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Brief Report

Happy babies, chatty toddlers: Infant positive affect facilitates early expressive, but not receptive language

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ABSTRACT

Eighty-three mother–infant dyads participated in this study. Positive affect (PA) broadly, along with fine-grained aspects of PA, was measured at 10 months of age. Language was measured at 14 months. Infant PA predicted expressive, but not receptive, language. The implications of these findings are discussed.

Early language acquisition has important implications for later cognitive, academic and socio-emotional functioning (Hohm, Jennen-Steinmetz, Schmidt, & Laucht, 2007) and there is growing interest in child characteristics, such as temperament (Usai, Garello, & Viterbori, 2009), that may promote language development. Surgency/Extraversion, an aspect of infant temperament commonly referred to as positive affect (PA), is the tendency to approach novelty, seek environmental stimulation, and express/experience positive emotions (Gartstein & Rothbart, 2003). To date, infant PA has been considered by only a few studies in relation to emerging language abilities and results have been mixed. For example, infants who displayed more smiling and laughter at 7 months were found to have better receptive language at 10 months (Dixon & Smith, 2000) and more expressions of joy at 8 months were related to better expressive language at 30 months (Moreno & Robinson, 2005). However, higher PA at 8 months of age has also shown negative associations with receptive vocabulary at 4.5 years of age (Wolfe & Bell, 2007).

In addition to inconsistent findings in previous work, few studies have focused on infant PA as it relates to emerging language in early toddlerhood. Most studies have measured language when toddlers are approximately 2 years of age or older. It is also important to note that no studies were identified that examined both infant PA broadly and fine-grained aspects of PA in relation to language development. Furthermore, language is typically measured with parent report questionnaires, as opposed to objective standardized measures (Moreno & Robinson, 2005, is a notable exception). Although parent reports of language skills have established validity, they are generally limited to vocabulary checklists, lacking the breadth of language assessment available with standardized measures. For example, children's initiation of and responsiveness to social requests are aspects of expressive and receptive language absent from most (if not all) parent report measures. Finally, it is important

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Table 1
Hierarchical regression analyses predicting expressive and receptive language from infant positive affect.

	Expressive language			Receptive language		
Predictor	ΔR^2	β	*SE* β	ΔR^2	β	*SE* β
Step 1	.16*			.17**		
Infant Gender (1 = boys)		−.23	.15		−.28*	.14
Cumulative Risk		−.34*	.16		−.33*	.15
Step 2						
Surgency/Extraversion	.10*	.30*	.14	.04	.18	.13
Activity level	.08*	.27*	.13	.01	−.01	.13
High Intensity Pleasure	.08*	.28*	.14	.02	.10	.14
Perceptual Sensitivity	.06+	.24+	.13	.05	.21	.13
Smiling & Laughter	.01	−.01	.13	.02	.11	.13
Vocal Reactivity	.07+	.24+	.14	.03	.15	.13
Approach	.10*	.33*	.15	.03	.17	.14

Due to multicollinearity, each aspect of PA was tested in separate analyses.
+ $p < .10$.
* $p < .05$.
** $p < .01$.

to measure receptive and expressive language separately, as each aspect of language may develop at different rates (Bates, Dale, & Thal, 1995).

The current study addressed some of the limitations in prior work by investigating infant PA broadly, along with fine-grained aspects of PA, at 10 months of age as it relates to emerging expressive and receptive language abilities, measured with a standardized objective language assessment at 14 months of age. It was expected that infant PA would be related to language skills. However, departing from existing work, the possibility that PA and its components would differentially relate to receptive and expressive language was also considered.

Eighty-three mother-infant dyads (59% female infants), recruited from a rural Midwest region via flyers posted in the community and through a local OB/GYN office, participated in the study. Mothers ranged in age from 17 to 42 years ($M = 27.68$, SD = 6.74), reported a wide range of educational attainment (9–20 years, $M = 14.51$, SD = 2.79) and 59% identified as Caucasian. Nineteen percent reported incomes that indicated they were living at or below the poverty line. Mothers attended a laboratory visit when their infants were 4 months of age, during which time they completed demographics questionnaires and were administered a structured clinical interview (First, Spitzer, Gibbon, & Williams, 2002). From this information, a Cumulative Risk index was calculated, where one point was given for each of the following characteristics: maternal age under 20 years, less than a high school education, living at or below the poverty level, single parent status, and past or current depressive episode.

When infants were 10 months of age, mothers completed the PA dimension of the Infant Behavior Questionnaire, Revised (IBQ-R; Gartstein & Rothbart, 2003), which is comprised of six sub-dimensions: Activity Level, High Intensity Pleasure, Perceptual Sensitivity, Smiling and Laughter, Vocal Reactivity, and Approach (for complete descriptions of these sub-dimensions, see Gartstein & Rothbart, 2003). In the current study, the reliability of the PA dimension was adequate ($\alpha = 0.72$) and ranged from adequate to excellent for the sub-dimensions (0.74–0.94).

During a laboratory visit when children reached 14 months of age, toddlers were administered the language portion of the Bayley Scales of Infant and Toddler Development, 3rd edition (Bayley-III; Bayley, 2006) by graduate students trained in clinical and developmental assessment. The Bayley-III is a standardized assessment instrument, developed for use in research and clinical applications, which includes indices of both receptive and expressive language. Receptive language items examine a variety of skills, such as word recognition (e.g., pointing to a named object), attending to others' play routines (e.g., passing a ball back and forth), and responding to commands (e.g., "Stop!"). Items examining expressive language assessed the production and imitation of words and word approximations, along with the pragmatics of word production, such as initiating play interactions with others.

Preliminary analyses identified gender differences and associations between language and Cumulative Risk. Females had higher scores on Perceptual Sensitivity, $t(58) = 2.01$, $p = .05$, receptive language, $t(53) = 2.40$, $p = .02$, and expressive language, $t(53) = 1.99$, $p = .05$. Additionally, Cumulative Risk was correlated with both receptive, $r = -.30$, $p = .05$, and expressive language, $r = -.32$, $p = .05$. Given these findings, infant gender and Cumulative Risk were included as covariates. Finally, there was a moderate amount of missing data, including 28% of the infant temperament data and 33.7% of the language outcomes. Little's omnibus test of missing values based on the data set as a whole was not significant (χ^2 [18] = 19.82, $p = 0.34$), providing evidence that missing data occurred completely at random (Schlomer, Bauman, & Card, 2010). Thus, multiple imputation, totaling 20 imputations (Tabachnick & Fidell, 2007), was used to estimate missing data, as this is considered a preferred procedure that provides less biased estimates relative to traditional methods (e.g., listwise deletion), and performs well with as much as 50% missing data (Widaman, 2006).

Infant PA at 10 months predicted expressive, $\beta = .30$, $t = 2.24$, $p = .02$, but not receptive language, $\beta = .18$, $t = 1.32$, $p = .18$ (Table 1). None of the PA sub-dimensions predicted receptive language. However, three sub-dimensions of PA predicted