

# The Pivotal Behavior Model: Parental Sensitivity and Children's Language Outcomes for Families in Rural Areas

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## Introduction

According to the pivotal behavior model of developmental learning proposed by Mahoney, Kim and Lin (2007), children's use of pivotal behaviors, such as persistence and initiation mediate the relationship between parental responsiveness and children's learning. Their study on children with developmental disabilities supported this theoretical model. Furthermore, Chiu, Lin, Mahoney, Cheng, and Chang (2017) investigated typically developing children from Taiwan and also found that children's pivotal behavior mediated the association between parental responsiveness and children's symbolic behavior. We hypothesized that children's pivotal behavior at 24 months would partially mediate the relationship between parental sensitivity at 24 months and children's language abilities at 35 months.

## Aim

The aim of the current study was to test the pivotal behavior model of developmental learning for children from rural counties in the United States by examining whether the relationship between parental sensitivity and children's language abilities was mediated by children's pivotal behavior.

## Method

**Participants:** The Family Life Project (<https://doi.org/10.3886/ICPSR34602.v4>) recruited a large sample ( $N = 1292$ ) of low-income families in rural counties in Pennsylvania and North Carolina, and collected data during the first three years of children's lives through home visits, childcare visits, and phone calls (Willoughby et al., 2013). Of 1021 participants included in the present analysis, 50.4% were males and 49.6% were females; 43% were African Americans and 57% were from other ethnic groups; 77.8% were from lower-income families and 22.2% were from higher-income families before applying calculated sampling weights. After the calculated sampling weights were applied, 51.3% were males and 48.7% were females; 23 % were African Americans and 77% were from other ethnic groups; 65.9% were from lower-income families and 34.1% were from higher-income families.

**Measures:** *Maternal sensitivity.* The maternal sensitivity scale measured parents' sensitivity/responsiveness, evaluating the extent to which the mothers were capable of responding to or attending to children's needs, emotional expressions, and social gestures (FLP Key Investigators, 2013). This variable was coded on a 1-7 scale from 1 (Not at all characteristic) to 7 (Highly characteristic). Trained coders completed about 30% of videos with the master coder(s), and the intra-class correlation for sensitivity was .89 (Wagner et al., 2015).

*Children's pivotal behavior.* Children's pivotal behavior was measure by assessing children's social engagement, which included children's persistence,

enthusiasm, and compliance in an activity when they were 24 months. These variables were also coded on a 1-7 scale from 1 (Not at all characteristic) to 7 (Highly characteristic). Inter-rater reliability for persistence at 24 months was acceptable,  $\kappa = .75$  (Willoughby, Stifter, Gottfredson, & FLP Investigators, 2015). Social engagement of children in the current study reflected how children insist on a task, how children are keen on a task, and how children are compliant during a task.

*Children's language abilities at 35/36 months.* Children's language abilities were assessed by Adaptive Language Inventory (Vernon-Feagans & Farran, 1979), which contained language comprehension, language expression, rephrasing ability, spontaneity, listening ability, and fluency. Only language comprehension, language expression, and fluency at 35 months were used in the present study.

*Children's expressive language at 24 months.* Children's expressive language was assessed by Preschool Language Scale 4<sup>th</sup> edition (Zimmerman, Steiner, & Pond, 2002). The expressive communication subscale of Preschool Language Scale 4<sup>th</sup> edition, which was used to evaluate young children's communicative competence (Vernon-Feagans, Garrett-Peters, Willoughby, Mills-Koonce, & Family Life Project Key Investigators, 2012), was administered when children were 24 months. The internal consistency was good, with Cronbach's  $\alpha = .89$  (De Marco & Vernon-Feagans, 2013).

**Procedure:** A sequence of home visits took place when children were 2, 6, 15, 24, and 36 months old (Willoughby et al., 2013). There were also child care visits when children were 6, 15, 24, and 36 months old (Willoughby et al., 2013). A 10-minute parent child interaction in the puzzle task, during which maternal sensitivity, detachment, positive regard for child, negative regard for child, animation, and stimulation of development and children's persistence, enthusiasm, compliance, positive mood, negative mood, and aggression were evaluated, were completed during one of the 24-month home visits.

**Analysis:** The 7.31 Version of Mplus was used to conduct structural equation modeling. Cases were weighted using calculated sampling weights. Parental sensitivity at 24 months was the independent variable, while children's pivotal behavior at 24 months was the mediator and children's language abilities at 35 was the dependent variable. Children's expressive language at 24 months was controlled for in this model.

## Results

The measurement model was tested first. The results indicated a good model fit, with CFI = 1.000; TLI = 1.001; RMSEA = .000; and  $\chi^2 = 6.211$ ,  $p = .62$ .

Then the structural model was conducted. The results indicated that the pivotal behavior model of developmental learning accounted for relationships among parental sensitivity, children's engagement, and children's language development for this sample of

relatively impoverished families in the United States (see figure 1.). The direct effect of parental sensitivity at 24 months on Adaptive Language Inventory at 35 months was found to be significant. The indirect effect of parental sensitivity at 24 months on adaptive language inventory at 35 months through children's social engagement at 24 months was also found to be significant ( $\beta = .03$ ,  $p < .01$ ). The fit indices suggest a good model fit,  $\chi^2 (17) = 47.383$ ,  $p < .001$ , CFI = .991, TLI = .985, and RMSEA = .042. Parental sensitivity had a direct positive effect on children's later language abilities, as well as an indirect positive effect on children's later language abilities through children's concurrent social engagement when children's concurrent expressive language is controlled for.

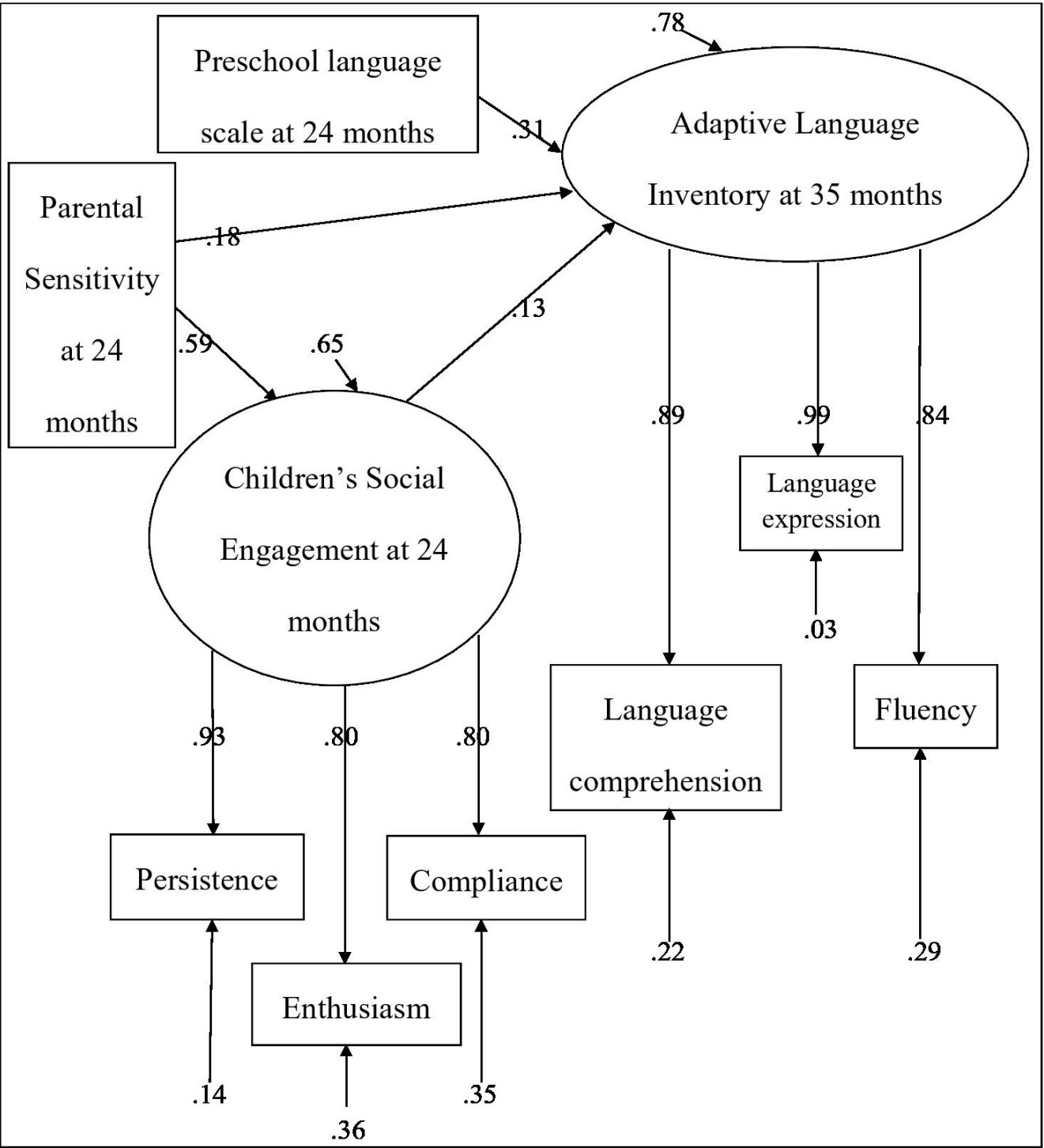


Figure 1. Children's social engagement at 24 months was tested as the mediator of the relationship between parental sensitivity at 24 months and children's Adaptive Language Inventory at 35 months, with preschool language scale at 24 months as the covariate. All path coefficients were significant.

## Conclusions

As we hypothesized, children's pivotal behavior at 24 months was found to partially mediate the relationship between parental sensitivity at 24 months and children's language abilities at 35 months. Results of the present study are consistent with the pivotal behavior model, adding to the literature demonstrating the importance of parental sensitivity and children's pivotal behavior in other populations (Chiu et al., 2017; Mahoney et al., 2007). This study found support for the pivotal behavior model in a population of children from disadvantaged backgrounds. The longitudinal data allowed this model to be tested within an 11-month time span, with language outcomes being measured 11 months later than parental sensitivity and children's social engagement while controlling for children's concurrent expressive communication. The present study found the direct effect of parental sensitivity on development outcomes, while in a previous study (Chiu et al., 2017) the direct effect of parental sensitivity on children's symbolic functioning was not found. Children's language abilities may be

more susceptible to direct parental influence in ways that symbolic abilities are not. The pattern the parent starts and leads the conversation in response to the child's behaviors can be established to ensure the child's language learning opportunities directly from the parent. Parents' sensitivity, on the other hand, may not necessarily directly involve any knowledge or implication for symbolizing meaning/understanding. Parental sensitivity also had an indirect effect on children's language outcomes through pivotal behaviors. When parents were able to appropriately respond to their children, children were more likely to be actively engaged in the dyadic interactions with parents in their daily lives. Active social engagement then played an important role on facilitating children's developmental outcomes. In this context, children's social engagement can be seen as pivotal behaviors that were defined as core behaviors that can affect many other developmental functions (Koegel, Koegel, & Carter, 1999).

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