

Impact of a Kentucky Maternal, Infant, and Early Childhood Home-Visitation Program on Parental Risk Factors

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Abstract As public health organizations continue to implement maternal and child health home-visitation programs, more evaluation of these efforts is needed, particularly as it relates to improving parental behaviors. The purpose of our study was to assess the impact of families' participation in a home-visitation program offered by a central Kentucky health department on parental risk factors. A family social worker or nurse interviewed parents pre-intervention, completing a Parent Survey which assessed multiple parental risk factors associated with negative health and well-being and to calculate a total risk score. Upon exiting the program, parents are re-interviewed to document improvements, review progress and accomplished goals, plan for transitional services, and calculate a new risk score. As of December 2010, 64 families had completed the home-visitation program and had pre- and post-risk scores available for analysis. Based on paired-sample *t* tests, there was a statistically significant difference in total mean risk scores among both mothers and fathers from pre to post. The McNemar–Bowker test also revealed statistically different scores for four of the six risk factors for mothers and fathers pre- and post-home-visitation: lifestyle behaviors and mental health, coping skills and support systems, stresses, and anger management skills. Findings suggest that families who were deemed at-risk for adverse pregnancy and child health outcomes benefit from participation in the home-visitation program. Programs designed to promote positive pregnancy outcomes and child development may benefit from providing

social support, fostering parental knowledge, skill development and problem solving, insuring proper medical care, and connecting parents with community resources.

Keywords Maternal and child health · Home visitation · Parental risk factors · Local health department · Kentucky

Introduction

The adverse or negative birth outcomes of preterm birth and low birthweight are important maternal-child health concerns (National Healthy Start Association [NHSA], n.d.; Peck and Alexander 2003). For the child, these outcomes are potential catalysts for physical and social challenges including learning and developmental disabilities, susceptibility to chronic disease, serious medical conditions, and behavioral problems (Lishner et al. 1999; March of Dimes 2008, 2009/2010; McCormick 1985; National Institute of Child Health and Human Development [NICHD] 2010; Peck and Alexander 2003). For the community and healthcare system, these outcomes lead to additional expenditures (March of Dimes 2009/2010; NICHD 2010). Healthcare payers, such as employers, federal and state Medicaid programs, health plans, and individuals, share costs for premature babies, which included a total cost of at least \$26.2 billion in 2005 (March of Dimes 2010a; Institute of Medicine 2006). Low birthweight infants, approximately one in every 12 babies born in the United States, generate economic costs to society including an average \$273,900 in first year expenses for the smallest survivors (March of Dimes 2008; NHSA, n.d.).

Although complications in prior pregnancies and certain medical conditions increase women's risk for preterm

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delivery and/or a low birthweight, some health compromising behaviors and lifestyle factors endanger both the mother and unborn infant and may place her at greater risk for adverse pregnancy outcomes (Dew et al. 2006; March of Dimes 2008, 2009/2010). The March of Dimes Foundation identifies these lifestyle factors as alcohol consumption, domestic violence (emotional, physical or sexual), exposure to environmental pollutants, extremely high stress levels, illegal drug use, lack of social support, late or no prenatal care, smoking, and socioeconomic factors (March of Dimes 2008, 2009/2010, 2010b). In order to improve pregnancy outcomes, there is a need for improving parental health behavior and practices.

Home-visitation programs have been implemented as a strategy to reduce negative maternal and child health outcomes. Some programs provide benefits prenatally, postnatal, and long-term with benefits varying across families and program models (Chapman et al. 1990; Olds et al. 1986a, b; Grantmakers In Health 2010). Evidence-based home-visitation programs reduce dependence on social service programs, increase access to preventive care, promote higher educational achievement, and lead to fewer incidences with the criminal justice system, which can lead to savings of up to \$5.70 for every tax-payer dollar spent (Chapman et al. 1990; Pew Center on the States 2010). Of particular interest are home-visitation programs that reduce parental risk factors (e.g., educational attainment, prenatal care, substance use, and domestic violence) through emphasizing social support, health education, and connection to services through community partnerships (Lee et al. 2009; National Institutes of Health 2007).

One such home-visitation program is Kentucky's Health Access Nurturing Development Services (HANDS), which is offered through local health departments to overburdened first-time parents during pregnancy or before the child is three months old (Illback et al. 2008; Kentucky Cabinet For Health And Family Services [CHFS] 2007a). Modeled after Hawaii Healthy Start and Healthy Families America, it replicates and expands upon nine elements that have been demonstrated in research to correlate with positive outcomes for children and families: (1) provide voluntary services for families with the greatest risk for a myriad of negative outcomes; (2) begin family interventions and services prenatally and continue through the child's first two years of life; (3) initially conduct home visits frequently and then taper them as children reach milestones and parents establish and improve parenting skills and self-sufficiency; (4) promote positive health behaviors and care-giving while providing social support; (5) focus on meeting the families' diverse needs and reducing familial stressors; (6) concentration on parent-child interaction, parental sensitivity, and parental knowledge of child development; (7) emphasis on quality of home safety (physical, psychological, and social); (8)

utilization of nurses and social workers for family needs assessment and paraprofessionals and professionals for outreach and engagement; and (9) linking families to medical care and community resources (Illback et al. 2008). Additionally, a similar program, Healthy Babies Are Worth The Wait (HBWW), mirrors the design, activities, and curriculum of HANDS, but focuses on non first-time parents and has been periodically offered at select Kentucky health departments (Kentucky Cabinet for Health and Family Services 2007). Both HANDS and HBWW utilize the Growing Great Kids Curriculum available through Great Kids, Inc., to support the development of nurturing and empathetic parent-child relationships (Illback et al. 2008). Curriculum modules focus on child development and health, family dynamics and stress management, communication and problem-solving skills, and provision of care, incorporating handouts for parents, activities, goal-setting, and interactive discussions. All HANDS staff are required to attend the Growing Great Kids one-week, hands-on training. Kentucky was the first state in the U.S. to use the strength-based curriculum in a statewide effort, requiring it for home visits in all 120 counties.

The body of research pertaining to home-visitation programs has continued to grow and results appear promising (DiLaurio 2009). However, many programs focus on special problems (e.g., teen or single mothers and racial minorities) or specific outcomes (e.g., pre-term delivery, low birth weight, and abuse) (American Academy of Pediatrics [AAP] 1998). There is a need to evaluate programs offering assistance to families with diverse needs and risks. Additionally, there is a research disparity pertaining to the influence of paternal socio-demographic and behavioral risk factors on maternal health and pregnancy outcomes and the influence of home-visitation on paternal characteristics and behaviors (Blumenshine et al. 2011; Misra 2010; Shah 2010; Reichman and Teitler 2006). The purpose of our exploratory study was to determine the impact of participation in a comprehensive home-visitation program (Kentucky HANDS) on parental risks by assessing pre/post changes in six risk factors for mothers and fathers. Parents' socio-demographics (i.e., age, ethnicity/race, employment, education), pregnancy outcomes (i.e., gestational age, prematurity, birthweight), and health behaviors (i.e., breastfeeding, domestic violence, tobacco use) were also examined.

Method

Subjects

Eligibility for Kentucky HANDS and HBWW is a three-step process. First, nurses provide patients who receive a positive pregnancy test at their local health department

with a HANDS referral. In a few instances, families are referred to HANDS postnatally when they seek health department services or are referred by the hospital or a healthcare provider. Second, nurses screen the referrals for “stress factors” (CHFS 2007b). If the mother indicates she is (1) single, separated or divorced, (2) non-compliant with prenatal care, or (3) has attempted an abortion or (4) indicates any two other factors (i.e., domestic violence, history of substance abuse, isolation, limited parental education, maternal depression, poor prenatal care, unemployment, unstable housing), then she receives a positive screen (Illback et al. 2008). The mother signs a consent form to be contacted about home-visitation. Third, family social workers and nurses contact families to schedule clinical interviews to assess parental needs and risks (Illback et al. 2008). Services are offered if at least one parent scores 25 or greater on the initial 10-dimension Parent Survey. A post-survey assessing six of the 10 dimensions is given to families upon completion of the HANDS and HBWW programs, which usually occurs 90 days prior to the child’s second birthday.

For the purposes of our exploratory study, we utilized HANDS and HBWW data from an urban county health department in central Kentucky. There was an active caseload of 434 eligible mothers from June 2009 until July 2010. These families were initially screened for program eligibility from June 2006 until July 2010. Sixty-six families completed HANDS and HBWW by December 2010. Of the 66 families, 64 families were eligible to be included in the analysis because pre and post Parental Survey scores were available for both the total score and each of the 10 dimensions assessed in the initial survey. All but three of the families were enrolled in the program prenatally; the three families enrolled postnatally entered the program 3, 4, and 38 days, respectively, after delivery. The average length of program enrollment was 29 months (range 14–42 months). The data for this secondary analysis was originally collected by family social workers and nurses who documented socio-demographics, parental risk behaviors, pregnancy outcomes, and maternal health behaviors from initial referrals, eligibility assessments, and periodic home visits scheduled before, during, and post-pregnancy. Study procedures were approved by the Office of Research Integrity at the University of Kentucky and the Institutional Review Board of the Lexington-Fayette County Health Department.

Measures

The Parent Survey is a copyrighted, standardized Great Kids, Inc., family assessment tool, which is a part of Growing Great Kids Curriculum described earlier; all Kentucky HANDS staff receive training on how to implement the survey during clinical interviews to assess

parental risk and needs (Illback et al. 2008). The survey is a 10-question adaptation of the Kempe Family Stress Inventory. The inventory is also referred to as the Carroll-Schmidt Parenting Checklist, the Kempe Family Stress Checklist, or the Family Stress Checklist; however, “inventory” is viewed as a better name in recognition of its use as a rating scale to assess parental risk. The Parent Survey assesses (1) parent’s childhood experience, (2) lifestyle behaviors and mental health, (3) parenting experience, (4) coping skills and support system, (5) stresses, (6) anger management skills, (7) expectations of infant’s developmental milestones and behaviors, (8) plans for discipline, (9) perceptions of new infant, and (10) bonding and attachment. Previous research has suggested that the Kempe Family Stress Inventory should only be used at baseline due to potential home-visitor bias and statistical regression (Duggan et al. 1999); however, practitioners view the use of the adapted Parent Survey as a post measure positively. For example, changes in survey scores help to document improvements in family outcomes (e.g., managing family stressors); serve as a venue to review progress and accomplished goals with the family prior to exiting the HANDS program; aid in transitional planning to ensure the family continues to access needed services; and support advocacy efforts for program expansion (C. Miller, personal communication, December 2011; CHFS 2007c). Six of the 10 dimensions/risk factors are assessed at both pre- and post-intervention (2, 3, 4, 5, 6, 8). Each question has the possible rating of 0 (minimal risk), 5 (medium risk), or 10 (high risk) and is weighted equally. The parent’s inability to answer a question led to a score of “unknown.” Higher total scores represented greater levels of risk and need.

Additional measures examined in this study include pregnancy outcomes (gestational age, birthweight, and preterm delivery) and socio-demographic and health behavior variables for mothers and fathers, respectively. Socio-demographic variables assessed for both mothers and fathers include age, educational level, and employment status. The variables of ethnicity and marital status were solely collected for the mothers. Exploration of parental health behaviors and lifestyle factors included the variables of breastfeeding, domestic violence, smoking in the home, and maternal decision to be screened for depression.

Data Analysis

We performed all analyses using PASW Statistics Grad-Pack 18 (SPSS Inc.). Demographic characteristics and health behaviors are reported as descriptive frequencies. Once the sum of the six dimensions for the pre- and post-score were paired for the mother and father, respectively, we conducted paired-samples *t* tests to evaluate the

difference in parents' total risk scores on the Parent Survey. To determine if there was a significant change in scores for mothers and fathers for each of the six dimensions of the Parent Survey available for pre- and post analysis, we conducted the McNemar–Bowker Test (Pallant 2010). Acceptance of statistical significance was based upon an alpha of .05.

Results

Family Characteristics

Upon referral into the home visitation program, the average age of the mothers was 25.7 years ($SD = 6.6$) and the majority self-identified their ethnicity as Hispanic/Latino (79.7 %). As reported in Table 1, one of every three mothers (36.0 %) reported they completed high school or earned a GED; less than one-third were employed (29.7 %). Most mothers (69.9 %) were unmarried. The average age of the fathers was 26.9 years ($SD = 5.6$). One of every four fathers (26.3 %) reported they completed high school or earned a GED; most fathers (89.5 %) were employed.

Table 1 HANDS and HBWW family characteristics (N = 64 families)

Characteristic	Mother n (%)	Father n (%)
Age^a		
≤20	17 (26.9)	6 (10.8)
21–25	17 (26.9)	15 (26.9)
26–30	13 (20.7)	22 (39.3)
>30	16 (25.5)	13 (23.2)
Ethnicity^b		
Hispanic/Latino	51 (79.7)	
Relationship status^{a,b}		
Single	24 (38.1)	
Married	17 (27.0)	
Separated	2 (3.2)	
Divorced	1 (1.6)	
Living with a partner	19 (30.2)	
Education^a		
Less than high school	41 (64.1)	42 (73.7)
High school/GED	14 (21.9)	11 (19.3)
Some college or more	9 (14.1)	4 (7.0)
Employment status^a		
Employed	19 (29.7)	51 (89.5)
Unemployed	45 (70.3)	6 (10.5)

^a Valid Percent excludes missing data

^b Data limited to mothers

Pregnancy outcomes and health behavior data is reported in Table 2. Sixty-two families reported no domestic violence at initial referral (96.9 %). Only eight families experienced preterm delivery at less than 37 weeks gestation (12.7 %); 61 babies weighed at least 5.5 pounds at birth (95.2 %). Fifty-four mothers (84.4 %) reported they had breastfed. More than three of every four families (89.5 %) reported neither they nor anyone living in the residence of the infant smoked. Most mothers agreed to be screened for depression and receive information about counseling throughout the program (71.9 %).

Bivariate Associations

Table 3 displays the paired-samples *t* tests between pre-test/post-test total risk scores for mothers and fathers. There was a statistically significant decrease in the total risk scores for mothers from Pre ($M = 21.80$, $SD = 9.44$)

Table 2 Pregnancy outcomes and health behavior variables among HANDS and HBWW families

Pregnancy outcome or health behavior ^a	Families (N = 64) n (%)
Gestational age^b	
<37 weeks	8 (12.7)
37 weeks	7 (11.1)
>37 weeks	48 (76.1)
Preterm delivery^b	
No	55 (87.3)
Yes	8 (12.7)
Birthweight	
<5.5 lbs	3 (4.8)
5.5 lbs	1 (1.6)
>5.5 lbs	60 (93.6)
Breastfeeding	
No	10 (15.6)
Yes	54 (84.4)
Edinburgh depression screening	
Completed	46 (71.9)
Not completed	18 (28.1)
Domestic violence	
No	62 (96.9)
Yes	2 (3.1)
Smoking in the home^b	
No	51 (89.5)
Yes	6 (10.5)

Gestational age = length of pregnancy; Preterm delivery = <37 weeks

^a Includes data of three families who began postnatal

^b Valid Percent excludes missing data

Table 3 Paired-samples *t* test of Parental Survey (total scores of six dimensions)

Pair	n	M	SD	95 % CI	t	<i>p</i>
Pair 1						
Mother Parental Survey Score (pre)	64	21.7969	9.44353			
Mother Parental Survey Score (post)	64	13.2813	8.91845			
Pair 2 ^a						
Father Parental Survey Score (pre)	61	18.9344	8.80884			
Father Parental Survey Score (post)	61	10.0820	8.34125			
Pair 1 differences	64	8.51563	10.18401	[5.97, 11.06]	6.689	.000
Pair 2 differences	61	8.85246	11.04511	[6.02, 11.68]	6.260	.000

CI confidence interval

^a Different n due to missing data

to Post (M = 13.28, SD = 8.92), $t(63) = 6.69, p < .0005$ (two-tailed). Additionally, the differences between fathers' risk scores differences were statistically significant from Pre (M = 18.93, SD = 8.81) to Post (M = 10.08, SD = 8.34), $t(60) = 6.26, p < .0005$ (two-tailed).

Table 4 displays the McNemar–Bowker Test for pre-test/post-test scores for each of the six dimensions available at pre- and post-test. Analysis revealed a statistically significant decrease, for both mothers and fathers, in parental risk for four of the six dimensions after participation in Kentucky HANDS and HBWW: lifestyle behaviors and mental health, coping skills and support system, stresses, and anger management skills. For both mothers and fathers, changes in parenting experience could not be computed because the majority of the parents were

not at-risk pre-intervention (pre-scores of zero) due to being first-time parents. Similarly, 93 % (39/42) of dads had a pre-score of zero for plans for discipline.

Discussion

Findings from this study of parents engaged in a central Kentucky health department-based home-visitation program suggest that parents who are at increased risk for negative pregnancy and child development outcomes may be able to improve their risk factors through home-visitation participation. Specifically, lifestyle behaviors and mental health risk, coping skills and support systems, stresses, and anger management skills are risk factors that

Table 4 McNemar-Bowker test of pre to post Parental Survey Score changes for six dimensions

Dimension	n ^a	Value	df ^b	<i>p</i>
2 Lifestyle behaviors and mental health				
Mother Parental Survey Score	63	7.818	3	.050
Father Parental Survey Score	53	9.908	3	.019
3 Parenting experience				
Mother Parental Survey Score ^c	62			
Father Parental Survey Score ^c	50			
4 Coping skills and support system				
Mother Parental Survey Score	63	15.908	3	.001
Father Parental Survey Score	53	10.786	3	.013
5 Stresses				
Mother Parental Survey Score	63	23.481	3	.000
Father Parental Survey Score	57	24.467	3	.000
6 Anger management skills				
Mother Parental Survey Score	62	12.697	3	.005
Father Parental Survey Score	45	10.164	3	.017
8 Plans for discipline				
Mother Parental Survey Score	62	5.667	3	.129
Father Parental Survey Score ^c	38			

Six dimensions of risk are assessed pre and post intervention: 2, 3, 4, 5, and 6

^a Total excludes missing data

^b Given a 3 × 3 square table, $3(3 - 1)/2 = 3$ degrees of freedom (*df*)

^c Computed only for a $p \times p$ table, where *p* must be greater than 1

may experience significant reductions. Two of the six dimensions did not have statistically significant pre/post differences: parenting experience and plans for discipline. This was to be expected as many of these HANDS participants were first-time parents. Placed into context, having new parents indicate they have concern for the safety of the child, have not received referrals for protective services, and have plans to teach their child without physical discipline is a positive finding.

This study also demonstrated four paternal risk factors changed significantly pre/post home-visitation. These findings support the research that it is beneficial to engage fathers in these programs (NHSA 2010a, b). It is important to note that the same risk factors reduced for both parents. Murphy et al. (1985) reported this same trend when establishing the validity of the Kempe Family Stress Inventory. Although further research is warranted, the mirroring paternal and maternal risk factors changes suggest a possible influence of the male partners on maternal health (NHSA 2010a, b).

These findings of changes in parental behavior and attitudes contribute to the growing evidence that participation in home-visitation programs can be beneficial for participants and reduce the rates of prenatal, postnatal, and long-term negative health choices and conditions that lead to challenges and negative outcomes faced by families (AAP 1998). Particularly, this exploratory study supports research suggesting that home-visitation programs can be effective early-intervention strategies if they are embedded in comprehensive community services to at-risk families (AAP 1998; Weiss 1993). The role of home-visitation has been to improve pregnancy outcomes, child safety, and parent and child health status and a growing number of research studies suggest that all at-risk families would benefit from participation and programs are cost-effective (AAP 1998). As additional small home-visitation programs are developed and implemented and federal health agencies are awarding grants to support home visiting programs, it is crucial to focus on careful design and empirical findings from previous research and to continually conduct rigorous evaluations (AAP 1998; Duggan et al. 1999; U.S. Department of Health and Human Services 2010).

Kentucky HANDS exemplifies the elements indicated for successful home-visitation programs: a focus on families in greater need, intervention beginning in pregnancy and continuing through at least the second year of life, flexibility and family specificity so that frequency of visits and offered services are adjusted to the family risk-level, encouraging active participation and not solely offering social support, a broad multi-issue approach to address the myriad of family needs, measures to reduce family stress through improvement of social and physical environments, and the use of nurses or paraprofessionals (AAP 1998;

Kempe 1978; Olds 1992). This examination of parental risk factors may lead to both modifications to the enrollment criteria, activities and curriculum, and community partnerships associated with home-visitation programs and additional research pertaining to demographic disparities (e.g., age, education, employment, ethnicity/race), the role of fathers, and factors encouraging retention in home-visitation programs.

A critique of this retrospective, exploratory study would lead to the acknowledgement of limitations and the need for further research. Findings are based on self-reported survey data of sensitive behaviors and circumstances and therefore, may be subject to poor recall or deliberate concealment. The nurses and family social workers attempted to minimize these limitations by providing assurances of privacy and confidentiality. In some cases, mothers answered all questions, but were uncertain of some aspects of paternal behaviors or histories. It is possible the father's information could be inaccurate (Korfmacher 2000; Murphy et al. 1985). Similarly, mothers' uncertainty could have also contributed to some fathers not receiving any scores (i.e., unknown) for various dimensions. Additionally, the numerical scores portion of the Parent Survey was assessed in lieu of the full version containing subcategories, which detailed gradations of the 0 (low), 5 (medium), and 10 (high). Subcategories correspond to a particular barrier, behavior, or belief and may provide an enhanced assessment of risks. While the average length of program enrollment was almost two and half years (29 months), there were two families who were in the program for 14 months and one family who was in the program for 42 months, leading to different levels of program exposure. Further, the results of this study may not be generalizable to other populations as our study population was more likely to self-identify as Hispanic and was located in central Kentucky. Lastly, we lacked a control group of parents who did not receive the home-visitation program (Duggan et al. 1999) and we did not specifically link the study results with birth outcomes.

In conclusion, there are diverse biological, behavioral, economical, educational, psychological, and social factors that lead to being at-risk for adverse maternal and child health outcomes. Several risk factors may reduce with behavioral intervention programs. Our findings suggest that families deemed at-risk for adverse pregnancy and child health outcomes may benefit from participation in a comprehensive home-visitation program. Programs designed to promote healthy pregnancies and child development may benefit from beginning prenatally and enduring at least two years, providing social support, fostering parental knowledge, skill development and problem solving, insuring proper medical care, and connecting parents with relevant community resources.

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