greater capacities for later emotion regulation (Crockenberg & Leerkes, 2004; Morales, Mundy, Crowson, Neal, & Delgado, 2005). Given that infants' executive control over orienting behaviors is believed to emerge around 3 months of age (Haith & McCarty, 1990), identification of early caregiver and child contributions during this critical period may help clarify early pathways involved in their development. *Self-comforting*, or self-stimulating behaviors meant to elicit calming such as thumb-sucking, face rubbing, and self-clasping (Crockenberg & Leerkes, 2004), comprises another important set of regulatory strategies present in infancy. Self-comforting behaviors are observed at peak frequency around 3 months of age (Rothbart et al., 1992), and are instrumental for modulating infants' experiences of emotional, physiological, and motoric arousal (Field, 1999; Stifter & Braungart, 1995).

### 1.2. Contributions of infant temperamental reactivity

Temperament reflects constitutional differences in emotional, motor, and attentional reactivity to change as well as the regulation of this reactivity, and is believed to serve as a basis for children's later self-regulatory functioning (Rothbart, 2011). In fact, Feldman and colleagues (1999) argue that the emergence of self-regulation can only be understood when infant temperament is considered. Two dimensions of temperament that may confer risk for regulatory capacity are negativity and surgency (Gartstein & Rothbart, 2003). *Negativity* encompasses general negative mood, fear, and anger responses, and may presuppose risk both by implicating the relative frequency of the infant's distress response and by creating more opportunities for negative responding by others (Belsky, 1997). These heightened levels of arousal may in turn interfere with children's capacities to self-regulate. Indeed, children higher in negativity are more likely to engage in less effective regulatory strategies (e.g., kicking, banging), and to fixate attention on the distressing objects (Calkins, Dedmon, Gill, Lomax, & Johnson, 2002).

*Surgency* includes components of both positive affectivity and high activity level, and has been implicated both as a risk and protective factor for regulation (Gartstein, Slobodskaya, Putnam, & Kinsht, 2009; Rothbart et al., 1992). The high levels of intensity associated with surgency may exaggerate expressions of negativity (Rothbart, Derryberry, & Hershey, 2000), but the positive affect associated with surgency may promote positive infant-caregiver interactions that facilitate caregiver responsiveness (Molfese et al., 2010). Because studies investigating contributions of surgency to infant regulatory capacity are limited, connections between the two remain to be clarified.

### 1.3. Maternal sensitivity, infant temperament, and infant regulatory capacity

Caregiver sensitivity is regarded as an important predictor of infant regulation. *Sensitivity* has been defined as the caregiver's availability, attentiveness, and responsiveness to infant cues according to the infant's age appropriate growth needs (Ainsworth, Blehar, Waters, & Wall, 1978). Sensitive caregiving has been found to predict increased consistency in infants' state regulation as early as the first ten days of life (Sander, Julia, Stechler, & Burns, 1972). Over time and across interactions, consistently sensitive caregiving may re-program infants' stress response in a way that further modulates negative reactivity over time (Braungart-Rieker, Hill-Soderlund, & Karrass, 2010; Feldman, 2010). Sensitive caregiving may also help to co-regulate infant states and thus to support infants' capacities to employ more sophisticated regulatory strategies (Conradt & Ablow, 2010).

### 1.4. Prenatal stress and infant regulatory capacity

Exposure to maternal prenatal stress during critical periods of fetal brain and body development may influence infants' subsequent capacities for regulation (see Weinstock, 1997 for a review). Hormonal imbalances associated with maternal prenatal stress are believed to interfere with the normal development of the infants' stress response system (Seckl, 2001), which then impairs later capacities for emotional and behavioral regulation. Mother self-reports of stress, anxiety and depression during pregnancy have been linked to dysregulated infant states and decreased regulatory capacity, even after controlling for birth weight, psychosocial risks, and maternal postnatal anxiety and depression (Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2002; O'Connor et al., 2007).

Maternal prenatal stress has also been associated with infant temperamental characteristics that confer risk for poor regulatory functioning. Infants prenatally exposed to maternal stress exhibit higher observational and mother reports of infant negativity even after controlling for maternal postnatal mood (Huizink et al., 2002). Separate studies have linked maternal prenatal stress to infant temperament (Huizink et al., 2002) and infant temperament to regulatory capacity (O'Connor et al., 2007), but few studies to date have examined the extent to which infant temperament mediates the relations between maternal prenatal stress and infant regulatory capacity.

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