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Leveraging Healthcare to Promote Responsive Parenting: Impacts of the Video Interaction Project on Parenting Stress

Carolyn Brockmeyer Cates, Adriana Weisleder, Benard P. Dreyer, Samantha Berkule Johnson, Kristina Vlahovicova, Jennifer Ledesma, and Alan L. Mendelsohn

Abstract

We sought to determine impacts of a pediatric primary care intervention, the Video Interaction Project, on 3-year trajectories of parenting stress related to parent-child interactions in low socioeconomic status (SES) families. A randomized controlled trial (RCT) was conducted, with random assignment to one of two interventions (Video Interaction Project [VIP]; Building Blocks [BB]) or control (C). As part of VIP, dyads attended one-on-one sessions with an interventionist who facilitated interactions in play and shared reading through review of videotaped parent-child interactions made on primary care visit days; learning materials and parenting pamphlets were also provided to facilitate parent-child interactions at home. Parenting stress related to parent-child interactions was assessed for VIP and Control groups at 6, 14, 24, and 36 months using the Parent-Child Dysfunctional Interaction subscale of the Parenting Stress Index- Short Form, with 378 dyads (84%) assessed at least once. Group differences emerged at 6 months with VIP associated with lower parenting stress at 3 of 4 ages considered cross-sectionally and an 17.7% reduction in parenting stress overall during the study period based on multi-level modeling. No age by group interaction was observed, indicating persistence of early VIP impacts. Results indicated that VIP, a preventive intervention targeting parent-child interactions, is associated with decreased parenting stress. Results therefore support the expansion of pediatric interventions such as VIP as part of a broad public health strategy to address poverty-related disparities in school-readiness.

Keywords

parenting stress; parent-child interactions; intervention; toxic stress; child development

Corresponding Author: C.B. Cates, Department of Pediatrics, Division of Developmental-Behavioral Pediatrics, NYU School of Medicine and Bellevue Hospital Center, 550 First Avenue; OBV, A529, New York, NY 10016, Carolyn.cates@nyumc.org.

Co-Authors:

A. Weisleder • B.P. Dreyer • S.B. Berkule Johnson • K. Vlahovicova • J. Ledesma • A.L. Mendelsohn New York, NY

Compliance with Ethical Standards

Potential Conflict of Interests to Report

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Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Introduction

Poverty-related disparities in child development and school readiness are evident from the time that children say their first words, during the first half of the child's second year of life, and both persist and worsen over time (Hart & Risley, 1995). Both the magnitude and long-term implications of these disparities have garnered significant attention during the past several years, with a broad national consensus deeming them a critical public health problem (Knudsen, Heckman, Cameron, & Shonkoff, 2006).

The etiology for these disparities experienced by children living in poverty is complex and multi-factorial, with a host of both poverty-related social and economic risk factors affecting the physical and social environment in which they are raised. Of great concern is that parents of children living in poverty often experience greater levels of "toxic stress" (Garner & Shonkoff, 2012) derived from a variety of factors, including lower levels of social support, scarcity of resources, food insecurity, and low education (Knudsen et al., 2006). This high degree of stress experienced by parents often translates into and overlaps with stress specific to the parenting role and the functionality of parent-child interactions, called "parenting stress". Parenting stress has been defined by Deater-Deckard (2004, p. 6) as *"...a set of processes that lead to aversive psychological and physiological reactions arising from attempts to adapt to the demands of parenthood."* This type of stress can be manifest in three broad concerns that parents may have about the parent-child relationship leading to dysfunction in interactions: (1) belief that (s)he as a parent is not capable of fulfilling the parenting role adequately, (2) attribution of an internal negative quality to the child that is believed to set him/her apart from peers, and (3) assessment of his/her interactions with the child as dysfunctional in nature. Parenting stress is distinct from other, more common life stressors, as it specifically threatens a parent's identity or role, with potentially devastating consequences for the parent-child relationship and child development.

Higher levels of parenting stress have been shown to be associated with parent-child interactions that are characterized as having less responsivity, less warmth, and a greater incidence of harsh discipline (Deater-Deckard, 2004). As a result, high levels of parenting stress have also been associated with negative child developmental outcomes such as higher incidence of insecure attachment (Jarvis & Creasey, 1991) as well as lower social competence and more internalizing and externalizing behaviors (Anthony et al., 2005).

In addition to directly impacting parenting and child social-emotional outcomes, high levels of parenting stress have also been hypothesized to indirectly impact child development through its role in minimizing the quantity and quality of cognitively stimulating parent-child interactions (Karrass, VanDeventer, & Braungart-Rieker, 2003). In the context of parenting stress and other poverty-related factors, children living in poverty tend to experience far fewer verbally-rich parent-child interactions in the contexts of play, shared reading, and everyday routines than middle-class peers; these interactions are critical for early child development and school readiness (Landry, Smith, & Swank, 2006). As parenting stress can negatively impact both the cognitively stimulating nature of parent-child interactions as well as the affective components of these interactions, it can be particularly deleterious for child development and school readiness outcomes.

The negative impacts of parenting stress on parent-child interactions and child development have prompted the implementation and study of clinical and community interventions designed to reduce its prevalence (Cohen, Lojkasek, Muir, Muir, & Parker, 2002; Gross, Fogg, & Tucker, 1995; Huebner, 2000; Kaaresen, Rønning, Ulvund, & Dahl, 2006; Telleen, Herzog, & Kilbane, 1989). In general, such interventions have incorporated techniques such as cognitive and behavioral skills training aimed to enhance efficacy regarding parenting as well as promote strategies for coping with stressors specific to conditions pre-specified for enrollment (i.e., parents of low-birth weight infants; parents of children with externalizing behaviors). Studies of such strategies have demonstrated significant reductions (~.5 standard deviation reduction) in parenting stress as a result of intervention participation. There is also evidence that programs designed not directly to reduce parenting stress but rather to increase the occurrence of some specific positive aspects of parent-child interactions, such as teaching parents how to play well with their children, have been met with reductions in this domain (Chau & Landreth, 1997).

Despite the evident success of these interventions in reducing parenting stress, few of the interventions have demonstrated long-term effectiveness (Deater-Deckard, 2004). It has been suggested that for interventions to spur long-term change, they should address the needs and concerns of the family unit and also involve an ongoing relationship between the family and the intervention team, which few of these parenting interventions have been able to do given high costs (Deater-Deckard, 2004). It is also important to note that few of these parenting interventions to date have worked with parents of infants, at an age where parent-child interactions are critical for setting the foundations for further development (Knudsen et al., 2006). While a small number of programs have intervened with expectant mothers (Kaaresen et al., 2006) or parents of infants (Armstrong, Fraser, Dadds, & Morris, 1999) the bulk of programs designed to reduce parenting stress have targeted parents of toddlers, preschoolers, or school age children (Gross et al., 1995; Huebner, 2000; Tucker, Gross, Fogg, Delaney, & Lapporte, 1998). Additionally, all of the known interventions to reduce parenting stress to date have been targeted- working with smaller groups of parents who have been deemed vulnerable due to meeting a very specific risk profile. More work is needed to identify programs that can prevent the parenting stress for the larger group of low-SES parents, given its potential to impede quality parent-child interactions early in life that impact later trajectories of child development.

The pediatric primary health care setting has been emphasized as a vital platform for preventive interventions aimed to foster parent-child interactions and school readiness and thus may provide a unique opportunity to address this issue. This setting offers the possibility of working with families population-wide, with early onset, and at low-cost for reasons enumerated by Mendelsohn and colleagues (Mendelsohn et al., 2011a, 2011b), including: (1) the frequency and near universality of visits; (2) the close relationship between parents and primary care providers; (3) the ability to utilize existing health care infrastructure; and (4) the lack of need for additional travel. Some of the first evidence documenting the potential of impacting parenting behavior and child development in the context of this setting comes from studies demonstrating success of Reach Out and Read (ROR), a program in which health care professionals provide families with children's books, model shared reading activities, and provide guidance about the benefits of shared reading at

well child visits beginning at age 6 months. ROR has been met with consistent impacts on shared reading and child language development, despite its low intensity and cost (Klass, Dreyer, & Mendelsohn, 2009).

Further evidence of successful parenting programs aimed to promote parent-child interactions and school readiness is drawn from studies by Mendelsohn and colleagues. In a randomized controlled trial (RCT), a parenting intervention designed to further the impacts of ROR by being delivered starting at birth, providing toys to families in addition to books, and involving additional strategies for promoting interactions, called the Video Interaction Project (VIP), was found to promote parenting and child development through child age 33 months and into first grade (Mendelsohn et al., 2005, 2007), and suggested that parenting stress might also be reduced (Mendelsohn et al., 2007). The core components of VIP are that it is (1) relationship-based, involving face-to-face interaction with a child development specialist at the time of well-child visits; and (2) utilizes videotape review of parent-child interactions to promote self-reflection regarding parenting while allowing for the reinforcement of positive parenting behaviors.

These earlier VIP findings provide some evidence that this relationship-based primary care intervention aimed to promote parent-child interactions and prevent poverty-related disparities in child development and school readiness can be effective in reducing parenting stress. However, many questions remain about the impact of VIP on this important outcome. For example, parenting stress was measured at one time point, leaving it difficult to discern whether VIP's impacts on parenting stress can be experienced long-term. Also, the sample studied in this RCT was limited to Latino dyads with mothers who had limited education. Therefore, it is not known whether VIP's impacts on parenting stress would extend to a broader population of low-SES mothers. Finally, it is also unclear as to whether factors such as low maternal literacy/education or social risk, each of which is common in low income populations and associated with both parenting and toxic stress (Garner et al., 2012; Knudsen, Heckman, Cameron, & Shonkoff, 2006), would moderate the impact of VIP on parenting stress.

A larger, ongoing RCT (part of the Bellevue Project for Early Language, Literacy and Education Success [BELLE]) comparing VIP to a control group and to a lower intensity parenting intervention called Building Blocks (BB) - and including a less homogeneous sample with regard to maternal education and social risk - provides an opportunity to address these questions. As part of this RCT, VIP has again been demonstrated to enhance parenting behaviors at child age 6 months (Mendelsohn et al., 2011b); however, impacts on parenting stress have not yet been explored. Therefore, the main purpose of the current investigation was to determine whether participation in VIP is associated with lower levels of parenting stress regarding parent-child interactions in this larger, more heterogeneous sample of low-SES families. The current study also employed a longitudinal design to determine whether reductions in stress associated with VIP are long-lasting. Finally, this study sought to examine whether maternal literacy/education or presence of enhanced social risk moderated VIP impacts on parenting stress.

It was hypothesized that VIP, due to the supportive relationship fostered between the child development specialist and parents and its innovative strategies used to empower parents to play an active role in their children's development, would be associated with reductions in parenting stress, and that these impacts would be experienced long-term. Given previous findings of greater impacts for VIP among mothers without very low literacy (Mendelsohn et al., 2011b), it was hypothesized that mothers with greater literacy would have greater reductions in parenting stress. Given no prior evidence of social risk as a moderator of VIP impact, analyses of social risk as a potential moderator were exploratory.

Method

Participants

This study was designed as a single-blind, three-way RCT, with parent-child dyads assigned to one of two intervention strategies (VIP and BB) or to a control group receiving ROR only (as standard of care). Enrollment was performed in the postpartum ward of an inner-city public hospital (BHC) serving low SES, primarily immigrant families, between November, 2005 and October, 2008. Consecutive mother-newborn dyads planning to receive pediatric primary care at our institution and meeting eligibility criteria designed to provide homogeneity across groups with regard to medical status, enhance feasibility, and reduce likelihood of receipt of prior/concurrent comparable services. Medical criteria were: no significant medical complications (requiring extended stay or transfer to Level II/III nursery, or with potential adverse developmental consequences); full term gestation 37 weeks, birth weight 2500gm, and singleton gestation. Feasibility criteria were: mother primary caregiver, mother able to maintain contact (working phone, intention to maintain geographic proximity), and mother's primary language English or Spanish. Criteria for no prior or concurrent services were: mother 18 yrs (as adolescent mothers routinely receive parenting services at our institution); no participation in a prior study of VIP or BB interventions. Of 905 eligible dyads offered enrollment, 675 (74.6%) were enrolled and randomized to VIP (n=225), BB (n=225), or to the Control group (n=225). All families were allocated to group as randomized and assessed based on group assignment; however, 16 of 225 allocated to VIP attended primary care elsewhere and did not participate in any VIP visits prior to 36 months. Impacts of BB were not considered in this analysis due to funding issues that resulted in limited follow-up of BB families beyond 14 months.

378 of 450 families (84%) were assessed for parenting stress one or more times over the course of four time points, including 190/225 VIP families (84.4%) and 188/225 controls (83.6%), $p=.90$. A total of 1,065 observations of parenting stress were recorded. Mean child age in months at each of the four assessments was: 6.9 (1.3) at 6 months, 15.8 (1.7) at 14 months, 25.8 (2.5) at 24 months, and 38.9 (3.5) at 36 months. Table 1 shows characteristics by group for all participants enrolled at baseline and for those participants with data collected during at least one assessment point. Groups did not differ significantly for any baseline socio-demographic characteristic or for word reading at the 6 month assessment. Dyads assessed during at least one assessment point did not significantly differ from those who were not assessed for maternal age, literacy, education, marital status, Hollingshead SES, presence of one or more enhanced social risks, child birth order, or child gender.

However, assessed mothers were more likely to speak Spanish as primary language ($p < .001$), to self-identify as Latina ($p < .05$), and to be immigrants to the US ($p < .001$). Of 190 VIP families assessed at one or more assessment points, 185 attended at least 1 VIP visit; 118 of these families (63.8%) attended 8 or more of 15 possible visits. There were no adverse events related to participation.

Procedure

IRB approval was obtained from New York University School of Medicine, Bellevue Hospital Center (BHC) and the New York City Health and Hospitals Corporation. Parents provided informed consent prior to participation. The trial was registered at clinicaltrials.gov (NCT00212576). Following enrollment, dyads were randomized to VIP, BB or control using a random number generated by the project director using Microsoft Excel 2003. Randomization was stratified in blocks of nine to guarantee equal distribution across groups. Randomization group assignments were concealed from research assistants performing enrollment. Following enrollment, randomization group assignments were provided to study participants. Families in all groups received the same well child care, delivered by the same group of primary care pediatricians; in fact, we made an effort to reach out to families in all randomization groups to facilitate making their well child care appointments. Beginning at 6 months of age, all families received ROR as standard of care. VIP and Control, the two groups analyzed in this study, are described below:

Video Interaction Project—VIP, which has been previously described (Mendelsohn et al., 2005, 2011b; Valdez et al., 2005), takes place from birth to three years, with fifteen 30–45 minute sessions taking place primarily on the day of primary care visits. Sessions are facilitated by an interventionist, who meets one on one with families, providing an individualized, relationship-based intervention. In favor of building a strong relationship with families, the same interventionist meets with each family from session to session to the extent possible. During sessions, the interventionist delivers a curriculum focused on supporting responsive, verbal interactions in the context of pretend play, shared reading and daily routines, to enhance child development and school readiness. The same interventionists conducted VIP with each of the families assigned to VIP; these Interventionists were trained and supervised by one of two developmental psychologists who were both also co-investigators of this study. VIP utilizes the following strategies:

- a. Videotaping of mother-child interaction: A 5–10 minute videotape or DVD is created and reviewed of each mother-child dyad engaging in activities suggested and modeled by the interventionist using a provided developmentally-appropriate learning material. The mother and interventionist then watch the tape/DVD together, with the interventionist making observations about the mother's interactions with her child. The interventionist reinforces positive interactions (e.g., mother responding to the child's vocalizations, engaging the child in back and forth conversation as the child develops language, recognizing infant non-verbal cues signifying bids for communication vs. over-stimulation) and provides suggestions regarding opportunities for interaction. A copy of the tape/DVD is given to the

parent to take home to support the implementation of activities in the home and shared with other family members.

- b. Provision of learning materials: Developmentally appropriate, stimulating learning materials are given to families at each visit to take home. Learning materials were selected to promote cognitive stimulation of the child, verbal engagement and emergent literacy
- c. Pamphlets: Messages are reinforced using written, visit-specific pamphlets which the interventionist reviews with each mother. Each pamphlet includes suggestions for interacting with the child through play, shared reading and daily routines. Pamphlets were developed in English and Spanish, and written at a 4th to 5th grade reading level using plain language principles. The interventionist encourages the parent to show the pamphlet to the pediatric provider who further reinforces messages.

Control—As described above, control families received all standard pediatric care, including all routine anticipatory guidance and developmental surveillance.

Measures

Assessments were performed by bilingual research assistants masked to group assignment. Parenting stress about the parent-child relationship was assessed at four timepoints, when children were 6, 14, 24, and 36 months of age using the Parent-Child Dysfunctional Interaction (P-CDI) subscale of the Parenting Stress Index- Short Form (PSI-SF), a widely used measure that has been shown to be reliable and valid for use with diverse populations (Abidin, 1997). Additionally, sociodemographic information, and other data characterizing the sample, was collected via parent interview, as described elsewhere (Mendelsohn et al., 2011a, 2011b), at the time of enrollment in the study.

Parent-Child Dysfunctional Interaction (P-CDI) subscale—The P-CDI subscale consists of 12 items, each scored on a scale of 1 to 5, that measure parent's perceptions of dysfunction in their relationship with their child, including: (1) their own inadequacy as a parent (e.g., "I feel that I am not very good at being a parent/a person who has some trouble with being a parent/an average parent/a better than average parent/a very good parent"); (2) inadequacies associated with their child in relation to peers (e.g., "My child does not seem to smile as much as most children."); and (3) dysfunction at the level of parent-child dyadic interactions (e.g., "Most times I feel that my child does not like me and does not want to be close to me"). Total P-CDI scale scores range from 12–60, with higher scores reflecting a greater degree of parenting stress relating to the parent-child dysfunctional interactions.

Sociodemographic characteristics—The following information about parents was collected via interview at enrollment: mother's age, country of origin, education level, primary language spoken, and marital status, and family Hollingshead Four Factor Socioeconomic Status (SES) based on parental education and occupation. In addition, at the 6 month assessment, we assessed maternal literacy in the mother's preferred language using the Woodcock-Johnson III/Bateria III Woodcock-Muñoz Tests of Achievement, Letter-Word

Identification Test. Mothers were considered to be at enhanced social risk if they had one or more of: homelessness, being a victim of violence, having involvement with child protective services, financial difficulties, food insecurity, smoking or alcohol use during pregnancy, or having a history of prior mental illness including depression. For the child, we obtained information about gender and birth order.

Data Analyses

225 families were enrolled per group to provide >80% power to find .67 SD effects for VIP compared to control, assuming 33% attrition by age 3 years. Statistical analyses were performed using Stata SE 12 (StataCorp., College Station, TX). All statistical analyses comparing VIP to Control for parenting stress over time were performed based on intention to treat. We performed comparisons of group means at each time point using t-tests; effect sizes were calculated using Cohen's *d*. We also performed comparisons of trajectories of parenting stress over time using multilevel modeling with age (both linear and quadratic), group, and group $\times$ age included as predictors of mean percentile P-CDI scores. These models were also used to test for moderation of maternal literacy/education (9th grade or higher literacy; education used as proxy for 79 cases missing literacy (Mendelsohn et al., 2011a) and social risk. For purposes of analyses, mean percentile P-CDI scores were log transformed due to non-normal (Kolmogorov-Smirnov $Z=3.42$, $p<.001$), positively skewed distribution (skewness=1.54, $SE=0.2$).

Results

Table 2 shows parenting stress as measured by the P-CDI subscale of the PSI-SF for VIP and Control families at each of the four time points. VIP families had significantly lower parenting stress than Controls at child age 6, 24, and 36 months, and there was a trend toward reduced parenting stress for VIP families at child age 14 months. The effect size (ES) for these group differences in parenting stress was Cohen's $d=.26$ at 6 months, .19 at 14 months, .26 at 24 months, and .24 at 36 months.

Table 3 and Figure 1 show the trajectories of VIP impacts on parenting stress as measured by the P-CDI. Results of multilevel modeling indicated a significant main effect of age for both VIP and control groups, with parenting stress increasing from child age 6 to 36 months, $z = 4.15$, $p<.001$. Results also indicated that the rate of increase in parenting stress decreased over time, $z = -2.79$, $p<.01$ for the quadratic term, with a more marked increase in parenting stress experienced by both VIP and Control mothers between child ages 6 and 24 months, but becoming fairly stable beyond 24 months.

Importantly, results yielded a significant difference between intervention groups, indicating that VIP mothers had lower parenting stress than control mothers beginning at child age 6 and continuing through 36 months, $z = -2.28$, $p<.05$. The coefficient associated with this effect was $-.195$, indicating that the parental stress experienced by VIP mothers over the four timepoints was on average 17.7% lower than the parental stress experienced by control mothers. However, there was no significant interaction found between group and age (either linear or quadratic), suggesting that the rate of change in parenting stress over time was

similar for both VIP and Control groups, after the initial reduction experienced by VIP mothers by 6 months of age.

Further analyses were conducted to assess whether maternal literacy (literacy less than 9th grade vs. literacy 9th grade or higher) or level of social risk (average vs. enhanced social risk) moderated positive impacts of VIP on parenting stress, by adding an interaction term to the multilevel models. Neither the interaction term between VIP participation and literacy nor between VIP participation and social risk was significant ($p=.11$ for literacy interaction; $p=.51$ for social risk interaction), suggesting that associations between participation in VIP and parenting stress did not vary depending on the levels of these characteristics.

Discussion

The main goal of this study was to investigate whether VIP, a parenting intervention delivered in the pediatric primary care setting, is effective in reducing parenting stress for parents from low-SES families. High levels of parenting stress can critically affect parent-child interactions both by leading to harsh parenting and by reducing the level of responsivity to children in everyday interactions, with implications for the child's development and later academic success.

Consistent with our first hypothesis, results indicated that participation in VIP was associated with a substantial reduction in parenting stress related to parent-child interactions beginning in infancy and continuing through child age 36 months. This finding replicates the finding of Mendelsohn et al. (2007) which showed that VIP was effective in reducing parenting stress for a smaller sample of low-SES Latina mothers with limited education. It also extends this prior finding by showing that this parenting intervention is effective in reducing parenting for a larger sample from a broader population in terms of level of education, ethnicity, and history of social risk.

The results of the current study demonstrating VIP impacts on parenting stress also support and add significantly to the literature on interventions to reduce parenting stress. Like studies of other parenting stress interventions, this study demonstrates that a relationship-based intervention aimed to empower parents in their interactions with their children is effective in reducing the level of stress incurred related to these interactions (Gross et al., 1995; Kaarensen et al., 2006; Telleen et al., 1989). However, unlike many other interventions to reduce parenting stress, VIP does not directly provide therapy nor directly teach parents coping mechanisms for dealing with stress. Rather, the techniques used in VIP to foster responsive parent-child interactions more generally (e.g., heighten parent's sensitivity to cues given by their children, promote reflection regarding parenting, encourage verbal responsivity) were met with reductions in parenting stress related to the parent-child relationship. Findings therefore support conclusions made by Chau and Landreth (1997) that the promotion of positive parenting practices is an effective strategy for intervening to reduce parenting stress.

The current study differed from many prior studies of parenting stress interventions in that rather than targeting a parenting group vulnerable to a particular stressor such as stress

related to giving birth to a preterm infant (Kaaresen et al., 2006), it sought to prevent parenting stress for a broader group of low-SES parents through an innovative use of the pediatric primary care platform. VIP is already a relatively low-cost intervention program, currently estimated to cost between \$150–\$200/child/year at scale, due in part to the fact that the interventionists typically do not have advanced degrees. However, the successful execution of this preventive parenting program within the primary care setting is of critical importance for its scalability, as this setting offers a remarkable opportunity for population-wide application with early onset and relative low cost; thus providing vast opportunity for impacting trajectories of child development particularly for low-income children who often experience disparities in development prior to school entry.

The second goal of the current study was to assess parenting stress longitudinally to determine whether impacts of VIP were experienced long-term. Analyses of the trajectories of parenting stress experienced by both VIP and Control mothers indicated that VIP participation was associated with reductions in parenting stress on average across all four time points, with intervention impacts experienced as early as child age 6 months and persisting throughout child age 36 months. This finding is significant as few parenting interventions aiming to reduce parenting stress have been able to show long-term impacts in this domain. VIP's robust impacts on parenting stress are likely due to a large extent to the social support provided to the parent via the relationship formed with the VIP interventionist. There is a large body of literature underscoring the significance of the relationships built between providers and intervention recipients for enhancing engagement, adherence to treatment, and adoption of intervention key messages (Luborsky, McLellan, George, O'Brien, & Auerbach, 1985). Indeed, a review of existing parenting stress interventions reveals that those with the greatest impacts involve an ongoing relationship with parents and service providers (Deater-Deckard, 2004). The current study provides evidence in support of these findings.

It is also of significance that VIP's impacts on parenting stress were found to be experienced by mothers as early as child age 6 months. High quality dyadic caregiver-child interactions beginning in the very first months of life are important for healthy child development outcomes. For instance, research has demonstrated maternal responsivity at age 4 months to be predictive of attachment security (Bigelow et al., 2010). Similarly, early cognitive stimulation by age 6 months has been found to be predictive of early communication and later child language outcomes (Cates et al., 2012). Impacts of these early interactions on infant and toddler development are also likely met with cascading impacts on further development across domains. Parenting stress experienced during early infancy may alter the quality of these early interactions and therefore serve as an obstacle to healthy child development outcomes. Therefore, findings from this study suggest that it is both important and effective to intervene with parents at risk of enhanced parenting stress prior to 6 months of age.

Interestingly, analyses of parenting stress trajectories indicated that for both VIP and Control groups, parenting stress increased between child age 6 through 36 months, although to a lesser degree beyond 24 months of age. The reason for this increasing rate of parenting stress for mothers in both the intervention and control groups cannot be determined from

present analyses. However, despite evidence that parenting stress remains relatively stable during the preschool years (Crnic, Gaze, & Hoffman, 2005), there is also some evidence that parenting stress rises throughout the earlier years, specifically for mothers with lower income-to-needs ratios (Mulsow, Caldera, Pursley, Reifman, & Huston, 2002). This finding also may be interpreted in light of Crnic and Booth's (1991) finding that parents with children between the ages of 9 months and 3 years reported experiencing an increasing number of "daily hassles" corresponding to increased age of the children (e.g., situations arising from increased autonomy of children such as resistance to bedtime, or whining/nagging). Such daily hassles have been found to be predictive of mothers' satisfaction with their parenting role, mothers' psychological well-being, family functioning, and various aspects of the mother-child relationship; therefore increasing parenting stress over this time period may be attributed to increases in daily hassles as children transition from infancy into early childhood. More research is needed to further explore the occurrence and impetus of rising parenting stress for low-income mothers from infancy through age 3.

The third goal of the current study was to determine whether the impact of VIP on parenting stress was moderated by maternal literacy or presence of enhanced social risk, two factors that have been shown to be associated with both parenting and with experiences of toxic stress. Findings indicated that neither maternal literacy/education nor presence of enhanced social risk affected the impact of VIP on parenting stress. The finding that maternal literacy did not moderate VIP impacts ran counter to our hypothesis, which was based on findings from previous VIP research indicating moderation of outcomes related to cognitive stimulation and child development. Taken together with these prior VIP findings, results from the current study suggest that maternal literacy may temper the impact of this parenting intervention on cognitive aspects of parenting (such as engaging children in teaching, reading, playing, and providing age-appropriate toys in the home) but not on affective components of parenting (such as parenting stress). It is possible that all intervention parents, independent of literacy experienced lowered parenting stress due to the social support provided by the interventionist.

There were three main limitations to this study. First, resources limited the number of assessments performed at 14 months. Therefore, it is likely that results are less robust at 14 months due to limited power, as evidenced by the trends rather than significance of group differences. Despite some loss of power at this assessment point, the threat to validity may have been limited, as assessed participants were equivalent across groups for all measures. Second, results at each assessment point were based on parent report, which can be subject to biases. Third, social support provided by the interventionist was not measured directly, making it difficult to discern the degree to which this aspect of the studied intervention played a role in the reduction of parenting stress. Additionally, since in this study we made a concerted effort to enhance attendance to well child visits for both intervention and control families, we were not able to assess the degree to which participation in the intervention (due to a supportive relationship with the interventionist) may have impacted adherence to well child care; this would be important to understand in the future.

In conclusion, VIP, a pediatric primary care parenting intervention for low-income families, resulted in early and long lasting reductions in parenting stress, a critical factor related to the

affective quality and richness of parent-child interactions. Dissemination of VIP in pediatric primary care may thus play an important role in bolstering the early experiences of low-income children who may be at risk for disparities in child development and school readiness.

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References

- Abidin, RR. The Parenting Stress Index: A measure of the parent-child system. In: Zalaquett, CP.; Woods, RJ., editors. *Evaluating Stress*. Lathan, MD: University Press of America; 1997.
- Anthony LG, Anthony BJ, Glanville DN, Naiman DQ, Waanders C, Shaffer S. The relationships between parenting stress, parenting behaviour and preschoolers' social competence and behaviour problems in the classroom. *Infant and Child Development*. 2005; 14:133–154.
- Armstrong KL, Fraser JA, Dadds MR, Morris J. A randomized, controlled trial of nurse home visiting to vulnerable families with newborns. *Journal of Paediatrics and Child Health*. 1999; 35(3):237–44. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/10404442>. [PubMed: 10404442]
- Bigelow AE, MacLean K, Proctor J, Myatt T, Gillis R, Power M. Maternal sensitivity throughout infancy: continuity and relation to attachment security. *Infant behavior & development*. 2010; 33(1): 50–60. [PubMed: 20004022]
- Cates CB, Dreyer BP, Berkule SB, White LJ, Arevalo JA, Mendelsohn AL. Infant communication and subsequent language development in children from low-income families: The role of early cognitive stimulation. *Journal of Developmental & Behavioral Pediatrics*. 2012; 33(7):577–85. [PubMed: 22947884]
- Chau IY, Landreth GL. Filial therapy with Chinese parents: Effects on parental empathic interactions, parental acceptance of child and parental stress. *International Journal of Play Therapy*. 1997; 6(2): 75–92.
- Cohen NJ, Lojkasek M, Muir E, Muir R, Parker CJ. Six-month follow-up of two mother-infant psychotherapies: Convergence of therapeutic outcomes. *Infant Mental Health Journal*. 2002; 23(4): 361–380.
- Crnic KA, Booth CL. Mothers' and fathers' perceptions of daily hassles of parenting across early childhood. *Journal of Marriage and Family*. 1991; 53(4):1042–1050.
- Crnic KA, Gaze C, Hoffman C. Cumulative parenting stress across the preschool period: Relations to maternal parenting and child behaviour at age 5. *Infant and Child Development*. 2005; 14:117–132.
- Deater-Deckard, K. *Parenting Stress*. New Haven and London: Yale University Press; 2004.
- Garner AS, Shonkoff JP. Early childhood adversity, toxic stress, and the role of the pediatrician: Translating developmental science into lifelong health. *Pediatrics*. 2012; 129:e224–e231. [PubMed: 22201148]
- Gross D, Fogg L, Tucker S. The efficacy of parent training for promoting positive parent-toddler relationships. *Research in Nursing & Health*. 1995; 18(6):489–99. [PubMed: 7480850]
- Hart, B.; Risley, TR. *Meaningful differences in the everyday experience of young American children*. Paul H Brookes Publishing; 1995.

- Huebner CE. Promoting toddlers' language development through community-based intervention. *Journal of Applied Developmental Psychology*. 2000; 21(5):513–535.
- Jarvis PA, Creasey GL. Parental stress, coping, and attachment in families with an 18-month-old infant. *Infant Behavior and Development*. 1991; 14(4):383–395.
- Kaarensen PI, Rønning JA, Ulvund SE, Dahl LB. A randomized, controlled trial of the effectiveness of an early-intervention program in reducing parenting stress after preterm birth. *Pediatrics*. 2006; 118(1):e9–e19. [PubMed: 16818541]
- Karrass J, VanDeventer MC, Braungart-Rieker JM. Predicting shared parent-child book reading in infancy. *Journal of Family Psychology*. 2003; 17(1):134–146. [PubMed: 12666469]
- Klass P, Dreyer BP, Mendelsohn AL. Reach Out and Read: Literacy promotion in pediatric primary care. *Advances in Pediatrics*. 2009; 56:11–27. [PubMed: 19968940]
- Knudsen EI, Heckman JJ, Cameron JL, Shonkoff JP. Economic, neurobiological, and behavioral perspectives on building America's future workforce. *PNAS*. 2006; 103(27):10155–10162. [PubMed: 16801553]
- Landry SH, Smith KE, Swank PR. Responsive parenting: Establishing early foundations for social, communication, and independent problem-solving skills. *Developmental Psychology*. 2006; 42(4): 627–42. [PubMed: 16802896]
- Luborsky L, McLellan AT, George E, O'Brien CP, Auerbach A. Therapist success and its determinants. *Archives of General Psychiatry*. 1985; 42:602–611. [PubMed: 4004503]
- Mendelsohn AL, Dreyer BP, Brockmeyer CA, Berkule-Silberman SB, Huberman HS, Tomopoulos S. Randomized controlled trial of primary care pediatric parenting programs: Effect on reduced media exposure in infants, mediated through enhanced parent-child interaction. *Archives of Pediatrics & Adolescent Medicine*. 2011a; 165(1):42–8. [PubMed: 21199979]
- Mendelsohn AL, Dreyer BP, Flynn V, Tomopoulos S, Rovira I, Tineo W, Nixon AF. Use of videotaped interactions during pediatric well-child care to promote child development: A randomized, controlled trial. *Journal of Developmental & Behavioral Pediatrics*. 2005; 26(1):34–41. [PubMed: 15718881]
- Mendelsohn AL, Huberman HS, Berkule SB, Brockmeyer CA, Morrow LM, Dreyer BP. Primary care strategies for promoting parent-child interactions and school readiness in at-risk families: The Bellevue Project for Early Language, Literacy, and Education Success. *Archives of Pediatrics & Adolescent Medicine*. 2011b; 165(1):33–41. [PubMed: 21199978]
- Mendelsohn AL, Valdez PT, Flynn V, Foley GM, Berkule SB, Tomopoulos S, Dreyer BP. Use of videotaped interactions during pediatric well-child care: Impact at 33 months on parenting and on child development. *Journal of Developmental & Behavioral Pediatrics*. 2007; 28(3):206–212. [PubMed: 17565287]
- Mulsow M, Caldera YM, Pursley M, Reifman A, Huston AC. Multilevel factors influencing maternal stress during the first three years. *Journal of Marriage and Family*. 2002; 64(4):944–956.
- Telleen S, Herzog A, Kilbane TL. Impact of a family support program on mother's social support and parenting stress. *American Journal of Orthopsychiatry*. 1989; 59(3):410–419. [PubMed: 2764075]
- Tucker S, Gross D, Fogg L, Delaney K, Lapporte R. The long-term efficacy of a behavioral parent training intervention for families with 2-year-olds. *Research in Nursing & Health*. 1998; 21(3): 199–210. [PubMed: 9609505]
- Valdez P, Dreyer B, Flynn V, Tomopoulos S, Tineo N, Rovira I, Mendelsohn A. Use of videotaped interactions during pediatric well-child care to promote child development: An RCT. *Journal of Developmental & Behavioral Pediatrics*. 2005; 26(6):461.

Figure 1.
Trajectories of parenting stress for VIP and Control mothers from child age 6 to 36 months.

Table 1

Maternal and Child Characteristics at Enrollment and Assessment Points

	Dyads at Enrollment		Dyads with 1 Evaluation of PCD-I from 6–36 months	
	VIP N=225	C N=225	VIP N=190	C N=188
Mother				
Age in Years	27.16 (5.10)	27.64 (6.43)	27.32 (5.15)	27.83 (6.53)
Latina	92.4%	88.9%	93.2%	91.0%
Immigrant	87.6%	82.7%	91.1%	85.1%
Spanish Primary Language	78.2%	75.6%	81.6%	79.8%
Married/With Partner	83.1%	83.6%	84.2%	84.0
Maternal Education: Mean (SD) Years Schooling	10.00 (3.72)	10.46 (3.55)	9.88 (3.71)	10.14 (3.54)
Maternal Literacy	12.38 (4.75)	12.58 (4.63)	12.38 (4.75)	12.58 (4.63)
Low SES	90.5%	90.9%	92.6%	91.5%
Social Risks	20.3%	20.8%	19.3%	19.5%
Child				
Female Gender	52.9%	48.9%	54.7%	48.9%
Firstborn	42.2%	39.1%	42.6%	38.3%

Table 2

Mean (SD) PCD-I Percentile Scores by Age

Age (Months)	VIP		C		VIP		C		<i>p</i> [*]	ES [*]
	n	n	n	n	M (SD)	M (SD)	M (SD)	M (SD)		
6	126	134	22.86 (23.05)	27.99 (23.59)	.038	.26				
14	109	109	28.74 (24.66)	33.39 (26.03)	.156	.19				
24	154	144	33.84 (27.92)	37.38 (24.72)	.023	.26				
36	149	140	35.63 (27.93)	41.45 (26.89)	.042	.24				

* *p*-values and Effect Sizes were calculated using log-transformed PCD-I Percentiles

Table 3

MLM Predictors of Log PCD-I Percentile Score

	Coefficients	SE	z	p
VIP	-.195	.09	-2.28	.02
Age (linear)	.039	.01	4.15	<.001
Age (quadratic)	-.001	.000	-2.79	.005