

## **Improving Early Head Start's Impacts on Parenting through Attachment-Based**

### **Intervention: A Randomized Controlled Trial**

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### Abstract

This randomized controlled trial tested an enhanced model of Early Head Start (EHS) that combined home-based EHS with *Attachment and Biobehavioral Catch-up* (ABC; Dozier & Bernard, 2017), a brief, evidence-based parenting intervention. The trial included 208 low-income mothers (87% Latina) and their 6- to 18-month-old infants. Control participants received home-based EHS plus 10 weekly books. Follow-up observations revealed positive impacts of the enhanced EHS plus ABC model on maternal sensitivity/responsiveness, intrusiveness, and positive regard ( $d$ 's = 0.23 – 0.77). Exploratory analyses of moderated effects suggested stronger impacts for those mothers who began the study with greater intrusiveness or who described their adult attachment style as secure or anxious. Findings are discussed in terms of implications for improving effects on parenting of publicly funded programs designed to support early development.

Keywords: Early Head Start, Attachment, Parenting, Low-Income, Home Visiting, Randomized Controlled Trial

## **Improving Early Head Start's Impacts on Parenting through Attachment-Based Intervention: A Randomized Controlled Trial**

The past 25 years have witnessed a proliferation of publicly funded programs designed to promote infant and toddler development in at-risk families, such as Early Head Start (EHS) and the Maternal, Infant, and Early Childhood Home Visiting program (MIECHV) (National Research Council and Institute of Medicine, 2012). In fiscal year 2015-16, there were 1,322 EHS programs serving approximately 150,000 low-income infants and toddlers and their families (National Head Start Association, 2017). EHS services, which can be home-based, center-based, or mixed, include developmental screenings, parenting education, and often child care. Initiated as part of the U.S. Affordable Care Act of 2010, the MIECHV program funds home-based parenting and early child development services. MIECHV grantees must implement pre-approved, evidence-based home visiting models (HRSA, 2017).

The multi-site, randomized evaluation of the EHS program, the Early Head Start Research and Evaluation Project (EHSREP,  $N = 3001$ ) demonstrated numerous positive effects on parenting behaviors and child outcomes (Love, Chazan-Cohen, Raikes, & Brooks-Gunn, 2013; Love et al., 2005). Program effects typically have been modest and frequently moderated, prompting suggestions for program improvements, especially in the areas of parenting and attachment (e.g., Berlin et al., 2011). In the current randomized controlled trial (RCT), we implemented and tested an enhanced EHS model designed to leverage the combined strengths of the existing, broad-based EHS program and an evidence-based, attachment-focused intervention with previously demonstrated effects on infant attachment security and sensitive caregiving behaviors, which are key antecedents of infant attachment security (Fearon & Belsky, 2016).

This study's focus on attachment drew on a compelling body of research illustrating the influence of infant attachment security on an array of crucial developmental processes in high- and low-risk families (see Thompson, 2016, for a review). Development and dissemination of attachment theory- and research-based interventions, moreover, are burgeoning (see Berlin, Zeanah, & Lieberman, 2016, for a review). Much about the real-world effectiveness of such interventions remains to be learned, however.

Two interrelated aims guided the current study. First, we aimed to test the extent to which our enhanced EHS model improved EHS's effects on parenting outcomes. Second, we aimed to contribute new findings to the evidence base concerning community implementation of attachment interventions. By pursuing both aims simultaneously, moreover, we answered a recent call for developmentally informed intervention research for vulnerable populations that can be applied to large-scale policy or service systems (Yoshikawa, Whipps, & Rojas, 2017).

### **Early Head Start: Modest and Moderated Effects on Early Maternal Supportiveness**

The EHS program developers drew explicitly on attachment theory and research to mandate that EHS services support parent-child relationships (U.S. DHHS, 1994). EHS providers have affirmed that supporting such relationships is a key goal (Raikes et al., 2014). The ways in which EHS programs address such relationships vary greatly, however, and typically do *not* include evidence-based attachment interventions (Vogel et al., 2015).

Although the EHSREP did not assess attachment security *per se*, it did include observational ratings of maternal "supportiveness" (reflecting sensitivity, positive regard, and cognitive stimulation) during a semi-structured, video-recorded assessment of mother-child interaction (Love et al., 2005; 2013). A consideration of program effects on maternal supportiveness at ages 2 and 3 illustrates a gap between program objectives and achievements in

the parenting domain. Impacts, while generally positive, have been small (Cohen, 1988). The intervention effect on maternal supportiveness at age 2 ( $d$ ) was 0.09 (Vogel, Brooks-Gunn, Martin, & Klute, 2013). At age 3, after intervention families had received an average of 20 to 23 months of EHS services, the effect ( $d$ ) was 0.15 (Love et al., 2005). Particularly relevant to the current study, the solely home-based EHS programs ( $N = 744$ ) showed no effect on maternal supportiveness at age 2 (Chazen-Cohen, Raikes, & Vogel, 2013) and a small effect at age 3 ( $d = 0.16$ ; Love et al., 2005). A secondary analysis of EHSREP programs providing more intensive home-based services ( $N = 1875$ ) found slightly stronger but still small effects on maternal supportiveness at ages 2 and 3 ( $d$ 's = 0.21 and 0.17, respectively; Raikes, Vogel, & Love, 2013).

In addition to this pattern of quite modest impacts on maternal supportiveness, EHSREP subgroup analyses have demonstrated differential effects by family race/ethnicity and cumulative demographic risk and by maternal attachment. For example, the strongest pattern of program impacts emerged for African American families (Raikes et al., 2013). Strikingly, these analyses revealed no significant effects on maternal supportiveness for white or Latino families (Raikes et al., 2013).

A secondary analysis of data from six EHSREP sites ( $N = 947$ ) found significantly different program impacts depending on mothers' pre-intervention, self-reported adult attachment. Mothers lower in attachment avoidance showed a small positive effect ( $d = 0.18$ ) and mothers higher in attachment avoidance showed a small *negative* effect ( $d = 0.20$ ) on maternal supportiveness at age 3 (Berlin et al., 2011).

Another investigation, based on data from two EHSREP sites ( $N = 275$ ), revealed a different pattern of effects. Analyses of observed maternal sensitivity revealed the strongest program impacts for mothers who reported both depressive symptoms and an insecure

attachment style (Robinson & Emde, 2004). A limitation of this study was that it did not separately examine maternal attachment avoidance and attachment anxiety.

These generally modest and frequently moderated effects of EHS on important, objectively rated early parenting behaviors have helped to identify program strengths and limitations, which in turn have generated suggestions for program improvements. It is a notable strength of the EHS program as a whole that it has repeatedly demonstrated main effects on maternal supportiveness at age 3. At the same time, these effects have been consistently small, especially considering that they reflect an average of almost two years of EHS service receipt. Additionally, null and negative effects have raised concerns about the fit of EHS for white and Latino families and for mothers higher on attachment avoidance.

In order to strengthen overall program impacts on early parenting, Raikes et al. (2014) argued that home-based EHS programs must more explicitly articulate measurable parenting goals and provide parenting services that directly and intensively target those goals. Similarly, Brooks-Gunn and colleagues reflected that “further innovation is needed to help EHS and other programs develop precision in targeting the parenting behaviors that matter for children’s development” (Brooks-Gunn, Love, Raikes, & Chazen-Cohen, 2013; p. 141). In this regard, it is notable that the EHSREP included two sites where attachment-focused services were embedded in EHS programming. The site-specific findings from these two early innovations laid important groundwork on which the current study built.

### **Enhancing Early Head Start through Attachment-Based Intervention**

One initiative ( $N = 179$ ) augmented a mixed-approach EHS program with a home-based, attachment-focused intervention consisting of 33 parenting modules (Spieker, Nelson, DeKlyen, & Staerkel, 2005). No main program effects emerged for observed parenting or infant attachment

security. Moderated program effects on sensitive parenting and infant attachment disorganization favored the dyads in which mothers had initially (at pre-intervention) reported *more* depressive symptoms.

A related study evaluated an explicitly attachment-informed, home-based EHS program focusing on facilitating responsive mother-infant interactions ( $N = 161$ ; Roggman, Boyce, & Cook, 2009). This study revealed a positive effect on mothers' ratings of their toddlers' attachment security according to the *Attachment Q-Set*. Whereas these findings supported the researchers' hypotheses, it is also important to note that the findings require replication with a more objective attachment measure.

In the current study, we capitalized on the availability of an established attachment-focused intervention with which to enhance home-based EHS services as usual. We targeted home-based EHS in order to focus on early parenting and the developing infant-mother attachment. Designed for children who have experienced early adversities, the manualized ABC program consists of 10 parent coaching sessions delivered to the primary caregiver and child together in their home. Each session addresses a specific topic and includes a review of video-recorded caregiver-infant interaction. Although brief, the ABC program is intensive, targeting three specific aspects of sensitive caregiving behavior: (a) providing nurturance; (b) following the child's lead with delight; and (c) avoiding intrusive and frightening behaviors. Each of these parenting targets is key to the development of attachment security and early childhood behavioral and physiological regulation (Dozier & Bernard, 2017; Fearon & Belsky, 2016).

Three randomized trials have demonstrated the efficacy of the ABC program for foster parents, parents of children adopted internationally, or birth parents involved in child protective services, with positive impacts on sensitive parenting behaviors, infant attachment quality and

cortisol production, and child behavioral regulation (see Berlin et al., 2016, and Dozier & Bernard, 2017, for reviews). In two studies in which community-based staff served as parent coaches, ABC was associated with large pre- to post-intervention changes in observed maternal sensitivity ( $d$ 's = 0.89 and 0.83) and intrusiveness ( $d = 1.21$ ) and a small-medium change in maternal positive regard for the child ( $d = 0.41$ ) (Caron, Weston-Lee, Haggerty, & Dozier, 2016b; Roben, Dozier, Caron, & Bernard, 2017). Dozier and her colleagues have identified next steps for elucidating the program's real-world effectiveness (Dozier & Bernard, 2017; Roben et al., 2017). These include testing causal effects through randomized trials of community-based ABC, as, to date, studies of community-based ABC have been quasi-experimental. In addition, to date, studies of ABC have tested main effects only, thus highlighting the importance of examining the effects of ABC for different subgroups of participants. The current study incorporated both of these next steps.

### **What Works for Whom: Potential Moderators of Early Head Start plus ABC**

As described, previous studies of standard or enhanced EHS have painted a mixed picture of moderated program effects, with some studies illustrating stronger effects for more vulnerable participants and others illustrating stronger effects for those with more advantages. Thus, our analyses of three potential program moderators were largely exploratory and designed to inform hypotheses about "what works for whom." First, to explore whether our Early Head Start plus ABC model might have stronger effects for mothers who began the program with higher or lower ratings on key parenting behaviors, we tested baseline parenting behaviors as moderators of program effects on these same parenting behaviors assessed post-intervention. Second, as noted, a previous study found stronger effects of EHS for mothers who reported lower levels of attachment avoidance or anxiety (Berlin et al., 2011). Moreover, one previous ABC study found

that secure mothers received higher ratings on their (a) understanding of intervention concepts and (b) reflectiveness during the sessions, (Bick, Dozier, & Moore, 2012). Taken together, these findings led us to test mothers' self-reported attachment security, avoidance, and anxiety as program moderators, and to hypothesize that more secure mothers would derive greater benefits from the enhanced EHS model. Third, given previous findings of stronger impacts of standard or enhanced EHS when mothers reported more depressive symptoms (Robinson & Emde, 2004; Spieker et al., 2005), we explored mothers' baseline depressive symptoms as a moderator of program effects.

### **The Current Study**

The current study was one of six Early Head Start-University Partnerships comprising the federal Buffering Toxic Stress Research Consortium (Buffering Toxic Stress Consortium, Meyer, & Fortunato, 2013). Early Head Start-University Partnerships mandate active collaboration between researchers and EHS staff. We conducted not only the first randomized trial of community-based ABC but also, in response to the racial/ethnic composition of collaborating EHS programs, the first evaluation of ABC with a predominantly Latino sample. This is particularly important, as EHSREP subgroup analyses demonstrated no significant program impacts on maternal supportiveness for Latino families (Raikes et al., 2013), and scholars have called for more development and evaluation of parenting interventions for Latino families (e.g., Yoshikawa et al., 2017). As noted, ABC was designed for children who have experienced early adversities. Previous program evaluations have focused on high-risk infants and toddlers receiving child protective services. The current study implemented and evaluated ABC more preventatively, testing the "value added" by ABC to home-based Early Head Start. Qualitative findings from initial pilot studies have indicated strong feasibility and acceptance of

this model, with both EHS mothers and staff attesting to its unique benefits (Aparicio, Denmark, Berlin, & Jones Harden, 2016; West, Aparicio, Berlin, & Jones Harden, 2017). We hypothesized that mothers randomly assigned to Early Head Start plus ABC would behave more sensitively towards their infants than control group mothers.

## **Method**

### **Study Design and Sample**

The current study was powered to detect medium-sized intervention effects on observed parenting behaviors ( $d$ 's = 0.50; Cohen, 1988). Using G\*Power software version 3 (Faul, Erdfelder, Lang, & Buchner, 2007) and estimating at least .80 power and a one-tailed significance level of .05, power analyses indicated a required minimum sample size of 154. In order to achieve this sample size within the study recruitment period, we collaborated with seven Early Head Start programs, each of which provided at least some home-based services. Recruitment was carried out on a rolling basis such that each program regularly provided the research team with rosters of those mother-infant dyads who met all of the following eligibility criteria: receiving home-based EHS services for at least three months; mother English- or Spanish-speaking; maternal age of 18 years or older; infant age 6 to 18 months; and infant not receiving federal Part C services for children with special needs. Typically, dyads were recruited as soon as possible after they had met eligibility criteria. If a mother had more than one child between 6 and 18 months receiving home-based EHS, the younger child was recruited. Although participants varied in the duration of EHS services that they had been receiving, extracting from EHS program databases precise data about home-based service duration was not feasible with existing project resources.

During the 38-month RCT period (May, 2013 – July, 2016), 208 of 282 eligible Early Head Start mothers (74%) agreed to participate in the trial and completed a baseline research assessment at which time they were randomly assigned to receive either EHS plus ABC (described in detail below) ( $n = 104$ ) or EHS plus “Book-of-the-Week” ( $n = 104$ ) (see Figure 1 for participation details). EHS plus Book-of-the-Week was a light control protocol consisting of 10 English/Spanish developmentally appropriate books sent weekly to the mothers by mail. During the 10 weeks, research assistants phoned each Book-of-the-Week mother three times to ensure she was receiving the books and to ask about the mother’s and infant’s wellbeing.

Although the majority of mothers did not report their income, consistent with EHS eligibility criteria, those who did reported low annual family income ( $n = 75$ ;  $M = \$21,519$ ,  $SD = \$11,353$ ). Almost all (95%) reported receiving federal Women, Infants, and Children (WIC) benefits, and 58% reported receiving benefits from the federal Supplemental Nutrition Assistance Program (SNAP or “Food Stamps”). Consistent with national trends (Vogel et al., 2011), collaborating Early Head Start programs’ families receiving home-based services were disproportionately Latino, as were study participants (87%). Most (91%) of the study participants reported being born outside of the US, mainly in Central America. The non-Latina mothers described themselves as Black or African American (8%), White (1.5%), Asian (1%), American Indian/Alaska Native (0.5%) or Other (2%). At enrollment, mothers ranged in age from 18 to 45 years ( $M = 31$ ,  $SD = 6.5$ ), 55% had completed high school or a GED, and 38% were employed at least part-time. Most (80%) described their marital status as either married or partnered. Children ranged in age from 6 to 20 months ( $M = 13$ ,  $SD = 4$  [this range exceeded the eligibility window because of eight mothers who completed their baseline assessments later than initially scheduled]). Approximately half of the children (51%) were girls.

### **Provision of Early Head Start plus ABC**

In considering whether to train EHS staff to provide ABC or to provide external, “expert consultant” parent coaches, we chose the latter, opting to test incrementally the enhanced EHS model before involving EHS staff, a body of workers observed to experience high levels of mental health problems and job turnover (Jones Harden, Denmark, & Saul, 2010; Vogel et al., 2015; Whitaker, Becker, Herman, & Gooze, 2013). Accordingly, two female, fully bilingual (English and native Spanish) parent coaches, trained and certified by ABC/Infant-Caregiver Project staff, delivered ABC approximately weekly in mothers’ homes. At the beginning of the study, one of the parent coaches was in the early stages of her career and had recently completed a Master’s degree in Social Work. The second parent coach had a Master’s degree in education and had worked in the early childhood field for over 20 years. For the purposes of the current study, the ABC manual and all written materials for the parents were translated into Spanish by a professional translation service with extensive experience with social science research and familiarity with the target population. Parent coaches also gave input into the translations. The parent coaches provided ABC sessions in English or Spanish, depending on mothers’ preferences. Latina pilot mothers attested to the good fit of the ABC program for Latino families (Aparicio et al., 2016).

Each ABC session addressed a specific topic related to one of the three principal intervention targets (i.e., providing nurturance, following the lead with delight, and avoiding frightening parenting behaviors). Principal intervention activities included discussion of basic attachment principles, guided practice of new parenting behaviors, and review of video clips from previous sessions to help reinforce parenting targets. Homework assignments provided

mothers with the opportunity to document their own parenting behaviors in relation to the weekly intervention topic. Homework was not required nor formally evaluated.

Throughout all sessions, parent coaches observed ongoing mother-infant interactions and made frequent “in-the-moment” comments. In-the-moment comments explicitly connect the parent’s ongoing behaviors to the three behavioral targets and to the ways in which they benefit the infant’s development. Independent ratings of the frequency and content of parent coaches’ in-the-moment comments have been found to predict positive changes in observed parenting behaviors (Caron et al., 2016a; Roben et al., 2017). The current study’s parent coaches were rated as making, on average, 2.18 comments per minute ( $SD = 0.42$ ).

Following training, to ensure ongoing delivery of ABC with fidelity, parent coaches received weekly, video-based supervision from ABC/Infant Caregiver Project staff for approximately one year. Supervision focused on overall adherence to the ABC manual and in particular on the number and type of in-the-moment comments provided. In addition, the co-principal investigator, a social worker and clinical-developmental psychologist, conducted weekly reflective supervision with each parent coach. After two years of providing ABC, each parent coach successfully completed the biennial ABC recertification process.

For the duration of their receipt of the EHS plus ABC model, intervention group mothers received two types of home visiting services: ongoing EHS services and ABC home visits. To help facilitate coordination of services and minimize parent coaches’ travel, each parent coach typically worked with three or four of the seven partnering EHS programs at a time, and thus worked most closely with a subset of EHS home visitors and their clients. The parent coaches coordinated their ABC home visits in collaboration with each mother’s Early Head Start home visitor so that no mother received more than one type of home visit on any given day. Parent

coaches provided each ABC mother's Early Head Start home visitor a brief closing report that summarized the mother's participation in ABC. In qualitative interviews, pilot Early Head Start home visitors identified open communication between themselves and the ABC coaches as a positive feature of the Early Head Start plus ABC model (West et al., 2017).

As illustrated in Figure 1, 87.5% of those randomly assigned to ABC completed all 10 sessions of the intervention. The mean duration to deliver the 10 ABC sessions was 13 weeks ( $SD = 6.9$ ). Of the 13 ABC non-completers, three never began the program and 10 completed between one and seven sessions (partial completion  $M = 2.2$  [ $SD = 1.9$ ]).

### **Procedures**

Two sets of research procedures, at baseline (pre-intervention) and post-intervention, were conducted in the families' homes in English or Spanish, according to the mother's preference. When available, standard Spanish versions of procedures and measures were used. If none existed, standard English versions were translated into Spanish (by the same translation service that translated ABC materials).

Baseline assessments consisted of a series of demographic and psychosocial questionnaires, administered interview-style, and a 15-minute, video-recorded, "Three Bag" assessment. Intentionally vague instructions involved giving the mother three numbered cloth bags, each containing one or more standard, age-graded toys or books, asking that the infant spend some time with each, and informing the mother that she could play or help however she wanted. Follow-up procedures, conducted within approximately one month of intervention completion, included a truncated demographic and psychosocial interview and a second, 15-minute Three Bag play assessment. Mothers received \$100 after completing each set of

procedures. The University of Maryland, Baltimore approved all research procedures (*Partners for Parenting*; HP-00051071).

## Measures

**Family cumulative risk.** Adhering as closely as possible to the definition of family risk in the EHSREP (Love et al., 2013), we computed a family risk index by summing the following risk factors: receiving federal SNAP benefits (Food Stamps), young maternal age (< 20), no high school or GED credential, unemployed, single parent (not married or partnered).

**Maternal sensitivity.** All Three Bag assessments were coded at the University of North Carolina CDS Observes Center using a series of established scales (Mills-Koonce & Cox, 2013). To ensure the cultural validity of these coding scales for Spanish-speaking mothers, a native Spanish speaker with a doctorate in clinical psychology and expertise in the assessment of children and families from diverse cultural groups provided initial consultation. A master coder with extensive training and experience reliably rating parent-child interactions oversaw coder training and inter-rater reliability. A group of five coders was trained until reliability was met and maintained on each scale, using a criterion intraclass correlation of > .70. A minimum of 20% of the assessments were double-coded for ongoing reliability checks. Coding discrepancies were resolved by conferencing. The master coder and the five members of the coding team were blind to participants' RCT group assignment.

Extra care was taken with the Spanish assessments. First, native Spanish speakers translated and transcribed all Spanish Three Bag interactions, and coders used both the videos and the transcriptions to inform their ratings. Second, for 10% of the Spanish assessments, native Spanish speakers trained in the coding system led ongoing case discussions of the transcripts and

the coded data to ensure that the coding system was being applied in a culturally sensitive manner.

The current study focused on three aspects of maternal sensitivity key to the development of infant attachment security and to the goals of the ABC intervention (Dozier & Bernard, 2017). Each of the following behaviors was rated on a 5-point scale, from *not at all characteristic* to *highly characteristic*. First, *sensitivity/responsiveness* referred to the degree to which the mother consistently displayed responsive, emotionally supportive behaviors that were well-timed, well-paced, and appropriate to the infant's cues. Maternal sensitivity/responsiveness is directly relevant to the ABC targets of nurturance and following the lead. Maternal *intrusiveness* referred to the degree to which the mother showed a lack of respect for the infant, including verbal and physical interference with the infant's needs, interests, and behavior. Maternal intrusiveness is directly relevant to the ABC targets of following the lead and (avoiding) frightening behaviors. Maternal *positive regard* referred to the mother's verbal and physical expressions of warmth, affection, enthusiasm and praise as specifically directed toward the infant. Maternal positive regard is directly relevant to the ABC targets of nurturance and following the lead. Strong evidence of the validity of these scales has come from numerous studies linking them to theoretically predictable maternal characteristics and child outcomes, over and above socio-demographic factors such as maternal education and family cumulative risk (Ayoub, Vallotton, & Mastergeorge, 2011; NICHD Early Child Care Research Network [ECCRN], 1997; Vernon-Feagans, Cox, & FLP Key Investigators, 2013).

Consistent with Roben et al. (2017) and with the NICHD Study of Early Child Care (NICHD ECCRN, 1997), we also created a composite *overall sensitivity* score reflecting the mean of sensitivity, positive regard, and intrusiveness (reversed). In the NICHD study, a similar

composite based on 6- and 15-month parenting behaviors significantly differentiated infants classified secure from those classified insecure-avoidant at 15 months (NICHD ECCRN, 1997). Another similar composite, based on 6-, 15-, and 36-month parenting behaviors, significantly differentiated secure from insecure preschoolers at 36 months (NICHD ECCRN, 2001).

**Potential moderators of ABC program effects.**

*Mothers' self-reported adult attachment security, avoidance, and anxiety.* At baseline, mothers completed one categorical and one dimensional adult attachment assessment. Mothers first completed Hazan and Shaver's (1987) *Adult Attachment Style (AAS)* assessment during which they selected one of three brief narrative descriptions, each of which corresponds to an adult attachment style (secure, avoidant, or anxious), to describe themselves (see Table S1). The AAS has high test-retest reliability and has been linked to observed sensitive and negative-intrusive parenting behaviors in mothers of infants (see Jones, Cassidy, & Shaver, 2015, for a review).

Second, mothers completed a slightly adapted *Experiences in Close Relationships Scale (ECR; Brennan, Clark, & Shaver, 1998)* a 36-item questionnaire with two subscales, one tapping attachment avoidance (18 items) and one tapping attachment anxiety (18 items) (see Table S2). The attachment avoidance subscale taps discomfort with interpersonal closeness and reliance on others. The attachment anxiety subscale taps concerns about staying connected and fears of abandonment. To make the ECR easier to complete for this sample, we reduced the response options from a 7-point to a 5-point scale (1 = *strongly disagree* to 5 = *strongly agree*). Following Brennan et al. (1998), the attachment avoidance and attachment anxiety subscales were each calculated as mean scores of all avoidance or anxiety items, respectively. Internal consistency reliabilities for both the attachment avoidance subscale ( $\alpha = .77$ ) and the attachment anxiety

subscale ( $\alpha = .88$ ) were acceptable and comparable to those reported in previous studies (Brennan et al., 1998; Cassidy et al., 2017). Self-reported attachment avoidance and attachment anxiety, assessed according to the ECR or ECR-Revised have been linked to observed sensitive parenting behaviors and to self-reported parenting stress (Jones et al., 2015).

***Maternal depressive symptoms.*** Also at baseline, mothers completed the widely-used, 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) tapping frequency of depressive symptoms during the week prior to the interview (see Table S3). Mothers responded on a 4-point scale (0 = *rarely/never* to 3 = *most/all of the time*). Total CES-D scores were based on a sum of all item responses ( $\alpha = .89$ ).

## Results

### Principal Analytic Approach

All tests of main and moderated effects followed an intent-to-treat approach in which we analyzed participants as randomly assigned, regardless of intervention “dose.” In addition, given minimal missing parenting outcome data (3%), analyses included only those mothers for whom parenting data were available ( $N = 202$ ). We tested main and moderated intervention effects using a series of regression models that covaried the relevant pre-intervention parenting behaviors and, drawing on previous studies analyzing the Three Bag scales (e.g., Vernon-Feagans et al., 2013), the following pre-intervention socio-demographic factors: family cumulative risk, child age, and child sex. In addition, as noted, participants were drawn from seven EHS programs. To minimize potential biases relating to this nesting, all regressions estimated heteroscedasticity-consistent standard errors. Analyses were performed in SPSS v.24 using Darlington and Hayes’s (2017) *Regression Analysis and Linear Models* (RLM) macro and following Long and Ervin’s (2000) sample size guidelines. Effect sizes are reported as Cohen’s

*d*'s, representing standardized estimates of the magnitude of the intervention effects. Given the large majority of Latina mothers and the possibility of differential findings by maternal ethnicity, it would have been ideal to test maternal ethnicity as a moderator of intervention effects. There was inadequate statistical power to test such moderated effects, however. Therefore, all analyses were conducted with all participants and then repeated with the Latina participants only. The two sets of findings were highly consistent, and so we report results based on all participants.

### **Preliminary Descriptive Statistics**

Table 1 provides descriptive statistics for all baseline participant characteristics for the sample as a whole and by RCT group. There were no statistically significant group differences in EHS program affiliation or in any baseline characteristics. Table S4 illustrates the bivariate correlations between all variables used in the principal analyses.

### **Main Effects of Early Head Start plus ABC**

As hypothesized, mothers randomly assigned to Early Head Start plus ABC behaved more sensitively towards their infants than Early Head Start plus Book-of-the-Week mothers. Following the intervention, ABC mothers were rated as significantly more sensitive/responsive, significantly less intrusive, and significantly higher on positive regard and overall sensitivity (see Tables 2 and S5). The effect of the intervention on intrusiveness was large ( $d = 0.77$ ). Intervention effects on sensitivity/responsiveness and positive regard were small ( $d$ 's = 0.27 and 0.23, respectively), and the effect on overall sensitivity was medium ( $d = 0.47$ ).

### **Moderated Effects of Early Head Start plus ABC**

Regression models tested moderated effects of Early Head Start plus ABC on maternal sensitivity/responsiveness, intrusiveness, and positive regard by mean-centered pre-intervention parenting scores, maternal attachment, and depressive symptoms. Consistent with previous

studies using the ECR (e.g., Cassidy et al., 2017), models testing the interactive effects of maternal attachment avoidance and anxiety included both scales together. For the categorical AAS moderator, the secure group served as the reference category.

Table 3 summarizes the results of these analyses. Two statistically significant moderated effects emerged and were probed. First, baseline maternal intrusiveness significantly moderated the intervention effect on post-intervention intrusiveness. Probing this interaction with tests of simple slopes at the mean and at  $\pm 1$  *SD* from the mean of the moderator revealed significant effects among mothers who began the study with both higher and lower scores for intrusiveness ( $t$ 's = -5.44 [ $p < .001$ ] and -2.91 [ $p = .004$ ] respectively;  $d$ 's = 0.77 and 0.41, respectively). The effect was stronger among the higher-intrusiveness mothers, however (see Figure 2).

Second, AAS attachment group, in particular the avoidant/secure contrast, significantly moderated the intervention effect on post-intervention sensitivity/responsiveness. Probing this interaction with tests of simple slopes for each attachment category revealed three significant intervention effects. The strongest effect was for the secure mothers ( $t = 3.49$ ,  $p = .001$ ,  $d = 0.49$ ). For anxious mothers, there was also a significant positive effect ( $t = 2.09$ ,  $p = .038$ ,  $d = 0.30$ ). For avoidant mothers, there was a significant *negative* effect ( $t = -2.67$ ,  $p = .008$ ,  $d = 0.38$ ) (see Figure 3). (See also Tables S6-S10 for detailed findings. See Table S11 for the results of three omnibus models which simultaneously tested all moderators and served as a robustness check, illustrating largely similar findings to those from the individual models.)

## **Discussion**

### **Main Effects of Early Head Start plus ABC**

We found positive effects of our enhanced Early Head Start plus ABC model on three important aspects of maternal sensitivity targeted by the ABC intervention:

sensitivity/responsiveness, intrusiveness, and positive regard. That these effects were observed while covarying pre-intervention parenting behaviors, family risk, child age, and child sex attests to the robustness of the findings. Moreover, these effects emerged for mothers already receiving comprehensive home-based services, and they did not emerge for control group mothers who received home-based EHS plus weekly books. These findings implicate the addition of the 10 ABC visits, *per se*, as the critical ingredient in our enhanced EHS model. As noted earlier, EHS services typically do not include evidence-based attachment interventions. The ABC program's unique content and processes appear to have improved effects on parenting behaviors. That these effects emerged for our predominantly Latino sample is notable, as the EHSREP found no significant impacts on maternal supportiveness for Latino families (Raikes et al., 2013).

Effect sizes, again considering that mothers were already receiving comprehensive home-based services, were notable. We found a large effect on maternal intrusiveness ( $d = 0.77$ ) and a medium effect on overall maternal sensitivity ( $d = 0.47$ ). Although small, effects on sensitivity/responsiveness and positive regard ( $d$ 's = 0.27 and 0.23, respectively) were still larger than the main effect of almost two years of home-based EHS on maternal supportiveness at age 3 ( $d = 0.16$ ; Love et al., 2005).

Compared to two pre-post studies of community-implemented ABC, the pattern of our findings was similar. Early Head Start plus ABC showed the strongest effects on reducing maternal intrusiveness, followed by positive effects on sensitivity/responsiveness and positive regard, as did community-implemented ABC (Caron et al., 2016b). The current effect sizes are smaller than those reported by Caron et al. (2016b) and Roben et al. (2017), however. This differential may reflect our somewhat lower-risk sample of mothers who had comparatively fewer gains to make. It may also reflect variations in research design and analytic approach.

We speculate that several features of the enhanced Early Head Start plus ABC model may have driven its efficacy. First, the coordination among EHS staff and ABC parent coaches may have strengthened retention of intervention participants and helped to keep them to a close to weekly schedule (steady dose) of ABC visits. As suggested by pilot study mothers (Aparicio et al., 2016), we suspect that a second important component was the use of bilingual, bicultural ABC parent coaches who provided ABC sessions in the language of the mother's preference. A third driving component may have been the regular, close supervision of the ABC parent coaches from ABC/Infant Caregiver Project staff (for approximately the first year of ABC provision) and from a senior member of the research team with clinical and supervisory expertise (for the duration of the study). A recent meta-analysis highlighted fidelity monitoring and reflective supervision of home visitors as important predictors of home visiting effectiveness (Casillas, Fauchier, Derkash, & Garrido, 2016).

Finally, we speculate that multiple features of the ABC program itself help account for its consistently positive effects. One such feature is ABC's explicitly dyadic, hands-on approach that facilitates the caregiver's active practicing of key parenting behaviors. A meta-analysis of "parent training" programs documented that larger program effects were associated with the requirement for parents to practice new skills with their children during training sessions (Kaminski, Valle, Filene, & Boyle, 2008). Moreover, ABC provides ongoing opportunities for *guided* practicing of key parenting behaviors via the parent coach's in-the-moment comments. Previous ABC research has linked parent coaches' commenting to parenting improvements (Caron et al., 2016a). We suspect that the current parent coaches' frequent comments helped to galvanize parenting changes.

It is interesting to consider why the strongest effect of Early Head Start plus ABC emerged for maternal intrusiveness. Qualitative interviews with the mothers who participated in the pilot study of Early Head Start plus ABC identified following the child's lead as the most difficult, and initially most culturally incongruous, of the three ABC parenting targets (Aparicio et al., 2016). Our large effect on reduced intrusiveness may reflect intervention mothers' mastery of this difficult goal. Another, not mutually exclusive, possibility is that the low-stress context provided by the Three Bag assessment is especially well suited for mothers to practice following the child's lead and for detecting intervention effects on maternal intrusiveness. More stressful assessments may increase opportunities to observe larger effects in different parenting domains, such as sensitivity to infant distress (Leerkes, Weaver, & O'Brien, 2012).

From the perspective of improving EHS's effects on important parenting outcomes, the current findings, while requiring replication in multiple EHS contexts, suggest that ABC adds value. Indeed, the addition of ABC to EHS appears to have accomplished what Raikes et al. (2014) and Brooks-Gunn et al. (2013) fervently advocated for EHS: increased precision and explicit targeting of "the parenting behaviors that matter for children's development" (Brooks-Gunn et al., 2013; p. 141). Our findings suggest that integrating a targeted, evidence-based parenting intervention such as ABC into ongoing EHS services is a worthy endeavor towards achieving the EHS program's goal of supporting early parent-child relationships.

From the perspective of community-based implementation of attachment interventions, the current study adds rigorous experimental findings to the evidence base supporting community-implemented ABC. In addition to the RCT design, novel elements of the current investigation compared to prior studies of ABC included (a) the provision of ABC in a more preventative context; (b) the provision of ABC to predominantly Latino families; and (c) the

examination of moderated effects. As the dissemination of attachment interventions grows, the ABC program's manualization, short duration, and substantive intensity make it an especially appealing candidate for community-based implementation and scale-up.

Although we were not able to include assessments of infant attachment, we found a medium-sized effect, reflecting an increase of approximately one half of a standard deviation, on overall maternal sensitivity, an effect size identified as necessary to improve attachment quality (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003). Moreover, improving maternal behaviors such as sensitivity, intrusiveness, and positive regard is valuable in its own right for supporting child development in both the short and long term (e.g., Vernon-Feagans et al., 2013).

### **Moderated Effects of Early Head Start plus ABC**

Our exploratory analyses of moderated intervention effects must be interpreted with caution, as no subgroups were randomly assigned and the AAS avoidant and anxious subgroups were small. At the same time, these analyses are the first of their kind and thus contribute uniquely to the EHS and ABC literatures. It appears that the efficacy of our enhanced model was not affected by mothers' depressive symptoms and only partially affected by mothers' pre-intervention parenting scores. In particular, for maternal intrusiveness, there was a significantly stronger effect among initially higher-intrusiveness mothers who presumably had more gains to make in this area. Again, we speculate that the ABC target of following the lead may have been particularly salient in this sample.

Interestingly, the second statistically significant moderated effect supported our hypothesis that more secure mothers would derive greater benefits from ABC. The follow-up simple slopes tests tentatively suggest that the Early Head Start plus ABC model was a better fit for mothers who classified themselves as secure or anxious. These mothers showed significantly

stronger positive effects on maternal sensitivity/responsiveness than those mothers who classified themselves as avoidant. These avoidant mothers, in contrast, showed a *negative* effect on sensitivity/responsiveness. The stronger intervention effects for the secure mothers is consistent with previous research linking mothers' attachment security to higher-quality participation in ABC (Bick et al., 2012). This finding is also consistent with research characterizing secure adults as open-minded and as deriving relatively greater benefits from psychotherapy (see Slade, 2016, for a review).

The negative effect for the avoidant mothers directly parallels Berlin et al.'s (2011) findings of a negative effect of standard EHS on maternal supportiveness for mothers higher in attachment avoidance (assessed dimensionally). Mothers high on attachment avoidance may be especially difficult to reach, as suggested by some studies of avoidant adults receiving psychotherapy (Slade, 2016). It may be that more avoidant mothers experienced the intervention model's emphasis on nurturance, along with the parent coaches' frequent comments, as dissonant or even aversive, which in turn led to iatrogenic effects. In contrast, it is interesting to note that a recent RCT of the Circle of Security-Parenting (COS-P) attachment-based intervention with Head Start preschoolers found a significant effect on child attachment security *only* for mothers higher in attachment avoidance (Cassidy et al., 2017). The authors speculated the COS-P's "gently challenging" approach was an especially good fit for these mothers (Cassidy et al., 2017; p. 666). Thus, it may be that more avoidant mothers are better served by a gentler intervention approach, at least initially.

### **Study Strengths and Limitations**

The current study benefited from numerous methodological strengths. First among these was the RCT design with a strong counterfactual that permitted the interpretation of causal

intervention effects and implicated the supplemental ABC program as pivotal. The study also benefitted from high rates of retention and minimal missing data and from the use of precise, well-validated research measures. Robustness of the findings was bolstered by the conservative, intent-to-treat approach and the use of statistical models that accounted for partial nesting of the data and that included multiple covariates.

Another major strength of the current study was the Early Head Start-University Partnership that undergirded all aspects of the research. Our collaboration with seven EHS programs to conduct an initial pilot study followed by the current RCT reflected the principles of a successful research-practice partnership outlined by Tseng, Easton, and Supplee (2017): (a) practices built on research-based knowledge; (b) ongoing trust among partners; and (c) a jointly-defined research agenda. EHS program partners not only served as crucial gatekeepers of prospective and active participants but also provided important input on working with EHS families and on research assessments. Our partnership simultaneously and synergistically contributed to community services, EHS program development, and developmental science in the real world.

An unanticipated strength of the study grew directly out of our partnering EHS programs' make-up, in that the programs' participating families were predominantly newly immigrated Latinos. As Yoshikawa et al. (2017) discuss, recent demographic trends have changed the nature of vulnerable populations requiring developmentally informed intervention services. These changes in turn require thoughtful consideration of intervention approaches. As described, we took numerous steps to assure the cultural relevance of both our intervention and research approaches. Most importantly, this RCT drew on the findings of a pilot study that directly investigated the cultural relevance of the Early Head Start plus ABC model, and documented

positive appraisals from both mothers and EHS staff (Aparicio et al., 2016; West et al., 2017). It is a limitation of the current study that we did not have adequate statistical power to test our enhanced EHS model for Latino (87%) vs. non-Latino (13%) families. We acknowledge that future evaluations must test whether this enhanced model works as well for predominantly non-Latino EHS families.

Additional limitations include the lack of attachment assessments and the lack of longer-term follow-up assessments. Although attachment assessments could not feasibly be collected, main and moderated intervention effects on other child outcomes and indirect effects on child outcomes mediated via parenting behaviors (currently being analyzed) will be described in future reports. Moreover, whereas it is possible that our short-term findings will not persist, previous ABC studies suggest that they will (Dozier & Bernard, 2017). A final limitation to note concerns the lack of precise information about the duration of the participants' receipt of EHS services. Our eligibility criteria required all participants to be receiving home-based EHS for at least three months. We were not able to test whether variation in the duration of EHS service receipt affected the uptake or outcome of the Early Head Start plus ABC model, however. Exact information on EHS service receipt will increase the precision of future studies.

### **Conclusions and Future Directions**

The current research-practice partnership answers recent calls for developmentally informed intervention research for vulnerable populations that can be applied to large-scale policy or service systems (Yoshikawa et al., 2017), in this case the federal Head Start/Early Head Start service system. We have demonstrated the initial success of our enhanced Early Head plus ABC model for supporting important early parenting behaviors. Our findings depict the Early Head Start plus ABC model as more efficacious for supporting these parenting behaviors than

typical, longer-lasting, but less targeted home-based EHS. These findings also contribute to the evidence illustrating ABC as a strong option for community-implemented attachment interventions. Our findings suggest that ABC can be beneficially integrated into home-based EHS services, at least for predominantly Latino families. Our exploratory findings of moderated effects align with some previous research suggesting that mothers higher in attachment avoidance may require special efforts to engage successfully.

The initial success of the Early Head Start plus ABC model raises the questions of if and how this model might be sustained. One option might consist of training EHS home visitors to provide ABC, thus consolidating EHS and ABC home visits into one weekly, presumably enhanced EHS home visit. As described earlier, for the purposes of the current trial, we considered but decided against training EHS staff as ABC parent coaches for several reasons including the skills and other resources required to provide ABC with fidelity, the existing demands placed on EHS home visitors, and the high levels of mental health problems and job turnover previously observed in EHS staff (Jones Harden et al., 2010; Vogel et al., 2015; Whitaker et al., 2013). Both previous studies of community-based ABC, however, successfully employed agency-based staff as parent coaches (Caron et al., 2016b; Roben et al., 2017), although Caron et al. (2016b) reported a lower retention rate (73%) than the current study's (87.5%). With adequate resources and supports from EHS program directors, it may be possible for some EHS home visitors or senior staff to provide ABC. Sustaining external, "expert consultant" parent coaches will also require ongoing dedication of significant resources including funding for parent coach salaries, equipment, and supervision.

Recent policy developments may bring new resources. As noted, the MIECHV program funds pre-approved home visiting models, including both EHS and ABC (HRSA, 2017).

Additionally, the recently revised Head Start Program Performance Standards require home-based EHS services to “offer opportunities for parents to participate in a research-based parenting curriculum that builds on parents’ knowledge and offers parents the opportunity to practice parenting skills....” (Office of Head Start, 2016; p. 61428). The current findings suggest that using ABC as the research-based parenting curriculum would be a worthy investment.

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Table 1

*Participant Characteristics by Program Group*

Participant Characteristics ( <i>M</i> [ <i>SD</i> ] or Percent)	Full Sample ( <i>N</i> = 202)	EHS + ABC Group ( <i>n</i> = 99)	EHS + BOW/ Control Group ( <i>n</i> = 103)	Test of Group Differences
Maternal Ethnicity:				
Hispanic/Latina	87.1%	87.9%	86.4%	$\chi^2(1) = 0.10, p = .755$
Family Cumulative Risk	1.96 (1.1)	1.97 (1.2)	1.95 (1.1)	$t(200) = -0.12, p = .908$
Child Age in Months	12.9 (4.1)	12.7 (4.2)	13.1 (4.0)	$t(200) = 0.75, p = .455$
Child Sex (Female)	51.0%	47.5%	54.4%	$\chi^2(1) = 0.96, p = .327$
Pre-Intervention Sensitivity/ Responsiveness	2.7 (0.9)	2.8 (0.9)	2.6 (0.9)	$t(200) = -1.14, p = .255$
Pre-Intervention Intrusiveness	3.0 (0.9)	2.9 (0.8)	3.1 (0.9)	$t(200) = 1.64, p = .103$
Pre-Intervention Positive Regard	2.9 (0.9)	3.0 (0.9)	2.9 (0.9)	$t(200) = -0.29, p = .776$
AAS Attachment Groups:				$\chi^2(2) = 2.38, p = .305$
Secure Attachment Group	63.4%	67.7%	59.2%	
Avoidant Attachment Group	22.8%	18.2%	27.2%	
Anxious Attachment Group	13.9%	14.1%	13.6%	
ECR Attachment Avoidance ( <i>N</i> = 197; <i>n</i> 's = 98 and 99)	2.6 (0.5)	2.5 (0.5)	2.7 (0.6)	$t(195) = 1.96, p = .051$
ECR Attachment Anxiety ( <i>N</i> = 197; <i>n</i> 's = 98 and 99)	2.4 (0.6)	2.3 (0.7)	2.4 (0.6)	$t(195) = 1.05, p = .296$
Maternal Depressive Symptoms (CES-D)	9.2 (9.2)	9.3 (9.7)	9.2 (8.8)	$t(200) = -0.11, p = .909$

Table 2

*Unadjusted and Adjusted Regression Estimates and Program Effects for Post-Intervention Parenting Behaviors*

	EHS + ABC Group ( <i>n</i> = 99)		EHS + BOW/ Control Group ( <i>n</i> = 103)		Program Effects				
	<i>M</i>	95% CI	<i>M</i>	95% CI	Regression Estimates			Effect Sizes	
					<i>B</i>	<i>SE</i>	$\beta$	<i>d</i>	95% CI
<i>Unadjusted Estimates</i>									
Post-Intervention:									
Sensitivity/Responsiveness	3.01	[2.82, 3.20]	2.68	[2.49, 2.87]	0.33*	0.13	.17	0.35	[0.07, 0.63]
Intrusiveness	2.40	[2.26, 2.55]	3.11	[2.93, 3.28]	-0.70***	0.12	-.40	0.86	[0.58, 1.15]
Positive Regard	3.19	[3.03, 3.35]	2.99	[2.82, 3.16]	0.20†	0.12	.12	0.24	[-0.03, 0.52]
Overall Sensitivity	3.27	[3.13, 3.41]	2.85	[2.70, 3.01]	0.41**	0.10	.27	0.56	[0.28, 0.84]
<i>Adjusted Estimates</i>									
Post-Intervention:									
Sensitivity/Responsiveness	3.03	[2.89, 3.16]	2.67	[2.55, 2.80]	0.25*	0.10	.13	0.27	[-0.01, 0.54]
Intrusiveness	2.40	[2.27, 2.54]	3.11	[2.96, 3.25]	-0.64***	0.11	-.36	0.77	[0.48, 1.05]
Positive Regard	3.20	[3.08, 3.33]	2.99	[2.85, 3.12]	0.19*	0.09	.11	0.23	[-0.05, 0.50]
Overall Sensitivity	3.27	[3.17, 3.38]	2.85	[2.74, 2.96]	0.35***	0.08	.23	0.47	[0.19, 0.75]

†  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Table 3

*Summary of Moderated Effects of Early Head Start plus ABC*

Moderated Effects	Post-Intervention Parenting Behaviors								
	Sensitivity/ Responsiveness			Intrusiveness			Positive Regard		
	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$	<i>B</i>	<i>SE</i>	$\beta$
RCT Group $\times$ Pre-Intervention Parenting Behavior	-0.09	0.11	-.04	-0.29*	0.12	-.14	0.01	0.11	.01
RCT Group $\times$ Avoidant vs. Secure Attachment Group	-0.91***	0.22	-.27	0.41 <sup>†</sup>	0.23	.13	-0.09	0.22	-.03
RCT Group $\times$ Anxious vs. Secure Attachment Group	0.14	0.29	.04	-0.23	0.37	-.07	0.13	0.32	.04
RCT Group $\times$ ECR Attachment Avoidance	-0.16	0.19	-.04	0.18	0.22	.05	0.20	0.19	.06
RCT Group $\times$ ECR Attachment Anxiety	-0.07	0.15	-.02	-0.02	0.18	-.01	0.30 <sup>†</sup>	0.17	.11
RCT Group $\times$ CES-D	0.01	0.01	.05	-0.01	0.01	-.03	0.01	0.01	.05

<sup>†</sup>  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Flow Diagram**

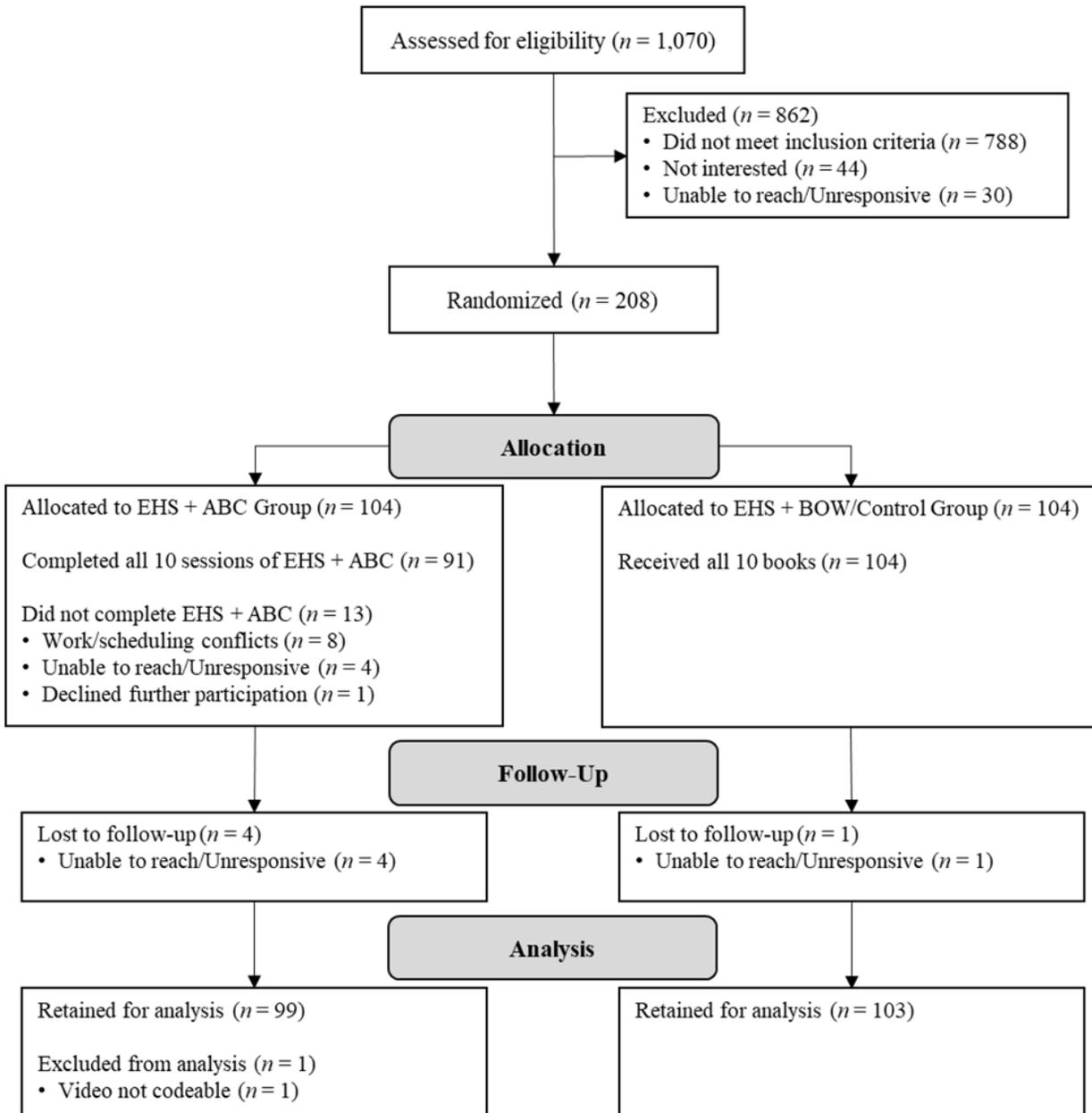


Figure 1. Flowchart detailing enrollment, randomization, and participant retention.

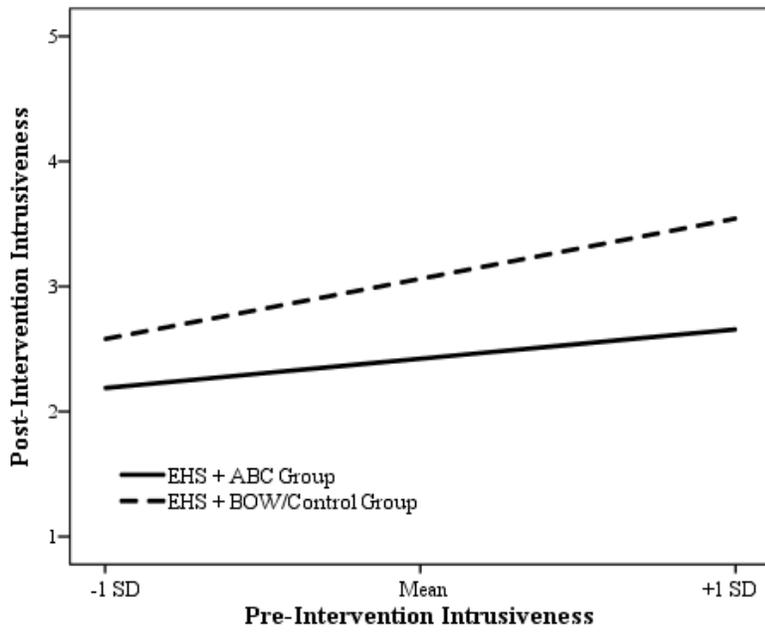


Figure 2. Adjusted means for post-intervention maternal intrusiveness at low, mean, and high levels of pre-intervention maternal intrusiveness, by RCT group.

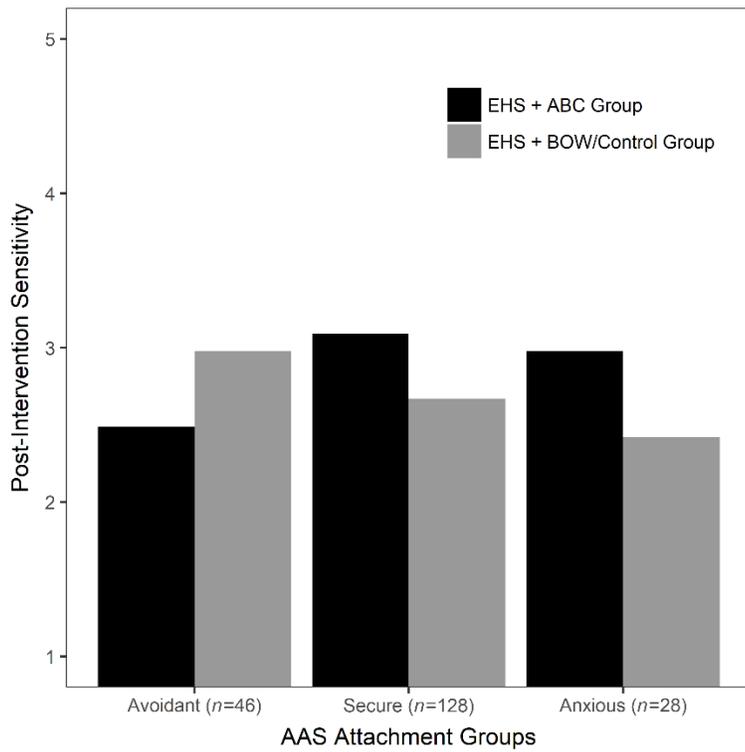


Figure 3. Adjusted means for post-intervention maternal sensitivity for avoidant, secure, and anxious mothers, by RCT group.