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**Meta-Analytic Review of Components
Associated with Home Visiting Programs:**

Final Report

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Jill Filene
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I. Introduction

Early childhood marks a period of rapid growth and development that lays the foundation for future success in school and life (Shonkoff & Phillips, 2000). Parents play a critical role in shaping children's early development, so interventions that reach parents or children in these early years have great potential for producing long-term benefits (Brooks-Gunn & Markman, 2005). Prenatal and early childhood home visiting is a widely-supported method for delivering a vast array of preventive and early intervention services to families in need of support. By engaging families in home visiting programs during the prenatal or early childhood period, providers seek to improve children's long-term developmental trajectories by fostering improved parenting knowledge and skills, social support, coping and problem-solving skills, and access to community and health services (Guterman, 2001).

Following the 1991 recommendation by the United States Advisory Board on Child Abuse and Neglect to develop a universal nationwide system of voluntary neonatal home visiting services in the United States (U.S.) (Krugman, 1993), hundreds of home visiting program models and thousands of sites proliferated across the country. With the passing of the Patient Protection and Affordable Care Act (ACA), which authorized the creation of the Maternal, Infant, and Early Childhood Home Visiting Program (MIECHV), home visiting programs have expanded still further into nearly all states and territories. Since the Board's recommendation, the American Academy of Pediatrics (1998), the Task Force on Community Preventive Services (Bilukha, et al, 2005), the National Academy of Sciences (Chalk & King, 1998), the National Governors Association (2002), and the World Health Organization (Butchart, Harvey, Mian, & Furniss, 2006) have endorsed home visiting to prevent child maltreatment and promote enhanced functioning and well-being for children and families.

However, previous meta-analyses and literature reviews summarizing the effects of home visiting programs across a wide range of outcomes suggest mixed, modest findings depending on the programs and outcomes examined (Bilukha et al., 2005; Gomby, 2005; Guterman, 1999; Howard & Brooks-Gunn, 2009; Layzer, Goodson, Bernstein, & Price, 2001; Sweet & Appelbaum, 2004). A recent review funded by the U.S. Department of Health and Human Services (HHS), the Home Visiting Evidence of Effectiveness (HomVEE) review, identified

nine models that met the HHS criteria for effectiveness (Avellar & Paulsell 2011). Across and even within these “evidence-based” models, the findings have been inconsistent, leaving gaps in knowledge about the effectiveness of home visiting across various outcome domains. The mixed findings may be due to the design of the program, the match between program components and expected outcomes, the quality of implementation of the program, or the quality of the evaluation. Quality of implementation can include the extent to which the program was implemented with fidelity (Mowbray et al. 2003), the manner in which the program was delivered, as well as whether the program incorporates evidence-based practices related to service delivery, such as the intensity of services, the skills of home visitors, and the content of the home visiting curriculum (Gomby, 2005). Alternatively, the differences in effects might simply be explained by the variation in the way home visiting programs are comprised and delivered, including variation in their goals, timing of enrollment, population served, standardization or prescriptiveness, content, delivery techniques, intensity, duration, qualifications of home visitors, and/or supervisory structure.

Further investigation is warranted to determine what factors contribute to the inconsistent findings and if outcomes could be stronger and more consistent if the quality of programs were improved. This is particularly important in an environment where funding for health and human services programs is limited, budget cuts are widespread, and programs are being held accountable for producing positive outcomes and cost savings.

Best practice recommendations concerning home visiting either take the form of suggesting wholesale adoption of models that have been shown to be effective (e.g., HomVEE (homevee.acf.hhs.gov), Promising Practices Network (2010)), or as suggestions for particular approaches that are based on clinical impression (e.g., recommendations for a particular schedule of home visits). Although model ratings are important for guiding practitioners in adopting a program model, any particular program may not include the most effective combination of components to produce maximum results for a given population or community. In addition, as MIECHV impels increased focus on outcomes, the more pressing question is how to best build the effectiveness of a program model or enhance models that may already be in operation: what elements (e.g., content, service delivery methods) in home visiting programs

are the most important for program success? The components associated with effective programs have rarely been examined. Several reviews have examined the relationship between select program components and parent and child outcomes (e.g., Sweet & Appelbaum, 2004), though none of the reviews have fully disassembled home visiting programs into individual components. Therefore, the purpose of the current study was to examine the effectiveness of home visiting programs by determining which individual home visiting program components have the most power to improve key parent and child outcomes.

Similar questions about the effectiveness of parent training programs led to a meta-analytic review of components associated with parent training programs (Kaminski, Valle, Filene, & Boyle, 2008). The meta-analysis, which reviewed studies published between 1990-2002, examined components of parent training programs designed to enhance the behavior and adjustment of children aged 0-7 years. Characteristics of program content and service delivery methods were used to predict effect sizes on measures of parenting skills and behaviors and children's externalizing behaviors. Results suggested that after controlling for differences attributable to research design, program components consistently associated with larger effects included increasing positive parent-child interactions and emotional communication skills, teaching parents to use time out and the importance of parenting consistency, and requiring parents to practice new skills with their children during parent training sessions.

This study used the same analytic approach as the earlier parent training program meta-analysis. A component analysis employing meta-analytic techniques was used to synthesize the results of published evaluations of home visiting programs for pregnant women and families with children birth to age 3. Characteristics of program content and service delivery were used to predict effect sizes on measures of key outcomes such as child and parent functioning, health, and well-being. The results have implications for the selection and strengthening of existing home visiting programs that are already labeled efficacious or effective, as well as in the development of innovative home visiting programs. Specifically, home visiting programs are likely to become more potent by adding components associated with larger effects and by changing or omitting components associated with smaller or effects. A component-oriented

approach to program improvement requires fewer resources, less time for staff retraining, and overcomes other obstacles to adopting an entirely new program (Barth et al., 2005).

II. Research Design and Methodology

The literature search parameters and inclusion criteria were selected to align with Pew's focus on prenatal and early childhood home visiting and to ensure a set of evaluations with a common set of outcomes, but with enough variability to investigate relationships between program characteristics and program effects.

Literature Search

In September 2010, the PsycINFO and MEDLINE databases were searched for literature published between 1979 and 2010 regarding evaluations of home visiting programs. Search strings included terms related to program descriptors, program targets, evaluation descriptors, and program outcomes. The initial search was designed to be very broadly inclusive of home visiting programs.

The original literature search resulted in 3,252 unduplicated studies. Of these, 49 were literature reviews and meta-analyses, from which we identified additional relevant publications. A secondary search was conducted on author names that appeared in the original search results at least twice. In addition, unduplicated studies from HomVEE were examined. These follow-up strategies and the initial search results provided 5,127 total abstracts for possible inclusion.

Document Review and Retrieval

Inclusion criteria were selected to define the scope of the meta-analysis to evaluations of home visiting programs targeting pregnant women and families with children birth through age 3. Studies were limited to those published as a journal article, book, or book chapter. As this study was not limited to national home visiting programs that are currently operating, it would have been difficult to obtain unpublished documents from all home visiting programs documented in the literature (e.g., dissertations). In addition, there is no systematic way to

examine the differences between the unpublished studies that were and were not obtained, precluding an examination of possible biases due to the inconsistent availability of unpublished documents. Finally, many of the unpublished documents (e.g., presentations) provide limited information about program components.

The review was limited to programs implemented in the U.S. to increase the generalizability of the findings for U.S. populations (the focus of Pew's Home Visiting Initiative) and those that used home visiting as a primary delivery strategy. Programs could be implemented in any language, but the study needed to be published in English.

Home visiting programs that were available to all pregnant women or families (i.e., universal home visiting programs) and at-risk families (i.e., selective home visiting programs) were the focus of this study. Home visiting programs that target families with identified problems (i.e., tertiary home visiting programs) were excluded. For example, family preservation programs, programs that provide services to families with a substantiated child maltreatment case or have had their child removed, were excluded.

Home visiting programs needed to be implemented for a sufficient duration to expect change. For example, some HMOs and hospitals require a brief, health-focused home visit from a nurse after the early discharge of a newborn baby and its mother. Programs like this, which provide fewer than four home visits, are unlikely to have a significant impact on long-term behavior change and were thus excluded from this study (Olds & Kitzman, 2003). The initial inclusion criterion related to dose of the home visiting intervention involved scrutinizing any program with fewer than 4 visits. As a result, we excluded four studies as not in alignment with the population of home visiting programs about which we intended to generalize our results. Three of those programs included only one home visit, and one program included only two home visits.

Criteria were also selected to ensure that evaluation results could be generalized to a broad population of normally developing children and parents. Home visiting programs that provide services to families with "typically" developing children and low birthweight infants were included (e.g., Infant Health and Development Program). This study excluded programs that targeted parents or children with developmental disabilities (e.g., Part C programs) or who

have experienced bereavement, and children with a chronic illness, a feeding disorder, or a traumatic brain injury because the programs provide specialized services that do not inform the general field of home visiting. Infant massage programs and kangaroo care programs were also excluded.

The 5,127 abstracts identified in the literature search were screened by two project staff to determine eligibility for the meta-analysis. A study was excluded at this point only if both staff agreed that it did not meet at least one of the inclusion criteria (n=4,602). The remaining 525 documents were retrieved and reviewed. To be able to calculate a traditional effect size, the standardized difference between outcomes scores of the “treatment” group and the “control” group needed to be calculated. As such, studies that utilized a single-case evaluation method, lacked a control or comparison group, or did not contain enough statistical information to calculate effect sizes (e.g., standard deviations or other critical statistical information) were excluded. The resulting 126 studies were appropriate for meta-analysis.

Data Abstraction

Based on recommendations for conducting meta-analysis of evaluation studies (e.g., Wilson and Lipsey, 2001), coding forms were designed to capture information about the document, home visiting program, participants, evaluation design, outcome measures, and statistical results. Coding forms from the Kaminski et al. (2008) study were adapted to reflect home visiting programs. Variables were operationalized in a final automated template and coding manual. When an article referred to a secondary study or article for additional program information, that document was obtained and the information was coded. Before coding independently, data abstractors were trained to criteria of coding three consecutive articles with greater than 90% accuracy in each of the broad categories of interest.

Data elements characterizing the intervention consisted of items related to the home visiting program’s location, year implemented, timing of enrollment, type, dosage, content, and delivery. Information about participants included household income and the number, age, education level, gender, and ethnicity of parents or children. Exhibit 2.1, Program Content

Variables, and Exhibit 2.2, Program Delivery Variables, describes the variables coded for program content and delivery components, respectively.

Exhibit 2.1: Program Content Variables (Coded as Present or Absent)

<i>Parenting Content</i>	<i>Description of Information or Skills Taught</i>
Child development knowledge	General knowledge about child development
Developmental norms and expectations	Typical child development and behavior
Developmentally appropriate care and routines	Developmentally appropriate activities related to satisfying a child's primary needs (e.g., diapering, dressing, bathing)
Medical care	Appropriate medical care (e.g., obtaining immunizations according to AAP schedule)
Home environment	Home environment conducive to child safety and development
Safe or clean home environment	Home cleanliness, safety, accident prevention, and first aid
Stimulating home environment	Organizing environment to promote development (e.g., books)
Nutrition and feeding	Age-appropriate nutrition and feeding (e.g., breastfeeding, starting solids)
Recreation	Child-related play or recreation (e.g., planned activities training)
Communication, responsiveness, and sensitivity	Responding sensitively to child's emotional and psychological needs (e.g., soothing)
Discipline-related communication	Giving instructions, stating expectations and/or consequences, etc.
Emotional or relationship-related communication	Involves listening or communication skills unrelated to discipline or rules
Responsiveness, sensitivity to cues, or nurturing	Providing developmentally appropriate physical contact and affection
Discipline or behavior management	Using age-appropriate discipline or management
Attitudes about use	Changing the parent's perception of the utility of various parenting techniques
Attributions about child behaviors	Identifying common misperceptions about child behavior such as interpretation of undesirable behavior as intentional or hostile
Monitoring and supervision	Ensuring appropriate supervision for the child's activities
Reinforcement and punishment procedures	Providing age-appropriate reinforcement and punishment
Positive reinforcement	Use of rewards or other positive consequences for good behavior

<i>Parenting Content</i>	<i>Description of Information or Skills Taught</i>
Time out from positive reinforcement	Time out is a specific response cost procedure that involves removing the child from all immediate reinforcement
Problem solving	Learning a specific problem-solving process to generate strategies for dealing with child behavior problems
Consistent responding or generalization	Consistent responding to child misbehaviors across different settings, situations, children, or caregivers
Promotion of child's socio-emotional development	Information to foster children's positive adjustment and well-being including positive self-esteem, adaptability, creativity, and interpersonal comfort
Promotion of child's cognitive development	Includes incidental teaching, in which the caregiver uses naturally occurring opportunities to increase child language or knowledge by describing aspects of the child's activity, asking questions, commenting on events in the child's environment
Promotion of child's language development	Activities that stimulate language or literacy skills
Promotion of child's academic skills	Activities related to school readiness, grades, etc.
Promotion of child's physical development	Activities that stimulate physical growth and motor development
<i>Non-Parenting Content</i>	<i>Description of Information or Skills Taught</i>
Home management	Focus on organization of home routines (e.g., meal planning and preparation)
Economic management or financial sufficiency	Strategies related to economic management or financial sufficiency (e.g., budgeting)
Public assistance	Includes information on obtaining or being directly taught to obtain housing, food, SNAP, WIC, TANF, AFDC, welfare
Concrete or instrumental assistance	Program directly provides resources to address basic needs, including transportation services, respite or child care, grocery certificates, or medical services
Finding alternate caregivers	Finding child care or respite (i.e., not directly provided by program)
Parental relationships	Enhancing parental relationship (e.g., communication between parents)
Parental health	Parent health (e.g., physical health)
Parental substance use	Substance use issues (e.g., educated on health consequences) or provided substance abuse services for their own substance use/abuse <i>by home visiting program</i>
Parental mental health	Taught about mental health issues or provided with mental health services by home visiting program
Prenatal health	Prenatal health and behavior (e.g., diet, nutrition, prenatal care, fetal development)

<i>Non-Parenting Content</i>	<i>Description of Information or Skills Taught</i>
Self-, stress-, or anger-management	Stress-, anger-, or self-management (e.g., skills related to self-sufficiency, such as time management)
Support group	Support group is provided directly by the program
Social support or social network (<i>need for</i>)	Importance of and how to access social support (e.g., social isolation of parents/families, and teaching parents how to identify and access support groups or develop a support network)
Environment or neighborhood safety	Teaching family risk factors in neighborhood and how to avoid unsafe situations
Adult literacy or academic achievement	Focus on obtaining GEDs, training, or other education, including literacy
Career skills	Focus on training or other education related to employment, including career development activities
Employment (not skill-related)	Focus on obtaining employment
Problem solving	Parents are taught problem-solving strategies
Goal setting	Explicitly states that “goal setting” was done/taught (not general service plan)
Child-related supplies	Provision of child-related supplies (e.g., books, toys)
Case management	Identifying and linking families to other services and resources (i.e., directly contacting, making the appointment, other hands-on assistance such as helping with forms or eligibility criteria, advocacy)

Exhibit 2.2: Program Delivery Variables (Coded as Present or Absent)

Home visiting program type	Coded as home visiting program as a stand-alone program (e.g., all information and training during home visits) or home visiting program in combination with other services (sub-codes: center-based early childhood education, pediatric practice, parent group, etc.)
Level of intervention	Universal or selective (coded risk factors)
Target population	Type of caregiver (e.g., biological mother)
Timing of enrollment	Prenatal, infancy, toddlerhood
Type of community	Urban, inner city, rural
Expected and actual intensity and duration of program	Expected and planned number, duration, and frequency of sessions; duration of sessions over time
Standardized curriculum	Use of an established curriculum, curriculum adapted to family needs, or no established curriculum used.
Visual or written materials	Use of written or visual materials
Modeling (live or videotape)	Parenting behavior is demonstrated or taught using demonstration (taped or live)
Rehearsal, role-playing, or practice	Involves rehearsal, practice, or role playing of parenting techniques or behaviors
Feedback provided	Home visitor provides feedback about parent behavior
Parent with own child	Parent practice, rehearsal, or role-play with own child
Homework assignments or home practice	Practice of parenting skills with child in the home/community outside of home visit
Teacher or school collaboration	Program fosters parents and teacher consultation, communication of information, and collaboration
Home visitor discipline	Professional (e.g., nurse, psychologist, social worker), paraprofessional, peer mentor
Staff training and supervision	Information about training and supervision content and amount
Staff caseload	Information about expected and actual caseload
Match between home visitor and client: language	Purposive matching of home visitor and client on spoken language
Match between home visitor and client: race/ethnicity	Purposive matching of home visitor and client on race/ethnicity
Language program delivered in	English, Spanish, other

Ten categories of parent outcome measures were defined: parent knowledge and information acquisition; parenting attitude or value change; parenting behavior or skill acquisition; parenting self-efficacy; parenting stress; parent mental health and well-being; parent-child interaction; family climate; and prenatal outcomes. Seven categories of child outcome measures were defined: child externalizing, hyperactive, oppositional, or problem behavior; child education and cognitive development; child maltreatment; child physical health, illness, and injury; child physical growth; long-term child externalizing or internalizing behaviors, sexual activity, substance use and delinquent behaviors; and birth outcomes. An effect size was not calculated for outcome measure domains reporting fewer than three studies: parental distress, child internalizing/ anxiety/ depression, child substance use/abuse, child witness to violence, child pro-social behavior, and child victim of violence (see Exhibit 3.1, Mean Effect Sizes and Confidence Intervals for Specific Outcomes at Immediate Post-Test). For each reported outcome measure, the method of data collection (e.g., survey, observation) and the reporter for that measure (e.g., home visitor, parent) were also coded.

Based on previous research, we expected effect size would be related to indicators of methodological rigor (Wilson & Lipsey, 2001). Potential threats to internal validity were examined to assess the extent to which the reported effect sizes reflect true treatment effects as opposed to variability in evaluation design or statistical methods. Four such threats include: (1) whether individual participants were randomly assigned to conditions or whether some other assignment procedure was implemented; (2) whether the initial equivalence of groups on outcome measures was assessed at baseline; (3) whether the comparison/control group received no treatment or an alternative treatment; and (4) whether home visiting was the primary service delivery strategy or whether home visits were conducted in conjunction with additional interventions (e.g., parent groups, pediatric practice, early childhood center).

Effect Size Calculation

The basis for all analyses reported herein is an effect size, which for the purposes of comparing program outcomes is a standardized unit of measure indicating the strength of program effects. Effect sizes can be calculated from a variety of reported analyses. For example, for program evaluations, Cohen's *d* is calculated as the difference in scores between the

treatment and comparison groups, divided by the pooled standard deviation (Hedges & Olkin, 1985). Larger positive effect sizes indicate greater differences between treatment and comparison groups, and thus positive program effects. Effect sizes approaching zero indicate smaller differences between treatment and comparison groups. Negative effect sizes occur when the comparison group exhibited more favorable outcomes than the treatment group. Using the software package Comprehensive Meta-Analysis 2 (Borenstein, Hedges, Higgins & Rothstein, 2005), effect sizes equivalent or analogous to Cohen's d can be calculated from other data reporting methods including categorical data (e.g., percent of participants in each group with a particular outcome), correlations, and odds ratios. Thus, the set of effect sizes obtained from our set of studies is inclusive of a wide range of reported analyses. In Kaminski et al., (2008), program effects reported as covaried or adjusted analyses were excluded. Given recent advances in meta-analytic methods, and the desire to include several national home visiting programs that routinely publish only adjusted means, covaried effect sizes were included in this study. Lipsey (personal communication, 2011) confirmed that adjusted effect sizes can be analyzed with unadjusted effect sizes, if differences between unadjusted and adjusted effect sizes are modeled statistically and examined for impact on the results. Once effect sizes were calculated, they were exported into SPSS v19 for analyses using freely available macros for multivariate analyses of effect sizes (Lipsey & Wilson, 2001; Wilson, 2005). Because smaller sample sizes can produce biased effect sizes, Hedges' (1983) small sample correction was applied to all effect sizes prior to analysis. Following meta-analytic convention, we accounted for differences in studies' ability to accurately reflect population differences, by weighting each effect size by the inverse of the variance (Hedges & Olkin 1985). All effect sizes reported are weighted effect sizes.

An important consideration in meta-analytic methods is independence of the effect sizes included in any particular analysis. For example, if a study reports the total score from the HOME Inventory and also scores from each of the subscales, including each of the reported effect sizes duplicates the information obtained from the data from a single outcome measure and violates the independence requirement. Similarly, if two studies report effects on the same outcome measure at the same time point using the same sample, both should not be included

in the same analyses. As in Kaminski et al., there were four types of potential non-independence encountered.

1. When a single study reported outcomes on a particular measure and time point by subsamples (e.g., outcomes were reported separately for mothers above and below a certain income level), results for the subsamples were averaged to produce a single effect size on that measure at that time point.
2. When a single study reported outcomes on multiple measures in the same coded category (e.g., Safe/clean home environment), those measures were averaged together to produce a single effect size for that study, time point and measure category. In cases where a full scale score and subscale scores within the same measure category were reported, only the full scale was maintained in the analyses.
3. When a single study included three or more groups, the effect size most closely attributable to the home visiting program itself was selected. For example, in a three-arm study comparing a home visiting program, a home visiting program plus additional services, and a no-treatment control group, effect sizes for the home visiting program (alone) compared to the no-treatment control group were selected for analysis.
4. When two or more studies reported the same outcomes at the same time points on a common sample, only one set of outcomes was used. In some instances entire studies were thus dropped from the analyses; in most instances, only some of the outcomes in a particular study overlapped with another study so individual outcomes were dropped.

Analytic Plan

The general analytic strategy from Kaminski et al., (2008) was adapted here to investigate the key components of home visiting programs. First, we examined program effects at the broadest level by aggregating to a single effect size at immediate post-test per published study, allowing us to make statements about the overall effectiveness of home visiting programs on any reported outcome. We next calculated the Q test of homogeneity of effect sizes to confirm the substantial variability we expected to have been masked by the overall effect size aggregation and provide justification for more finer-grained analyses. Based on Kaminski et al.'s results showing significant variability according to category of outcome measure (e.g., parent knowledge, parent behavior change, child physical health), we investigated differences in mean effect size at post-test when aggregating across multiple

measures (e.g., three different parent behavior measures) to obtain a single effect size per outcome category per study. Similarly, we examined the influence of characteristics of the evaluation designs (e.g., use of random assignment), as indicators of methodological rigor.

As stated in the original research plan, the remaining analyses were determined by the extent of data available on outcomes of high interest and relevance for policy and practice decisions about home visiting programs. Following Kaminski et al., we began by looking at the immediate post-test results, specifically the outcome measure categories with a sufficient number of studies to support multivariate analyses to determine program characteristics most strongly associated with larger program effects. Only two broad outcome categories (Parent Behavior Change and Child Cognitive Development and Language) were included in sufficient numbers of studies at immediate post-test (30 and 21 studies, respectively) to be considered for component analyses. Using Wilson's SPSS macros (Lipsey & Wilson, 2001; Wilson, 2005), we next conducted inverse-variance weighted analyses of variance to examine the relationship between individual program characteristics and the reported effect size. These analyses are analogous to conducting a oneway analysis of variance with two categories – i.e., comparing the average effect size of programs defined by a particular characteristic with the average effect size of programs lacking that particular characteristic. We next investigated the robustness of program characteristics in predicting effects on Parent Behavior and Child Cognitive Development and Language by including each program component in inverse-variance-weighted linear regressions, controlling for the indicators of methodological rigor.

Given that only two outcome categories provided sufficient numbers of studies to conduct component analyses, examining other policy-relevant outcomes reported by home visiting programs required a slightly different approach. Rather than selecting a time point and relying on only the outcomes reported at that time, we next selected particular outcomes of interest and examined those for all time points at which they were reported. For example, it is critical to understand these programs' impact on birth outcomes such as prematurity or low birthweight at any point in program implementation they might have occurred. Four categories of outcomes were selected for this set of analyses: birth outcomes, maternal life course outcomes (e.g., receipt of welfare, being partnered or married, employment/education,

subsequent pregnancies and births), child maltreatment outcomes, and child health, illness and injury outcomes. For these categories, when a study included measurement of the same outcome at two or more time points, the last time point (i.e., when participants were oldest) was selected for the analyses to assure independence of effect sizes. Component analyses of these outcomes followed the pattern above, with inverse-variance weighted ANOVAs first and inverse-variance-weighted linear regressions (controlling for methodological rigor) second.

The long-term impact of home visiting programs on child outcomes was similarly investigated. For these analyses, child outcomes (e.g., behavior problems, mental health, academics, delinquency, risky behaviors) assessed as a follow-up measure (as defined by the published evaluation) were selected for analysis. The same ANOVA and linear regression analytics were computed on this broad category. Due to the notably large range of length of follow up (1 month to 19 years post intervention), length of follow-up period was used as an additional control variable in the linear regressions.

All analytics described above were conducted as fixed-effect models, which allow maximum variability among studies to be available for prediction by the components. However, fixed effect models reflect an assumption that there is a single “true” effect size among the studies, with variability among effect sizes due to sampling error (Borenstein, Hedges, Higgins & Rothstein, 2010). In other words, a fixed-effect analysis of home visiting assumes that all home visiting programs are approximately equally effective, and any variation in reported effects is due to characteristics of the study sample. While this might be true even in the face of the marked variability in effects previously documented (Bilukha et al., 2005; Gomby, 2005; Guterman, 1999; Howard & Brooks-Gunn, 2009; Layzer, Goodson, Bernstein, & Price, 2001; Sweet & Appelbaum, 2004), it appears more likely that the “true” effect varies due to study design and program characteristics. This would be consistent with a random-effects model, which is more statistically conservative and assumes that variability among effect sizes is due to differences in characteristics of the participants, programs, and evaluations (Borenstein et al., 2010). We thus conducted each of the regression analyses a second time as random effects models estimated via iterative maximum likelihood. The results from these final random-

effects models represent the most robust study and program characteristics for each outcome analyzed here.

III. Results

Overall Analyses: Immediate Post-Test

The overall weighted effect size of the final set of 55 studies across all coded outcomes (aggregated to a single effect size per study) at post-test was .15 (95% CI = .12 - .19), reflecting a significant mean difference between treatment and comparison groups at immediate post-test of approximately one sixth of a standard deviation, favoring the treatment group. The 366 effect sizes ranged from – 0.07 to 3.23. The Q test of homogeneity of effect sizes was significant ($Q[54] = 174.21, p < .001$), indicating marked variability in reported effect sizes across studies. This variability warranted examination of potential moderators of effect size.

Differences by Outcome Measure Category. We first investigated variability in effect sizes according to outcome measure categories (see Exhibit 3.1, Mean Effect Sizes and Confidence Intervals for Specific Outcomes at Immediate Post-Test). For six categories (parenting attitude and value change; parenting behavior and skill acquisition; parent life course; child cognitive development and language; child physical health, illness and injury; and child social competence), effect sizes were positive and significantly different from zero, indicating that on average, the home visiting programs included in this review were associated with positive effects at immediate post-test on these outcomes. Because different sets of studies contributed effect sizes to different outcome category, we cannot perform statistical inference tests of significance across categories. However, visual inspection revealed that the average effect size for parenting attitude or value change (.36) was the largest for parent outcomes, followed by parent life course (.23) and parenting behavior change or skill acquisition (.19), representing significantly better outcomes for intervention families than control families. Among the child outcome measures, child cognitive development and language and child physical health, illness and injury appeared to have the highest average effect sizes (.21 and .20, respectively). The average effect sizes for the remaining categories (parent knowledge and information acquisition; parenting self-efficacy; parenting stress; parent

mental health and well-being; parent-child interaction; family climate; prenatal outcomes; child externalizing, hyperactive, oppositional, and problem behaviors; child maltreatment; child physical growth) were not significantly different from zero, indicating that families in the control group and in the treatment group exhibited those outcomes at about the same level at immediate post-test. Two categories of outcomes provided a sufficient number of studies with which to examine within-category variability due to program content and delivery characteristics: parenting behavior change and skill acquisition and child cognitive development and language.

Exhibit 3.1: Mean Effect Sizes and Confidence Intervals for Specific Outcomes at Post-Test

Outcome Category	Number of Studies	Mean Effect Size	95% CI	Range of Effect Sizes
Parent knowledge and information acquisition	6	.12	(-.01 - .26)	-.18 - 3.51
Parenting attitude and value change	6	.36 ^a	(.16 - .56)	-.18 - 1.06
Parenting behavior change and skill acquisition	30	.19 ^a	(.14 - .24)	-.14 - 3.95
Parenting self-efficacy	3	.03	(-.13 - .19)	-.06 - .16
Parenting stress	3	-.01	(-.16 - .13)	-.13 - .05
Parent mental health and well-being	17	.05	(-.01 - .10)	-.75 - .77
Parent-child interaction	5	.05	(-.07 - .17)	-.10 - .71
Family climate	3	.05	(-.07 - .17)	-.02 - .08
Maternal life course	9	.23 ^a	(.13 - .33)	.06 - 1.10
Prenatal outcomes	4	.09	(-.03 - .21)	.04 - .78
Child externalizing, hyperactive, oppositional, and problem behaviors	7	.01	(-.07 - .09)	-.55 - .33
Child cognitive development and language	21	.21 ^a	(.15 - .26)	-.32 - 2.51
Child maltreatment	8	.02	(-.08 - .11)	-.33 - 3.57
Child physical health, illness and injury	13	.20 ^a	(.14 - .26)	-.13 - .90
Child physical growth	5	.02	(-.09 - .12)	-.02 - .50
Child social competence	4	.20 ^a	(.06 - .33)	.14 - .54

^a Significant at p<.004.

Differences by Research Design. Six indicators of methodological rigor in the evaluation design were examined to determine the extent to which effect sizes reflected the impact of home visiting programs rather than methodological influences or biases. Using available macros for SPSS (Wilson, 2002), inverse-variance-weighted oneway ANOVAs were conducted on overall study effect sizes with each of the six independent variable indicators of rigor. As shown in Exhibit 3.2, Mean Post-Test Effect Sizes Associated with Indicators of Methodological Rigor, three of six variables predicted significant differences in effect sizes at post-test.

Exhibit 3.2: Mean Post-Test Effect Sizes Associated with Indicators of Methodological Rigor*

Rigor Indicator	Percent of studies	Mean ES (95% CI)
Randomly assigned individuals?		
Yes	75%	.13 (.10 - .17) ^a
No	25%	.21 (.15 - .27) ^a
Initial equivalence assessed?		
Yes	85%	.14 (.11 - .18)
No	15%	.23 (.15 - .31)
True “no treatment” control group?		
Yes	51%	.10 (.05 - .14) ^a
No	49%	.24 (.19 - .29) ^a
Home visiting evaluated as a stand-alone program?		
Yes	62%	.11 (.07 - .15) ^a
No	38%	.24 (.18 - .29) ^a
Were any reported results covaried?		
Yes	22%	.15 (.08 - .23)
No	78%	.15 (.12 - .19)
Were analyses conducted as intent-to-treat?		
Yes	70%	.11 (.07 - .15) ^a
No	30%	.22 (.12 - .32) ^a

* N = 54 studies; 384 effect sizes aggregated to one effect size per study at immediate post-test.

^a Means for “yes” versus “no” were significantly different in an inverse-variance-weighted oneway ANOVA ($p < 0.01$).

In studies that employed random assignment of individuals to treatment conditions, reported effect sizes were significantly smaller than in studies that employed a different strategy (i.e., randomly assigning groups, or not employing any random assignment). Studies with a true no-treatment control/comparison group reported significantly smaller effect sizes than studies in which the control/comparison group received alternate treatment or services. When home visiting programs were tested as a stand-alone intervention, effect sizes were significantly

smaller than when the “treatment group” effect size represented the home visiting program of interest plus other services (e.g., parent groups, home visiting plus services as usual). Finally, studies that employed intent-to-treat analyses (i.e., using all available data from participants and analyzing based on initial group assignment) reported significantly smaller effect sizes than those that did not. Studies that assessed initial equivalence of participants at baseline, and studies that reported covaried analyses produced similar effect sizes as those studies that did not.

Fixed-Effect Component Analyses: Immediate Post-Test

Results from the fixed-effect analyses for all outcome categories are presented here first, to provide a full account of all analyses that were conducted. Results from random-effects analyses are presented in a subsequent section, beginning on p. 25.

Parenting Behavior and Skills. In separate inverse-weighted analyses of variance, fourteen program components were significantly associated with effect sizes on parenting behavior and skills outcomes at immediate post-test (noted with superscript ^a in Exhibit 3.3, Effect Sizes and Predictors of Parenting Behavior and Skills Outcomes). Nine of those fourteen components (Child Development Knowledge; Developmental Norms and Expectations; Nutrition and Feeding; Responsiveness, Sensitivity to Cues, or Nurturing; Discipline or Behavior Management; Parental Relationships; Parental Health; Parental Substance Use; and Parental Mental Health) were each predictive of larger program effects. The remaining five significant components (Program Offers Home Visiting Only, Promotion of Child’s Socio-Emotional Development, Finding Alternate Caregivers, Parent Support Group and Need for Social Support or Social Network) were each predictive of smaller program effects. Eighteen components (indicated by a superscript ^d and “N/A” in Exhibit 3.3) did not provide sufficient variability to be tested for relationships with parent behavior outcomes at post-test. The remaining components’ effect sizes were not significantly different from zero, and thus did not differentiate between programs that were more or less successful in changing parent behaviors at post-test.

Parenting behavior and skill effect sizes were next regressed separately onto each component, controlling for four threats to internal validity. Although two additional threats

were examined in this study (Exhibit 3.2, Mean Post-Test Effect Sizes Associated with Indicators of Methodological Rigor), they were not included in the regression analyses. The intent-to-treat variable was significant, but was missing for 32% the studies, which would further limit the number of studies for the main analyses of interest. Whether or not reported results reflected covaried analyses made very little difference in terms of overall effect size, so was not added to the analyses here. To address the potential that self-reporting bias influenced effect sizes for programs that relied solely on parent's self-report of their parenting behavior, a fifth control variable was included in the regressions for parenting behaviors and skills only. This dichotomous variable distinguished between studies that only used parents as reporters of their own behaviors and studies that also or alternatively used other reporters of parents' behaviors (e.g., home visitors, research assistants).

Ten components significantly predicted parenting behavior when methodological rigor and parent self-report were controlled (noted with superscript ^b in Exhibit 3.3, Effect Sizes and Predictors of Parenting Behavior and Skills Outcomes). Four of those ten components produced significantly positive coefficients, indicating that their presence was reliably associated with more successful programs: Nutrition and Feeding, Parental Relationships, Parental Substance Use, and Parental Mental Health. Six of the ten components resulted in significant negative coefficients, indicating that their presence was reliably associated with less successful programs: Safe or Clean Home Environment, Promotion of Child's Cognitive Development, Promotion of Child's Language Development, Promotion of Child's Socio-Emotional Development, Need for Social Support or Social Network, and Goal Setting.

Exhibit 3.3: Effect Sizes and Predictors of Parenting Behavior and Skills Outcomes

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
Program Type			
Program Offers Home Visiting Only	.11 (.04) ^a	.27 (.04) ^a	-.172
Universal home visiting program	.18 (.08)	.19 (.03)	.024
Child development knowledge			
Developmental norms and expectations	.22 (.03) ^a	.07 (.06) ^a	.101
Developmentally appropriate care and routines	.29 (.05) ^a	.14 (.03) ^a	.146
Medical care ^d	.16 (.05)	.20 (.03)	-.045
Component	N/A	N/A	N/A
Component			
Home environment	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
Safe or clean home environment	.19 (.04)	.18 (.04)	-.094
Stimulating home environment	.16 (.04)	.21 (.04)	-.221 ^b
Nutrition and feeding	.28 (.06)	.17 (.03)	-.011
Recreation ^d	.33 (.06) ^a	.15 (.03) ^a	.277 ^b
Parenting Content	N/A	N/A	N/A
Parenting Content			
Communication, responsiveness, and sensitivity	.19 (.04)	.18 (.04)	-.084
Discipline-related communication ^d	N/A	N/A	N/A
Emotional or relationship-related communication ^d	N/A	N/A	N/A
Responsiveness, sensitivity to cues, and nurturing	.31 (.05) ^a	.16 (.03) ^a	.104
Discipline and behavior management	.30 (.05) ^a	.15 (.03) ^a	.117
Attitudes about use ^d	N/A	N/A	N/A
Attributions about child behaviors ^d	N/A	N/A	N/A
Monitoring/supervision ^d	N/A	N/A	N/A
Reinforcement and punishment procedures	.41 (.15)	.18 (.03)	.136
Positive reinforcement	.41 (.15)	.18 (.03)	.136
Time out from positive reinforcement ^d	N/A	N/A	N/A
Problem solving ^d	N/A	N/A	N/A
Consistent responding or generalization ^d	N/A	N/A	N/A
Promotion of child's socio-emotional development	.12 (.04) ^a	.23 (.03) ^a	-.314 ^b
Promotion of child's cognitive development	.15 (.04)	.21 (.03)	-.228 ^b
Promotion of child's language development	.23 (.06)	.18 (.03)	-.232 ^b
Promotion of child's academic skills ^d	N/A	N/A	N/A
Promotion of child's physical development ^d	N/A	N/A	N/A
Alcohol, tobacco and other drug avoidance ^d	N/A	N/A	N/A

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
Non-Parenting Content			
Home management ^d	N/A	N/A	N/A
Economic management ^d	N/A	N/A	N/A
Concrete or instrumental assistance	.19 (.06)	.19 (.03)	-.121
Finding alternate caregivers	.08 (.05) ^a	.22 (.03) ^a	-.151
Parental relationships	.32 (.06) ^a	.16 (.03) ^a	.264 ^b
Parental health	.24 (.03) ^a	.12 (.04) ^a	.143
Parental substance use	.70 (.08) ^a	.13 (.03) ^a	.572 ^b
Parental mental health	.66 (.08) ^a	.13 (.03) ^a	.607 ^b
Intimate partner violence ^d	N/A	N/A	N/A
Self-, stress-, or anger-management	.18 (.09)	.19 (.03)	-.054
Support group	.17 (.04) ^a	.21 (.04) ^a	-.083
Social support or social network (<i>need for</i>)	.10 (.04) ^a	.29 (.04) ^a	-.512 ^b
Environment/neighborhood safety ^d	N/A	N/A	N/A
Problem solving	.17 (.04)	.20 (.03)	-.121
Goal setting	.13 (.05)	.21 (.03)	-.413 ^b
Child-related supplies	.19 (.05)	.19 (.03)	-.123
Case management	.18 (.03)	.32 (.10)	-.106
Program Delivery Methods			
Modeling (live or videotape)	.21 (.04)	.17 (.06)	.004
Rehearsal or role-playing	.26 (.06)	.17 (.03)	-.067
Parent with own child ^d	N/A	N/A	N/A
Homework assignments or home practice	.22 (.09)	.18 (.03)	.028
Home visitor is professional	.23 (.04)	.14 (.04)	.026
Match between home visitor and client: language	.22 (.07)	.18 (.03)	.010
Match between home visitor and client: race/ethnicity	.25 (.06)	.17 (.03)	.099
Standardized curriculum	.21 (.06)	.18 (.03)	-.032
Program delivered in language other than English	.15 (.04)	.22 (.04)	-.051

^a For these rows, effect sizes for programs “with” and “without” that component were significantly different in an inverse-variance-weighted oneway ANOVA ($p < 0.05$).

^b Standardized regression weight from inverse-variance-weighted multiple linear regression was significant ($p < 0.05$).

^c Controlled for indicators of methodological rigor (whether programs: randomly assigned individuals, examined initial equivalence of individuals, had a no treatment control group and whether the home visiting program was evaluated as a stand-alone program) and reliance on parent report.

^d Component could not be tested due to limited frequency (i.e., reported by almost all or almost none of the programs) in the sample.

Child Cognitive Development and Language Outcomes. In the inverse-variance-weighted oneway ANOVAs, nineteen program components were significantly associated with effect sizes on child cognitive development and language outcomes at immediate post-test (noted by superscript ^a in Exhibit 3.4, Effect Sizes and Predictors of Child Cognitive Development and Language Outcomes). Seven of the nineteen components (Developmental Norms and Expectations, Promotion of Child’s Socio-Emotional Development, Promotion of Child’s Cognitive Development, Promotion of Child’s Language Development, Promotion of Child’s Physical Development, Parent Support Group, and Problem-Solving) were each predictive of larger program effects. Twelve of the nineteen components (Program Offers Home Visiting Only; Developmentally Appropriate Care and Routines; Medical Care; Safe or Clean Home Environment; Communication, Responsiveness, or Sensitivity; Finding Alternate Caregivers; Parental Health; Adult Literacy or Academic Achievement; Case Management; Modeling; Professional Home Visitor; and Delivery of Program in Language other than English) were each predictive of smaller program effects. Six other components of interest for this outcome category were not tested due to limited variability among this set of programs (indicated by a superscript ^d and “N/A” in Exhibit 3.3). The remaining components’ effect sizes were not significantly different from zero, and thus did not differentiate between programs that were more or less successful in changing child cognitive development and language outcomes at post-test.

Next, the child cognitive development and language outcomes were regressed separately onto each component, controlling for the four threats to internal validity (i.e., whether programs randomly assigned individuals, examined initial equivalence of individuals, had a no treatment control group, and whether the home visiting program was a stand-alone program). Twenty components significantly predicted child cognitive development and language outcomes at post-test when methodological rigor were controlled (indicated by superscript ^b in Exhibit 3.4, Effect Sizes and Predictors of Child Cognitive and Language Outcomes). Seven components produced significantly positive coefficients, indicating that their presence was reliably associated with more successful programs: Developmental Norms and Expectations, Promotion of Child’s Socio-Emotional Development, Promotion of Child’s

Cognitive Development, Promotion of Child’s Language Development, Promotion of Child’s Physical Development, Parent Support Group, and Problem Solving. Thirteen components resulted in significant negative coefficients, indicating that their presence was reliably associated with less successful programs: Program Offers Home Visiting Only; General Child Development Information; Developmentally Appropriate Care and Routines; Medical Care; Safe or Clean Home Environment; Communication, Responsiveness, and Sensitivity; Finding Alternate Caregivers; Parental Health; Adult Literacy or Academic Achievement; Case Management; Modeling; Home Visitor is a Professional; and Program Delivered in Language Other Than English.

Exhibit 3.4: Effect Sizes and Predictors of Child Cognitive Development and Language Outcomes

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
Program Type			
Program Offers Home Visiting Only	.07 (.04) ^a	.32 (.04) ^a	-.390 ^b
Universal home visiting program ^d	NA	NA	NA
Parenting Content			
Child development knowledge	.17 (.03)	.29 (.05)	-.305 ^b
Developmental norms and expectations	.33 (.08) ^a	.19 (.03) ^a	.201 ^b
Developmentally appropriate care and routines	.06 (.06) ^a	.27 (.03) ^a	-.296 ^b
Medical care	.01 (.07) ^a	.24 (.03) ^a	-.208 ^b
Home environment	.22 (.05)	.24 (.04)	-.182
Safe or clean home environment	-.02 (.07) ^a	.25 (.03) ^a	-.403 ^b
Stimulating home environment	.21 (.13)	.21 (.02)	-.002
Recreation ^d	N/A	N/A	N/A
Communication, responsiveness, and sensitivity	.10 (.05) ^a	.26 (.03) ^a	-.232 ^b
Responsiveness, sensitivity to cues, and nurturing	.35 (.10)	.19 (.03)	.163
Promotion of child’s socio-emotional development	.34 (.04) ^a	.09 (.04) ^a	.601 ^b
Promotion of child’s cognitive development	.34 (.04) ^a	.08 (.04) ^a	.658 ^b
Promotion of child’s language development	.39 (.06) ^a	.15 (.03) ^a	.537 ^b
Promotion of child’s physical development	.37 (.05) ^a	.15 (.03) ^a	.564 ^b
Non-Parenting Content			
Public assistance ^d	N/A	N/A	N/A
Concrete or instrumental assistance ^d	N/A	N/A	N/A
Finding alternate caregivers	.01 (.06) ^a	.27 (.03) ^a	-.356 ^b

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
Parental relationships ^d	N/A	N/A	N/A
Parental health	.09 (.05) ^a	.25 (.03) ^a	-.378 ^b
Parental substance use	.44 (.15)	.20 (.03)	.132
Parental mental health	.17 (.11)	.22 (.03)	-.079
Support group	.28 (.04) ^a	.10 (.04) ^a	.312 ^b
Social support or social network (<i>need for</i>)	.21 (.04)	.20 (.04)	.084
Adult literacy or academic achievement	.03 (.06) ^a	.25 (.03) ^a	-.249 ^b
Problem solving	.33 (.04) ^a	.13 (.04) ^a	.336 ^b
Child-related supplies ^d	N/A	N/A	N/A
Case management	.06 (.04) ^a	.38 (.04) ^a	-.831 ^b
Program Delivery Methods			
Modeling (live or videotape)	.08 (.05) ^a	.26 (.03) ^a	-.323 ^b
Rehearsal or role-playing	.20 (.08)	.21 (.03)	.108
Homework ^d	N/A	N/A	N/A
Home visitor is professional	-.07 (.15) ^a	.22 (.03) ^a	-.456 ^b
Match between home visitor and client: language	.12 (.09)	.22 (.03)	-.064
Match between home visitor and client: race/ethnicity	.19 (.09)	.21 (.03)	.032
Standardized curriculum	.10 (.08)	.21 (.03)	-.215
Program delivered in language other than English	.08 (.04) ^a	.31 (.04) ^a	-.596 ^b

^a "With" and "without" significantly different in an inverse-variance-weighted oneway ANOVA ($p < 0.05$).

^b Regression weight from inverse-variance-weighted multiple linear regression was significant ($p < 0.05$).

^c Controlled for indicators of methodological rigor (whether programs: randomly assigned individuals, examined initial equivalence of individuals, had a no treatment control group, and whether the home visiting program was evaluated as a stand-alone program).

^d Component could not be tested due to limited frequency (i.e., reported by almost all or almost none of the programs) in the sample.

Fixed-Effect Component Analyses: Other Outcomes and Other Time Points

Several meta-analyses of home visiting programs have examined end-of-treatment measures only (e.g., Sweet & Appelbaum, 2004). However, home visiting evaluations assess families over an extended period of time and over different phases of maternal and child development. Several studies have identified positive outcomes many years after services were provided to families (e.g., Olds et al., 1997), and others have evidenced significant effects before the intervention has ended (e.g., Duggan, Caldera, Rodriguez, et al. 2007). Though parent behavior and child cognitive outcomes are important outcomes for home visiting programs, several other outcome domains of home visiting programs have potential for policy

and practical impact but were not reported at immediate post-test for a sufficient number of studies to be further investigated. We thus examined the pool of available studies for five other outcomes of interest irrespective of time of measurement during or after program participation: maternal life course outcomes (e.g., welfare, repeat births, education or employment); birth outcomes (e.g., low birthweight, small for gestational age); child physical health, illness and injuries; child maltreatment; and long-term child outcomes (i.e., follow-up assessments of outcomes such as child externalizing or internalizing behaviors, sexual activity, substance use and delinquent behaviors). For four of these outcome categories (Maternal Life Course Outcomes; Birth Outcomes; Child Physical Health, Illness and Injuries, and Long-Term Child Outcomes) the average study effect size was significantly different from zero, indicating an overall positive effect on those outcomes by home visiting programs (see Exhibit 3.5, Mean Effect Sizes and Confidence Intervals for Specific Outcomes: Any Time Point).

Exhibit 3.5: Mean Effect Sizes and Confidence Intervals for Specific Outcomes: Any Time Point

Outcome Category	Number of Studies	Mean Effect Size	95% CI	Range of Effect Sizes
Maternal life course outcomes	25	.14*	(.09 - .19)	-.20 to 1.09
Birth outcomes	16	.08*	(.03 - .12)	-1.01 to .58
Child physical health, illness, and injuries	26	.08*	(.05 - .12)	-.21 to .83
Child maltreatment	23	.04	(-.01 - .09)	-.68 to 3.57
Long-term child outcomes	34	.09*	(.05 - .12)	-.64 to .80

*Significant at $p < .05$.

As with the post-test findings, results from the fixed-effect analyses for all outcome categories are presented here first, to provide a full account of all analyses that were conducted. Results from random-effects analyses are presented in a subsequent section.

Maternal Life Course Outcomes. Six program components were significantly associated with effect sizes on maternal life course outcomes in inverse-variance weighted oneway ANOVAs (indicated by superscript ^a in Exhibit 3.6, Effect Sizes and Predictors of Maternal Life Course Outcomes). Four components (Home Visitor is Professional; Match between Home Visitor and Client on Race and Ethnicity; Standardized Curriculum; and Program Delivered in Language other than English) were each predictive of larger program effects. Two components (Program Offers Home Visiting Only and Public Assistance) were each predictive of smaller

program effects. Four components of interest (indicated by superscript ^b in Exhibit 3.6, Effect Sizes and Predictors of Maternal Life Course Outcomes) did not provide sufficient variability to be included these analyses. The remaining components' effect sizes were not significantly different from zero, and thus did not differentiate between programs that were more or less successful in changing maternal life course outcomes at post-test.

Exhibit 3.6: Effect Sizes and Predictors of Maternal Life Course Outcomes

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
General Program Characteristics			
Program Offers Home Visiting Only	.12 (.03) ^a	.26 (.06) ^a	-.909 ^b
Universal home visiting program ^d	N/A	N/A	N/A
Non-Parenting Content			
Public assistance	.04 (.04) ^a	.19 (.03) ^a	-.361 ^b
Concrete or instrumental assistance ^d	N/A	N/A	N/A
Parental relationships	.25 (.07)	.12 (.03)	.354 ^b
Parental health	.15 (.03)	.11 (.06)	.026
Parental substance use	.13 (.11)	.14 (.02)	.029
Parental mental health	.22 (.05)	.12 (.03)	.248
Family planning or birth spacing	.19 (.04)	.11 (.03)	.306
Self-, stress-, or anger-management	.20 (.09)	.12 (.02)	.093
Support group	.01 (.10)	.15 (.02)	-.367 ^b
Social support or social network (<i>need for</i>)	.16 (.03)	.10 (.04)	.059
Problem solving	.12 (.03)	.17 (.04)	-.100
Goal setting	.17 (.04)	.12 (.03)	.077
Career Skills ^d	N/A	N/A	N/A
Case management	.13 (.03)	.18 (.06)	-.170
Program Delivery Methods			
Home visitor is professional	.17 (.03) ^a	.05 (.04) ^a	.560 ^b
Match between home visitor and client: language ^d	N/A	N/A	N/A
Match between home visitor and client: race/ethnicity	.43 (.10) ^a	.12 (.03) ^a	.489 ^b
Standardized curriculum	.27 (.07) ^a	.12 (.03) ^a	.267
Program delivered in language other than English	.34 (.07) ^a	.11 (.03) ^a	.400 ^b

^a "With" and "without" significantly different in an inverse-variance-weighted oneway ANOVA ($p < 0.05$).

^b Regression weight from inverse-variance-weighted multiple linear regression was significant ($p < 0.05$).

^c Controlled for indicators of methodological rigor (whether programs: randomly assigned individuals, examined initial equivalence of individuals, had a no treatment control group, and whether the home visiting program was a stand-alone program).

^d Component could not be tested due to limited frequency (i.e., reported by almost all or almost none of the programs) in the sample.

Next, the maternal life course outcomes effect sizes were regressed separately onto each component, controlling for the four threats to internal validity. Seven components significantly predicted maternal life course outcomes when indicators of methodological rigor were controlled (see Exhibit 3.6, Effect Sizes and Predictors of Maternal Life Course Outcomes). Four components produced significantly positive coefficients, indicating that their presence was reliably associated with more successful programs: Parental Relationships; Home Visitor is a Professional; Match between Home Visitor and Client: Race and Ethnicity; Program Delivered in Language other than English. Three components resulted in significant negative coefficients, indicating that their presence was reliably associated with less successful programs: Program Offers Home Visiting Only, Public Assistance, and Parent Support Group.

Birth Outcomes. Eight program components were significantly associated with effect sizes on birth outcomes in inverse-variance weighted oneway ANOVAs (indicated by superscript ^a in Exhibit 3.7, Effect Sizes and Predictors of Birth Outcomes). Five components (Public Assistance; Parental Health; Non-Parenting Problem-Solving; Match between home visitor and client on Race/ethnicity; and Program Delivered in Language other than English) were each predictive of larger program effects. Three components (Concrete or Instrumental Assistance, Case Management and Home Visitor is a Professional) were predictive of smaller program effects. Insufficient variability was provided by seven components of interest (indicated by superscript ^d and “N/A” in Exhibit 3.7, Effect Sizes and Predictors of Birth Outcomes), which therefore could not be tested. The remaining components effect sizes were not significantly different from zero, and thus did not differentiate between programs that were more or less successful in changing birth outcomes.

Next, birth outcomes effect sizes were regressed separately onto each component, controlling for the four threats to internal validity. Six components significantly predicted birth outcomes when methodological rigor were controlled (indicated by superscript ^b in Exhibit 3.7, Effect Sizes and Predictors of Birth Outcomes). Four components produced significantly positive coefficients, indicating that their presence was reliably associated with more successful programs: Parental Health; Prenatal Health; Match between Home Visitor and Client on Race/Ethnicity; and Program Delivered in Language other than English. Two components

resulted in significant negative coefficients, indicating that their presence was reliably associated with less successful programs: Standardized Curriculum and Home Visitor is a Professional.

Exhibit 3.7: Effect Sizes and Predictors of Birth Outcomes

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
General Program Characteristics			
Program Offers Home Visiting Only ^d	N/A	N/A	N/A
Universal home visiting program ^d	N/A	N/A	N/A
Non-Parenting Content			
Public assistance	.23 (.05) ^a	.03 (.03) ^a	.000
Concrete or instrumental assistance	.02 (.03) ^a	.11 (.03) ^a	-.145
Finding alternate caregivers	.08 (.04)	.07 (.03)	-.180
Parental relationships	.15 (.10)	.07 (.02)	.200
Parental health	.11 (.02) ^a	-.18 (.06) ^a	.665 ^b
Parental substance use ^d	N/A	N/A	N/A
Parental mental health ^d	N/A	N/A	N/A
Prenatal health	.09 (.03)	.04 (.04)	.510 ^b
Self-, stress-, or anger-management ^d	N/A	N/A	N/A
Support group ^d	N/A	N/A	N/A
Social support or social network (<i>need for</i>)	.05 (.04)	.09 (.03)	-.577
Problem solving	.30 (.05) ^a	.03 (.03) ^a	.185
Goal setting	-.01 (.05)	.09 (.03)	-.167
Child-related supplies	.12 (.09)	.07 (.02)	-.015
Case management	.07 (.02) ^a	.53 (.21) ^a	-.187
Program Delivery Methods			
Home visitor is professional	-.09 (.04) ^a	.14 (.03) ^a	-.810 ^b
Match between home visitor and client: language ^d	N/A	N/A	N/A
Match between home visitor and client: race/ethnicity	.37 (.07) ^a	.04 (.02) ^a	.445 ^b
Standardized curriculum	-.01 (.06)	.09 (.02)	-.914 ^b
Program delivered in language other than English	.37 (.08) ^a	.05 (.02) ^a	.416 ^b

^a "With" and "without" significantly different in an inverse-variance-weighted oneway ANOVA (p<0.05).

^b Regression weight from inverse-variance-weighted multiple linear regression was significant (p<0.05).

^c Controlled for indicators of methodological rigor (whether programs: randomly assigned individuals, examined initial equivalence of individuals, had a no treatment control group, and whether the home visiting program was a stand-alone program).

^d Component could not be tested due to limited frequency (i.e., reported by almost all or almost none of the programs) in the sample.

Child Physical Health, Illness, and Injury Outcomes. Eleven program components were significantly associated with effect sizes on child physical healthy, illness, and injury outcomes in inverse-variance weighted oneway ANOVAs (indicated by superscript ^a Exhibit 3.8, Effect Sizes and Predictors of Child Physical Healthy, Illness, and Injury Outcomes). Six components (Program Offers Home Visiting Only, Discipline and Behavior Management, Concrete or Instrumental Assistance, Finding Alternate Caregivers, Need for Social Support or Network, and Home Visitor is a Professional) were each predictive of larger program effects. Five components (Universal Home Visiting Program; Medical Care; Promotion of Child’s Physical Development; Parent Support Group; and Non-Parenting Problem Solving) were each predictive of smaller program effects. Two components (indicated by superscript ^d and “N/A” in Exhibit 3.8: Effect Sizes and Predictors of Child Physical Healthy, Illness, and Injury Outcomes) did not provide sufficient variability across programs measuring this outcome category to be used in analyses. The remaining components’ effect sizes were not significantly different from zero, and thus did not differentiate between programs that were more or less successful in changing child morbidity and mortality outcomes at post-test.

Next, the child physical health, illness and injury outcomes effect sizes were regressed separately onto each component, controlling for four threats to internal validity. Nineteen components significantly predicted child physical health, illness and injury outcomes when methodological rigor were controlled (indicated by superscript ^a in Exhibit 3.8, Effect Sizes and Predictors of Child Physical Healthy, Illness, and Injury Outcomes). Four components produced significantly positive coefficients, indicating that their presence was reliably associated with more successful programs: Universal Home Visiting Program; Home Visitor is a Professional; Finding Alternate Caregivers and Case Management. Fifteen components resulted in significant negative coefficients, indicating that their presence was reliably associated with less successful programs: General Child Development Information; Developmental Norms and Expectations; Developmentally Appropriate Care and Routines; Medical Care; Home Environment; Safe or Clean Home Environment; Stimulating Environment; Communication, Responsiveness, and Sensitivity; Promotion of Child’s Physical Development; Concrete

Assistance; Parent Support Group; Non-Parenting Problem Solving; Child-Related Supplies; Nutrition and Feeding; and Discipline and Behavior Management.

Exhibit 3.8: Effect Sizes and Predictors of Child Physical Health, Illness, and Injury Outcomes

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
General Program Characteristics			
Program Offers Home Visiting Only	.29 (.03) ^a	.02 (.02) ^a	.397 ^b
Universal home visiting program	.03 (.02) ^a	.17 (.02) ^a	.022
Parenting Content			
Child development knowledge	.07 (.03)	.12 (.02)	-.204 ^b
Developmental norms and expectations	.03 (.04)	.12 (.02)	-.279 ^b
Developmentally appropriate care and routines	.07 (.03)	.11 (.02)	-.277 ^b
Medical care	.00 (.04) ^a	.12 (.02) ^a	-.361 ^b
Home environment	.08 (.03)	.11 (.02)	-.290 ^b
Safe or clean home environment	.08 (.03)	.11 (.02)	-.290 ^b
Stimulating home environment	.02 (.05)	.11 (.02)	-.402 ^b
Nutrition and feeding	.13 (.09)	.09 (.02)	-.054 ^b
Communication, responsiveness, and sensitivity	.05 (.02)	.17 (.03)	-.158 ^b
Discipline and behavior management	.35 (.08) ^a	.09 (.02) ^a	.164 ^b
Promotion of child's physical development	.02 (.03) ^a	.17 (.02) ^a	-.298 ^b
Non-Parenting Content			
Public assistance	.05 (.05)	.09 (.02)	-.036
Concrete or instrumental assistance	.30 (.06) ^a	.08 (.02)	-.202 ^b
Finding alternate caregivers	.28 (.04) ^a	.06 (.02) ^a	.373 ^b
Parental health	.07 (.03)	.12 (.02)	.070
Parental substance use ^d	N/A	N/A	N/A
Parental mental health	.18 (.07)	.10 (.02)	.054
Self-, stress-, or anger-management ^d	N/A	N/A	N/A
Support group	.01 (.02) ^a	.30 (.03) ^a	-.465 ^b
Social support or social network (<i>need for</i>)	.16 (.03) ^a	.07 (.02) ^a	-.240
Problem solving	.02 (.03) ^a	.14 (.02) ^a	-.431 ^b
Goal setting	.18 (.05)	.09 (.02)	.091
Child-related supplies	-.02 (.11)	.10 (.02)	-.137 ^b
Case management	.10 (.02)	.02 (.06)	.193 ^b
Program Delivery Methods			
Home visitor is professional	.22 (.03) ^a	.01 (.02) ^a	.379 ^b
Match between home visitor and client: language ^d	N/A	N/A	N/A
Match between home visitor and client: race/ethnicity	-.05 (.08)	.09 (.02)	-.111

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
Standardized curriculum	.12 (.06)	.08 (.02)	-.105
Program delivered in language other than English	.02 (.02)	.16 (.02)	.008

^a "With" and "without" significantly different in an inverse-variance-weighted oneway ANOVA ($p < 0.05$).

^b Regression weight from inverse-variance-weighted multiple linear regression was significant ($p < 0.05$).

^c Controlled for indicators of methodological rigor (whether programs: randomly assigned individuals, examined initial equivalence of individuals, had a no treatment control group, and whether the home visiting program was a stand-alone program).

^d Component could not be tested due to limited frequency (i.e., reported by almost all or almost none of the programs) in the sample.

Child Maltreatment Outcomes. Seven program components were significantly associated with effect sizes on child maltreatment outcomes in inverse-variance weighted oneway ANOVAs (indicated by superscript ^a in Exhibit 3.9, Effect Sizes and Predictors of Child Maltreatment Outcomes). Five components (Program Offers Home Visiting Only; Developmental Norms and Expectations; Promotion of Child's Language Development; Stress-, Self-, and Anger Management; and Standardized Curriculum) were each predictive of larger program effects. Two components (Nutrition and Feeding and Parental Relationships) were each predictive of smaller program effects. Two components (Universal Home Visiting Program and Match between Home Visitor and Client on Language) could not be tested. The remaining components effect sizes were not significantly different from zero, and thus did not differentiate between programs that were more or less successful in changing child maltreatment outcomes.

Next, the child maltreatment outcomes effect sizes were regressed separately onto each component, controlling for the 3 of the 4 threats to internal validity. All of the studies that included measurement of child maltreatment outcomes assessed initial equivalence of the groups. Thus there was no variability in the methodological rigor variable of initial equivalence and it could not be used in the regressions. Twenty components significantly predicted child maltreatment outcomes when methodological rigor variables were controlled (indicated by superscript ^b in Exhibit 3.9, Effect Sizes and Predictors of Child Maltreatment Outcomes). Fifteen components produced significantly positive coefficients, indicating that their presence

was reliably associated with more successful programs: Program Offers Home Visiting Only; Developmental Norms and Expectations; Stimulating Home Environment; Communication, Responsiveness, and Sensitivity; Discipline and Behavior Management; Positive Reinforcement of Child’s Behavior; Promotion of Child’s Socio-Emotional Development; Promotion of Child’s Cognitive Development; Promotion of Child’s Language Development; Home Management; Public Assistance; Finding Alternate Caregivers; Stress-, Self-, and Anger Management; Non-Parenting Problem-Solving; and Standardized Curriculum. Five components resulted in significant negative coefficients, indicating that their presence was reliably associated with less successful programs: Nutrition and Feeding; Parental Relationships; Parental Substance Use; Parent Support Group; and Home Visitor is a Professional.

Exhibit 3.9: Effect Sizes and Predictors of Child Maltreatment Outcomes

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
General Program Characteristics			
Program Offers Home Visiting Only	.08 (.03) ^a	-.11 (.06) ^a	.405 ^b
Universal home visiting program ^d	N/A	N/A	N/A
Parenting Content			
Child development knowledge	.05 (.03)	-.04 (.09)	.061
Developmental norms and expectations	.09 (.03) ^a	-.02 (.04) ^a	.257 ^b
Developmentally appropriate care and routines	.02 (.04)	.05 (.03)	.072
Home environment	.05 (.04)	.03 (.03)	.104
Safe or clean home environment	.05 (.04)	.03 (.03)	.104
Stimulating home environment	.10 (.07)	.04 (.03)	.350 ^b
Nutrition and feeding	-.07 (.06) ^a	.07 (.03) ^a	-.315 ^b
Communication, responsiveness, and sensitivity	.07 (.03)	-.04 (.05)	.419 ^b
Responsiveness, sensitivity to cues, and nurturing	.02 (.06)	.05 (.03)	.113
Discipline and behavior management	.15 (.06)	.02 (.03)	.471 ^b
Positive reinforcement	.10 (.07)	.04 (.03)	.350 ^b
Promotion of child’s socio-emotional development	.09 (.07)	.03 (.03)	.244 ^b
Promotion of child’s cognitive development	.12 (.06)	.03 (.03)	.266 ^b
Promotion of child’s language development	.23 (.07) ^a	.02 (.03) ^a	.458 ^b
Non-Parenting Content			
Home management	.08 (.07)	.04 (.03)	.381 ^b

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
Public assistance	.08 (.04)	.00 (.03)	.380 ^b
Concrete or instrumental assistance	.04 (.07)	.04 (.03)	.167
Finding alternate caregivers	.08 (.04)	.03 (.03)	.302 ^b
Parental relationships	-.07 (.06) ^a	.07 (.03) ^a	-.315 ^b
Parental health	.08 (.03)	-.04 (.04)	.079
Parental substance use	.05 (.04)	.04 (.03)	-.312 ^b
Parental mental health	.06 (.03)	.02 (.04)	-.112
Self-, stress-, or anger-management	.14 (.05) ^a	.01 (.03) ^a	.415 ^b
Support group	-.07 (.07)	.06 (.03)	-.341 ^b
Social support or social network (<i>need for</i>)	.02 (.04)	.06 (.03)	.137
Problem solving	.06 (.03)	.01 (.05)	.257 ^b
Goal setting	.06 (.03)	.02 (.03)	.026
Child-related supplies	-.01 (.11)	.04 (.03)	-.024
Case management	.04 (.02)	.06 (.10)	-.014
Program Delivery Methods			
Home visitor is professional	-.01 (.04)	.08 (.03)	-.502 ^b
Match between home visitor and client: language ^d	N/A	N/A	N/A
Match between home visitor and client: race/ethnicity	.10 (.06)	.03 (.03)	.204
Standardized curriculum	.37 (.09) ^a	.01 (.03) ^a	.418 ^b
Program delivered in language other than English	.08 (.05)	.03 (.03)	.137

^a “With” and “without” significantly different in an inverse-variance-weighted oneway ANOVA ($p < 0.05$).

^b Regression weight from inverse-variance-weighted multiple linear regression was significant ($p < 0.05$).

^c Controlled for indicators of methodological rigor (whether programs: randomly assigned individuals, had a no treatment control group, and whether the home visiting program was a stand-alone program).

^d Component could not be tested due to limited frequency (i.e., reported by almost all or almost none of the programs) in the sample.

Long-Term Child Outcomes. Eight program components were significantly associated with effect sizes on child long-term outcomes (child externalizing or internalizing behaviors, sexual activity, substance use and delinquent behaviors) in inverse-variance weighted oneway ANOVAs (see Exhibit 3.10, Effect Sizes and Predictors of Child Long-Term Outcomes). Six components (General Child Development Knowledge; Promotion of Child’s Cognitive Development; Child-Related Supplies; Match Between Home Visitor and Client on Race/Ethnicity; Standardized Curriculum; and Program Delivered in Language other than English) were each predictive of larger program effects. Two components (Universal Home Visiting Program and Parent Support Group) were each predictive of smaller program effects.

Only one component of interest (Parental Substance Use) could not be examined for this outcome category. The remaining components' effect sizes were not significantly different from zero, and thus did not differentiate between programs that were more or less successful in changing long-term child outcomes at post-test.

Next, the long-term child outcomes effect sizes were regressed separately onto each component, controlling for the 4 threats to internal validity. Due to the extremely wide range of length between the end of the intervention and the follow up assessment across studies (i.e., from 1 month to 19 years post-intervention), length of time to follow up assessment was also used as a control variable. Inclusion of the length of follow up period did not change the patterns of results. Five components significantly predicted long-term child outcomes when methodological rigor were controlled (indicated by superscript ^b in Exhibit 3.10: Effect Sizes and Predictors of Long-Term Child Outcomes). Two components produced significantly positive coefficients, indicating that their presence was reliably associated with more successful programs: Child-Related Supplies and Standardized Curriculum. Three components resulted in significant negative coefficients, indicating that their presence was reliably associated with less successful programs: Universal Home Visiting Program; Parent Support Group; and Program Delivered in Language other than English.

Exhibit 3.10: Effect Sizes and Predictors of Long-Term Child Outcomes

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
General Program Characteristics			
Program Offers Home Visiting Only	.12 (.03)	.07 (.02)	.173
Universal home visiting program	.04 (.03) ^a	.12 (.02) ^a	-.818 ^b
Parenting Content			
Child development knowledge	.13 (.03) ^a	.05 (.03) ^a	-.102
Developmental norms and expectations	.11 (.03)	.07 (.02)	-.257
Developmentally appropriate care and routines	.12 (.03)	.07 (.02)	.199
Home environment	.07 (.04)	.09 (.02)	-.059
Stimulating home environment	.06 (.04)	.09 (.02)	-.105
Communication, responsiveness, and sensitivity	.13 (.03)	.05 (.03)	-.176

Component	Mean Effect Size (Standard Error) of programs with component	Mean Effect Size (Standard Error) of programs without component	Standardized regression weight ^c
Responsiveness, sensitivity to cues, and nurturing	.15 (.05)	.08 (.02)	.072
Discipline and behavior management	.11 (.05)	.08 (.02)	.060
Positive reinforcement	.16 (.09)	.08 (.02)	.116
Promotion of child's socio-emotional development	.12 (.03)	.07 (.02)	.166
Promotion of child's cognitive development	.14 (.03) ^a	.04 (.03) ^a	-.055
Promotion of child's language development	.11 (.04)	.08 (.02)	-.070
Non-Parenting Content			
Public assistance	.12 (.04)	.08 (.02)	.134
Concrete or instrumental assistance	.06 (.09)	.08 (.02)	-.008
Finding alternate caregivers	.10 (.04)	.08 (.02)	.156
Parental relationships	.09 (.03)	.09 (.02)	.078
Parental substance abuse ^d	N/A	N/A	N/A
Parental mental health	.11 (.07)	.09 (.02)	.038
Self-, stress-, or anger-management	.10 (.08)	.09 (.02)	-.027
Support group	.05 (.02) ^a	.15 (.03) ^a	-.397 ^b
Social support or social network (<i>need for</i>)	.07 (.03)	.10 (.02)	-.117
Problem solving	.07 (.04)	.09 (.02)	-.005
Goal setting	.09 (.06)	.09 (.02)	.038
Child-related supplies	.46 (.09) ^a	.07 (.02) ^a	.325 ^b
Case management	.08 (.02)	.14 (.05)	-.157
Program Delivery Methods			
Home visitor is professional	.11 (.03)	.08 (.02)	.197
Match between home visitor and client: language	.09 (.07)	.09 (.02)	-.254
Match between home visitor and client: race/ethnicity	.37(.07) ^a	.04 (.02) ^a	-.142
Standardized curriculum	.48 (.08) ^a	.06 (.02) ^a	.450 ^b
Program delivered in language other than English	-.02 (.03) ^a	.15 (.02) ^a	-.653 ^b

^a "With" and "without" significantly different in an inverse-variance-weighted oneway ANOVA ($p < 0.05$).

^b Regression weight from inverse-variance-weighted multiple linear regression was significant ($p < 0.05$).

^c Controlled for indicators of methodological rigor (whether programs: randomly assigned individuals, examined initial equivalence of individuals, had a no treatment control group, and whether the home visiting program was a stand-alone program) and for length of time between the end of the intervention and the follow up assessment point.

^d Component could not be tested due to limited frequency (i.e., reported by almost all or almost none of the programs) in the sample.

Random-Effects Models: All Outcome Categories

Exhibit 3.11, Summary of Significant Predictors in Random-Effects Linear Regressions Across Outcomes, provides a summary of the random-effects, inverse-variance-weighted linear regressions for all outcomes, controlling for methodological rigor. These findings represent the most robust associations between program components and the seven outcomes examined in this study. Thus, they are the focus of the implications and discussion.

Parenting Behavior and Skills. When the inverse-variance-weighted regressions were conducted via random-effects models, four components were significantly associated with parent behavior and skills outcomes at immediate post-test. Programs that provided content related to Stimulating Home Environment, Parental Substance Use and Parental Mental Health reported larger effect sizes than programs not including those components. Programs that educated parents about the Need for Social Support or Social Network reported smaller effect sizes than programs without those components.

Child Cognitive Development and Language. In random-effects models, seven components produced significant standardized regression coefficients. Programs with significantly larger effect sizes were those that included information about Developmental Norms and Expectations; Responsiveness, Sensitivity to Cues, or Nurturing; Promotion of Child's Socio-Emotional Development; Promotion of Child's Cognitive Development; and offered Rehearsal or Role-Play Opportunities. Programs with significantly smaller effect sizes were those that included Case Management and were Delivered in a Language Other Than English.

Maternal Life Course. In random effects models, only Match between Home Visitor and Client: Race and Ethnicity (predictive of larger effects), Program Offers Home Visiting Only and Public Assistance (both predictive of smaller effects) remained significant for maternal life course outcomes.

Birth Outcomes. Three components remained significant in random effects models for birth outcomes. Programs that addressed Prenatal Health and with a Match Between Home Visitor and Client on Race/Ethnicity predicted larger effects, while Professional Home Visitor predicted smaller effects.

Exhibit 3.11: Summary of Significant Predictors in Random-Effects Linear Regressions Across Outcomes

Component ¹	Post-Test		Other Time Point				
	Parenting Behavior (30 studies)	Child Cognitive Development & Language (21 studies)	Maternal Life Course (25 studies)	Birth Outcomes (16 studies)	Child Physical Health, Illness, & Injury (26 studies)	Child Maltreatment (23 studies)	Long-Term Child Outcomes (34 studies)
Program Type							
Program Offers Home Visiting Only			---		+++		
Universal home visiting program							---
Parenting Content							
Child development knowledge							
Developmental norms and expectations		+++					
Developmentally appropriate care and routines							
Medical care							
Home environment							
Safe or clean home environment							
Stimulating home environment	+++						
Nutrition and feeding						---	
Communication, responsiveness, and sensitivity							
Discipline-related communication							
Responsiveness, sensitivity to cues, and nurturing		+++					
Discipline and behavior management							
Reinforcement and punishment procedures							
Positive reinforcement							
Promotion of child's socio-emotional development		+++					
Promotion of child's cognitive development		+++					
Promotion of child's language development							
Promotion of child's physical development							

¹ +++ Presence of that component (row) significantly predicted *larger* effect sizes for that outcome (column) in random-effects, inverse-variance-weighted linear regression ($p < .05$).

--- Presence of that component (row) significantly predicted *smaller* effect sizes for that outcome (column) in random-effects, inverse-variance-weighted linear regression model ($p < .05$).

Component ²	Parenting Behavior	Child Cognitive Development & Language	Maternal Life Course	Birth Outcomes	Child Physical Health, Illness, & Injury	Child Maltreatment	Long-Term Child Outcomes
Non-Parenting Content							
Home management							
Public Assistance			---				
Concrete or instrumental assistance							
Finding alternate caregivers							
Parental relationships						---	
Parental health							
Parental substance use	+++						
Parental mental health	+++						
Prenatal health				+++			
Family planning or birth spacing							
Self-, stress-, or anger-management							
Support group					---		---
Social support or social network (<i>need for</i>)	---						
Adult literacy or academic achievement							
Problem solving							
Goal setting							
Child-related supplies							+++
Case management		---					
Program Delivery Methods							
Modeling (live or videotape)							
Rehearsal or role-playing		+++					
Homework assignments or home practice							
Home visitor is professional				---		---	
Match between home visitor and client: language							
Match between home visitor and client: race/ethnicity			+++	+++		+++	
Standardized curriculum							+++
Program delivered in language other than English		---				+++	---

² +++ Presence of that component (row) significantly predicted *larger* effect sizes for that outcome (column) in random-effects, inverse-variance-weighted linear regression ($p < .05$).

--- Presence of that component (row) significantly predicted *smaller* effect sizes for that outcome (column) in random-effects, inverse-variance-weighted linear regression model ($p < .05$).

* There were many coded components that were not tested with any outcome, either due to limited variability in the sample or because they were not hypothesized to be associated with a particular outcome (e.g., teaching discipline and behavior management was not expected to affect maternal life course outcomes). Those components have been omitted from the table for simplicity of presentation: recreation; emotional or relationship-related communication; attitudes about use of discipline; attributions about child behaviors; monitoring/supervision; time out from positive reinforcement; discipline-related problem solving; consistent responding or generalization; promotion of child's academic skills; child alcohol, tobacco and other drug avoidance; economic management; intimate partner violence; environment/neighborhood safety; career skills; and parent practice with own child.

Component was hypothesized to be important for an outcome but could not be tested due to limited frequency (i.e., reported by almost all or almost none of the programs) in the sample.

Component was not hypothesized to be associated with outcome so was not tested.

For blank cells, component was not significant in any of the analyses for that outcome.

Child Physical Health, Illness, and Injury Outcomes. Two components continued to be significant predictors of child physical health, illness, and injury outcomes in the random-effects models: Program Offers Home Visiting Only (predictive of larger effects) and Parent Support Group (predictive of smaller effects).

Child Maltreatment Outcomes. Five components were significant in random-effects models for child maltreatment outcomes. Programs that Match between Home Visitor and Client on Race/Ethnicity and Program Delivery in Language Other Than English were associated with larger program effects. Programs that addressed Nutrition and Feeding and Parental Relationships, and those in which the Home Visitor is a Professional were all associated with smaller program effects.

Long-Term Child Outcomes. Five components were significant in random effects models for long-term child outcomes. Programs that provided Child-Related Supplies and used a Standardized Curriculum were associated with larger program effects. Three components predicted smaller effects: Universal Home Visiting Program; Parent Support Group; and Program Delivered in Language other than English.

Summary of Results

As can be seen in Exhibit 3.11, Summary of Significant Predictors in Random-Effects Linear Regressions Across Outcomes, components significantly associated with some outcomes often were not significant with respect to other outcomes. This indicates that home visiting components contributed differently to different outcomes.

Looking at patterns separately by assessment time point, there were no components that significantly predicted both parenting behavior and child cognitive development and language at post-test. Among the outcomes investigated at any time point in a study, three predictors emerged as consistent predictors across multiple outcomes. Matching home visitors and their clients on race or ethnicity was associated with larger program effects on maternal life course, birth, and child maltreatment outcomes. Professional home visitors, on the other hand, were associated with smaller program effects on birth and child maltreatment outcomes. Providing parents with a support group was associated with smaller program effects on child physical health, illness and injury and on long-term child outcomes. The presence or absence of

these three components therefore appear to be consistently associated with program effects across a range of home visiting programs, research designs, and outcomes.

With respect to program “type,” programs that offer only home visiting were associated with larger effects on child physical health, illness, and injury, but smaller effects on maternal life course outcomes. This suggests that in order to impact parents’ life course (e.g., subsequent pregnancies, education/employment), home visiting alone may not be sufficient. Universal home visiting programs in these analyses do not appear to be as effective as programs serving at-risk families in terms of long-term child outcomes. Limited variability on that variable (i.e., universal vs. selective) precluded analysis on four of the other six outcomes, and thus its effects in those areas are unknown.

IV. Discussion and Recommendations

Consistent with results of previous meta-analyses of home visiting programs (e.g., Bilukha et al., 2005; Gomby, 2005; Sweet and Appelbaum, 2004;), parents and children participating in home visiting programs achieved more positive outcomes than parents and children in control/comparison groups, supporting the use of home visiting programs to promote child and parent health, behavior, and well-being.

At the end of the home visiting program, parents, on average, exhibited significantly better parenting attitudes and values, better parenting behavior change and skill acquisition, and better life course outcomes than control/comparison parents. The average effect sizes for the remaining parenting categories (parent knowledge and information acquisition, parenting self-efficacy, parenting stress, parent mental health and well-being, parent-child interaction, family climate, and prenatal outcomes) were not significantly different from zero, indicating that parents in the control/comparison group and in the treatment group exhibited those outcomes at about the same level at immediate post-test.

Effect sizes for three child outcomes were significantly different from zero at post-test, indicating that on average, children participating in home visiting programs achieved significantly better outcomes related to child education and cognitive development; childhood health, illness, and injuries; and child social competence. Data for the remaining child

outcomes at post-test (child externalizing, hyperactive, oppositional, or problem behaviors; child maltreatment; and child physical growth) were not significant.

Examining outcomes across time points, including mid-treatment, post-test and follow-up assessments, several significant outcomes for home visited parents and children were observed in comparison to their control/comparison counterparts. Home visited parents exhibit significant positive outcomes associated with maternal life course (e.g., welfare, repeat births, education or employment) compared to control/comparison parents. Effect sizes for birth outcomes were significantly larger for home visited families. Effect sizes for child physical health, illness, and injuries, as well as long-term child outcomes, were also significantly larger for home visited children. Consistent with the finding at post-test, child maltreatment outcomes were not significantly different between the home visited group and the control/comparison group.

Similar to Sweet and Appelbaum (2004), no clear and consistent pattern of effective home visiting program components emerged across all outcome domains. For example, while home visiting programs delivered in combination with other services were associated with larger effects for life course outcomes, programs that offered home visiting only were associated with larger effects for child physical health, illness, and injury in random-effects models.

As expected, the results of the random-effects regression analyses demonstrated that, independent of study design characteristics, there were identifiable program components and strategies that were associated with larger effect sizes. However, these components vary across outcomes. The lack of components which consistently predicted larger effect sizes is not surprising given the different outcomes programs intend to achieve (which also influences which programs were included in analyses). It is important to note that not all components were tested for each outcome either because the components were not theoretically linked to the outcome or because there were not enough effect sizes to conduct analyses examining those outcomes. So while the presence of a significant component indicates a robust effect, the absence of significance does not necessarily imply a lack of impact of a component.

For parenting behavior and skills, home visiting programs that taught parents strategies to create a stimulating home environment were associated with larger effects (i.e., the intervention groups exhibited higher levels of positive parenting behaviors and skills). Content regarding a stimulating environment included information such as providing age-appropriate books and toys in accessible space, organizing materials in a space accessible to children, and providing a variety of opportunities for exploration. Larger effects on parenting behaviors were also reported by programs that addressed aspects of parental functioning and well-being: parental substance use and mental health issues. Program content addressing parental substance use included topics such as education on health consequences and its impact on parenting and general functioning, providing referrals to substance abuse treatment, and direct provision of substance abuse services as part of the program. Parental mental health issues were addressed by teaching parents about mental issues, referring families to mental health services, and providing mental health services as part of the program. Given the link between both substance abuse and mental health issues and impaired parenting capacity, these two components are particularly important for promoting parenting behavior (e.g., Barnard & McKeganey, 2004; Field, 2010).

Programs that addressed the importance of a positive social support network were associated with smaller effects for parenting behavior. In other words, programs that addressed social support, such as identifying family members and friends that could assist with parenting and other responsibilities were less associated with positive parenting behavior and skills outcomes than those programs that did not address social support. Although other components were robust in accounting for the methodological indicators in fixed-effects models, these four components were especially robust in the even more conservative random-effects test. Hence, of the program components and strategies included in our analyses, the presence or absence of these four represent the greatest stability in predicting significant, positive outcomes for parenting behavior and skills.

As expected, home visiting programs that addressed the promotion of child's development, specifically socio-emotional and cognitive development, were associated with larger effects related to child cognitive development and language than programs without

these components. With respect to socio-emotional development, parents were taught strategies to foster children's positive adjustment and well-being, how to interact appropriately in social situations with peers or adults, and prosocial skills such as sharing, cooperating, etc. Language development would likely be inter-related as part of this component. Promotion of child's cognitive development focused on activities such as parents using naturally occurring opportunities to increase child language or knowledge by describing aspects of the child's activity, asking questions, commenting on events in the child's environment. Home visiting programs that provided information about developmental norms and expectations (e.g., range of typical behavior and physiological, cognitive, and emotional development) were also associated with larger effects than those that did not provide this information. Equipping parents with knowledge about typical child development may lead to developmentally-appropriate parenting behavior, which in turn may have contributed to enhanced child cognitive development and language outcomes. Home visiting programs that focused on responsiveness or sensitivity to child cues (e.g., responding functionally and appropriately to the child's verbal and physical signals) and physical nurturing (e.g., developmentally appropriate physical contact between parent and child, showing physical affection through hugging), were also associated with larger effects for child cognitive development and language outcomes. Home visiting programs that utilized active service delivery methods involving rehearsal, practice, role play, and coaching related to parenting techniques or behaviors during a home visit were predictive of child cognitive and language outcomes.

Case management, however, which involves linking families to services and active advocacy for services on an individual parent's behalf, was reliably associated with less successful programs with respect to child cognitive development and language. In addition, programs delivered in a language other than English reported smaller effects. One could assume that if the program itself is delivered in another language, the home visitor is not strengthening the families' English skills, which would put the child at a disadvantage on child language development outcomes.

Programs that offered home visiting in combination with other services were positively associated with maternal life course outcomes. It is unclear why this component would

contribute to life course outcomes because supplemental services were generally related more directly to parenting and children rather than life course development. Programs that matched home visitors and clients based on race and ethnicity were associated with more positive effects for maternal life course. Interestingly, programs that provided information about public assistance (i.e., information on obtaining or being directly taught to obtain housing, food/food stamps, WIC, TANF, AFDC, welfare) were less effective than those that did not for life course outcomes.

As expected, programs that addressed prenatal health, such as healthy behavior and linking pregnant women to prenatal care, were associated with significantly larger effects for birth outcomes. Contrary to predictions and to commonly held beliefs, non-professional home visitors were associated with programs reporting more positive birth outcomes. Programs that matched home visitors and clients based on race and ethnicity also had larger effects.

Only two components were associated with child physical health, illness, and injury. Programs that offered home visiting only, not in combination with other services, reported larger effects. This finding is somewhat unexpected given that some of the home visiting programs included in this study also provide pediatric primary care as part of their services, which would be expected to improve child physical health and reduce child illness. Supplemental parent support groups were associated with less successful programs with respect to child physical health, illness, and injury.

Although the rate of child maltreatment at any time point for families that participated in home visiting programs was, on average, less than for families who did not participate, the difference was not significant. However, several service delivery features were identified as significant predictors of more positive child maltreatment outcomes. Home visiting programs that employed non-professional home visitors (e.g., paraprofessionals, peer mentors) reported significantly larger positive effects on child maltreatment. Matching home visitors and clients on race and ethnicity and delivering the program in languages other than English were also associated with larger effects for child maltreatment. One interesting finding is that programs that addressed parental relationships were less successful in producing child maltreatment outcomes. Although this component may have been inclusive of addressing intimate partner

violence, studies did not specifically state that it was included (intimate partner violence was coded as a separate variable if explicitly noted to be part of the program). Given the correlation between child maltreatment and intimate partner violence, we would have expected this to be positively associated with child maltreatment. Programs that addressed nutrition and feeding for infants and children were also less successful in preventing child maltreatment.

Larger effects for long-term child outcomes, such as child externalizing or internalizing behaviors, sexual activity, substance use and delinquent behaviors at follow-up assessments, were reported for programs that provided child-related supplies such as books and toys, and programs that utilized a standardized curriculum. Three components resulted in significant negative coefficients in random-effects models, indicating that their presence was reliably associated with less successful programs: universal home visiting programs and those that offered parent support groups and delivered the program in a language other than English.

There were several patterns of interest. Several theoretically related components (case management, support group, teaching about the need for social support, and public assistance) were all associated only with smaller program outcomes in the random-effects models, though only support group was significant for more than one outcome. It may be that programs that incorporate those components are focusing parents' attention on meeting their families' needs with external supports, and neglecting to foster parents' sense of self-efficacy. Although parenting self-efficacy appeared as an outcome measure in a small number of studies, fostering self-efficacy was not a component that appeared with sufficient frequency (as an "other" write-in on the coding forms) to be incorporated into the analyses. Future studies could investigate this possible theme.

Delivering the program in a language other than English was associated with smaller effects on child cognitive outcomes at post-test, which is perhaps not surprising given that the cognitive outcomes for very young children are very language-dependent. Programs conducted in the parents' native language may not be fostering English language development in the parents, thus making it more difficult for the parents to foster the children's language development. (Though we did not include parental English language proficiency in our coding scheme, it would have been captured as a write-in and included in analyses if it had occurred

with sufficient frequency.) This component was also associated with smaller effects on children's long-term outcomes. This is also not surprising, given the consistent associations between early childhood cognitive outcomes and later behavioral outcomes. However, program delivery in a language other than English was associated with larger effects (so better outcomes) on child maltreatment measures, which are indicators of the parents' behaviors. Combined with the finding that matching home visitors and clients on race/ethnicity was also associated with better outcomes on child maltreatment measures may indicate that non-English delivery may be an effective way of connecting with parents who are more comfortable in other languages. However, the smaller effects of non-English programs on child cognition and behavior suggests that full program delivery in another language may not produce optimal program outcomes.

Several design features were related to effect sizes, providing additional support to the growing understanding of how methodological choices influence study outcomes. Contrary to what was found by Kaminski et al., (2008) regarding parent training programs, home visiting studies that randomly assigned individuals to treatment condition reported significantly smaller effect sizes than studies not employing random assignment of individuals. This may be due to the group assignment strategy, reflecting real differences by study design choice in obtained results regardless of program being investigated, or may be due to differences in effectiveness of programs in the group of studies that used random assignment versus the different set of programs that did not. Half of the studies compared the home visited group to a true no-treatment control group. An unexpected finding was that use of a no-treatment control group produced smaller effect sizes than a comparison group that received alternative services. This could be due to unmeasured counterfactual conditions received by the control group (e.g., families might have received more effective services than those services received in comparison conditions), or to differences in actual program content between those that were tested against true "no-treatment" groups and those tested against alternate treatment groups in the published studies included here. Future research should be directed to understanding services received by participants in "no-treatment" control groups.

Examination of evaluations of programs that offer home visiting only was another design variable of interest because it provides information about the direct effect of home visiting. Home visiting programs implemented in combination with other services were associated with significantly larger effect sizes than standalone home visiting programs. However, nearly all studies included in this review that offered additional services did not examine the differential impact of these additional services (e.g., impact of adding parent groups to home visiting above and beyond home visiting). Statistical adjustment of data (i.e., covariance) did not differentially influence effect sizes. Although only 20% of studies did not conduct intent-to-treat analyses, the effect sizes produced by these studies (i.e., limiting analyses to families who received a certain number of visits or completed the program) produced significantly larger effects than those that conducted intent-to-treat analyses. This finding supports the notion that intent-to-treat studies provide a more conservative assessment of impact because all families assigned to a condition are included in analyses.

As with any review that is limited to published literature, our results cannot be considered representative of programs for which evaluation results have not been published. However, the programs included in this study varied widely in their content and delivery components, which allowed for examination of the contribution of these components to program effect sizes. In addition, the intentional inclusion of nonrandomized studies increases the applicability of the results beyond programs that have been subjected to controlled trials to include programs implemented in “real life” situations. Although the generalizability of the results should be interpreted with caution, we attempted to minimize the likelihood that programs not meeting the publication inclusion criteria would be substantially different from included programs.

As is true in all meta-analyses, the results of the current study are correlational. Researchers conducting meta-analysis have no experimental control over the studies they include and must take the field of study “as is.” Thus, it would be inappropriate to claim that particular components or strategies caused program success or that the inclusion of other components led to less optimal outcomes. The results speak only to the extent to which certain components were consistently associated with greater differences between treatment and

control/comparison groups on the parent and child outcomes examined in this study across a broad range of program content, delivery, and evaluation methodologies.

Many theoretically and empirically linked components could unfortunately not be tested on particular outcome categories due to limited variability in the pool of studies for a particular outcome. Thus, we cannot know if the lighter-shaded boxes in Exhibit 3.11 would have been significant if that component-outcome relationship could have been tested. A lack of statistical significance should therefore not be interpreted as a clear lack of effectiveness. However, we can make the conclusion that, of the components we were able to test for each outcome, the non-significant components did not by themselves distinguish more successful programs from less successful programs on that outcome, and are thus unlikely to be sufficient to produce outcomes they do not significantly predict. In other words, although these components may or may not contribute to program outcomes as precursors to or through interactions with other components, they appear less likely to be independently sufficient to ensure program success. Statistical tools do not currently allow for tests of such interaction effects among components in an analogue to linear regression with effect sizes. Future research should be directed to address questions about combinations of components in other ways.

In addition, the set of studies reporting on one outcome may have little or no overlap with the set of studies reporting on another outcome. As an extreme example, there was only one study common to birth outcomes and long-term child outcomes. Thus, different sets of studies, and therefore different combinations of components, were being examined for different outcomes. It is thus unsurprising that the patterns of significance varied by outcome, and again non-significant outcomes should not be over-interpreted. However, components that were significant across more than one outcome can be interpreted as extremely robust predictors of home visiting program success.

Another limitation pertains to the completeness of reporting within individual studies. The conclusions made about the effectiveness of program components are limited by the completeness of the information reported in the studies examined. Studies had insufficient reporting to allow investigation of the moderation of 17 components on effect sizes (range:

31% to 93% of studies missing information). These variables included: information on program or model fidelity, implementing agency, year(s) of program implementation, number of home visitors in study, gender of home visitors in study, staff training, staff supervision, number of cases per home visitor (recommended or actual), program dosage, study refusals, program dropouts, parent age, parent or household income, parent education, parent race/ethnicity, and parent marital status. These missing data limited the ability to conduct moderator analyses of interest such as the impact of dosage on effect sizes. The absence of such information in publications is well established and has been commented on by others (e.g., Borrelli et al. 2005; McCart et al. 2006).

For some variables, the extent of missing data was known. For other variables, a lack of mention of the variable in the article was coded as a lack of use (e.g., if an article did not report addressing substance use with parents, the program was coded as not addressing substance use). Thus, the results are dependent upon detailed descriptions of program components. Although secondary sources referenced in the study were coded in an attempt to ameliorate this problem, the extent to which program characteristics were not reported is unknown, as are the effects of such under-reporting on the results. Statistical reporting quality also impacted the findings of this study, as many studies were excluded because they were missing one or more basic pieces of data (e.g., sample size) necessary to compute an effect size.

This meta-analysis marks a distinct departure from the common practice of recommending the wholesale adoption of evidence-based programs. Although model ratings are important for guiding practitioners in adopting a packaged program model, any particular program may not include the most effective combination of components to produce maximum results for a given population or community. Instead of considering each program as a black box, the coding scheme used in the current study allowed the authors to disassemble home visiting programs into specific components. The findings point to new program and research opportunities within the home visiting field, whether through the development or selection of a home visiting program, or for improving programs already labeled efficacious or effective. This is particularly important in the context of MIECHV, in which grantees are required to demonstrate improvement in benchmarks over time. Although careful evaluation of

modifications or adaptations to existing programs would be critical, these changes are likely to produce programs that are more potent in producing positive outcomes for children and families. Our results do not imply that funding should be cut for programs if they contain certain components that did not contribute positively to effect sizes. However, these results suggest that if the intended outcomes of a program are those included in this study, attention should be paid to incorporating those that produced larger effects.

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