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THE EFFECTIVENESS OF ATTACHMENT INTERVENTIONS: A META-ANALYSIS

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Abstract

A meta-analysis of the primary studies on early attachment interventions among caregivers was conducted to determine their efficacy on attachment and sensitivity outcomes. We used five online databases (PubMed, PsycINFO, CINAHL Plus, ERIC, and Web of Science) to search for relevant primary articles through April 2022. Our initial search yielded 10,465 potentially relevant articles, and 60 papers published between 1980 and 2022 met our inclusion/exclusion criteria. Two teams of two individuals independently extracted qualitative and quantitative data. The total sample included 5,940 children, 5,674 mothers, and 1,050 fathers. We calculated the association of the effects between the intervention and attachment and sensitivity separately based on the available statistical information as odds ratio (OR). The analyses of 37 and 26 studies showed improved attachment security and maternal sensitivity, respectively. Interventions were more effective in the studies that used randomized control trials than in studies that used other designs for both attachment and sensitivity outcomes. While video use did not impact the sensitivity outcome, interventions that did not use video were more effective for attachment outcome than those that used video. Finally, the number of sessions and intervention length did not impact the efficacy of the intervention on attachment and sensitivity.

Keywords

Attachment Intervention; Primary Caregivers; Sensitivity

Introduction

A secure attachment between primary caregiver and infant provides a foundation for optimal development of all aspects of a child's life (e.g., Ainsworth & Bowlby, 1991; Cimino & Cerniglia, 2024; Sroufe, 2005; Stronach et al., 2013) and throughout the lifespan (e.g., Crouch, 2015; Hazan & Shaver, 1987; Simmons et al., 2009). In secure attachment relationships, the primary caregiver provides a sense of safety, emotion regulation, and a secure base that develops into a healthy reciprocal relationship (e.g., Crouch, 2015; Flaherty et al., 2011; Sroufe, 2005). This sensitive and responsive parenting meets the needs of the child and informs how a child navigates and views the world (Ainsworth et al., 1974; Bretherton, 1992) which in turn informs their capacity to develop empathy and social competence (Sroufe, 2005). The capacities developed in infancy due to a secure attachment are associated with many protective factors throughout the lifespan. These include resilience, emotion regulation, flexibility, social competence, trust, hope, independence, and autonomy while still valuing the importance of close relationships (Ainsworth & Bowlby, 1991; Sroufe, 2005). Also, secure attachment serves as a protective factor for mental health and wellbeing in infancy, childhood, and adulthood (Hazan & Shaver, 1987; Sroufe, 2005; Waldinger et al., 2015).

On the other hand, an insecure and/or disorganized attachment between primary caregiver and infant is associated with academic, social, and emotional difficulties throughout the lifespan (Hazan & Shaver, 1987; Simmons et al., 2009). These also include mental health effects, such as depression, anxiety, dissociation, and personality disorders (e.g., Barlow et al., 2016; Sroufe, 2005). Additionally, past attachment experiences can hinder future parenting and the transmission of insecure attachment relationships to the next generation (Cimino & Cerniglia, 2024; Flaherty et al., 2011; Mattheß et al., 2024).

Given the prevalence of insecure attachment relationships (33%; Barlow et al., 2016), researchers developed interventions to increase the likelihood of obtaining a secure foundational attachment and improving child-caregiver relationships when maladaptive attachment patterns develop (e.g., Dozier et al., 2005). These

programs typically focus on enhancing caregiver skills through education, behavior modification, and prevention strategies (e.g., Huber et al., 2015; Dozier et al., 2005). Past reviews suggest that attachment interventions are generally effective at increasing secure attachment (e.g., OR = 1.81 $p < .002$; Mountain et al., 2017), improving caregiver sensitivity (e.g., $d = 0.33$) or attachment security (e.g., $d = 0.19$; Bakermans-Kranenburg, et al., 2003), and decreasing disorganized attachment (e.g., OR = 0.46 $p < .01$; Wright & Edginton, 2016).

However, knowing which interventions are effective can be challenging due to the inconsistencies in attachment-related research, including the use of varied research designs and protocols, and reporting (Bakermans-Kranenburg et al., 2003; Cook et al., 2007; Mountain et al., 2017). While descriptive attachment intervention studies are more common than experimental designs, reviews reveal larger effect sizes in randomized control trials (Bakermans-Kranenburg et al., 2003, Mortensen & Mastergeorge, 2014). Additionally, studies use varied intervention protocols, including focus, modality, delivery (e.g., who, how, etc.), and setting (e.g., at home vs. public organization settings.; Barlow et al., 2016; Mountain et al., 2017). Finally, previous reviews found variability in technical reporting across studies, including treatment integrity, environmental and demographic characteristics, the use of assessment methods, and effect sizes (Doughty, 2007; Cook et al., 2007).

Given the inconsistencies in existing literature, it is important to continue to investigate which interventions are effective and what contributes to their effectiveness. Therefore, the purpose of this meta-analysis was to quantitatively analyze the current literature to assess the strength of interventions on attachment relationships as assessed via attachment and sensitivity outcomes. Additionally, we examined whether study design, intervention setting, and the use of video play a role in the effectiveness of the intervention on attachment and sensitivity. The focus of our review is on primary caregiver-child interventions occurring during any stage of a child's life, including prenatal development through adolescence. Therefore, the findings of our project can contribute to clinicians, researchers, and public policy architects to determine the effectiveness of interventions and whether the use of different intervention methods impacts their efficacy.

Methods

Search Strategy

We (LSR, UD) searched five online databases (i.e., PubMed, PsycINFO, CINAHL Plus, ERIC, and Web of Science) using a predetermined set of keywords for primary research that examined the effects of attachment interventions among caregivers in April 2022. ***Supplemental File 1*** includes the detailed search strategy. We imported the initial searches into reference-managing software (Zotero, 2022). After excluding the duplicates, two teams of two individuals screened the titles and abstracts of potentially relevant articles while working independently. Both teams and the lead investigators (LSR, UD) independently assessed the full texts of these articles. We also examined reference lists from previous reviews and papers. The teams and lead investigators met to reach a consensus on each paper's inclusion/exclusion criteria (e.g., early attachment interventions targeting caregivers, etc.). Disagreements were adjudicated by discussion, with the final decision made by the lead investigator (LSR). We obtained consensuses for all included articles.

Study Inclusion Criteria

The studies were included if they 1) were written in English language (due to limited resources in translating the articles), 2) implemented interventions targeting caregivers, 3) measured outcome variable of attachment or sensitivity, and 4) provided enough statistical information to calculate the effect sizes (ESs). No other restrictions were set.

Study Exclusion Criteria

Studies were excluded if they 1) were written in a non-English language, 2) did not assess attachment or sensitivity as an outcome, 3) featured attachment interventions that did not focus on caregivers (e.g., daycare providers, nannies, babysitters, legal guardian only, foster parents, adoptive parents [unless adopted before the infant is six months old], stepparents), and 4) did not provide (or we were unable to acquire) information needed to calculate ESs.

In Table 1, we describe inclusion/exclusion criteria according to a Population, Exposure/Intervention/Comparison, Outcomes, and Study Design (PE/I/COS) framework (Brown et al., 2006; Huang et al., 2006).

Search Strategy	Details
Inclusion criteria	P: Child's primary caregiver (mother/father); biological child or child adopted before six months of age
	E/I/C: Attachment interventions targeting caregivers (at any age) caring for a child up to 18 years of age, including prenatal development; parental or caregiver sensitivity interventions
	O: Attachment or sensitivity outcome (e.g., SSP, AQS, etc.,) or self-report from parents
	S: Case-control studies, non-/randomized control trials (RCTs), quasi-experiments, comparative, pre-post design
Exclusion criteria	P: Child adopted after six months of age
	E/I/C: Attachment interventions focusing on daycare providers, nannies, babysitters, legal guardians only, foster parents, adoptive parents (unless adopted before the infant is six months old), and stepparents
	O: Other than attachment or sensitivity outcome (e.g., mental health measures only, etc.)
	S: Reviews, letters, book chapters, articles without quantitative and quantitative data
Language	English
Time filter	None
Database	PubMed, PsycINFO, CINAHL Plus, ERIC, Web of Science

Table 1 Detailed description of selection criteria according to the PE/I/COS Framework (Brown et al., 2006; Huang et al., 2006).

Note. AQS = Adult Attachment Questionnaire, P = Population, E/I/C = Exposure/Intervention/ Comparison, O = Outcomes, S = Study Design, RCT = randomized control trial, SSP = The Strange Situation Procedure.

Data Extraction

Both teams performed data extraction independently and were overseen by the lead investigators. The initial data extraction form was created by the investigator (UD) and piloted on a random sample of five studies. Based on feedback from the team and the primary investigator (LSR), the data extraction form was revised. The information extracted from each study included design, participant characteristics (e.g., population, sample size, age, etc.), assessment methods for attachment/sensitivity, intervention characteristics (e.g., duration, number of sessions, frequency, etc.), main findings, and relevant data to calculate the ESs (e.g., means, standard deviations, proportions, standard errors, *p*-values). The teams had full access to each paper during data extraction. The lead investigators examined the extraction tables for accuracy and completeness. Table 2 presents the summary of the extracted data.

Risk of Bias Assessment

Each study included in our review was assessed for methodologic rigor using a self-developed quality scale, which followed the guidelines for reporting research on psychology put forth by the American Psychological Association (see APA Publications and Communications Board, 2008). The quality scale consisted of eight dimensions (i.e., statement of purpose/hypotheses, target population/recruitment/sampling, description of the outcome measures, intervention, statistical analyses, adequacy of results, and overall quality of the study). It used a 10-point Likert-type scale ranging from 1 (*Not Acceptable*) to 10 (*Excellent*). The lead authors (LSR, UD) independently rated each study in the meta-analysis. ***Supplemental File 2*** includes details about the quality scale.

The Statistical Method of Estimation of Effect Sizes and Analyses

We calculated the association of the effects between the intervention (exposure) and attachment and sensitivity (outcomes) separately based on the available statistical information (e.g., means, standard deviations, number of participants per category, *p*-values, etc.) as odds ratio (OR) with 95% confidence intervals in the Comprehensive Meta-Analysis program Version 3.0 (Borenstein et al., 2011; Borenstein et al., 2005). We calculated the average scores if separate data were available for female (e.g., mothers) and male (e.g., fathers) caregivers. Additionally, if the study assessed outcomes at multiple points/over time, we used the data of the final assessed time point.

Heterogeneity was assessed using Cochran's *Q* statistic to inform us about variation in ESs (Hedges & Olkin, 1985). The I^2 statistic was used to determine the proportion of the observed variance that reflected differences in true ESs (Higgins & Thompson, 2002; Huedo-Medina et al., 2006). We used a random-effects model as the pooling method because studies in our review were gathered from existing literature and may be based on multiple populations (Borenstein, 2019; Borenstein et al., 2011; Higgins & Thompson, 2004). The funnel plot, Egger linear regression test, and Begg rank correlation test were inspected to detect publication bias (Begg & Mazumdar, 1994; Egger et al., 1997). We constructed forest plots for each study's graphical overview of the ESs.

Additionally, to estimate whether the effectiveness of intervention varied across the use of different study designs and video, we conducted subgroup analyses by design (RCT vs. Others) and video use (Yes vs. No) on attachment and sensitivity, and intervention setting (Individual vs. Group) for attachment only. Finally, a multivariate meta-regression using the restricted maximum likelihood estimator (Dempster et al., 1981) for between-studies variation with the Knapp-Hartung adjustment (Hartung & Knapp, 2001) was used to explore whether the number of sessions and length of the interventions played a role and were used as covariates (Higgins & Thompson, 2004). A *p*-value less than .05 was considered significant for all tests.

Results

Literature Search and Characteristics of Included Studies

Our initial search resulted in 10,465 potentially relevant articles. After removing duplicates, we screened titles and abstracts of 9,640 papers for inclusion/exclusion criteria. This resulted in 164 full-text articles, which were read fully and critically assessed. This qualitative screening resulted in 60 papers published from 1980 to 2022 that met our inclusion/exclusion criteria. These included 36 RCTs and 8 quasi-experimental, 12 pre-post, 4 comparative, and 3 longitudinal studies. The total sample included 5,940 children, 5,674 mothers, and 1,050 fathers. Twenty-six studies included samples from the U.S., and 33 were from non-U.S. countries (e.g., Europe, Asia, and Oceania). The sample sizes ranged from 9 to 325 children who were prenatal and up to 16 years of age.

To assess attachment and sensitivity, studies used a variety of self-report questionnaires, including the Adolescent Attachment Questionnaire, Ainsworth Strange Situation Tests, and Strange Situation Procedure among others. Table 2 reports details on participants and study characteristics. As per the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) statement (Moher et al., 2009), results from each stage of the search are displayed in Figure 1.

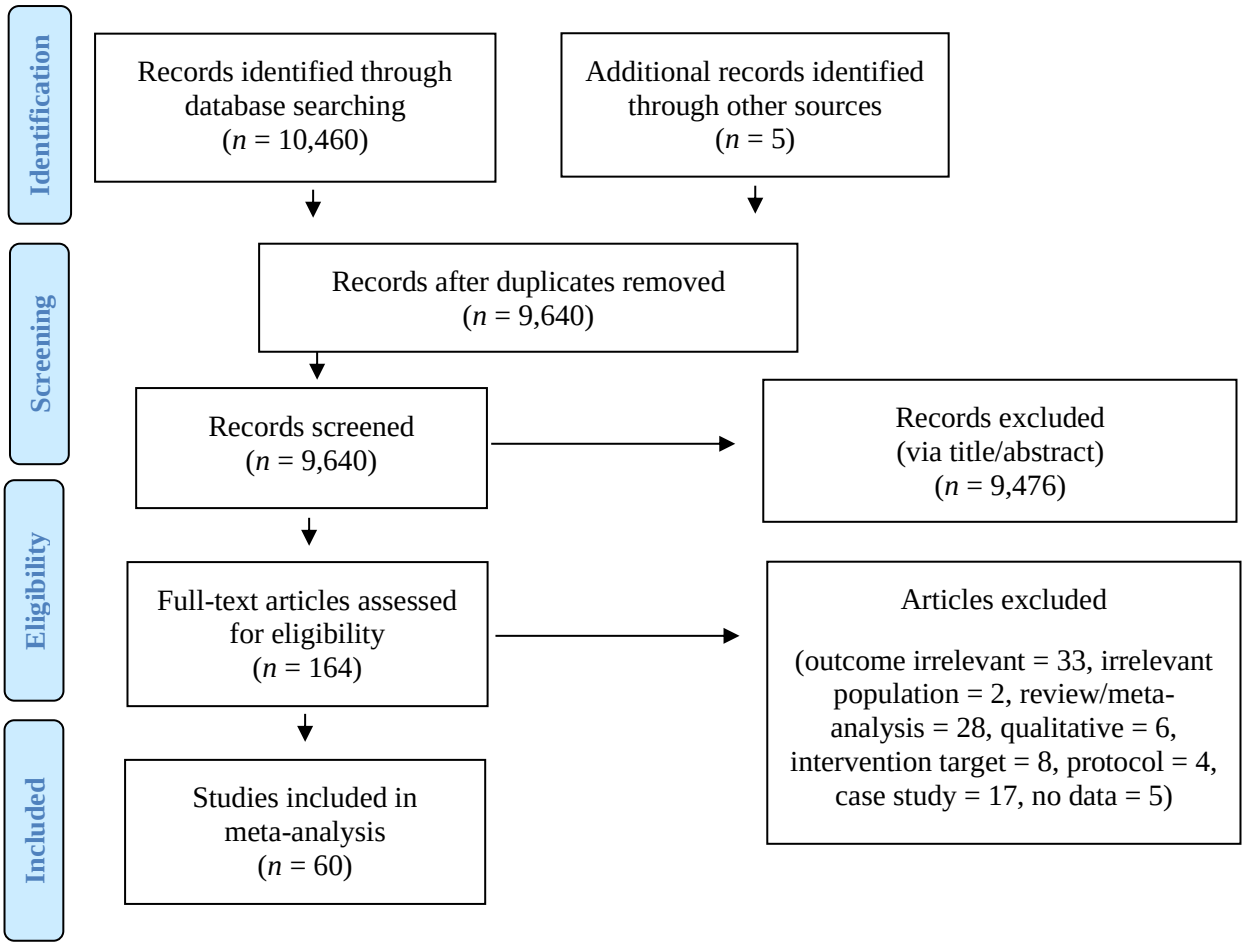

Figure 1: PRISMA Flow-Chart: Search Result

Short Citation	Country	Design	Recruitment Methods	Population	Intervention Characteristics	Intervention Focus	Control Group	Outcome Measures	Treatment Integrity & Delivery	Efficacy
Alhusen et al. (2021)	USA	RCT	Convenience sample from two obstetrical clinics in Baltimore, MD	60 children 60 mothers (M_{age} = 24.5, *SD* = 5.53) with moderate to severe depression Low SES	*n* = 30 Mothers & Babies course Six 120-minute sessions over 6 weeks	Attachment & Sensitivity	*n* = 30 Standard parental care	Maternal-Fetal Attachment Scale (MFAS for attachment) Nursing Child Assessment Satellite Training-Feeding Scale (NCAST-Feeding, for maternal sensitivity)	Standardization followed Professionals	Yes
Ammerman et al. (2022)	USA	RCT	Convenience sample of participants already enrolled in home visiting program	150 children 150 mothers (M_{age} = 23.20, *SD* = 5.00) 150 fathers (M_{age} = 25.50, *SD* = 5.90) Low SES	*n* = 70 Family Foundations plus Home Visiting (FFHV) Eleven sessions over 11 weeks	Sensitivity	*n* = 80 Home Visiting Alone (HV)	Observational Measures of Parenting Quality and Coparenting (OMPQC; sensitivity subscale)	Standardization followed Delivered by non-professionals	No
Anderson & Sawin (1983)	USA	RCT	Convenience sample	30 newborn infants, first-born females 30 mothers (M_{age} = 25, *Range* = 19-39) Medium SES	*n* = 10 "Show and Tell" during Brazelton Neonatal Behavior Assessment Scale (BNBAS) One 45-minute session	Sensitivity	*n* = 10 BNBAS with no interaction/information about performance *n* = 10 Received info about infant furniture safety	Assessment of Mother-Infant Sensitivity Scale (AIMS)	Delivered by professionals	Yes
Armstrong et al. (1999)	Australia	RCT	Convenience sample from Royal Women's Hospital based on Brisbane Evaluation of Needs Questionnaire scores	181 newborn infants 181 mothers identified as "vulnerable" with history of postnatal depression Low SES	*n* = 90 Home Nurse Visits Six weekly visits over 6 months	Attachment	*n* = 91 UC-Standard community child health services	Parenting Stress Index (Parent Domain and Child Domain subscales)	Delivered by professionals	Yes

Ashton et al. (2016)	Canada	Pre-Post	Convenience Sample of participants enrolled in CASA Trauma and Attachment Group (TAG) Program	51 children (Age_{Range} = 5-12 years) who had PTSD/developmental trauma and attachment related disorder 51 caregivers	*n* = 51 CASA Trauma and Attachment Group (TAG) Program ~Thirty-two 120–150-minute sessions over 8 months	Attachment	N/A	Parenting Relationship Questionnaire (PRQ; attachment subscale)	Delivered by professionals	Yes
Beetz et al. (2015)	Germany	RCT	Convenience sample recruited via newspaper advertisements	20 children (M_{age} = 16.55 months, *Range* = 11-27, *SD* = 4.26) with behavioral/emotional dysregulation, potentially insecure/disorganized attachment 20 mothers (M_{age} = 28.20, *Range* = 19-46, *SD* = 8.464) with some at risk due to psych. disorders	*n* = 10 Equine-Assisted Intervention (EAI) Eight 45-minute sessions over 8 weeks	Sensitivity	*n* = 10 Conventional Play-Based Intervention (PBI)	Ainsworth Strange Situation Test (ASST) Maternal Attitude Towards the Own Child Questionnaire (MACQ) CARE-Index	Delivered by professionals	No
Bellieni et al. (2007)	Italy	Comparative	Convenience sample from women who attended PEC or from first trimester fetal echography visit	77 children, prenatal (second trimester) 77 mothers (M_{age} = 31.50, *SD* = 4.10)	*n* = 36 Prenatal Education Courses (PEC) Five 60-minute sessions over ~3 months, ("during the second trimester of pregnancy")	Attachment	*n* = 41 Enrolled at first trimester fetal echography; did not attend the PEC	Prenatal Attachment Inventory (PAI)	Delivered by professionals	Yes
Berlin et al. (2017)	USA	RCT	Convenience sample of "Baby Love" Program participants	94 children (M_{age} =16.5 months, *SD* = 3.6 at Strange Situation Test), identified as "high risk" 94 mothers (M_{age} = 20.10, *SD* = 4.60) Low SES	*n* = 67 Healthy Families Durham (HFD) ~52 sessions (*M* = 28.69, *SD* = 13.18, *Range* = 0-59) over 12 months	Attachment	*n* = 27 "Yearly Check-Up"/"Services as Usual"	Strange Situation Procedure (SSP)	Standardization followed Delivered by professionals	No
Berlin et al. (2018)	USA	RCT	Convenience sample involving rolling recruitment from 7 EHS programs' attendees	208 children (M_{age} = 13 months, *Range* = 6-20, *SD* = 4) 208 mothers (M_{age} = 31, *Range* = 18-45, *SD* = 6.50), majority Latino (87%)	*n* = 99 Early Head Start (EHS) plus Attachment and Biobehavioral Catchup (ABC)	Sensitivity	*n* = 103 Home-based EHS plus "Book of the Week"	"Three Bag" Assessment (Sensitivity)	Standardization followed Delivered by non-professionals (trained parent coaches certified in ABC)	No

				Low SES	*Ten sessions over M =13 weeks (SD = 6.9)*					
Bettman & Tucker (2011)	USA	Pre-Post	Convenience sample	96 children (M_{age} = 15.98 years, *Range* = 14-17, *SD* = 0.95), majority with diagnoses of Oppositional Defiant Disorder (ODD, 76%), Depressive Disorders (65.6%), and Substance dependence (51.4%)	*n* = 96 Wilderness Therapy All-intensive program lasted 7 weeks (*M* = 49.31 days, *SD* = 9.53) ~14 (2 days/wk) psychotherapy sessions + 3-day family therapy at end of treatment	Attachment	N/A	Adolescent Attachment Questionnaire (AAQ) Adolescent Unresolved Attachment Questionnaire (AUAQ) Inventory of Parent and Peer Attachment (IPPA)	Delivered by professionals	Yes
Blizzard et al. (2018)	USA	RCT	Convenience sample recruited during well and sick visits at the pediatric primary care clinic	58 children (M_{age} = 13.52 months, *Range* = 12-15, *SD* = 1.31), majority ethnic/racial minority background (98%) 58 mothers (M_{age} = 29.90, *Range* = 17-42, *SD* = 5.3) Low SES	*n* = 28 Infant Behavioral Program (IBP) Five to seven (*M* = 6.1) 60–90-minute sessions over ~ 2 months	Attachment	*n* = 30 Standard care	Early Parent Coding System (EPCS) The Dyadic Parent-Child Interaction Coding System - Third Edition (DPICS)	Standardization followed Delivered by non-professionals (doctoral students in clinical psychology)	Yes
Borghini et al. (2014)	Switzerland	RCT	Convenience sample from Lausanne University Hospital NICU from 2005-2009	55 very pre-term infants (M_{age} = 30 weeks gestation, *SD* = 2) 55 mothers (M_{age} = 33 years, *SD* = 4.14)	*n* = 26 3-Step Early Intervention Program Five total sessions over 5 months (one 30–60-minute session at 33 weeks after conception + 1 assessment session at 42 weeks after conception + 3 10-minute sessions at 4 months corrected age)	Sensitivity	*n* = 29 Pre-term infants without intervention (Standard Care)	The CARE-Index	Delivered by professionals	Yes
Bryan (2000)	USA	Quasi-experimental	Nonrandomized convenience sample from expectant parent classes	77 children (M_{age} = 10.50 months, *Range* = 6-24) 77 mothers (M_{age} = 25, *Range* = 18-36) 77 fathers (M_{age} = 28, *Range* = 18-51) Low SES	*N* = 35 Growing as a Couple and a Family (GCF) Three 120-minute sessions	Sensitivity	*n* = 42 Community childbirth preparation classes	The Nursing Child Assessment Teaching Scale (NCATS)		Yes

Bunston et al. (2016)	Australia	Pre-Post	Convenience sample of referrals from Maternal Child Health, Child Protection, Women's Support Services, or another external service	128 children (M_{age} = 20.40 months, *SD* = 11.31) 128 mothers (M_{age} = 30.24, *Range* = 18-53, *SD* = 5.95), some reporting mental health issues, substance use, or IPV *n* = NR fathers (M_{age} = 34.51, *SD* = 7.15)	*n* = 128 The Peek-a-Boo Club™ Eleven (8 weekly sessions + 1 reunion group +1 pre- and 1 post- group) 120-minute sessions over 9 weeks	Attachment	N/A	The Maternal Postnatal Attachment Scale (MPAS)	Standardization followed Delivered by professionals	Yes
Carson &Virden (1984)	USA	RCT	Convenience sample of health department clients from prenatal clinic sites (WIC Food Program + Prenatal Group in Drug Abuse Treatment Program)	69 children 69 mothers (M_{age} = 24, *Range* = 16-25) Low SES	*n* = 44 (21 Relaxation Group + 23 Palpation Group) Carter-Jessop Prenatal Attachment Intervention Two 20-minute sessions	Attachment	*n* = 25 Usual Prenatal Services	Frequency of Attachment Behavior identified by Carter-Jessop Tool	Delivered by professionals	No
Casey & Whitt (1980)	USA	RCT	Convenience sample of nursery infants recruited from North Carolina Memorial Hospital	44 healthy first-born infants 44 mothers (M_{age} = 21.16) Low SES	*n* = 15 Pediatrician Guidance Intervention Six 25-30-minute sessions over 25 weeks (~6 months, visits at age 2 weeks to 27 weeks)	Sensitivity	*n* = 17 Standard Care	Sensitivity-Insensitivity Scale (developed by Ainsworth's group)	Standardization followed Delivered by professionals	Yes
Cassidy et al. (2011)	USA	RCT	Convenience sample of infants recruited at birth from 14 local hospitals in large metropolitan area	220 newborn infants, within top 20% of irritability scores 220 mothers (M_{age} = 24.06, *Range* = 18-39, *SD* = 5.23) Low SES	*n* = 86 Circle of Security-Home Visitng-4 Intervention (COS-HV4) Four 60-minute sessions over ~9 weeks	Attachment	*n* = 88 Three 60-minute psychoeducational sessions on same schedule as intervention group	Strange Situation Procedure (SSP)	Standardization followed	Yes

Cassidy et al. (2017)	USA	RCT	Convenience sample of individuals enrolled in Head Start	141 children (M_{age} = 50.92 months, *Range* = 39.87-63.58, *SD* = 5.98) 141 mothers (M_{age} = 29.64, *Range* = 18-48, *SD* = 6.27) Low SES	*n* = 75 Circle of Security Parenting (COS-P) Ten 90-minute sessions over 10 weeks	Attachment	*n* = 66 Wait list	Strange Situation Procedure (SSP)	Standardization followed Delivered by professionals	No
Chang et al. (2004)	Korea	Pre-Post	Convenience sample recruited from Taegyo-focused prenatal classes in Seoul public health center	49 children, prenatal (M_{age} = 34 weeks gestation, *Range* = 20-36, *SD* = 4.19) 49 mothers (M_{age} = 29.3, *Range* = 24-40, *SD* = 3.18)	*n* = 49 Taegyo-focused Prenatal Classes Four 120-minute sessions over 4 weeks	Attachment	N/A	Cranley's Maternal-Fetal Attachment Scale (MFAS)	Delivered by professionals	Yes
Chen et al. (2019)	Taiwan	Comparative	Convenience sample of fathers in special care nursery in Taiwan	82 preterm infants (M_{age} = 33.4 gestational weeks, *Range* = 32-37 weeks) 82 fathers (M_{age} = 35.6, *Range* = 24-48, *SD* = 5.02)	*n* = 41 Early Fatherhood Intervention Program Five sessions during hospitalization of infant	Attachment	*n* = 41 Standard Care (conventional nursing guidance during hospitalization of infant)	Maternal Attachment Inventory (MAI) - Taiwanese Version	Delivered by professionals	Yes
Cicchetti et al. (1999)	USA	Longitudinal	Convenience sample from community	108 children (M_{age} = 20.40 months, *SD* = 2.38) 109 mothers (M_{age} = 31.70, *Range* = 22-41, *SD* = 4.36), a majority with major depression; "Non-low" SES	*n* = 27 Toddler-Parent Psychotherapy (TPP) *M* = 45.63 sessions (*SD* = 11.40, *Range* = 31-68) over *M* = 59.03 weeks (*SD* = 10.44, *Range* = 42.88-78.93)	Attachment	*n* = 36 Depressed Control Group (no treatment)	The Attachment Q-Set (AQS) Attachment Q-Scales	Standardization followed Delivered by professionals	No

Cohen et al. (2002)	Canada	Comparative	Convenience sample of 10–30-month infants and their mothers who attended children's mental health clinic	57 children (M_{age} = 20.55 months, *Range* = 10-30, *SD* = 6.45) with chronic feeding, sleeping, or behavior problems, parent reported attachment/relational difficulties 57 mothers (M_{age} = 32.22, *SD* = 4.30) Medium SES	*n* = 26 Watch, Wait, and Wonder (WWW) *M* = 13.8 60-minute sessions over *M* = 4.6 months	Attachment	*n* = 31 Mother-Infant Psychodynamic Psychotherapy (PPT)	Strange Situation Procedure (SSP)	Standardization followed Delivered by professionals	No
Davis & Akridge (1987)	USA	RCT	Convenience sample	22 children, prenatal (*Range* = 32-37 weeks gestation) 22 mothers (M_{age} = 20.6, *Range* = 17-32, *SD* = 2.54)	*n* = 10 Intrauterine Attachment Intervention Three sessions during the third trimester	Attachment	*n* = 12 Standard Care	Avant's Maternal Attachment Assessment Scale	Delivered by professionals	No
Doaltabadi &Amiri-Fatahani (2021)	Iran	Quasi-experimental	Convenience sample spouses of primiparous women recruited from three prenatal clinics in Tehran	114 children, prenatal (*Range* = 24-37 weeks gestation) 114 mothers (M_{age} = 27.26, *Range* = 18-35, *SD* = 3.97) 114 fathers (M_{age} = 31.34, *SD* = 4.05) Mixed SES	*n* = 76 In-Person and Virtual Prenatal Care Training (for spouses) Four 90-minute or digital content sessions over 13 weeks	Attachment	*n* = 38 Standard Care	Maternal Postnatal Attachment Scale (MPAS) Postnatal Paternal-Infant Attachment Questionnaire (PPAQ)	Standardization followed Delivered by professionals	No

Dollberg et al. (2013)	Israel	Pre-Post	Convenience sample of families who were referred to community-based infant mental health clinic	45 children (M_{age} = 21.21 months, *Range* = 6-35, *SD* = 8.94), majority (62.2%) met criteria for infant psychiatric disorder 45 mothers (M_{age} = 29.15, *SD* = 5.06) 36 fathers (M_{age} = 32.10, *SD* = 5.58) Low – Medium SES	*n* = 45 Parent-Infant Psychotherapy	Sensitivity	N/A	The Coding Interactive Behavior Manual (CIB) - Maternal Sensitivity	Delivered by professionals	Yes
Duggan et al. (2009)	USA	RCT	Convenience sample referred by program staff via Healthy Families Alaska (HFAK) program sites	325 infants 325 "at-risk" mothers (M_{age} = 23.55, *SD* = 5.7) Low SES	~25 (*M* = 22.53, *SD* = 15.73) 50-minute sessions over 6 months Healthy Families Alaska (HFAK) Weekly sessions over 6-9 months	Sensitivity	*n* = 163 Standard Care	The Nursing Child Assessment Teaching Scale (NCATS)	Delivered by non-professionals	No
Eruyar & Vostanis (2020)	Turkey	Pre-post	Convenience sample; recruited from non-governmental organization (NGO) in Istanbul, Turkey	30 children (M_{age} = 12.60, *Range* = 11-14, *SD* = 1.03); Syrian refugees with a cutoff score of 7 for Reactive Attachment Disorder 30 mothers (M_{age} = 39.8, *Range* = 31-54, *SD* = 6.64); Syrian refugees Very low to Low-medium SES	*n* = 15 Theraplay Eight 45-minute sessions over 8 weeks	Attachment	*n* = 15 No intervention	Security Scale (Perceived Attachment Security)	Delivered by professionals	No
Feldman et al. (2003)	Israel	Comparative	Convenience sample of premature infants from Shaare-Zedek Medical Center and Schneider Children's Hospital	146 premature infants (M_{age} = 30.65 weeks gestation, *Range* = 24-34, *SD* = 2.76), low birth weight (*M* = 2.79 lbs., *Range* = 1.16-3.79) 146 mothers (M_{age} = 29.35, *SD* = 5.43) 146 fathers (M_{age} = 32.38, *SD* = 6.82) Medium SES Low SES	*n* = 73 Kangaroo Care (KC) 14 60-minute sessions over 2 weeks	Sensitivity	*n = 73* Standard Care	The Coding Interactive Behavior Manual (CIB) - Parent Sensitivity and Responsiveness Codes	Standardization followed Delivered by professionals	Yes

Guild et al. (2021)	USA	RCT	Convenience sample; referrals from mental health professionals; notices in newspapers, community publications, medical offices, and community bulletin boards	130 children (M_{age} = 20.34 months, *SD* = 4.68) 130 mothers (M_{age} = 31.68, *Range* = 21-41, *SD* = 4.68), history of major depressive disorder since childbirth Middle SES	*n* = 66 Child-Parent Psychotherapy (CPP) Thirty to seventy-five 60-minute sessions over ~14 months	Attachment	*n* = 64 Standard Care	Strange Situation Procedure (SSP)	Standardization followed Delivered by professionals	Yes
Güney & Ucar (2019)	Turkey	RCT	Convenience sample, contacted using phone number from Family Health Center in Malatya	110 prenatal infants (M_{age} = 29.58 weeks gestation, *Range* = 28-32, *SD* = 1.48) 110 mothers (M_{age} = 27.62, *Range* = 19-40, *SD* = 4.69), no risk factors during pregnancy (e.g., preeclampsia), no fertility treatment	*n = 55* "Count-to-10-method" or "Cardiff method" Independent 15-20 minutes sessions for 4 weeks	Attachment	*n* = 55 Standard Care	Maternal Antenatal Attachment Scale (MAAS)	Delivered by non-professionals	Yes
Handley et al. (2017)	USA	RCT	Purposeful & convenience community sample of non-treatment-seeking women from primary care clinics serving low-income women and from Woman, Infant and Children (WIC) clinics	125 children (at baseline M_{age} = 13.23 months, *SD* =. 99) 125 mothers (M_{age} = *23.43* years, *Range* = 18-40, *SD* = 5.01), majority African American (54.4%), all met criteria for MDD Low SES	*n* = 97 Interpersonal Psychotherapy (IPT) Fourteen 60-minute sessions over 14 weeks	Attachment	*n* = 28 Enhanced Community Standard (ECS)	Disorganized Attachment Characteristics (DAC)	Standardization followed Delivered by professionals	No
Hoffman et al. (2006)	USA	Longitudinal	Convenience sample of families recruited from Head Start and Early Head Start programs in Washington state	65 children (M_{age} = 32 months, *Range* = 11-58, *SD* = 12.6), "at-risk" of psychopathology, maladaptive outcomes, etc. 56 mothers, 4 fathers (M_{age} = 23.8, *Range* = 16-55, *SD* = 6.8) Low SES	*n* = 65 Circle of Security (COS) Twenty 75-minute sessions over 20 weeks	Attachment	N/A	Strange Situation Procedure (SSP) / MacArthur Preschool Strange Situation	Standardization followed Delivered by professionals	Yes

Huber et al. (2015)	Australia	Longitudinal	Convenience sample from clinical referral to community-based infant and early childhood mental health service	83 children (M_{age} = 47.80 months, *Range* = 13-88, *SD* = 17.48), 19% experienced substantiated abuse/neglect 73 biological caregivers, majority with prior/current mental health problems (89%)	*n* = 83 Circle of Security (COS) Twenty 90-minute sessions over 20 weeks	Attachment	N/A	Strange Situation Procedure (SSP)	Standardization followed Delivered by professionals	No
Juffer et al. (1997)	Netherlands	Pre-post	Convenience sample recruited through three adoption agencies	90 infants (*n* = 19 Korean, *n* = 71 Sri Lankan; at adoption M_{age} = 8 weeks, *Range* = 2-18 weeks, *SD* = 3.67); birth weight *M* = 2600g, *Range* = 1500-4000g, *SD* = 450) 90 mothers (M_{age} = 32.52, *SD* = 3.35) 90 fathers (M_{age} = 34.62, *SD* = 3.48)	*n* = 60 Book Only or Book + Video Group Two book-only sessions over 6 months Two book-only + three video feedback sessions over 6 months	Sensitivity	*n* = 30 Standard Care	9-point Rating Scales for Sensitivity and Cooperation Strange Situation Procedure (SSP)	Delivered by professionals	No
Klomek et al. (2013)	Israel	Pre-post	Convenience sample from self-referral or referral from community/medical providers	40 children (M_{age} = 12.6 years, *Range* = 11-15, *SD* = 0.87), diagnosed with learning disability (77.5% with more than one) 40 mothers (M_{age} = 43.1, *SD* = 4.45) 39 fathers (M_{age} = 44.77, *SD* = 5.1) Middle SES	*n* = 40 "I Can Succeed" program (ICS) Nineteen sessions over 22 months	Attachment	N/A	Attachment Security Style Scale	NR	No
Knoche et al. (2012)	USA	RCT	Convenience sample of families involved in rural Early Head Start home-based programming	234 children (M_{age} = 10.30 months, *Range* = 1.8-24.5 months, *SD* = 6.50) 222 mothers, 12 fathers (M_{age} = 24.75, *Range* = 12-49, *SD* = 5.38), majority receive public aid (97.8%) Low SES	*n* = 37 Getting Ready intervention *M* = 45.8 (*SD* = 28.45) sessions over 16 months	Sensitivity	*n* = 24 Standard Early Head Start program	Parent/Caregiver Involvement Scale (P/CIS)	Standardization followed Delivered by professionals	No

Komoto et al. (2015)	Japan	Quasi-Experimental	Convenience sample recruited from pediatric clinic in Japan	135 infants (1,2, and 3 months old, *n* = 45 per each age group) 135 mothers (M_{age} = 33.31, *SD* = 4.73), identified as needing "continued childcare support" Middle SES	*n* = 15 Japanese Early Promotion Program (JEPP) Four - twenty-seven *(M* = 11.3, *SD* = 5.64) 60-90-minute sessions over 10-12 months	Sensitivity	*n* = 120 Standard Care	Nursing Child Assessment Teaching Scale (JNCATS, adapted for Japan) Child-Adult Relationship Experimental Index for Infants (CARE-Index)	Delivered by professionals	Yes
Landy et al. (1997)	Canada	Pre-post	Convenience sample of children with behavioral difficulties from CPS, behavioral classroom in an elementary school, and a Parent Resource Center	24 children (M_{age} = 4.75 years, *Range* = 3-6 years, *SD* = 1.68), externalizing/behavior issues 24 parents Low-Middle SES	*n* = 24 Helping Encourage Affect Regulation (HEAR) 20 120-minute sessions over 20 weeks	Sensitivity	N/A	Emotional Availability Scales	Delivered by non-professionals	Yes
Leigh et al. (2013)	Chile	Pre-post	Convenience sample recruited from Primary Health Care (PHC) clinics in Chile	9 children (M_{age} = 7 months, Range = 5-12), suspected "non-secure" styles of attachment 9 mothers (M_{age} = 22.7 years, *Range* = 17-31)	*n* = 9 Pilot Intervention Four sessions	Attachment	N/A	Massie-Campbell Scale	Delivered by professionals	No
Meijssen et al. (2010)	Netherlands	RCT	Convenience sample from two hospitals with level III NICUs and 5 city hospitals	112 preterm infants (M_{age} = 29.8 weeks gestation, *Range* = 25-35, *SD* = 2) 122 mothers (M_{age} = 31.15, *SD* = 5.25)	*n* = 53 The Infant Behavioural Assessment and Intervention Program (IBAIP) 6-8 60-minute sessions	Sensitivity	*n* = 56 Standard Care	Maternal Interaction Quality/Maternal Sensitivity and Responsivity (coded with the MSRS during Still Face Procedure)	Delivered by professionals	No

Moss et al. (2011)	Canada	RCT	Convenience sample of families being monitored for maltreatment from community or child welfare services	67 children (M_{age} = 3.35 years, *SD* = 1.38, Range = 12 - 71 months), monitored by community or child welfare agency for maltreatment, 72% experienced neglect before program 63 mothers, 4 fathers (M_{age} = 27.82, *Range* = 18 – 49, *SD* = 7.61), primary caregivers presently living with child Low–Middle SES	*n* = 35 Home visiting program Eight ~90-minute sessions over 8 weeks	Sensitivity	*n* = 32 Standard Agency Services (monthly visit by child welfare caseworker + crisis situation help)	Maternal Behavior Q-Set (MBQS) Strange Situation Procedure and Preschool Separation-Reunion Procedure (SSP)	Standardization followed Delivered by professionals	No
Oxford et al. (2016)	USA	RCT	Convenience sample of families with open case of maltreatment in child protective services database from cities in Washington State	247 children (M_{age} = 16.37 months, *Range* = 10-24, *SD* = 4.47), recent CPS report of child maltreatment 225 mothers, 22 fathers (M_{age} = 26.73, *SD* = 5.74) Low SES	*n* = 124 Promoting First Relationships (PFR) Ten sessions over 10 weeks (*M* = 14.3 weeks, *Range* = 5-26, *SD* = 5.4)	Attachment & Sensitivity	*n* = 123 Resource and Referral Intervention (R&R)	Nursing Child Assessment Teaching Scale (NCATS) Toddler Attachment Sort-45 (TAS-45)	Standardization followed Delivered by professionals	Yes - attachment No – sensitivity
Pillhofer et al. (2015)	Germany	Quasi-experiment	Convenience sample recruited from practitioners in health care of child welfare institutions in Germany	83 children (M_{age} = 38.2 weeks gestation at birth, *Range* = 22-42, *SD* = 3.25) 83 mothers (M_{age} = 22.5 years, *Range* = 15-37, *SD* = 6.1), new mothers considered “at risk”	*n* = 55 The Ulm Model (+ “A Good Start to Life”) Seven 90-minute sessions over 3 months	Sensitivity	*n* = 28 Standard Care	CARE-Index	Standardization followed Delivered by professionals	No

Riva Crungola et al. (2016)	Italy	Quasi-experiment	Convenience sample from Obstetrics and Gynecology Dept. of San Palo Hospital of Milan and at Family Counseling Services in Province of Milan	48 infants (*Range* = 3-9 months) 48 adolescent mothers (M_{age} = 18.48, *Range* = 14-21, *SD* = 1.64) Low-Medium SES	*n* = 32 "Promoting Responsiveness, Emotion Regulation, and Attachment in Young Mothers and Infants" (PRERAYMI) ~Fifteen sessions over 7 months	Sensitivity	*n* = 16 Treatment-as-usual	CARE-Index	Standardization followed Delivered by professionals	Yes
Sajaniemi et al. (2001)	Finland	RCT	Convenience sample of extremely low birth weight (EELBW) infants from a NICU in Helsinki	48 infants (beginning at 3-months corrected age), ELBW < 1000g, increased risk for major and minor neurological disabilities 48 mothers, some mothers diagnosed with chronic disease	*n* = 23 Occupational Therapy Methods *M* = 20 60-minute sessions over 6 months	Attachment	*n* = 25 Standard Care	Preschool Assessment of Attachment (PAA)	Delivered by professionals	No
Santelices et al. (2010)	Chile	RCT	Convenience sample of patients seeking prenatal care at medical centers in Santiago, Chile via flyers	72 children (*Range* = prenatal–12 months of age) 72 mothers (M_{age} = 26.4, *Range* = 18-39, *SD* = 4.82); non-clinical, low risk Low-Middle SES	*n* = 43 Promoting Secure Attachment Prenatal: Six 120-minute sessions over 6 weeks Postnatal: Four 60-minute sessions over 12 months	Attachment	*n* = 29 Educational Lecture Only	Strange Situation Procedure (SSP)	Delivered by professionals	No
Schein et al. (2022)	USA	Pre-post	Convenience sample of families from community implementation sites across the U.S.	70 children (Range = 6-24 months (ABC-Infant) or 25-48 months (ABC-Toddler)); experienced early adversity 70 parents identified as "high-risk," experiencing early adversity	*n* = 70 Attachment and Biobehavioral Catch-Up (ABC) - Hybrid or TeleABC Ten sessions over 6 months (Jun-Dec 2020)	Sensitivity	N/A	National Institute of Child Health and Development Observational Recording of the Caregiving Environment (ORCE)	Standardization followed Delivered by professionals	Yes

Setodeh et al. (2018)	Iran	RCT	Convenience sample of primiparous women and their partners attending prenatal clinics in Iran	150 children (*Range* = 28-34 weeks gestation) 150 mothers (M_{age} = 24.59, *Range* = 18-35) 150 fathers (M_{age} = 29.03, *Range* = 21-42)	*n* = 75 Attachment Behavior Training Program Four 60–90-minute sessions over 6 weeks	Attachment	*n* = 75 Standard Care	Avant Checklist	Delivered by non-professionals (husbands delivered instructions to wives)	Yes
Slade et al. (2020)	USA	RCT	Convenience sample of women receiving care from Community Health Center (CHC)	156 children (M_{age} = 39 weeks gestation, *SD* = 2) 156 mothers (M_{age} = 20.05, *SD* =2.65), "young first-time mothers living in underserves, poor, urban communities" Range = 0-60 fathers (M_{age} = 22.95, *SD* = 5.2) Low SES	*n* = 60 Minding The Baby (MTB) ~Fifty sessions (weekly through pregnancy, labor, delivery, and 12 months of age; biweekly until 24 months of age) over 27 months	Attachment	*n* = 64 Standard Care	Strange Situation Procedure (SSP)	Standardization followed Delivered by professionals	Yes
Steele et al. (2019)	USA	RCT	Convenience sample referred from pediatrics, child welfare, and court systems in the Bronx, NYC	78 children (*Range* = birth-36 months), identified as high risk for maltreatment 78 mothers, some with previous psychiatric hospitalization, currently taking psychotropic meds, with a "heavy trauma burden," or prior foster care involvement Low SES	*n* = 43 Group Attachment-Based Intervention (GABI) Seventy-eight 120-minute sessions over 26 weeks	Attachment	*n* = 35 Systematic Training for Effective Parenting (STEP)	Coding Interactive Behavior (CIB) system	Standardization followed Delivered by professionals	Yes
Stronach et al. (2013)	USA	RCT	Convenience sample recruited from child protective services and temporary assistance for needy families records	137 children (M_{age} = 13.31 months, *SD* = 0.81), prior experiences of maltreatment (84.6% neglect, 69.2% emotional maltreatment, 8.8% physical abuse, 0% sexual abuse), high risk for abuse/neglect	*n* = 53	Attachment	*n* = 35	Strange Situation Procedure (SSP)	Standardization followed	Yes

				137 mothers (M_{age} = 26.98, *SD* = 5.98), high risk for abuse/neglect, majority minority race (74.6%), majority reporting own childhood maltreatment (79.4%) or traumatic event (89.9%) Low SES	Child-Parent Psychotherapy (CPP) 21.56 sessions (*SD* = 9.60) over 46.4 weeks (*SD* = 7.36) *n* = 49 Psychoeducational Parenting Intervention (PPI) 25.35 sessions (*SD* = 9.65) over 49.4 weeks (*SD* = 4.81)		Standard Care		Delivered by professionals	
Suess et al. (2016)	Germany	Quasi-experimental	Convenience sample from child welfare agency serving mothers at risk of abuse/neglect	78 12-month-old children 78 mothers (M_{age} = 18.71); at risk of child abuse/neglect; 20% reported mental health problems Low SES	*n* = 38 Steps Toward Effective Parenting (STEEP) 30 sessions over 24 months	Attachment	*n* = 18 Standard care	Strange Situation Procedure (SSP) QSort	Standardization followed Delivered by professionals	No
Svanberg et al. (2010)	England	Quasi-Experimental	Convenience sample drawn from Sure Start Program in northern England	192 infants 192 mothers (M_{age} = 26.1, *SD* = 5.7) Low SES	*n* = 134 Sunderland Infant Programme Range = 1-4 sessions over around 12 months (individualized to dyads depending on assessed risk from "sensitive enough" to "high risk")	Attachment and Sensitivity	*n* = 58 Standard Care	CARE-Index Strange Situation Procedure (SSP)	Delivered by professionals	Yes
Toth et al. (2006)	USA	RCT	Convenience sample referred to by mental health professionals, publications, and flyers	100 children (M_{age} = 20.34 months, *SD* = 2.50) 100 mothers (M_{age} = 31.68, *Range* = 21-41, *SD* = 4.68), history of major depressive disorder at some time since childbirth, bipolar disorder not included, some reporting comorbid disorders (e.g., 53.8% anxiety disorder, 11.5% bulimia, 9.2% alcohol disorder) High SES (72.7%)	*n* = 46 Toddler-Parent Psychotherapy (TPP) 45.24 sessions (*SD* = 11.6, *Range* = 30-75) over 58.19 weeks (*SD* = 10, *Range* = 42-79)	Attachment	*n* = 54 Standard Care (therapy and medication for depression as usual)	Strange Situation Procedure (SSP)	Standardization followed Delivered by professionals	Yes

Twohig et al. (2021)	Ireland	RCT	Convenience sample of parents of preterm infants from a NICU in Dublin, Ireland	72 children (M_{age} = 28.35 weeks, *SD* = 2.44); preterm infants (< 32 weeks) with various health concerns 61 mothers (M_{age} = 33, *SD* = 5.5)	*n* = 37 Preterm Infant-Parent Program for Attachment (PIPPA) Three 45-90-minute sessions over the infant's stay in NICU	Sensitivity	*n* = 35 Standard Care	CARE-Index	Delivered by professionals	No
van Doesum (2008)	Netherlands	RCT	Convenience sample recruited from local therapists and publications	71 children (M_{age} = 5.5 months, *SD* = 3.05) 71 mothers (M_{age} = 30.15, *SD* = 3.85) Mixed SES	*n* = 35 Mother-Baby Intervention Eight-Ten 60-90-minute sessions over 3-4 months	Sensitivity	*n* = 36 Minimal intervention; three 15-minute phone calls to support with practical parenting advice	Attachment Q-Set (AQS)	Delivered by professionals	No
Van Zeijl et al. (2006)	Netherlands	RCT	Convenience sample recruited from community records of several cities and towns	237 "at risk" children (M_{age} = 26.99 months, *Range* = 13.58 - 41.99) 237 mothers (M_{age} = 33.15, *SD* = 4.22); high levels of stress (e.g., marital discord, daily hassles, low maternal well-being)	*n* = 120 Video-feedback Intervention to Promote Positive Parenting and Sensitive Discipline (VIPP-SD) Six 90-minute sessions over 8 months	Sensitivity	*n* = 117 Six phone calls, interviews of general development with no advice or information offered	Maternal Sensitivity Score (pre- and post- derived in the lab with a series of problem-solving tasks)	Standardization followed Delivered by non-professionals	No

Zajac et al. (2020)	USA	RCT	Convenience sample drawn from participants of earlier RCT referred by child welfare agencies	100 children (M_{age} = 9.46 years, *SD* = 0.36) 100 parents (M_{age} =37.83, *SD* = 9.7) Low-Middle SES	*n* = 44 Attachment and Biobehavioral Catch-up (ABC) Ten 60-minute sessions over 10 weeks	Attachment	*n* = 56 Developmental Education for Families (DEF)	Kerns Security Scale	N/A	Yes
Ziv et al. (2016)	NR	Pre-post	Convenience sample recruited from mental health center's Parent-Child Clinical Services Program	32 children (M_{age} = 5.17 years, *Range* = 3-6 years, *SD* = 9 months), exhibit externalizing or internalizing problems, majority exposed to trauma 32 mothers (Age NR), majority exposed to trauma Low SES	*n* = 32 Parent-Child Psychotherapy Program (PPP) (20%); Two-Clinician Model (12%); Dyadic Psychotherapy (36%); Individual Play Therapy and Parent Guidance (68%)	Attachment	N/A	Emotional Availability Scales (EAS)	Delivered by professionals	Yes

Note: N/A - not applicable; NR - not reported; *M* - mean; *n* - number of participants; RCT – randomized control trial; *SD* - standard deviation; SES – socioeconomic status

Methodologic Quality Analysis

The studies ranged from very low (3.1) to high quality (8.8), with a mean score of 6.89 (SD = 1.26). The inter-rater agreement among the coders was very high (*ICC* = .93; 95% CI: .85, .97, $p < .001$). Several issues contributed to variation in study quality, including the use of comparative and cross-sectional designs, biased recruitment techniques, non-representative sampling, subjective assessments, lack of a control group and random assignment, not accounting for social desirability and good participant and observer-expectancy effects, and statistical, interpretive, and communication errors.

Heterogeneity and Publication Bias

The *Q* statistics for attachment [$Q(36) = 293.21$, $p < .001$, $I^2 = 88\%$] and sensitivity [$Q(25) = 110.08$, $p < .001$, $I^2 = 77\%$] suggested that we can assume that the true effect size is the same for all these studies. Approximately 82.5% of the variance in the observed effects is a true effect rather than a sampling error. The 95% prediction interval for attachment was .46 to 11.76, and for sensitivity was .41 to 8.17

The funnel plots for attachment and sensitivity are portrayed in Figures 4 and 5 in ***Supplemental File 3***, based on log odds ratio (*x*-axis) and standard error (*y*-axis). The Egger and Begg tests for sensitivity (intercept = 0.82, $t(24) = 0.76$, 95% CI [-1.42, 3.06], $p = .23$; Kendall's tau = 0.21, $p = .07$) were nonsignificant and show no evidence of asymmetry of the effects. However, while Begg test for attachment (Kendall's tau = 0.07, $p = .26$) was nonsignificant, the Egger test (intercept = 1.58, $t(35) = 1.58$, 95% CI [0.27, 2.89], $p = .01$) suggested potential publication bias.

Main Findings

The analysis of 37 studies examining attachment showed a beneficial effect of the intervention (OR = 2.32, 95% CI [1.73, 3.10], $p < .001$). The analysis of 26 studies examining sensitivity also suggested a beneficial effect of the intervention (OR = 1.82, 95% CI [1.31, 2.52], $p < .001$). Figures 2 and 3 show the forest plots for the OR values and their associated 95% CI for attachment and sensitivity.

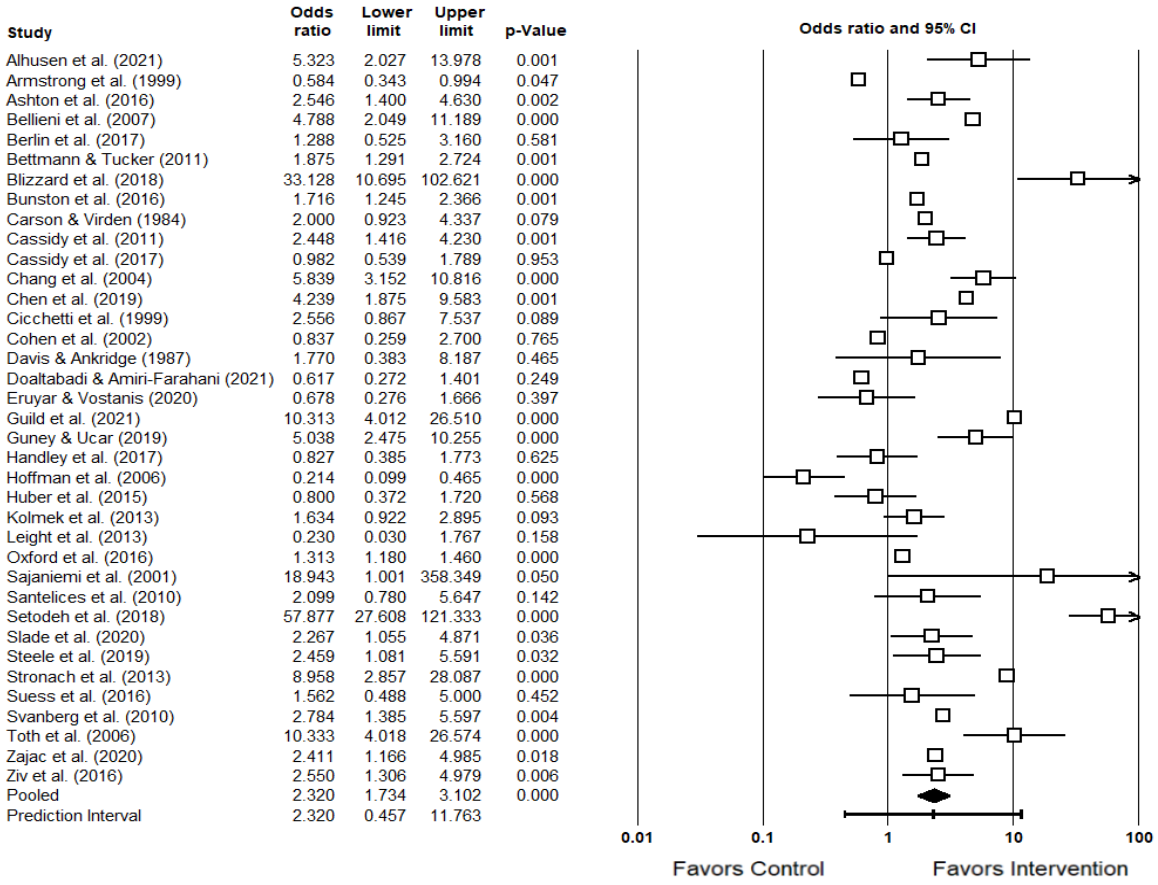

Figure 2. Forest plot for OR and 95% CI (CIs) for attachment between control and intervention groups

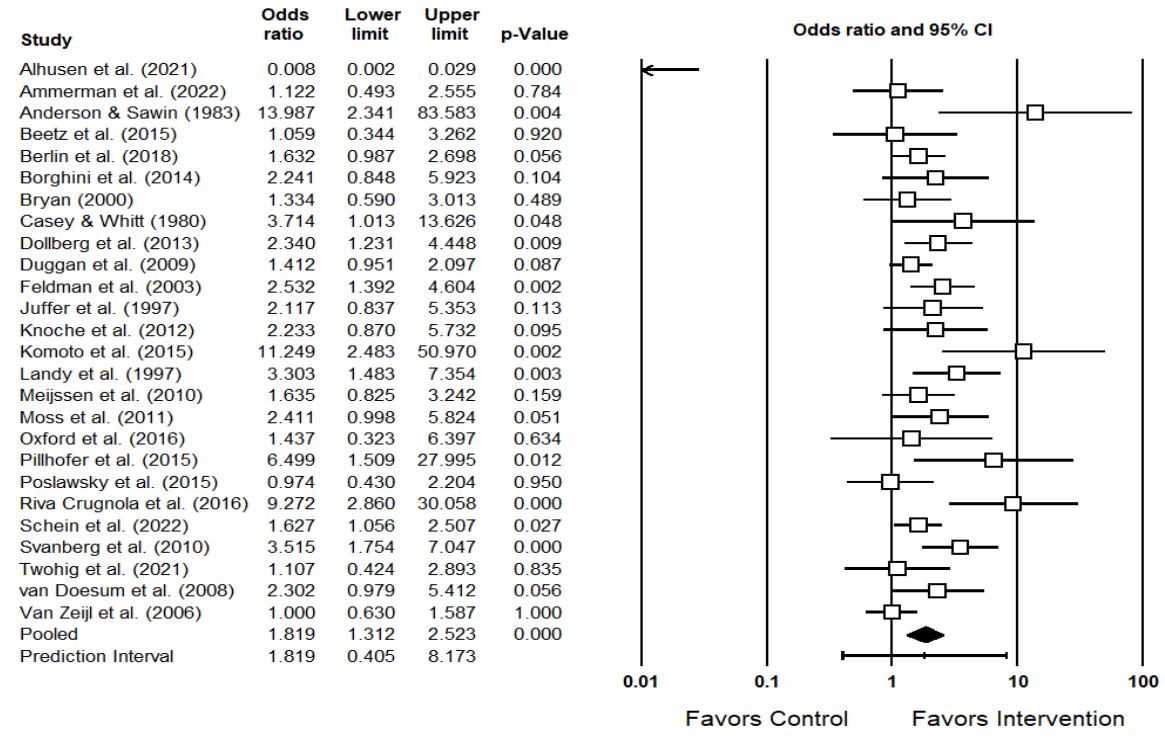

Figure 3. Forest plot for OR and 95% CI (CIs) for sensitivity between control and intervention groups

Subgroup Analyses

Table 3 shows the results for the subgroup analyses of study design (RCT vs. Others), intervention setting (Individual vs. Group), and video use (yes vs. no) for both attachment and sensitivity outcomes. We provide the number of studies included in the analyses, effect sizes, 95% confidence intervals, *Q* statistics, and *p*-values.

Specifically, for the attachment outcome, studies that used RCT (OR = 3.29) showed significantly higher OR compared to studies that used other designs (OR = 1.57), $p = .002$. Also, studies that did not use video (OR = 2.86) showed that intervention was more effective than the studies that used video (OR) = 1.34), $p = .035$. However, the difference between individual (OR = 2.51) vs. group (OR = 2.05) settings was not statistically significant, $p = .59$.

For the sensitivity outcome, studies that used RCT (OR = 3.01) showed significantly higher OR compared to studies that used other designs (OR = 1.31), $p = .011$. However, studies that used video (OR = 2.18) intervention were similarly effective as the studies that did not use video (OR = 1.53), $p = .298$.

Attachment		*k*	OR	95% CI	*Q*	*p*-value
Design						
	RCT	20	3.29	2.13, 5.11		
	Other	17	1.57	0.99, 2.49	5.25	.002**
Setting						
	Individual	23	2.51	1.65, 3.81		
	Group	11	2.05	1.13, 3.72	0.31	.586
Video						
	Yes	9	1.34	0.74, 2.43		
	No	20	2.86	1.98, 4.02	4.47	.035*
Sensitivity						
Design						
	RCT	16	1.31	0.88, 4.96		
	Other	10	3.01	1.83, 4.96	6.45	.011*
Video						
	Yes	13	2.18	1.36, 3.5		
	No	13	1.53	0.95, 2.45	1.08	.298

Notes. K = number of studies, OR = odds ratio, 95% CI = 95% confidence intervals, *Q* = *Q* statistics, *p* = *p*-values.

*$p < .05$

**$p < .005$

Table 3. Moderator analyses of attachment and sensitivity for study design, intervention setting, and video use

Meta-Regression

A random-effects multivariate meta-regression of 21 studies of intervention showed that the number of sessions (beta-coefficient = -0.004, $p = .84$) and length of the intervention (beta-coefficient = .003, $p = .80$) did not play a significant role on attachment outcome, $F(2, 18) = 0.04$, $p = .96$, $R^2 = -0.12$ ($I^2 = 91.03\%$, $Q(18) = 200.67$, $p < .001$). Similarly, a random-effects multivariate meta-regression of 17 studies of intervention showed that the number of sessions (beta-coefficient = 0.025, $p = .48$) and length of the intervention (beta-coefficient = -0.024, $p = .097$) did not play a significant role on sensitivity outcome, $F(2, 14) = 1.69$, $p = .22$, $R^2 = 0.09$ ($I^2 = 82.35\%$, $Q(14) = 79.33$, $p < .001$). In short, the number of sessions and intervention length did not impact the strength of the intervention on attachment and sensitivity outcomes.

Discussion

The purpose of our meta-analysis was to determine the effectiveness of the primary caregiver-child dyad interventions on attachment and sensitivity. Additionally, we examined whether design, intervention setting, and the use of video play a role in the efficacy of the intervention. We identified 60 studies that met our inclusion criteria. The studies had 5,940 children (prenatal and up to 16 years of age), 5,674 mothers, and 1,050 fathers from Europe, Asia, Oceania, and North America.

The meta-analysis of the primary studies demonstrated the effectiveness of interventions for enhancing attachment and—to a lesser extent—infant sensitivity. This finding is contrary to the previous review showing that sensitivity-focused interventions are more effective than attachment-focused interventions, albeit both demonstrating significance (e.g., Bakermans-Krannenburg et al., 2003; De Wolff & van IJzendoorn, 1997). In line with previous reviews, we found that randomized control trials with a control group are more effective at increasing both attachment and sensitivity outcomes (Bakermans-Kranenburg et al., 2003; Cook et al., 2007). Our finding on the use of video is inconsistent with prior meta-analytic evidence. Specifically, previous reviews showed that interventions that include video feedback are more effective (Barlow et al., 2016). However, our analysis demonstrated that interventions in studies with no video feedback were more effective for attachment outcome than

studies using video feedback, with no significant differences in sensitivity outcome. Additionally, individual studies show support for the effectiveness of individual interventions with the caregiver-child dyad, often taking place in the home (e.g., Tobon et al., 2022). Our findings do not align with this prior research showing no significant differences between individual versus group setting on attachment outcome. This suggests that both types of interventions can be effective due to different qualities and strengths, including community building and individual attention. Finally, our meta-regression showed that the number of sessions and length of the intervention did not play a role in the strength of the intervention on attachment and sensitivity outcomes. This finding is consistent with Bakermans-Krannenberg et al. (2003) who determined that "less is more," especially in high-risk populations.

Strengths, Limitations, and Suggestions for Future Studies

Our prior decision to include attachment-based interventions for all stages of development allowed for greater generalizability of the findings. While we excluded non-English-language studies, prior reviews showed no systematic bias from only including English-language studies (Nussbaumer-Streit et al., 2019; Morrison et al., 2012).

Several studies focused on reflective functioning or "fixing" internal working models and representations of attachment history. Including these models is in line with Sommer et al. (2024)'s "two generation approach" to improve the well-being of children as well as their families. Assisting caregivers in healing from their own maladaptive attachment histories may have a stronger effect on the attachment relationship than attempting to intervene (Cassidy et al., 2013; Letourneau et al., 2015; Mattheß et al., 2024). Therefore, the inclusion of reflective functioning or representation into intervention practice and research (Mountain et al. 2017; Letourneau, 2015) may lead to greater healing and understanding of the influence of parental history on the attachment relationship (Cassidy et al., 2013).

Also, the importance of both parents being involved in a child's life and in striving for secure attachment relationships is clear (Grossmann et al., 2008). As such, we recommended researchers to recruit and invite both parents to participate in the intervention (e.g., Cimino & Cerniglia, 2024; Setodeh et al., 2018; Slade et al., 2020; Twohig et al., 2021). Furthermore, fathers who are more likely to be involved in interventions are less likely to 'need' interventions (i.e., not high risk; Roggman et al., 2004). Consequently, there is variability in family unit and environmental characteristics (e.g., socio-economic status, marital status, risk factors, parity, education level). More complete reporting on these factors would enable meta-analysts to decipher the needs and trends of specific groups and explore potentially important but unanswered questions (e.g., Letourneau et al., 2015(Cook et al., 2007; Schlosser et al., 2006; Wright & Edginton, 2016).

Studies used different intervention methods (e.g., the use of video feedback, settings: group, individual, in-home, training levels, (Barlow et al., 2016), and duration variability (Bakermans-Kranenburg et al., 2003; Barlow, 2016; Doughty, 2007; Mortensen & Mastergeorge, 2014). This can lead to inconsistent findings, therefore, working towards standardizing research may help with replication and consistency. The use of different outcome measures can also create inconsistencies. Ideally, outcome measures should demonstrate good psychometric properties, such as the Strange Situation and Q-sort (Letourneau et al., 2015). Also, not all measures are suitable for all ages. Finally, the use of longitudinal research designs would provide a more in-depth understanding of the benefits of interventions at different ages and provide opportunities for long-term assessment of the continuity of interventions in later stages of development (Cook et al., 2007; Doughty, 2007).

Conclusion

The purpose of our meta-analysis was to analyze the current literature and assess the strength of interventions on attachment and sensitivity outcomes. Our results show that interventions are effective for both attachment and sensitivity. Additionally, we found a stronger effect in the studies that used RCTs than other designs. While the of video had no impact on sensitivity outcomes, studies that did not use video feedback had a stronger effect on attachment outcomes than those that used video feedback. Finally, the number of sessions and length of intervention did not play a significant role in attachment and sensitivity outcomes.

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