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Use of Videotaped Interactions During Pediatric Well-Child Care: Impact at 33 Months on Parenting and on Child Development

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Abstract

Objective—We performed a randomized, controlled trial to assess the impact of the Video Interaction Project (VIP), a program based in pediatric primary care in which videotaped interactions are used by child development specialists to promote early child development.

Method—Ninety-nine Latino children (52 VIP, 47 controls) at risk of developmental delay based on poverty and low maternal education were assessed at age 33 months. VIP was associated with improved parenting practices including increased teaching behaviors.

Results—VIP was associated with lower levels of parenting stress. VIP children were more likely to have normal cognitive development and less likely to have developmental delays.

Conclusion—This study provides evidence that a pediatric primary care–based intervention program can have an impact on the developmental trajectories of at-risk young preschool children.

Index terms

pediatric prevention; developmental services; parenting

Over the past two decades, a consensus has developed that pediatric primary care represents an important and underused opportunity for preventive intervention.[1–4] One reason is that pediatric well-child visits happen frequently, with 10 to 12 visits in the first 3 years. In addition, participation in well-child care happens almost universally because all children require vaccinations beginning in early infancy. As such, opportunities are present for low-cost interventions that address early child development and the parent-child relationship.

Recent studies have demonstrated that interventions based in pediatric well-child care can be effective in promoting parent-child relationships and early child development. One program that has been widely disseminated is Reach Out and Read, which facilitates early language and literacy development through the promotion of parent-child reading aloud, which has been shown to have an impact on parent-child reading activities and on children's language development.[5–10] Another approach (Healthy Steps) integrates child development specialists

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into pediatric care and has been shown to lead to increased parental sensitivity to children's signals and decreased use of harsh or physical approaches to disciplining.[3,11]

A program called the Video Interaction Project (VIP) is under study by the Department of Pediatrics at New York University School of Medicine and Bellevue Hospital Center. The VIP approach involves the use of videotaped interactions by child development specialists while parents wait to see their child's pediatric provider for well-child visits, and it applies the work of Bernstein and McDonough,[12] Erickson et al,[13] McDonoough,[14] and Kubicek[15] to the pediatric primary care setting. The goal of VIP is to support the parent-child relationship and thereby enhance cognitive, language, and social-emotional development. The VIP approach is relationship based: a single child development specialist builds a caring relationship with each family that forms the foundation for the intervention. VIP sessions begin at the first visit to the pediatrician when the infant is approximately 2 weeks old and continue regularly until age 3 years. Each 30- to 45-minute session includes (1) discussion of parental expectations and concerns about the child as well as the child's present and anticipated developmental progress, (2) receipt of a developmentally appropriate learning material (e.g., toy or book) that promotes parent-child engagement, (3) a 5- to 10-minute videotaped recording of the parent and child engaging in activities of the parent's choice, which is then rewound for the parent and the child development specialist to view together. As the tape is watched, the parent and the specialist each make observations based on the videotape, with the specialist highlighting the parent's strengths and suggesting activities to practice at home. Because VIP is integrated into pediatric primary care and does not require home visits, its cost is relatively low (approximately $240 per child per year).

In order to assess the impact of the program, VIP was implemented as a randomized, controlled trial. We enrolled a birth cohort of economically disadvantaged Latino children at high risk of developmental delay based on low maternal education. We previously reported on the developmental outcomes of these children when they reached age 21 months, including improved cognitive and language development and a trend toward decreased need for early intervention (EI).[16] In this article, we report on the impact of VIP on the cohort at age 33 months, including parenting and child development outcomes.

METHODS

Study Design

The study was conducted as a single-blind, randomized, controlled trial. Institutional review board approval was obtained from New York University School of Medicine, Bellevue Hospital Center, and the New York City Health and Hospitals Corporation. Parents provided informed consent before participation in the study.

Study Sample

The study sample has been previously described.[16] In brief, enrollment was performed on the postpartum floor of an inner-city public hospital between July 1999 and January 2002. Latino mother-newborn dyads were considered eligible for the study if the mother had low education (defined as not having graduated high school). Exclusion criteria included medical complications (e.g., prematurity or postnatal medical complications), psycho-social issues (e.g., adolescent mother, maternal history of substance abuse), or follow-up care planned outside our institution. Following enrollment, dyads were randomized to the Video Interaction Project (VIP) intervention or a control group based on the toss of a coin. Intervention and control families received the same well-child care by the same primary care pediatricians, including the same anticipatory guidance and periodic routine screening according to the guidelines of the American Academy of Pediatrics.[17]

Measures

Assessments of parenting and child developmental-behavioral outcomes were performed when the child was 33 months. Bilingual research assistants masked to group assignment performed these assessments.

Parenting was assessed in two domains: parenting practices important for child development (provision of toys, reading, teaching, and verbal responsivity), and attitudes and perceptions related to parent-child interaction (parenting stress and maternal depressive symptoms). Parenting practices were assessed using the (StimQ-Toddler [StimQ-T]).[18] The StimQ-T assesses parenting practices related to child development. It is based on a structured interview with the child's caregiver and is validated for use in low socioeconomic status populations in English and Spanish.[18] It has good internal consistency (Cronbach's alpha = .88), test-retest reliability (intraclass correlation coefficient of 0.93), and criterion-related validity (correlation with Home Observation for Measurement of the Environment [HOME] Inventory[19]: $r = .55$, $p < .001$) and is gender neutral. It also has good concurrent validity with developmental measures and is correlated with Bayley Scales of Infant Development Mental Development Index (MDI)[20] (semi-partial regression (sr) = 0.45, $p < .001$[18]) and One Word Picture Vocabulary Tests[21] (Receptive: sr = 0.38, $p = .01$; Expressive: sr = 0.33, $p = .03$)[22] It has been used in several recent studies of early child development performed with urban economically disadvantaged populations.[10,23,24] The StimQ-T consists of four subscales, which are summed together for a total score (range, 0–39). Availability of Learning Materials (ALM) assesses learning materials such as toys provided by the caregiver in the home (range, 0–7). Reading Activities (READ) assesses number and diversity of books that are read to the child as well as frequency of reading activities (range, 0–18). The Parental Involvement in Developmental Advancement (PIDA) assesses caregiver teaching and play activities (e.g., teaching letters, words, and colors), teaching the child to play with toys (e.g., stacking blocks, pressing buttons), and playing make believe games with the child (range, 0–10). Parental Verbal Responsivity (PVR) assesses caregiver-child verbal interactions such as talking while feeding and playing rhyming games (range, 0–4).

Stress related to parenting was assessed using the Parenting Stress Index-Short Form (PSI-SF).[25] The PSI-SF is a 36-item scale that consists of three subscales: The Parental Distress subscale measures symptoms of anxiety and depression related to parenting. The Dysfunctional Interaction subscale measures perceived engagement between parent and child. The Difficult Child subscale measures perceived difficult child temperament. For each subscale and for the overall scale, the 85th percentile is used as a cutoff to define severe parenting stress.[26]

Maternal depression was assessed using the Center for Epidemiological Studies-Depression Scale (CES-D).[27] This 21-item scale measures self-reported depressive symptoms. Participants answered questions about the frequency of feelings and experiences during the past week on a 4-point Likert scale ranging from "rarely or none of the time" to "most or all of the time." An example of a question would be "Did you feel that you could not shake off the blues, even with help from your family or friends?" Mothers were considered to screen positive for depressive symptoms if the score was 16 or higher.

Child developmental-behavioral assessments were conducted in three domains: cognitive, language, and social-emotional/behavioral. Child cognitive development was assessed using the MDI of Bayley Scales of Infant Development-Second Edition.[20] The MDI was administered in the families' preferred language (English, Spanish, or both). No formal Spanish version exists; therefore, the raters agreed on common, appropriate language to use during administration of the MDI in Spanish. This approach represents our clinical practice in assessing for early intervention (EI) eligibility, which has been accepted by New York

State EI assessment guidelines.[28] Language development was assessed using the Preschool Language Scale-3 (PLS-3), which is normed in English and Spanish.[29]

Both the MDI and PLS-3 provide standardized scores, with a mean of 100 and an SD of 15. For each of the these assessments, performance was considered to be in the normal range if the score was at or above a cut point of 1 SD below the mean (≥85 and above), borderline if the score was between 1 and 2 SDs below the mean (70 through 84), and delayed if the score was below a cut point of 2 SDs below the mean (69 and below).

Social-emotional/behavioral development was assessed using the Child Behavior Checklist (CBCL) for ages 1½ to 5 years. The CBCL is validated in English and Spanish and consists of 100 items describing behaviors that the parent rates as "not true," "somewhat or sometimes true," or "very often or often true." Based on these items, T scores (mean, 50; SD = 10) for Internalizing Problems (e.g., irritability, withdrawal, anxiety, depression, somatization), Externalizing Problems (e.g., aggression, oppositionality, inattention), and Total Problems were calculated. As recommended in the manual, clinically significant behavior was defined as a T score of 64 or greater.

In addition, eligibility for EI services was determined based on the criteria used in our state.[30] Children were considered EI eligible if the score was 2 SDs below the mean in any of the three domains that were measured (cognitive [MDI], language [PLS-3], social-emotional / behavioral CBCL), or 1.5 SDs below the mean in any two domains.

Finally, demographic and other data characterizing the sample were collected based on parental interview. For the parents, this included mother's age, country of origin, education level, primary language spoken, and occupation and father's education level and occupation and whether the father lived in the household. Family socioeconomic status was determined based on parental education and occupation (Hollingshead Four Factor Index of Social Status).[31] For the child, we assessed gender, birth order, and whether EI services were received before this assessment.

Statistical Analysis

Statistical analyses were performed based on intention to treat, i.e., outcomes were assessed according to group (and not according to degree of participation in the intervention).[32] Data were analyzed using SPSS.[33] VIP and control families were compared for sociodemographic characteristics and for parenting and developmental behavioral outcomes. Comparisons of means were performed using independent samples t tests. Comparisons of frequencies were performed using χ^2 (with continuity correction for 2 × 2 tables) for nominal data and Spearman rank correlation for ordinal data (e.g., frequency of normal, borderline, or delayed development). We had decided a priori to assess whether the impact of the intervention might differ by level of maternal education and had found at the earlier 21-month assessment that maternal education moderated the impact of VIP on developmental outcomes.[16] As at 21 months, we performed subgroup analyses for children of mothers whose level of education was above (seventh to 11th grade) and below (sixth grade or lower) the median of the sample.

RESULTS

Sample Description

Enrollment and randomization took place from July 1999 through January 2002 and has been previously described.[16] Of 150 enrolled families, one or more measures was obtained at mean (SD) 33.6 (1.7) months for 99 (66.0%) families, including 52 of 77 (67.5%) Video Interaction Program (VIP) and 47 of 73 *(64.4%)* controls ($\chi^2 = 0.06$, $p = .82$). When

compared to families lost to follow-up, families undergoing the 33-month assessment were more likely to have mothers who were immigrants ($p < .001$), were Spanish speaking ($p < .001$), and had lower education ($p = .04$), but were similar for child's gender, birth order, and having a father living at home.

VIP and control families included in this analysis are compared in Table 1. Families in the two groups were similar for most variables, including child's gender and previous receipt of early intervention (EI) services, mother's age, country of origin, language spoken in the home, father living in the household, and Hollingshead Four Factor Index of Social Status. VIP children were less likely to be first born and VIP mothers had less education, but these were not statistically significant.

Parenting Outcomes

Parenting outcomes are compared for VIP and control families in Table 2. On the StimQ-Toddler (StimQ), VIP families scored higher on the Parental Involvement in Developmental Advancement (PIDA) (teaching) subscale ($p = .003$). Trends were seen for differences in Availability of Learning Materials (ALM) and Parental Verbal Responsivity (PVR), but these were not statistically significant ($p < .10$). Total parenting stress was lower among VIP families ($p = .048$); in addition, a trend was seen in which fewer VIP mothers scored in the clinical range (39.2% vs 58.7%; $p = .09$). The subscale of the Parenting Stress Index-Short Form (PSI-SF) that appeared to contribute most to the difference in overall parenting distress was the Parenting Distress subscale, which measures stress related to anxiety and depression and was somewhat lower for VIP families ($p = .09$). Maternal depression did not differ between the two groups.

Child Development and Behavior Outcomes

VIP children were more likely to have normal cognitive development scores (63.5% vs 44.0%) and less likely to have developmental delays (1.9% vs 6.7%), with $p = .048$ (Table 3). Statistically significant differences were not seen for language, behavior, or EI eligibility.

As with the results at 21 months,[16] differences between VIP and control children for developmental outcomes were most apparent for the subgroup of mothers with seventh to 11th grade education (Table 4). In this subgroup, the frequency of normal Mental Development Index (MDI) was more than double among VIP children (73.7% vs 36.4%), and the frequency of developmental delay was reduced (0.0% vs 9.1%), with $p = .01$. MDI score was mean 5.5 (95% confidence interval: 0.0–10.9) points higher in VIP children ($p = .049$). Although VIP children tended to have lower Child Behavior Checklist (CBCL) scores and less frequent EI eligibility, these differences were not statistically significant. In comparison, no differences in developmental-behavioral outcomes were found between VIP and control children whose mothers had sixth grade or lower education.

DISCUSSION

In this study, we have documented continuing developmental effects of Video Interaction Program (VIP) at 33 months as well as effects on parenting. Children randomized to VIP had improved cognitive development, with more than a 40% increase in the percentage of children performing in the normal range and more than a 33% reduction in the percentage of children performing in the borderline or delayed range. In addition, VIP was associated with improved parenting practices and reduced parenting stress.

As at the 21-month report,[16] children of mothers with seventh to 11th grade education showed the greatest improvement. In this group, there was more than a SD improvement in cognitive score, with a doubling of children scoring in the normal range and no child found

to be delayed. In addition, there was a 50% reduction in early intervention (EI) eligibility in this group; although this was not statistically significant, this may have been a result of smaller sample size and lower power within this subgroup. Although Ramey and colleagues demonstrated that mothers with low education (less than 12th grade) may benefit more from parenting interventions than mothers who have completed high school, it is possible that interventions of greater frequency or intensity may be required to alter developmental trajectories for children whose mothers have very low levels of education, below seventh grade.[34–36]

Importantly, we documented improved parenting activities in VIP families, particularly regarding teaching and playing. Numerous longitudinal studies using either the Home Observation for Measurement of the Environment (HOME) Inventory or direct measures of verbal interaction have documented the importance of these activities in influencing early childhood developmental tractories.[37–40] In addition, we have previously documented the importance of learning materials in promoting parent-child interaction and developmental outcomes in this sample.[41] While VIP had no impact on reading activities, this is perhaps not surprising given that Reach Out and Read had been in place for children presenting to our pediatric clinic during the period in which this study was performed and all of the enrolled families had been exposed to this intervention.

In addition, VIP was associated with reduced parenting stress. This is important as parenting stress is associated with difficulties in the parent-child relationship, the potential for child maltreatment, and long-term child adjust-ment.[42] The Parenting Distress subscale, which in part reflects depressive symptoms related to parenting, appeared to contribute most to this difference. In contrast, depressive symptoms in general (and not necessarily related to parenting) as measured on the Center for Epide-miological Studies–Depression Scale (CES-D) were not different between the two groups. Depressive symptoms are prevalent and multifactorial in economically disadvan-taged populations,[43,44] and it is not surprising that VIP should have had an impact only on those symptoms related to parenting.

We were unable to show an impact of VIP on language development. Although the rate of delay was lower in the subgroup with seventh to 11th grade maternal education, this difference was not statistically significant, possibly as a result of limited power. In addition, close to 40% of families in each of the groups had received EI services before the 33-month assessment, and almost all these children had received speech therapy. At 21 months, differences had been noted for language measures, and it is possible that EI services had the effect of bringing the VIP and control groups closer together for both cognitive and language outcomes. Although our results were consistent with this possibility, we were unable to definitively prove this hypothesis.

A limitation of this study is that we were only able to obtain assessments for approximately two thirds of enrolled families. It is therefore possible that differential loss to follow-up could have accounted for some of the findings. However, rate of loss to follow-up was similar in the two groups. In addition, demographic and other characteristics, including receipt of EI services, were comparable between the groups. Although the VIP families had slightly lower maternal education, this might have made it more difficult to show differences between the groups.

An additional limitation of this study is that while we were able to study the aggregate impact of VIP, we were unable to determine the individual importance of each component. However, the importance of the relationship between developmental specialists and the family in preventive interventions has been documented in other studies. In the Infant Health and Development Program, improved child developmental outcomes were seen for families

that were more engaged with the interventionists.[45] There is also evidence that videotape with feedback has an impact beyond that of written materials in studies of attachment based interventions.[46]

In conclusion, we have provided further evidence that a pediatric primary care–based intervention program can have an impact on the developmental trajectories of atrisk young preschool children. Furthermore, we have shown that this intervention has an impact on measures of parenting practices important for child development as well as on parenting stress. Long-term follow-up of this sample is in progress to assess whether VIP has an impact as children attend kindergarten and first grade. Finally, a large-scale replication study funded by National Institute of Child Health and Human Development is in progress, assessing the impact of VIP on a large birth cohort of newborns from ethnically and educationally diverse background (5 R01 HD047740-02).

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Table 1

Sociodemographic Characteristics of Families Assessed at 33 Months

	VIP[a]	Control[a]	Test[b]	*p*
Child[c]				
Female gender	40.4%	36.2%	0.05	.82
First born child	21.2%	36.2%	2.05	.15
Received EI services	37.5%	39.5%	0.00	1.00
Mother/family[d]				
Age, yr	29.8 (5.8)	29.8 (6.2)	0.03	.97
Immigrated from outside US	100.0%	95.7%	0.60	.43
Language spoken: monolingual Spanish	96.2%	91.5%	0.30	.58
Father living in household	82.7%	83.0%	0.05	.82
Education, yr	6.8 (2.1)	7.3 (2.5)	1.20	.22
Hollingshead social class 5	100.0%	95.7%	0.62	.43

VIP, Video Interaction Program; EI, early intervention.

[a] Values are mean (SD) or percentage.

[b] Values are t or χ^2.

[c] VIP, n = 52; control, n = 47 except receipt of early intervention services (VIP, n = 48; control, n = 43.)

[d] VIP, n = 52; control, n = 47.

Table 2

Parenting Outcomes

	VIP[a]	Control[a]	Test[b]	p
Parenting practices (StimQ)[c]				
Total score	23.1 (5.7)	21.7 (7.5)	1.06	.29
ALM subscale	5.7 (1.5)	5.0 (1.8)	1.90	.06
READ subscale	7.4 (3.7)	8.4 (3.8)	1.44	.15
PIDA subscale	7.5 (1.7)	6.1 (2.8)	3.07	.003
PVR subscale	2.6 (1.2)	2.1 (1.3)	1.82	.07
Parenting stress (PSI)[d,e]				
Total score	71.8 (23.8)	80.6 (18.8)	2.01	.048
In clinical range[f]	39.2%	58.7%	2.94	.09
Parenting Distress subscale	60.9 (25.1)	68.9 (19.6)	1.72	.09
In clinical range[f]	23.5%	34.8%	0.99	.32
Parent-Child Dysfunctional Interaction subscale	76.0 (22.9)	80.9 (18.4)	1.15	.25
In clinical range[f]	37.3%	47.8%	0.72	.40
Difficult Child subscale	58.0 (25.8)	63.6 (26.6)	1.05	.30
In clinical range[f]	29.4%	28.3%	0.00	1.00
Maternal depression (CES-D)[g]				
Total score	10.6 (12.0)	12.4 (9.5)	0.81	.42
In clinical range[h]	19.2%	25.5%	0.26	.61

VIP, Video Interaction Program; ALM, Availability of Learning Materials; READ, Reading Activities; PIDA, Parental Involvement in Developmental Advancement; PVR, Parental Verbal Responsivity; PSI, Parenting Stress Index; CES-D, Center for Epidemiological Studies–Depression Scale.

[a] Values are mean (SD) or percentage.

[b] Values are t or χ^2.

[c] VIP, n = 52; control, n = 45.

[d] VIP, n = 51; control, n = 46.

[e] Lower scores on the PSI are indicative of lower levels of parenting stress.

[f] Scores at or above the 85th percentile are considered to be within the clinical range for parenting stress.

[g] VIP, n = 51; control, n = 46.

[h] Scores at or above 16 are considered to be within the clinical range for depression.

Table 3

Child Developmental and Behavioral Outcomes: Sample as a Whole

	VIP[a]	Control[a]	Test[b]	*p*
Cognitive (MDI)[c]				
MDI score	86.1 (7.5)	83.9 (9.7)	1.30	.20
% Normal	63.5	44.4	0.20	.048
% Borderline	34.6	48.9		
% Delayed	1.9	6.7		
Language (PLS-3)[c]				
PLS-3 score	80.7 (10.2)	81.1 (10.6)	0.20	.86
% Normal	30.8	35.6	0.04	.69
% Borderline	55.8	51.1		
% Delayed	13.5	13.3		
Behavior (CBCL)[d,e]				
CBCL total	50.2 (10.0)	53.2 (9.7)	1.50	.13
In clinical range[f]	7.7%	17.0%	0.14	.16
CBCL externalizing	50.0 (9.8)	51.8 (9.4)	0.90	.36
In clinical range[f]	11.5%	10.6%	0.01	.89
CBCL internalizing	52.9 (9.9)	53.8 (9.3)	0.40	.66
In clinical range[f]	17.3%	14.9%	0.03	.75
Early intervention[c]				
Eligible	25.0%	28.9%	0.04	.67

MDI, Mental Development Index; PLS-3, Preschool Language Scale–3; CBCL, Child Behavior Checklist.

[a] Values are mean (SD) or percentage.

[b] t Test or Spearman *r*.

[c] VIP, n = 52; control, n = 45.

[d] Lower scores are indicative of less problematic behavior.

[e] VIP, n = 52; control, n = 47.

[f] Clinically significant behavior was defined as a T score of 64 or greater.

Table 4

Child Developmental and Behavioral Outcomes: Mothers with Seventh to 11th Grade Education

	VIP[a]	Control[a]	Test[b]	*p*
Cognitive (MDI)[c]				
MDI score	88.0 (5.8)	82.5 (10.8)	2.04	.049
% Normal	73.7	36.4	0.39	.01
% Borderline	26.3	54.5		
% Delayed	0.0	9.1		
Language (PLS-3)[c]				
PLS-3 score	82.3 (8.4)	80.2 (9.6)	0.70	48
% Normal	36.8	31.8	0.09	58
% Borderline	52.6	50.0		
% Delayed	10.5	18.2		
Behavior (CBCL)[d,e]				
CBCL total	49.9 (9.1)	55.6 (9.9)	1.90	.07
In clinical range[f]	5.3%	21.7%	0.23	.14
CBCL externalizing	50.1 (9.2)	54.6 (10.9)	1.40	.16
In clinical range[f]	10.5%	21.7%	0.15	. 34
CBCL internalizing	52.9 (7.4)	54.9 (9.2)	0.80	.44
In clinical range[f]	15.8%	17.4%.	0.02	.89
Early intervention[c]				
Eligible	15.8%	31.8%	0.19	.24

VIP, Video Interaction Project; MDI, Mental Development Index; PLS-3, Preschool Language Scale–3; CBCL, Child Behavior Checklist.

[a] Values are mean (SD) or percentage.

[b] t Test or Spearman *r*.

[c] VIP, n = 19; control, n = 22.

[d] Lower scores are indicative of less problematic behavior.

[e] VIP, n = 19; control, n = 23.

[f] Clinically significant behavior was defined as a T score of 64 or greater.