Durham Connects Impact Evaluation Executive Summary
Pew Center on the States

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Significance and Program Overview

Child maltreatment is an urgent national public health problem. In 2009, 762,940 U.S. children (10 per 1,000) were identified as victims of abuse or neglect. The federal response has accelerated in recent years through the Maternal, Infant, and Early Childhood Home Visiting Program (MIECHV), which provides $1.5 billion in funding to states and communities for the expanded implementation of evidence-based home visiting programs for at-risk children and families. Up to 25% of MIECHV funding may be allocated to promising new programs, offering an important, time-limited opportunity for the expanded implementation of innovative home visiting programs with promising evidence supporting impact for children and families.

Currently, the most popular maltreatment-prevention programs are long-term, intensive home visiting for high-risk, pregnant, primiparous women selected by demographic characteristics (e.g., Nurse-Family Partnership [NFP], Healthy Families America [HFA]). The rationale for these programs is that the highest victimization rates occur among infants under age one (21 per 1,000) and certain groups of women are higher risk than others. However, even among programs certified as evidence-based through the MIECHV program (e.g., NFP, HFA), findings have been inconsistent across implementation sites and effects are weaker in some groups than others. Further, enrolling families based on demographics, rather than a systematic assessment of actual risk, means that not all families at high risk for maltreatment will receive services. *Most importantly, no home-visiting program has ever been scaled up successfully to lower the population rate of maltreatment for an entire community,* in spite of the Institute of Medicine mandate to move from basic science to an efficacy trial to an effectiveness trial to population dissemination. Scaling up involves multiple challenges related to 1) prohibitive opportunity costs (that is, even a promising advertised rate of return cannot compel a community if the cost of saturating that community is too high); 2) poor penetration and retention rates; 3) degradation in program fidelity and quality; and 4) lack of community capacity to respond to participant needs. Impact on population outcomes, however, is the essential goal of public health and public policy.

The *Durham Connects* (*DC*) Program is an innovative, universal newborn nurse home-visiting program designed to address existing limitations to targeted home visiting programs. It has been developed in a community setting with complementary foci of increasing community capacity while delivering individual services to all families. It is designed to be brief and inexpensive ($700 per birth) so that communities can afford its costs. It is delivered universally in order to achieve high penetration and population impact, as families do not perceive participation in a universal program as stigmatizing them. Further, by implementing universally from the start, the program avoids decreases in fidelity and impact reported by targeted home visiting programs after scaling-up from smaller RCT trials. Its goals, however, are consistent with those of other maltreatment prevention home visiting programs (e.g., NFP, HFA): 1) to connect with the mother in order to enhance maternal skills and self-efficacy; and 2) to connect the mother with needed community services such as health care, child care, and financial and social support. To support family connections with community services, the Durham Connects program spent six years growing a Preventive System Of Care (PSOC) of community services by gaining the support of virtually all community agencies, providers, and volunteer groups in Durham County. The PSOC is modeled after the System Of Care concept in child mental health treatment, which focuses on the needs of the child, includes all relevant members of the child's ecology, and "wraps" services around the child. All community agency directors signed a memorandum of agreement to follow the Preventive System of Care Model, directing increased resources toward prevention and delivering services in a family-centric way.

DC consists of 4-7 intervention contacts, beginning with consenting during a birthing-hospital visit when a staff member delivers a brief intervention message and schedules the family for a nurse home visit. Over the course of 1-3 nurse home visits, *DC* is delivered universally to mothers (and fathers when possible) through "teachings" about health, parenting, and well-being. During these visits, the nurse also assesses and scores health and psychosocial risk in four domains known to increase risk of child maltreatment (*Healthcare, Parenting / Childcare, Household Safety & Violence,* and *Parent Mental Health / Well-Being*). Instances of mild / moderate risk receive short-term nurse-delivered intervention in-home. Instances of high risk receive a connection (or referral) to one or more matched community resources tailored to address the particular risk, with nurses making 1-2 contacts with community agencies to support family connections. Families also receive a staff-member telephone or in-home follow-up one month after the nurse completes all home visits to ascertain whether the family has received needed supports, if additional problem-solving is needed to address family needs, and if the family was satisfied with their home visit.

In order to determine whether a universal nurse home visiting program could be implemented with high penetration and fidelity for an entire population, *Durham Connects* was implemented as a randomized controlled trial (RCT) study for an 18-month period, with funding provided by the Duke Endowment. The Pew Center on the States provided generous funding to support an initial wave of impact evaluation when infants were age 6-months. The following hypotheses were examined:

1. Random assignment to *Durham Connects* will be associated with more connections to community resources.
2. Random assignment to *Durham Connects* will be associated with higher quality family functioning and better child health and well-being
3. Associations between *Durham Connects* eligibility and improved child health and well-being will be accounted for by greater family connections to community resources and enhanced family functioning

Durham Connects RCT and Evaluation Study Design

From July 1, 2009, through December 31, 2010, all 4,782 residential births in Durham County, North Carolina, were randomly assigned according to birthdate, with even-birth-dates assigned to receive *DC*. Odd-birth-dates were assigned to receive services-as-usual and served as the control group. Program implementation was evaluated for all 2,330 even-birth-date families.

We selected a random, representative subsample of the 4,782 families to evaluate *DC* program impact on multiple outcomes related to *DC* program implementation through intensive in-home interviews conducted when infants were 6-months of age. Utilizing a random subsample of the broader population is a common procedure for intensive evaluation of population-level interventions due to the high costs associated with blinded in-home interviewing. Using publically available birth records, we randomly selected one birth for each day of the *DC* RCT period (spanning births from July 1, 2009, through December 31, 2010) for participation in the evaluation study (n = 549 overall; n = 269 *DC*-eligible families; n = 280 control group families). Even-birth-date families were recruited without consideration for *DC* recruitment and participation outcomes. Families that declined participation were replaced with a same birth date same race/ethnicity family. We tested participating families to the population on 13 demographic and birth characteristics and found only one significant difference (interviewed families were more likely to be Medicaid-insured or uninsured). We concluded that we had selected a representative sample and had obtained representative participation that was not biased between intervention and control groups.

Home interviews at age 6-months were approximately 1-2 hours in length; mothers provided information on demographic characteristics, family utilization of community resources, family functioning across all domains of risk assessed by the *Durham Connects* nurse home visitor (infant and parent health, parenting and child care, financial stability and home safety, and parent well-being and support), and information on child development and well-being. Additionally, research assistants completed observational ratings of the parent-child relationship quality of the home environment. All analyses for the impact evaluation study were conducted using a two-tailed "intent-to-treat" design that included all interviewed families without regard to intervention adherence.

Durham Connects Implementation Results

Of the 2,330 families who gave birth to an infant on an even birth date, 80.0% were successfully contacted by trained *DC* staff members and completed a brief introductory session. Of these families, 86% successfully completed the program (69% net penetration). Nurse fidelity and reliability in assessing each of 12 factors associated with risk for child maltreatment was evaluated monthly through direct observation by a trained supervisor. Fidelity to the protocol averaged 84% (range = 66.0%-99.0%); Cohen's Kappa inter-rater reliability for nurse ratings of the 12 risk factors was 0.69 (range = 0.55-0.82). These rates are considered very good. Forty-five percent of all families received at least one rating indicating higher risk, leading nurses to refer them to external community resources. In telephone contacts four weeks after visits are completed, families reported establishing contact with 61% of all community referrals and receiving services from 39% of all referrals.

Durham Connects Evaluation Study Impact Results

Community Connections. Families randomly assigned to *DC* (herein called *DC* families) reported accessing 14% more community resources than did control families ($p < .0001$).

Parenting and Childcare. DC mothers reported more positive parenting behaviors ($p < .01$), but no differences were found in negative parenting behaviors, knowledge of infant development, or sense of parenting competence. *DC* mothers reported marginally higher father-infant relationship quality ($p = .08$). Blinded in-home observers rated the parenting quality of *DC* mothers as higher than that of control mothers ($p < 05$). No group difference was found for the likelihood of using out-of-home childcare. When infants were placed in out-of-home childcare, however, the quality of care was higher for *DC* families than control families as rated by the NC 5-star rating system ($p < .001$).

Mother Well-Being. DC mothers were less likely to be screened as having possible clinical depression (12% of control vs. 8% of *DC* mothers; $p < .10$) and anxiety (29% for control vs. 22% for *DC* mothers, $p < .05$), but not substance-use (6% for control vs. 4% for *DC* mothers).

Home Environment Quality / Safety. Blinded in-home observers rated the home environment quality as higher for *DC* families than control families ($p < .05$). No difference was reported for partner relationship quality.

Infant Health. Relative to control mothers, *DC* mothers reported 84% fewer overnights in the hospital ($p < .0001$), 17% fewer emergency medical visits ($p = .05$), and less overall emergency medical service utilization ($p < .0001$).

Benefit-Cost Analysis. Based on *DC* implementation costs and average cost of child emergency care, we estimate a Benefit-Cost Ratio of 1.59, meaning that every $1 spent on the *DC* program saved $1.59 by age six months in costs for infant emergency medical care. For a community of the size of Durham, NC, with an average of 3,187 resident births per year and intervention cost of $700 per birth, an investment of $2,230,900 for the *DC* Program would yield a community-wide emergency health care cost savings of $3,547,131 per year.

Conclusions and Limitations

Based on results from an 18-month, universal RCT implementation trial and subsequent impact evaluation, we conclude that the *Durham Connects (DC)* Program offers a feasible, affordable, and effective public health policy for families of newborn infants. Findings reported here indicate that when this program is implemented in large numbers, it is successful in penetrating most of the community, can be implemented with high fidelity and reliable assessment of individual family risk, and is delivered at affordable cost. This approach offers a novel solution to the paradox faced by existing, targeted home visiting programs by offering services universally, but also tailoring intervention to individual-family needs by triaging families into matched community services based on individualized nurse assessments.

Impact findings indicate that random assignment to the *DC* Program at birth has a positive impact on reducing mother-reported infant emergency healthcare outcomes at age 6 months. It also improves a family's connections to community resources, parent-child relationship quality, rates of high quality childcare utilization, home environment quality and safety, and maternal mental health. Effect sizes are modest for an individual family but are similar to those of longer, more intensive home-visiting programs (e.g., NFP). Further, results from benefit-cost analyses on mother-reported infant emergency healthcare episodes at age 6 months suggest that the program could have a cost-beneficial impact on the population. Importantly, these cost benefit savings were observed approximately three months after program implementation, suggesting communities may obtain significant financial returns on initial program investments, through reduced infant emergency healthcare costs, within a relatively brief period of time.

Several caveats temper the reported findings. First, child emergency health outcomes were based on maternal report. Thus, while *DC* cost benefits to the community through reduced emergency care utilization appear substantial, administrative record review for all births over the 18-month RCT period is needed for objective measures of population-level emergency care utilization and cost savings. Second, the long-term impacts of *DC* participation are unknown. Longitudinal evaluation of the families participating in the 18-month RCT is required to determine whether initial gains associated with *DC* participation are sustained over time. Finally, because randomization within county was required in order to ensure maximum rigor in the RCT design, we were unable to evaluate the extent to which existing community resources in Durham County could support family needs across the entire population of births. Relatedly, it is plausible that the positive impact of *DC* would not transfer to other communities or other implementations of the program, particularly those with fewer relative resources. We await replications of the *DC* model to examine these issues of broader generalizability.

Future Directions for Continued Impact Evaluation

Future studies will follow up these findings by extending cost analysis farther in the infants' lives and more broadly to other domains, to see whether even larger savings accrue or costs are simply deferred by the *DC* Program. Additional ongoing analyses will examine the mechanisms that account for associations between *DC* participation and greater family connections to community resources and enhanced family functioning and child well-being. A new research grant from NICHD will allow us to evaluate the impact of *DC* on population rates of family functioning and child well-being through the transition to school (age 66 months).

The *DC* program is now being disseminated to more communities, with ongoing evaluation. It is being implemented at scale in Durham through a combination of government, foundation, and local funding. The model will also be implemented in 3-6 rural NC communities through funding from the Early Childhood portion of the federal Race To The Top program.