Intersensory Processing of Social Events Mediates Relations Among Maternal Well-Being, Language Input, and Child Language

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Introduction

Maternal well-being is a multi-faceted construct that encompasses psychological (e.g., depression, anxiety, self-acceptance, and satisfaction) and social processes (e.g., family and community support), with implications for child development [1]. A sizeable literature has demonstrated that lower levels of maternal depression, greater maternal sensitivity (emotionally positive, prompt, and contingent responsiveness) [2-4], as well as greater maternal language input [5], predict better child language outcomes. Recently, we demonstrated that greater infant and child attention to audiovisual speech and intersensory processing of faces and voices also predict better child language outcomes [6-8]. Given that caregivers typically scaffold infant attention and language learning during social interactions, greater attention and intersensory processing of faces and voices likely increases language learning opportunities. Little research, however, has explored the role of infant skills (e.g., attention, intersensory processing) along with maternal factors (e.g., well-being, language input) and how they jointly promote child language outcomes. Here, we assessed relations among child intersensory processing of faces and voices, maternal well-being and language input, and pathways from these behaviors to child language outcomes.

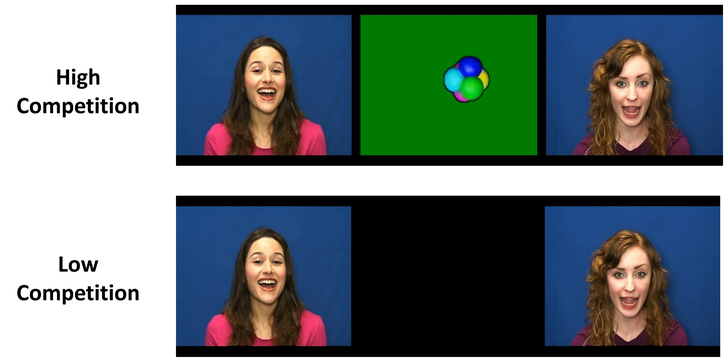
Methods

Children (*N* = 97; 50 F) participated at 36 months of age (*M* = 36.77 months, *SD* = 0.93) as a part of a larger, ongoing longitudinal study.

Measures:

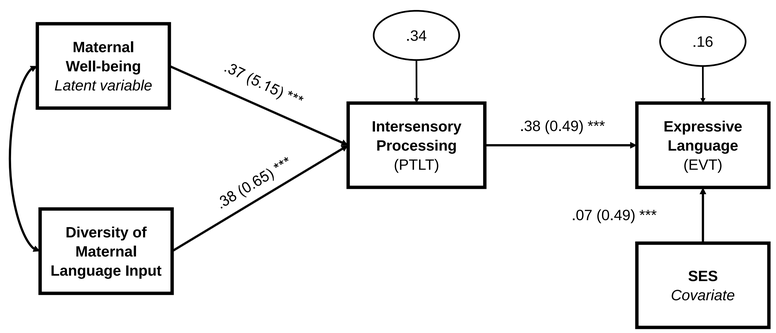
- **Intersensory Processing of Faces and Voices** was assessed using the Multisensory Attention Assessment Protocol [6], a new individual difference measure of attention to audiovisual events.
  - Trials consisted of a 3s central event (morphing geometric shapes) followed by two 12s lateral social events (women speaking), one of which was synchronous with its natural soundtrack (see Figure 1).
  - IP was calculated as the proportion of total looking time to the sound-synchronous event (face-voice matching) on each trial and was averaged across 12 trials.
- **Diversity of Maternal Language Input** was calculated as the number of unique words mothers spoke to their child during an 8-minute lab-based play session.
- **Maternal Well-Being** was assessed by having mothers complete the Ryff Scales of Psychological Well-being [9], which measures six aspects of well-being: self-acceptance, positive relations, autonomy, environmental mastery, purpose in life, and personal growth.
- **Child Expressive Language** was assessed using the Expressive Vocabulary Test [10].
- Maternal education served as our index of **Socioeconomic Status (SES)** and was used as a covariate.

Figure 1. Static images of the audiovisual social events from the MAAP.



Note. Half of the trials (*n* = 6) were low competition trials, and the remaining half were high competition trials. On high competition trials (top row, the central event remained on during the lateral events, whereas on low competition trials (bottom row), the central event was turned off during the lateral events.

Figure 2. Mediation Model: Child Intersensory Processing of Faces and Voices Mediates Relations Among Maternal Well-being, Diversity of Maternal Language Input, and Child Expressive Language.



Note. * *ps* < .001. For each pathway, standardized regression coefficients are presented first, followed by unstandardized coefficients in parentheses. Proportions of residual (error) variance are presented above intersensory processing and expressive language.

Results

Bivariate correlations. We created a latent variable of maternal well-being using a confirmatory factor analysis of the six Ryff sub-scales. The latent variable showed excellent fit with the data, $X^2(7) = 4.94$, $p = .67$. Analyses revealed significant correlations among child intersensory processing, maternal language input, child expressive language, and SES, *rs* > .21, *ps* < .01. Also, the maternal well-being latent factor was correlated with child intersensory processing and expressive language, *rs* > .31, *ps* < .02.

Mediation model. To assess relations among our measures, we tested several SEM models (using a robust FIML estimator) and arrived at one with good fit to the data, $X^2(29) = 29.36$, $p = .45$. Our final model revealed that revealed that child intersensory processing mediates the relation between maternal factors (maternal well-being and language input) and child language (see Figure 2). Greater maternal well-being and more maternal language input significantly predicted greater child intersensory processing of faces and voices, *ps* < .001. In turn, child intersensory processing significantly predicted greater child expressive language, *p* < .001, holding SES constant.

Conclusions

Findings reveal new developmental pathways to child language outcomes, in which maternal factors (well-being, language input) and child skills (intersensory processing) contribute to language outcomes. They build on our prior findings that child intersensory processing predicts language outcomes [6-8], but also, for the first time, demonstrate the important role of maternal behaviors as predictors of individual differences in child intersensory processing. Further, the present findings highlight the important, mediational role of child intersensory processing in the relation between maternal behaviors and child language outcomes. Findings build upon our previous research emphasizing the importance of early intersensory processing as a gateway to language outcomes.

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