













Early Mental Health Foundations: A Scoping Review of Reflective Functioning in Caregiver-Child Dyads

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ABSTRACT

International public health strategies indicate a need for equitable resources for wellness in younger children and their caregivers. Reflective functioning, a proxy for emotional regulation abilities, is a key area in this domain. As an emerging area, reflective functioning has not been mapped comprehensively and requires systematic investigation. This review examines “what qualitative and quantitative evidence is there for the value of reflective functioning assessment and intervention studies in caregiver-child dyads?”

This scoping review focused on data published to September 2021, focusing on caregivers of children ≤36 months of age (including Medline, PsycINFO, CINAHL, ERIC, Scopus, Web of Science, and Embase). Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews guidelines were followed.

From 5162 initial articles, 608 papers were screened for full text yielding a final 181 papers. Only 69 studies included multiple ethnicities. Seven of the 69 studies included at least 1 Indigenous person. No studies were conducted in low- to middle-income countries, and no studies reported data on gender identity.

This review comprises a novel and comprehensive mapping of the reflective functioning literature in terms of both assessment and intervention studies. The present mapping of the reflective functioning literature indicates the importance of health disparities in caregiver-child dyads (these include gaps and needs for future research). In relation to gaps, studies of adverse childhood experience, consideration of equity, diversity, and inclusion, and global mental health are underrepresented. Future research is needed to provide information on the relevance of gender identity and low- to middle-income countries in relation to the impact on reflective functioning in this context.

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INTRODUCTION

The World Health Organization (WHO) in 2022 reported that “Infancy, childhood and adolescence are ages of both vulnerability and opportunity in mental health.”¹ WHO highlighted a strategic plan in restructuring services for a mental health reform, which involves a multisectoral effort spanning different health and wellness areas. Key shifts include valuing mental health for all, reducing discrimination and advocating for equal participation, budgeting services appropriately, actively collaborating on a multisectoral scale to improve determinants of mental health, strategizing prevention programs, balancing a biopsychosocial approach, using person-centered, human

rights-based, recovery-oriented care, embedding mental health care across sectors, coordinating services with universal health coverage, networking with community-based services, integrating mental health in primary care, and activating informal support.¹ As a first step, it is crucial to have a thorough understanding and be inclusive of a broad range of determinants in health. One factor that is especially relevant to caregiver-child dyads is emotional regulation which has multiple links to social, emotional, and physical health outcomes.^{2,3} A proxy measure of emotional regulation ability is reflective functioning (RF),⁴ which has been increasingly studied over the last several years.

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Reflective functioning is defined as the capacity to understand one's own and others' behavior in terms of mental states.⁵ Building off previous work on mentalization (i.e., caregivers identify their child's affect and reflect or mirror that back), RF was defined to highlight the dynamic process of linking mental states and behavior [e.g., a mother acknowledges that her child threw a tantrum in public (behavior) as a result of running around all day with him which made him tired (mental state)].⁶ Reflective functioning has predictive power in a variety of health-related factors such as internalizing symptoms, externalizing symptoms, developmental delays, attachment status, and behavioral outcomes such as aggression.⁷⁻⁹ Cross-cultural investigations of RF are sparse, but recent data suggest that collectivist societies, such as Asian countries, have different caregiving norms than individualistic societies, such as Canada and the USA, and this potentially affects RF levels.¹⁰

In keeping with the WHO's mandate to equitably develop resources related to early life stress such as adverse childhood experiences (ACEs), it is imperative to continue exploring novel areas of health outcomes especially in the period of vulnerability that infants, children, adolescents, and their caregivers face. Given the links RF has to numerous other health factors, a deeper investigation of this niche area is warranted—this will further elucidate how RF assessments and interventions can be specifically applied to a variety of clinical and community settings for the purpose of improving family wellness.

To date, several key publications have focused on the role of RF in caregiver-child dyads. For instance, 1 RF-related randomized controlled trial was conducted by Suchman and colleagues.¹¹ In a population of mothers in substance abuse treatment, Suchman compared an attachment-based parenting therapy program called Mothers and Toddlers Program (MTP) intervention group (n=23) versus an active control Parental Education (PE) group (n=24). Their findings demonstrated benefits in the MTP mothers with higher RF scores, fewer symptoms of depression, less psychiatric distress, moderately reduced drug use, and higher caregiving as compared to the PE active control group.

More recently, Slade and colleagues in 2020 conducted a randomized controlled trial of Minding the Baby (MTB) (n=77) versus an active control group (n=79), involving

routine prenatal and postnatal well-woman health visits, in young mothers living in underserved urban communities.¹² Their findings demonstrated that MTB mothers showed an increase in RF over the course of the intervention as compared to the control group. In addition, infants of the MTB group were significantly more likely to be securely attached as compared to the control group.

The most recent meta-analyses^{13,14} conducted included only 6 and 15 randomized controlled trial intervention studies, respectively, whereas we found more than 161 publications not descriptively summarized before. Another recent review focused only on the relationship between parental RF and the relationship to parental behaviours.¹⁵ To the best of our knowledge, no published review has yet examined RF assessments in addition to interventions comprehensively. In view of the apparent limitations in research from an informal literature scan, a scoping review was deemed appropriate for mapping gaps and opportunities in the context of RF. A specific aim of this review is to answer the question: what qualitative and quantitative evidence is there for the value of RF assessment and intervention studies in caregiver-child dyads? The results of this review will inform the family lived experience and be useful for informing family stakeholders and public policy.

This scoping review also took advantage of the rising awareness of the importance of equity, diversity, and inclusion (EDI) to examine the caregiver-child dyadic literature from an EDI perspective. An EDI lens will be applied systematically throughout the present scoping review to identify what has been studied as well as pointing out specific directions for future research in diverse populations within the RF literature.

MATERIAL AND METHODS

Eligibility Criteria, Information Sources, and Search

Guidelines from the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR)¹⁶ were used in the present review. The methodological framework outlined by Arksey and O'Malley¹⁷ and further refined by Levac and colleagues¹⁸ also guided the present study. A scoping review of electronic databases was conducted from database inception to September 22, 2021, by a health sciences librarian. Databases included Medline, PsycINFO, CINAHL, ERIC, Scopus, Web of Science, and Embase. The database search included relevant medical subject headings and keywords corresponding to the patient, intervention, comparison, and outcome model¹⁹ in Supplementary materials S1. The search strategy included a combination of subject headings and keywords to combine the concepts of RF or coregulation or mentalization or mirror neurons or mind-mindedness or metacognition or theory of mind or insightfulness, and parents. The complete search

MAIN POINTS

- At least 1 ethnicity other than the dominant ethnicity of the study country was included in 69 studies (out of 181 total), and so further research is warranted in ethnic minority populations.
- No studies were conducted in low- to middle-income countries (LMICs), and so expanding further work into LMICs is warranted.
- No studies included measures of gender identity, and so future reflective functioning studies incorporating both sex and gender analyses are warranted.

strategy for each database can be found in Supplementary material S1. The PRISMA-ScR checklist can also be found in Supplementary material S2.

No limits were placed on country or publication date, but due to limited resources, we only included peer-reviewed studies published in English, Spanish, French, German, and Arabic. Studies that sampled any parents/guardians of children up to and including 36 months of age were used because there are clinically relevant epochs in that age range.²⁰ This criterion is also in line with a previous meta-analysis.¹³ Papers that included broad age ranges for children were included only if they reported disaggregated data specific to 36 months of age or younger. There was no restriction on the age of caregivers. Non-peer-reviewed studies and animal studies were excluded. The full data extraction table can be requested from the author, and inclusion/exclusion criteria are presented in Supplementary material S3.

Selection of Sources of Evidence, Data Charting, and Synthesis of Results

The 5162 identified papers were first independently screened by title and abstract using Covidence software (<https://www.covidence.org/>) by 2 reviewers. Disagreements were resolved by a third reviewer. The full texts of the remaining 608 papers were then independently screened by 2 reviewers, and disagreements were also resolved by a third reviewer. Data were charted by 1 independent reviewer and verified by another reviewer. The final set comprising information for this review included 181 publications.

Protocol and Registration

The scoping review was registered with Open Science Framework (OSF) with DOI <https://doi.org/10.17605/OSF.IO/GKT6R>. No review protocol was developed for this study. Figure 1 shows the PRISMA diagram of study selection.

RESULTS

A total sample of 15 231 dyads and 8310 families were analyzed. The majority of studies focused on mother-infant dyads specifically (87%). Other studies included father-infant dyads (2%), and some studies reported the number of families without specifying whether the mother and father were both recruited (11%). The full tables describing sociodemographic characteristics of studies included and interventions are presented in S4 and S5 of the Supplementary materials. The reference list of the 181 included studies can be found in S6 of the Supplementary materials.

In terms of population type, 95 were general population studies, 78 were clinical population studies, 69 included an ethnic minority population in their studies (these

studies overlap with other population categories), 3 were foster/adoptive population studies, 2 were forensic/prison population studies, and 3 were high-risk population studies. General population was defined as any random or convenience sample taken in the community, daycare, nursery, or pregnancy center. Clinical population was defined as reporting some type of clinician-rated or self-rated diagnosis for the caregiver and/or child. Ethnic minority populations were marked if they collected any data on participants outside of the dominant ethnicity of the respective country. High-risk samples were identified and stated explicitly by study authors²¹⁻²³ as experiencing some degree of psychosocial difficulty such as substance using, experiencing intrafamily trauma, or experiencing difficulty adapting to their parenting role. Some studies had overlapping populations (i.e., clinical and ethnic minority population), but only 1 population categorization was selected based on what the study authors identified as most relevant to the study's primary objectives and main outcomes.

In terms of the type of study, 73% of papers (133) were assessment studies and 27% (48) were intervention studies. For study design, 50% of papers (91) were cohort studies, 24% (44) were cross-sectional, and 13% (24) were non-randomized trials, 8% (14) were randomized trials, and 4% (8) were case reports. For the type of data reported, 56% of papers (101) comprised mixed-methods data results, and 34% (61) used exclusively qualitative and 10% (19) quantitative data.

Assessments

The majority of the 133 assessment studies focused on mother-infant dyads specifically. Some studies simply reported the number of families and did not specify whether the mother and father were recruited. Cohort studies comprised 66% of papers, 32% were cross-sectional studies, and the rest were non-randomized trials. Non-randomized trials were classified as assessments because they involved an experimental manipulation without an RF intervention. Mixed-methods approaches were the most common, although several papers used either qualitative or quantitative approaches.

Assessment studies used a variety of measurements for RF, where frequently used methods include the Parental Reflective Functioning Questionnaire²⁴ and RF measured in the Parental Development Interview.²⁵ A more detailed list can be found in S4 of the Supplementary materials.

Interventions

Table 1 shows the breakdown of the 48 intervention papers. Forty-four studies specify the intervention and 4 did not. Most studies focused on mother-infant dyads specifically. As with assessments, some studies simply reported the number of families and did not specify whether the

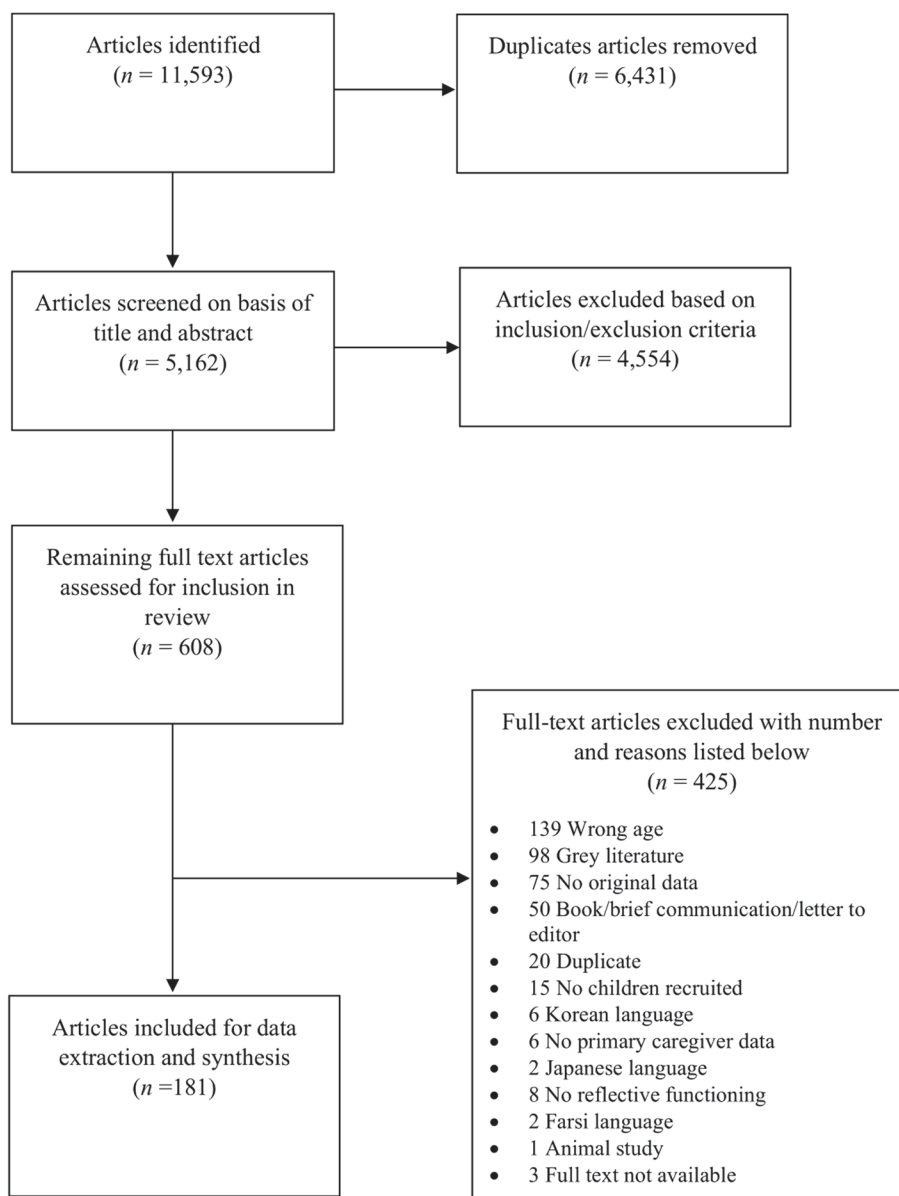


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram of study selection.

mother and father were recruited. Non-randomized trials made up 46% of included papers, 29% were randomized trials, and the rest were either case studies, cross-sectional studies, or cohort studies. All randomized trials used mixed-methods approaches, with the exception of 1 quantitative study. The remaining study designs varied in terms of mixed-methods, qualitative, and quantitative approaches.

A variety of RF interventions were used such as the MTP,²⁶ New Beginnings,²⁷ and MTB.¹² Mothers and Toddlers Program appeared 5 times and Parent-Infant Psychotherapy appeared 7 times (PIP; broken down into Focused with 2 uses and Psychoanalytic with 5). These 2 interventions make up 25% of all interventions mentioned. Circle of Security (2 uses; 4.17%), Marte Meo therapy (2 uses; 4.17%), MTB® (2 uses;

4.17%), Mindful with Your Baby/Toddler Training (2 uses; 4.17%), Promoting Responsiveness Emotion Regulation and Attachment in Young Mothers and Infants (PRERAYMI) (2 uses; 4.17%), and a category for other (22 uses; 45.83%) make up the rest of the interventions.

Table 1 also shows the summary of intervention papers that reported within-subject pre-intervention and post-intervention scores. There were 4 studies that reported increased RF pre/post using the MTP and 1 study that reported no change. There were 2 studies that reported increased RF pre/post using the PIP, 3 studies that reported decreased RF, and 3 studies that reported no change. There was 1 study that reported increased RF pre/post using the Circle of Security program and 1 study that reported decreased RF. There was 1 study that reported increased

Table 1. Summary of Types of Interventions Used

Intervention	Number of Studies	RF Pre/Post-measurement Recorded Change
Mothers and Toddlers Program	5 (10.41)	4 studies increased, 1 study no change
Parent-Infant Psychotherapy	7 (14.58)	2 studies increased, 3 studies decreased, 3 studies reported no change
Circle of Security	2 (4.17)	1 study increased, 1 study decreased
Marte Meo therapy	2 (4.17)	1 study increased
Minding the Baby®	2 (4.17)	2 studies increased, 1 study reported no change
Mindful with Your Baby/Toddler Training	2 (4.17)	2 studies increased, 1 study reported no change
PRERAYMI	2 (4.17)	1 study increased
Not reported/Non-specific	4 (8.33)	2 studies increased, 1 study reported no change
Other*	22 (45.83)	17 studies increased, 5 studies decreased, 8 studies reported no change
Location	N (%)	
Administered in the community	12 (25.0)	
Administered in a clinical setting	25 (52.1)	
Administered in both	8 (16.7)	

Some studies reported multiple groups so there may be overlap (i.e., study A had group 1 increase in RF and group 2 decrease in RF). *Other category includes interventional programs reported in 1 occurrence. The following intervention information in Table 1 includes studies that reported RF pre/post measurements.
 N=number of articles; RF=reflective functioning

RF pre/post using the Marte Meo therapy. There were 2 studies that reported increased RF pre/post using the MTB program and 1 study that reported no change. There were 2 studies that reported increased RF pre/post using the Mindful with Your Baby/Toddler training and 1 study that reported no change. There was 1 study that reported increased RF pre/post using PRERAYMI program. There were 2 studies that reported increased RF pre/post using programs that were unspecified and 1 study that reported no change. There were 17 studies that reported increased RF pre/post using other programs, 5 studies that reported decreased RF, and 8 studies that reported no change.

General Population

Out of the 95 general population studies, 94% were assessment studies and rest were intervention studies. Out of the 89 assessment studies, 70% used cohort designs, and the remainder used cross-sectional or non-randomized trial designs. A range of mixed-methods, qualitative, and quantitative approaches were used across assessment studies. Out of the 6 intervention studies, 3 were non-randomized trials, 1 was a randomized trial, and 2 were case studies. Either mixed-methods or qualitative approaches were used across intervention studies.

Clinical Population

Of the 78 clinical population studies, 49% used self-rated scales, 45% used clinician-rated scales, and the remainder did not specify the methods. Out of the 38 self-rated clinical populations, 58% were assessment studies and 42% were intervention studies. Out of the 35 clinician-rated clinical populations, 57% were intervention studies and

43% were assessment studies. Out of the remaining 5 not specified clinical population studies, 80% were assessment studies and 20% were intervention studies.

Ethnic Populations

Table 2 shows papers included for the 69 ethnic minority studies divided into distinct types of studies and data as well as specific ethnicities. Studies marked with an asterisk indicate that either the authors did not mention which ethnic minorities were included or the participants did not specify their ethnicity. Every article considered an ethnic minority study that reported inclusion of at least 1 ethnicity other than the dominant ethnicity of the study country. This section includes overlapping categories (i.e., an ethnic minority study will also fall into the general population or clinician-rated population category, for example). Most studies were from the USA (36 studies), the UK (21 studies), and Canada (7 studies). Sixty-eight percent of these studies were assessment studies, most of which used a cohort design (71%). Out of the 69 studies, only 7 reported the inclusion of an Indigenous person in their sample.

The 69 studies comprised 8332 participants, 6421 of whom belonged to the dominant ethnicity of the study country. Ethnic minorities made up 1883 of the participants (30%), with only 14 Indigenous participants. The remaining 28 participants did not report their ethnicity at the time of the study.

Remaining Populations

Out of the 8 remaining population studies, 38% were assessment studies and 63% were intervention studies.

Table 2. Types of Specific Ethnic Minority Groups Included in Studies (Numbers and Percentages Represent Total Number of Individuals in Each Study Type)

Study Type	Study Design	Ethnicity, n (%)	
Assessments	Cohort	Caucasian	4184 (82.8%)
		Black/African	345 (6.8%)
		Latinx	130 (2.6%)
		Asian	44 (0.9%)
		Arab	6 (0.1%)
		Indigenous	3 (0.06%)
		Mixed	115 (2.3%)
		Other*	226 (4.5%)
	Cross-sectional	Caucasian	1184 (81.0%)
		Black/African	117 (8.0%)
		Latinx	29 (2.0%)
		Asian	24 (1.6%)
		Indigenous	5 (0.4%)
		Mixed	17 (1.2%)
		Other*	82 (5.6%)
	Non-randomized trial	Caucasian	266 (70.2%)
		Black/African	36 (9.5%)
		Latinx	40 (10.6%)
Asian		15 (4.0%)	
Other*		22 (5.8%)	
Intervention	Non-randomized trial	Caucasian	376 (70.0%)
		Black/African	81 (15.1%)
		Latinx	35 (6.5%)
		Asian	14 (2.6%)
		Other*	32 (5.9%)
	Randomized trial	Caucasian	224 (34.3%)
		Black/African	133 (20.9%)
		Latinx	178 (28.0%)
		Asian	13 (2.0%)
		Indigenous	3 (0.5%)
		Mixed	23 (3.6%)
		Other*	61 (9.6%)
	Cohort	Caucasian	84 (52.2%)
		Black/African	37 (23.0%)
		Latinx	14 (8.7%)
		Indigenous	3 (1.9%)
		Mixed	3 (1.9%)
	Cross-sectional	Caucasian	103 (99.0%)
		Asian	1 (1.0%)

*The author did not mention which ethnic minorities were included or the participant did not specify their ethnicity.

For the 3 assessment studies, there was 1 high-risk study that used a qualitative approach, and there were 2 foster/adoptive studies that used a qualitative approach. For the

5 intervention studies, there was 1 foster/adoptive study that used a mixed-methods approach, 2 forensic/prison studies that used qualitative approaches, and 2 high-risk studies that used a mixed-methods approach.

Gender

Sex was identified in most papers, but it is not specified clearly whether it is self-identified binary sex, biological binary sex, or sex assigned at birth. There was not a single paper that included information on gender. The lack of information on sex and gender is a significant gap. Given the increased incidence of gender-diverse couple engaging in childcare, there is a need to examine both gender and sex as determinants of caregiver-child outcomes.²⁸

Adverse Childhood Experiences

Of the 11 studies that accounted for ACEs, 55% were assessment studies and the remainder were intervention studies. Among assessment studies, 5 focused on general population samples and 1 focused on a clinical population. Of the 5 intervention studies, 3 focused on clinical populations and 2 focused on a general population sample.

Family History Taken

Of the 35 papers with family history records, 74% were intervention studies and the remainder were assessment studies.

Out of the 26 intervention studies, most studies (69%) were either randomized or non-randomized trials, and the remainder (31%) used case report or cohort designs. A mix of mixed-methods, qualitative, and quantitative approaches were used.

Among the 9 assessment studies, just over 56% used cohort designs and the remainder (44%) used cross-sectional designs. A mix of mixed-methods, qualitative, and quantitative approaches were used.

Geographic Distribution of Studies

Table 3 shows the geographic study site distribution of studies included in alphabetical order. All studies were conducted in countries with major economies, and there was not a single paper that was conducted in a low- to middle-income country (LMIC) economy.

DISCUSSION

This review is the first to summarize RF-related assessment and intervention studies for caregivers and their children (up to and including 36 months of age) from an EDI perspective. The resulting “roadmap” of RF studies is meant to provide researchers with a broad summary that will be useful for planning future studies in this important health area. There are several major points that comprise this “roadmap” (including gaps and future areas of research) which are described below.

Table 3. Scope of Studies Included Sorted Alphabetically

Country	Number of Studies
Australia	7
Austria	1
Belgium	2
Brazil	1
Canada	22
Chile	3
China	2
Denmark	5
France	2
Finland	7
Germany	10
Israel	5
Italy	25
Japan	2
Mexico	1
Netherlands	6
Norway	6
South Africa	2
Spain	1
Sweden	1
Switzerland	3
Turkey	1
United Kingdom	25
United States	42
Total	182

1 study is Australia + China (counted 1 + 1 to account for both locations within study).

Summary of Major Points Found

Most studies were assessments that used cohort designs with mixed-methods approaches in the general population. Cohort designs are appropriate for this population because there are observable patterns of emotional development and clinically relevant epochs in children.²⁰ Longitudinal designs help to capture changes in dyadic interactions and RF across the development of a child and their caregiver. Additionally, mixed-methods approaches have been shown to give a more comprehensive picture of clinical measurements, such as caregiver-child dyadic interactions and the quality of caregiving relationship.²⁹

Most interventions were non-randomized trials using mixed-methods approaches which showed improved within-subject pre/post-intervention RF for either the caregiver or child or both. A more detailed investigation of 6 randomized controlled trials in a recent meta-analysis¹³ showed no significant improvements in pre/post RF scores and a significant reduction in disorganized attachment. The studies were underpowered, however, and so there are still future opportunities to look at RF interventions with a bigger sample size to improve dyadic relationships.

The majority of studies included in the present scoping review focused on mother-child dyads. The focus on mothers in the last few decades of research may be due to the prevalence of traditional gender roles in binary sex couples during that period,³⁰ whereby men are primary wage/salary earners and women primarily engage in child rearing. These patterns are undoubtedly shifting as 1 recent study,³¹ for example, showed that young, unmarried, childless men and women prefer more egalitarian relationship structures. This would lead to a more equitable caregiving load on both parents in the future. In this context, there is a clear gap with respect to knowledge of the impact of gender diversity among caregivers.

Gaps and Future Opportunities

Equity, Diversity, and Inclusivity. In addition to the many strengths that exist in the current RF literature, this review illustrates a few important research gaps. First, included articles noted binary gender only. An individual's gender identity and others' acceptance of it are important determinants of mental health in children, and this needs to be addressed in the RF literature pertaining to caregiver-child dyads. A study by MacMullin and colleagues²⁸ suggests that gender nonconformity in children was correlated with increased emotional and behavioral challenges that are worsened with non-accepting parents/guardians, who view gender as strictly binary. Parents who are more supportive and involved in their child's life have stronger RF and a healthier parent-child relationship.³² Therefore, we suspect that lack of acceptance toward the child's nonconforming gender identity by the caregiver may weaken the caregiver-child relationship and impact the child's RF. More research is needed to elucidate the impact that gender identity has on RF in caregiver-child dyads.

A second gap is the dearth of studies that assess RF in ethnic minorities. Out of the 181 included articles, 69 included an ethnic minority population. Ethnic minorities experience more mental health concerns than members of dominant ethnic groups due to experiences of racism, discrimination, and reduced access to health care.³³⁻³⁶ Reflective functioning can be impaired in patients with comorbid mental health disorders. A study conducted by Quitmann and colleagues³⁷ found that depressed mothers were less insightful and had lower RF than mothers who were non-depressed. Moreover, Indigenous peoples face an even greater mental health burden,³⁸ yet only 7 of the studies included Indigenous participants for a total of 14 Indigenous participants in the entire review. Consequently, we do not understand how RF presents in an ethnic minority population and the impact it has on mental health. Understanding this relationship is critically important for addressing the mental health burden experienced by Indigenous peoples.

Adverse Childhood Experiences. In order to be inclusive of a variety of factors related to wellness, ACEs are an important determinant to consider when studying caregiver-child dyads. There is also evidence detailing the intergenerational transmission of ACEs. For example, maternal maltreatment directly predicted higher levels of maladaptive infant socioemotional symptoms.³⁹ Also in a recent longitudinal study, RF mediated the association between maternal childhood abuse and neglect with offspring socioemotional development.⁸ The present scoping review included 181 studies, but only 6% of studies accounted for childhood trauma in their study designs. There is a substantial opportunity to look at ACEs in future cohort studies to investigate how RF is affected from the maternal prenatal and postnatal stages as well as from a child outcome perspective.

In a nationally representative sample in the USA,⁴⁰ the most common ACEs reported were economic hardship (22.5%) and parental and guardian separation (21.9%). In the present scoping review, out of the 48 intervention studies, only 10% accounted for ACEs; hence, we do not yet understand how ACEs impact treatment outcomes in RF intervention studies. Future trials and assessment studies are needed to understand how RF outcome measurements are affected in caregiver-child dyads when ACEs are included in the analysis. Simply intervening on a social determinant of health level will not solve health inequalities, but accounting for ACEs in study designs and understanding why children from less advantaged backgrounds appear to have more health challenges may be one positive approach to enabling a more equitable approach for optimizing child and adolescent mental health.⁴¹

Global Mental Health. From a global mental health (GMH) perspective, one of the core goals is to reduce disparities in health between groups.⁴² For example, 90% of people in LMICs have no basic access to mental health care.⁴³ This has been characterized as a moral failure.⁴⁴ The GMH is a historic gap in the quality of mental health compared to other health issues⁴⁵ reflected in the complete lack of LMIC studies identified in the present review. As the evidence base for caregiver-child RF interventions increases, so does the need for understanding how to implement and scale-up to the appropriate community context.⁴⁶

The first step would be to conduct a cost-benefit analysis as a crucial prerequisite for selecting affordable RF interventions in LMICs. Integrating and contextualizing capacity for evidence-based practice for specific LMIC health systems is also necessary for the process of considering behavioral, managerial, economic, and social barrier factors.⁴⁷ A more substantial step after the cost-benefit analysis would be to conduct a situational analysis which is an assessment approach to design an appropriate health plan which considers multiple interacting factors in a system such as human, financial, and social determinants

of health.⁴⁸ Situational analysis is⁴² an essential first step in developing robust research in GMH.

From a “social determinants of health perspective,” members of ethnic minority populations may be disproportionately affected by mental health problems as well as experiencing barriers to accessing culturally appropriate care.⁴⁹ Yet, in the present scoping review, only 1 study examined cross-cultural differences. Australian mothers used a higher frequency of mind-related comments, a measure related to RF, and a lower frequency of non-attuned comments compared to their Chinese mother counterparts.⁵⁰ Additionally, the Australian mothers used more mental state terms referring to desire and preference than Chinese mothers. This may be due to cultural factors where China is more oriented toward collectivist goals and group identity is prioritized based on a Confucian heritage.⁵¹ This single cross-cultural study points out an opportunity for substantial contributions to the knowledge base. More replication studies using a cross-cultural lens in LMICs would benefit this body of knowledge.

Reflective functioning as an Outcome. Reflective functioning has been studied as a predictor as well as an outcome in various studies. In a sample of mothers with a history of interpersonal violence-related post-traumatic stress disorder, lower maternal RF was associated with child Dysregulation, as measured by the Infant Toddler Social Emotional Assessment.⁵²

Another area of interest related to RF is attachment. In a sample of mother-infant dyads, securely attached mothers reported more appropriate mind-related comments and lower non-attuned mind-related comments compared to mothers classified as insecure avoidant, insecure resistant, and insecure disorganized.⁵³ Mind-related comments provide 1 index into how well caregivers can relate to their child in terms of internal experience. Opportunities to be more present and attuned to a child’s emotional needs seem to arise when the mother is securely attached and better self-regulated.⁵⁴⁻⁵⁶

Reflective functioning can also predict other child outcomes such as infant aggression. In a sample of first-time mothers, low prenatal RF was associated with high infant physical aggression.⁵⁷ This RF-aggression link may be moderated by maternal intrusiveness as significant differences in aggression between high and low RF mothers were only observed in the absence of intrusiveness. These findings are of particular concern to parents because early infant aggression can lead to a trajectory of persistent antisocial behavior later in life.⁵⁸ Therefore, these findings support interventions that target prenatal maternal RF as a determinant in decreasing child aggression. This is of particular relevance to high-risk mothers where insightfulness, a term related to RF, has shown to be a protective factor to postpartum stress.⁵⁹

Recent evidence shows that fathers' RF is a protective factor against family risk due to economic disadvantage.⁶⁰ However, due to the sparseness of RF evidence found in the present scoping review, it is not clear if the broader results discussed above are applicable to fathers as well as whole family units. Future work would benefit from sampling more diverse caregivers such as fathers, foster parents, and whole family units, rather than focusing solely on mother-infant dyads to deepen our understanding of RF's role as a determinant.

Based on the RF intervention studies found focusing primarily on mother caregivers, RF does seem to be a modifiable trait in adulthood. It is difficult to determine the strength of this plasticity due to the variability of terms used to capture this concept, and especially since similar terms such as metacognition and theory of mind, as opposed to RF, are more commonly used in empirical studies for adults to capture this general reflective ability. Further work on modifying RF levels in adults would be a valuable area to explore, since the present focus has been on health outcomes in caregiver-child dyads.

Limitations

This scoping review investigated the range of evidence from published studies of RF assessments and interventions in caregiver-child dyads. Many variables across time will have an impact on caregiver-child dyads. Among these factors, a current prominent concern is pandemic illnesses, such as the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2-pandemic), which undoubtedly have an impact on this context.⁶¹ The literature on this is sparse, and more work is needed, especially around the impact of pre- vs. post-pandemic stressors on health.⁶²

The present scoping review did not account for large-scale disasters [such as coronavirus disease 2019 (COVID-19), fires, and floods], but the negative mental health effects on families are noted. For instance, considering COVID-19-disrupting face-to-face therapeutic interventions, 1 recent study showed initial improvements in parental RF from a virtual attachment-based group intervention.⁶³ In terms of recessions, from a national sample in the USA in the early months of the COVID-19 pandemic, results from a study⁶⁴ show that parents/guardians who reported higher caregiving burden also reported higher anxiety, depression, and parent-perceived child stress. These caregiver burdens, mental health challenges, and child perception of stress associations were, in turn, significantly associated with child-parent closeness and conflict, which indicate a "spillover" effect for parents struggling with mental health problems onto their child.⁶² The link between increased caregiving burden and other negative clinical outcomes, such as depression, deserves more attention - non-pharmacological interventions, such as enhancing exercise, have been shown to be

effective in reducing mortality and treating symptoms of depression.⁶⁵ Given the reliability established, a 2-stage screening process with the Patient Health Questionnaire is recommended to screen for caregiving burden moving forward.⁶⁶

In other evidence,⁶⁷ the economic recession of 2007-2009 involved parental job loss and residential instability, which may drive negative later life outcomes for children. One narrative review⁶⁸ found that the psychological impact on children from disasters can manifest in post-traumatic stress disorder, depression, anxiety, emotional distress, and sleep disorders. These results are important to consider because additional overall population stressors may provide a "natural experiment" opportunity to further elucidate the determinants of RF within caregiver-child relationships. Due to sparseness of the RF literature, it was not possible to tap into this and look at issues such as the SARS-CoV-2-pandemic and effects of economic instability as it relates to RF outcomes in caregiver-child dyads from the perspective of overall determinants of health.⁶⁹

In addition, a quality appraisal was out of scope for the present scoping review since the aim was to systematically map out the evidence and gaps in knowledge for RF in caregiver-child dyads and to provide a foundation for future systematic reviews of subtopics within the RF literature.

Finally, this scoping review only included peer-reviewed manuscripts published in English, Spanish, French, German, and Arabic. It is possible that this led to the omission of relevant studies published in other languages. However, given the resources available to our team, we are confident that the search strategies and inclusion/exclusion criteria used captured a representative sample of the RF literature that is useful for offering future directions in this key area of research.

Our review summarizes evidence relating to RF assessment and intervention studies for caregiver-child dyads. The EDI lens that we used to frame the research question and search criteria provides a list of studies sorted by the type of study, study design, type of data, population type, and type of caregiver. This review identified substantial gaps in studies, including both biological sex and gender, ACEs, ethnic minority populations, and studies conducted in LMICs. Future work would benefit from including more comprehensive surveys on the populations studied with gender information and ACE background. Studies focusing on both Indigenous communities and LMICs are needed for us to understand potential disparities in health outcomes. This review of the RF literature can be used as a "roadmap" for future RF work by helping researchers to browse the RF existing literature efficiently, to know which measures to use and to know which populations have been studied to date.

Data Access: The authors confirm that the data supporting the findings of this study are available within the article or its supplementary materials.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of the University of Alberta Human Research Ethics Committee (Approval No: Pro00113683).

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - J.J., A.G., P.S., Y.W., W.P., H.P., L.D.; Design - J.J., A.G., P.S., Y.W., W.P., H.P., L.D.; Supervision - J.J., A.G., P.S., Y.W., W.P., H.P., L.D.; Funding - External (see Funding section below); Materials - J.J., A.G., L.D.; Data Collection and/or Processing - J.J., R.G., H.A., A.D., T.L.; Analysis and/or Interpretation - J.J., R.G., H.A., A.D., T.L.; Literature Review - J.J., R.G., H.A., A.D., T.L., M.R.; Writing - J.J., R.G., H.A., A.D., T.L., M.R.; Critical Review - J.J., R.G., H.A., A.D., T.L., M.R., A.G., P.S., Y.W., W.P., L.D., H.P.

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S1. MESH SEARCH STRATEGY

Ovid MEDLINE(R) ALL 1946 to March 10, 2021

Date searched: March 11, 2021

Results: 1100

1. mentalization/ or “theory of mind”/
2. (reflective functioning or mentalization or mentalisation or co-regulation or coregulation or mirror neurons or mind-mindedness or theory of mind or insightfulness).mp.
3. Metacognition/
4. (metacognition or meta cognition).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]
5. (parent* or maternal or paternal or mother* or father* or mom or moms or dad or dads).mp.
6. (1 or 2 or 3 or 4) and 5

Embase 1974 to 2021 March 10

Date searched: March 11, 2021

Results: 1446

1. mentalization/
2. mentalization-based treatment/
3. “theory of mind”/
4. (reflective functioning or mentalization or mentalisation or co-regulation or coregulation or mirror neurons or mind-mindedness or theory of mind or insightfulness).mp.
5. metacognition/ or metacognitive awareness/
6. (metacognition or meta cognition).mp.
7. (parent* or maternal or paternal or mother* or father* or mom or moms or dad or dads).mp.
8. (1 or 2 or 3 or 4 or 5 or 6) and 7

APA PsycInfo 1806 to March Week 1 2021 (OVID Interface)

Date searched: March 11, 2021

Results: 2356

1. mentalization/ or “theory of mind”/
2. (reflective functioning or mentalization or mentalisation or co-regulation or coregulation or mirror neurons or mind-mindedness or theory of mind or insightfulness).mp.
3. metacognition/
4. (metacognition or meta cognition).mp.
5. (parent* or maternal or paternal or mother* or father* or mom or moms or dad or dads).mp.
6. (1 or 2 or 3 or 4) and 5

CINAHL Plus with Full Text (EBSCO Host interface)

Search date: March 11, 2021

Results: 766

Deselect all equivalent subjects

((MH “Mentalization”) OR (MH “Theory of Mind”) OR metacognition OR meta cognition OR reflective functioning or mentalization or mentalisation or co-regulation or coregulation or mirror neurons or mind-mindedness or theory of mind or insightfulness) AND ((parent* or maternal or paternal or mother* or father* or mom or moms or dad or dads))

ERIC (EBSCO Host interface)

Search date: March 11, 2021

Number of results: 825

Deselect all equivalent subjects

(metacognition OR meta cognition OR reflective functioning or mentalization or mentalisation or co-regulation or coregulation or mirror neurons or mind-mindedness or theory of mind or insightfulness) AND ((parent* or maternal or paternal or mother* or father* or mom or moms or dad or dads))

Web of Science (Web of Science Interface)

Search date: March 11, 2021

Results: 2232

Advanced search

Ts=(metacognition OR meta-cognition OR reflective-functioning or mentalization or mentalisation or co-regulation or coregulation or mirror-neurons or mind-mindedness or theory-of-mind or insightfulness) AND ts=((parent* or maternal or paternal or mother* or father* or mom or moms or dad or dads))

Scopus (Scopus database)

Search date: March 11, 2021

Results: 2013

Advanced search

TITLE-ABS-KEY(metacognition OR meta-cognition OR reflective-functioning or mentalization or mentalisation or co-regulation or coregulation or mirror-neurons or mind-mindedness or theory-of-mind or insightfulness) AND TITLE-ABS-KEY ((parent* or maternal or paternal or mother* or father* or mom or moms or dad or dads))

PICO tool for guiding the search strategy

P (Problem or Patient or Population)	Parents
I (intervention/indicator or exposure)	Intervention to improve reflective functioning
C (comparison)	N/A
O (outcome of interest)	Changes in reflective functioning and mental health related symptoms

S2. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	1
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	1-2
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	2
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	3
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	2-3

(Continued)

S2. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist (Continued)

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	2-3
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	S1
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	2-3
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	2-3
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	2-3
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	3
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	4
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	3-6
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	3-6
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	3-6
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	6-9
Limitations	20	Discuss the limitations of the scoping review process.	9
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	9
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	10

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467-473. doi: 10.7326/M18-0850.

S3. PRELIMINARY INCLUSION CRITERIA

POPULATION

- Parents of children up to and including 36 months of age

STUDY DESIGN

- randomized controlled trials (RCTs)
- case-control studies
- interrupted time series
- cohort studies
- cross sectional studies
- observational studies
- qualitative studies
- case series
- case studies

Systematic reviews, meta-analysis and narrative reviews will be included in the screening phase. However, the references will be checked for primary sources that meet our inclusion criteria, and the review will be excluded.

MEASURES

- Use of a validated psychometric scale as an outcome measure
- Reflective functioning scale (eg. used in the Adult Attachment Interview, etc), or;
Specific domain(s) - parental mental health, child attachment security, parent-infant interaction
- Interventions targeting reflective functioning/coregulation/mind-mindedness/mirror neurons/mentalization in caregiver-child dyads

COUNTRY OF STUDIES

- Any country

DATE OF PUBLICATION

- No restrictions

LANGUAGE

- No restrictions

APPENDIX E - PRELIMINARY EXCLUSION CRITERIA:

- Grey literature (including dissertations and theses)
- Posters
- Brief communications and letters to the editor
- Animal

S4 Sociodemographic characteristics of all included studies.

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
Mothers and female caregivers only											
1	Ahrnberg 2020	Finland	Assessment	Cohort study	2886 mothers and fathers	Female 65% caregivers; children NR	NR	Mothers 30.23 (4.71); Fathers 31.94 (5.44); Children 6 months	General population	NR	PRFQ-FI used which is short form of Parental Reflective Functioning Questionnaire (PRFQ)
2	Álvarez 2019	Chile	Assessment	Cohort study	90 mother-infant dyads	Female 100% caregivers; Female 43.3% children	NR	Mothers 27.8 years (6.74); Children 12 months (1.37)	Ethnic minority	NR	Mentalization assessed in videotaped story interaction
3	Arikan 2020	Turkey	Assessment	Cross sectional study	537 mother-toddler dyads	Female 100% caregivers; Female 48% toddlers	NR	Mothers 32.03 years (4.75); Toddlers 3.26 months (7.47)	General population	NR	Parental Reflective Functioning Questionnaire-1 (PRFQ-1)
4	Arnott 2007	United Kingdom	Assessment	Cohort study	21 mothers, 17 fathers and their respective infants	Female 55% caregivers; infants NR	NR	Mothers 30.5 years (NR); fathers 35.5 years (NR); infants 34.5 weeks gestation (5.04)	General population	96% Caucasian, 4% Asian	Reflective functioning coded for in Adult Attachment Interview (AAI)
5	Arnott 2008	United Kingdom	Assessment	Cohort study	21 mothers, 17 fathers and their respective infants	Female 55% caregivers; Female 33% children	NR	Mothers 30.5 (NR); Fathers 35.5 (NR); children 6 months (NR)	General population	96% Caucasian, 4% Asian	Mind mindedness assessed by "What do you think your baby will be like at 6 months of age?" and transcribed play sessions
6	Aureti 2010	Italy	Assessment	Cohort study	10 mother-infant dyads	Female 100% caregivers; female 40% infants	NR	Mothers NR; infants 10.7 months (NR) at starting observation	General population	NR	Co-regulation coded by the Relational Coding Scheme
7	Aureti 2018	Italy	Assessment	Cohort study	80 mother-infant dyads	Female 100% caregivers; Female 49% children	NR	Mothers 34.67 (4.56); Children 3 months (9)	General population	NR	Co-regulation adapted from the Revised Relational Coding System
8	Bain 2014	South Africa	Intervention	Non-randomised experimental study	22 mother-infant dyads	NR	NR	Mothers 18-43; Children 9 days- 2.5 years	Clinical population	NR	Reflective functioning on the Parent Development Interview (PDI)
9	Bain 2017	South Africa	Intervention	Randomised controlled trial	106 mother-infant dyads	Female 100% caregivers; Female 42.5% infants	NR	Intervention mothers 26.94 years old (5.80); Control mothers 25.25 (5.61); Infants with mothers in intervention 4.45 months (1.42); Infants with mothers in control 4.48 months (1.99)	General population	NR	Reflective functioning coded for in Parent Development Interview
10	Baradon 2008	United Kingdom	Intervention	Non-randomised experimental study	15 mother-infant dyads	Female 100% caregivers; female 60% infants	NR	Mothers 27 (NR); Infants 15 weeks (NR)	Forensic/prison	53% Black/African, 27% Caucasian, 20% Asian	Parental Development Interview (PDI)
11	Bark 2013	Germany	Intervention	Case report	1 mother-infant dyad	Caregiver 100% female, infant 100% female	NR	NR	Clinical population	NR	NR

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
12	BeLOT 2015	France	Assessment	Cross sectional study	26 mother-infant dyads (13 clinical population, 13 controls)	Female 100% caregivers; infant NR	NR	NR	Clinical population	NR	The Rorschach Test
13	Bernier 2003	United States	Assessment	Cohort study	64 mother-infant dyads	Female 100% caregivers; Female 36% infants	NR	Mothers 47 (12); Infants 18.3 months (6)	Foster	Children: 67% African-American, 16% Caucasian, 11% Mixed, 6% Latinx. Foster mothers: 63% African-American, 35% Caucasian, 2% Latinx	Mind-mindedness using the This Is My Baby interview (TIMB)
14	Berube-Beaulieu 2016	Canada	Assessment	Cohort study	97 mother-infant dyads	Females 100% caregivers; Females 51.1% infants	NR	Mothers 29.8 years old (3.95); infants approximately 6 months old at 2nd assessment	High-risk Mothers with a history of trauma.	NR	Reflective functioning scale
16	Bigelow 2015	Canada	Assessment	Cross sectional study	31 mother-infant dyads	Female 100% caregivers; Female 48% infants	NR	Mothers 32.5 years (3.5); Children 5.2 months (0.6)	General population	100% Caucasian	Mind-Mindedness Coding Manual used in transcripts
15	Bigelow 2018	United States	Assessment	Cohort study	53 mother-child dyads	Female 100% caregivers; female 40% children	NR	Mothers 29.4 (6.5); Children 4 months	Clinical population	56.3% Caucasian, 18.4% Black/African, 25.3% Latinx	Mind-Mindedness Coding Manual
17	Bisallon 2019	Canada	Intervention	Case series	2 mother-child dyads	Females 100% caregivers; Infants NR	NR	Mother 1 (F) approximately 30 years old; Mother 2 (P) approximately 30 years old; Infants NR	General population	NR	Parental reflective functioning measured in Parent Development Interview
18	Borelli 2021	United States	Assessment	Cross sectional study	131 mother-child dyads	Female 100% caregivers; Female 54% children	NR	Mothers: mean 30.63 years (5.32); children mean 2.1 months (2.5)	General population	65% Caucasian, 2% Indigenous, 3% Black/African, 6% Asian, 11% Mixed, 13% Other	Parental Reflective Functioning Questionnaire (PRFQ)
21	Buttitta 2019	United Kingdom	Assessment	Cohort study	77 parents and their infants	NR parents; Females 52% infants	NR	Mothers NR; fathers 33.80 years (7.09); infants 23.72 months (3.69)	Ethnic minority	62% Caucasian, 18% Mixed, 5% Asian, 4% Black/African, Indigenous, 1% Other	Reflective functioning measured in parent development interview (PDI)
24	Camisasca 2014	Italy	Assessment	Cross sectional study	28 mother-infant dyads	Females 100% caregivers; Females 60% infants	NR	Mothers 32.9 years old (4.2); Infants 16 months (2)	General population	NR	Maternal mind-mindedness (MM) was assessed by observing a sequence of free play between mother and child lasting 20 minutes

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
26	Camisasca 2017	Italy	Assessment	Cohort study	41 mother-infant dyads	Female 100% caregivers; Female 56.1% children	NR	Mothers 32.33 (3.70); Children 16.93 (2.15) months at T3	Clinical population	NR	Maternal mind-mindedness from a videotaped 20-min free-play session
25	Camisasca 2018	Italy	Assessment	Cohort study	46 mother-infant dyads	Female 100% caregivers; Female 58.7% children	NR	Mothers 33.20 (4.30); Children at T3 16.93 (2.15)	Clinical population	NR	Mind mindedness measured in videotaped free-play session
27	Cheng 2017	China	Assessment	Cohort study	96 mother-infant dyads	Female 100% caregivers; Female 56% children	NR	NR; Children 6.46 (0.4)	Ethnic minority	NR	Mind-mindedness was coded using speech transcripts
28	Cohen 2016	United States	Intervention	Case series	2 caregiver-child dyads	Females 100% caregivers; Females 0% children	NR	Mothers NR; Infants 18 months old and 3 years old	Clinical population	NR	NR
30	Cooke 2017	Australia	Assessment	Cohort study	120 caregiver-child dyads	Female 48% caregivers; Females 48% children	NR	Mothers age under 28: 26%, between 28-38: 70%, over 38: 4%; Fathers age under 28: 18%, between 28-38: 66%, over 38: 16%; Children were approximately 12 months old	General population	NR	Parental Reflective Functioning Questionnaire (PRFQ)
31	Cordes 2017	Denmark	Assessment	Cohort study	Nonclinical group 52 mother-child dyads; Clinical group 27 mother-infant dyads	NR	NR	Nonclinical group mothers 30.35 (4.21); Clinical group mothers 30.19 (4.10); Children NR	General population	NR	Reflective functioning measured on Adult Attachment Interview (AAI)
32	Crucianelli 2019	United Kingdom	Assessment	Cohort study	45 mother-infant dyads	Female 100% caregivers; Female 40% children	NR	Mothers 45% were over 36 years old, 40% between 26 and 35, and 15% below 25; Children 11.77 months (1.43)	General population	NR	Mind-mindedness (MM) was coded in a book sharing activity
125	Crugnola 2016	Italy	Intervention	Non-randomised experimental study	28 mother-infant dyads	Female 100% caregivers; Female 62% for intervention and control group children	NR	Intervention group mothers 18.75 (1.43); Control group mothers 17.94 (1.94); Children NR	General population	NR	Reflective functioning scale in Adult Attachment Interview (AAI)
33	Dai 2020	Australia and China	Assessment	Cross sectional study	50 mother-infant dyads in Australia; 50 mother-infant dyads in China	Female 100% caregivers; Australian infants 56% female; Chinese infants 60% female	NR	Australian mothers 30.34 years (3.14); Chinese mothers 29.18 years (4.14); Australian infants 18.98 months (0.87); Chinese infants 18.50 months (2.25)	General population	NR	Mind-mindedness coded for in free-play session videotapes
34	De Campora 2019	Italy	Assessment	Cohort study	34 mother-infant dyads	Female 100% caregivers; Female 43.4% children at T3	NR	Women at T1 34.8 years (3.8); mean age NR Children	Clinical population	NR	Reflective functioning assessed in Adult Attachment Interview (AAI)
35	Degotardi 2007	Australia	Assessment	Cohort study	22 mother-infant dyads	Female 100% caregivers; Female 45% children	NR	Mothers 30 years (4.90); mean age Children NR	General population	NR	Mental-state talk coded from video footage of mother-infant interactions

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
36	Demers 2010	Canada	Assessment	Cohort study	106 mother-infant dyads	Female 100% caregivers; Female 48% children	NR	Adolescent mothers 17.4 years (1.5); Adult mothers 28.4 years (NR); Children 6 months old at starting assessment	General population	NR	Mind-Mindedness coded for in descriptions given by mothers
37	Demers 2010	Canada	Assessment	Cross sectional study	69 adolescent mothers and their infants; 29 adult mothers and their children	Female 100% caregivers; adolescent mother infants 56% female; adult mother infants 34% female	NR	Adolescent mothers 18.4 years (1.5); Adult mothers 28.7 years (4.9); children age 18 months old	General population	100% Caucasian	Mind-mindedness was measured through a 10-minute free-play session
38	Doiron 2017	Canada	Assessment	Cohort study	87 mother-infant dyads	Females 100% caregivers; Full term children 52% female; Very low birthweight/pre-term children 50% female	NR	Full-term mothers 30.09 years (5.30); Very low birth weight/pre-term mothers 31.73 years (6.03); Full-term infants 5.42 months (0.25); Corrected mean age of infants of very low birthweight/pre-term 5.76 months (0.50).	General population	NR	Coregulation was coded using the Revised Relational Coding System
39	Dollberg 2022	Israel	Assessment	Cohort study	68 mother-infant dyads	Female 100% caregivers; Female 46% caregivers	NR	Mothers 30.59 years (4.22); Children 3.84 months (0.86)	General population	NR	Parental reflective functioning (PRF) was assessed via Parent Development Interview-Revised Short Form (PDI-R2-5) and 5-minute free play sessions were coded for mind-mindedness
40	Easterbrooks 2017	United States	Assessment	Cohort study	212 mother-infant dyads	Females 100% caregivers; Females 46.2% infants	NR	Mothers 18.88 years old (1.27); Infants at T2 11.94 months old (5.53)	Clinical population	NR	Maternal mind-mindedness was coded from maternal utterances during free play
42	Ensink 2016	Canada	Assessment	Cohort study	88 mother-infant dyads	Female 100% caregivers; Females 50% infants	NR	Mothers 30.82 (4.00); Infants 6 months old at 2nd assessment	General population	100% Caucasian	RF was assessed using the Adult Attachment Interview
43	Ensink 2017	Canada	Assessment	Cohort study	86 mother-infant dyads	Females 100% caregivers; Females 49.5% infants	NR	Mothers 30.82 years old (4.00); Infants 16 months old at final assessment	General population	NR	RF was assessed with the Adult Attachment Interview
41	Ensink 2019	Canada	Assessment	Cohort study	88 mother-infant dyads	Females 100% caregivers; Females 100% infants	NR	Mothers 30.82 years old (4.00); Infants 6 months old at PRFI assessment	General population	100% Caucasian	The Mini-Parent Reflective Functioning Interview (Mini-PRFI)
44	Farkas 2017	Chile	Assessment	Cross sectional study	208 adults; Children NR	Educational staff 100% females; 100% female caregivers; Females 44.2% children	NR	Educational staff 33.66 years (11.58); Mothers 27.65 years (6.78); Children 12.02 months (1.34)	Ethnic minority	NR	Mentalization measured in storytelling activity
45	Farrow 2014	United Kingdom	Assessment	Cohort study	74 mothers of 35 boys and 39 girls	Females 100% caregivers; Females 53% infants	NR	Mothers 32 years (5.21); Infants 6 months old at first assessment	General population	NR	Mind-mindedness measured in interview

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
46	Feldman 2003	Israel	Assessment	Cross sectional study	100 Israeli couples and their first-born children	NR Caregivers; Females 48% children	NR	Mothers 27.7 years old (3.93); Fathers 30.37 years old (4.99); Infants 20.51 weeks (3.14)	Clinical population	NR	Co-regulation of positive arousal coded for in videotaped interactions
47	Fonagy 2016	United Kingdom	Intervention	Randomised controlled trial	76 mother-infant dyads	Females 100% caregivers; Females 39% infant control; Females 34% infant intervention	NR	Mothers control 31.2 years (5.9); Mothers intervention group 31 years (6.2); Infant control 3.8 months (3.0); Infant intervention group 3.9 months (3.2)	Physician referral	63% Caucasian, 33% Other	Reflective functioning measured in Parent Development Interview (PDI)
50	Frolli 2021c	Italy	Assessment	Cohort study	60 children and mothers	Female 100% caregivers; Female 27% children	NR	17 months/15-20 months (1.41) Children	General population	NR	Reflective Functioning Questionnaire
51	Gagné 2018	Canada	Assessment	Cross sectional study	92 families	Female 50% caregivers; Female 49% children	NR	Mothers 31 years (NR) and fathers 34 years (NR); Children 18.27 months (0.98)	General population	94% Caucasian, 6% Other	Paternal mind-mindedness was assessed during a free-play session
52	Gagné 2021	Canada	Assessment	Cohort study	96 mother-child dyads	Female 100% caregivers; Female 45.5% children	NR	21.8 years/15-25 (1.87)	Clinical population	100% Caucasian	Parental embodied mentalizing (PEM) Coding System Manual
53	Gálvez 2017	Chile	Assessment	Cross sectional study	105 mother-child dyads	Female 100% caregivers; Children NR	NR	Mothers 27.87 years (6.8); children 12.1 months (1.33)	General population	NR	Assessment of the mentalization of the significant adult
54	Garon-Bissonnette 2021	Canada	Assessment	Cohort study	111 mother-child dyads	Female 100% caregivers; Female 53.2% children	NR	Mothers 28.31 years old (4.18); Children 14.99 months (6.33) at second assessment point	General population	98.1% Caucasian	Reflective Functioning Questionnaire
55	Garset-Zamani 2020	Denmark	Assessment	Cohort study	80 mother-infant dyads	Female 100% caregivers; Female 54.9% Nonclinical children; Female 44.8% Clinical children	NR	Nonclinical mothers 30.49 years (4.15); Clinical group mothers 30.76 years (3.81); Nonclinical children 4.01 months (-.19); Clinical children 3.98 months (.26)	Clinical population	100% Caucasian	Parental embodied mentalizing capacities were assessed using the PEM Coding System
58	Georg 2019	Germany	Intervention	Case report	1 mother-infant dyad	Female 100% caregivers; Female 0% infants	NR	Mother NR; infant 8 months old	Clinical population	NR	Reflective Functioning Scale
57	Georg 2021	Germany	Intervention	Randomised controlled trial	154 mothers-infant dyads	Female 100% caregivers; Female 43.50% children	NR	Mothers 33.26 years old (4.40); children 8.57 years old (3.10)	Physician referral	NR	Parental Reflective Functioning (PRFQ) German version
61	Giovanelli 2020	Italy	Assessment	Cohort study	43 mother-child dyads	Female 100% caregivers; Female 60% children	NR	Mothers 34.70 years (4.00); Infants at phase 1 6.35 months old (0.48)	General population	NR	Mind-mindedness coded for in free-play session

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
63	Gojman 2012	Mexico	Assessment	Cross sectional study	66 mother-child dyads	Mexico City: Female 100% caregivers; Female 37% children; North of the State of Puebla: Female 100% caregivers; Female 52% children	NR	Mexico City: Mothers 31.8 years (5.83); Children 13.1 months (1.49); North of the State of Puebla: Mothers 26.1 years (6.34); Children 14 months (3.51)	Ethnic minority	NR	Caregiver sensitivity assessed in videotaped session
64	Gordo 2020	United Kingdom	Assessment	Cross sectional study	433 mothers and 113 fathers of infants	Females 79% caregivers; Females 47.8% infants	NR	Mothers 36.23 years (3.85); Fathers 37.85 years (3.96); Infants 15.87 months (7.01)	General population	NR	Parental Reflective Functioning Questionnaire (PRFQ)
65	Grienenberger 2005	United States	Assessment	Cohort study	45 mother-infant dyads	Female 100% caregivers; children NR	NR	Mothers 31 years of age (NR);	General population	94% Caucasian, 6% Other	Reflective functioning assessed in Parent Development Interview (PDI)
66	Gulsrud 2010	United States	Intervention	Randomised controlled trial	34 mother-toddler dyads	Female 100% caregivers; Females 24% toddlers	NR	Mothers 34.5 years (4.5); Toddlers 30.6 months old (4.0)	Clinical population	56% Caucasian, 44% Other	Co-regulation coded free-play sessions
67	Guo 2015	United States	Assessment	Cohort study	80 mother-child dyads	Females 100% caregivers; Females 50% children	NR	Mothers 29.95 years old (3.30); Children 36 months of age at co-regulation assessment	General population	83% Caucasian, 17% Other	Co-regulation measured with State Space Grid
68	Guo 2021	United States	Assessment	Cohort study	80 mother-child dyads	Female 100% caregivers; Female 50% children	NR	NR	Clinical population	81% Caucasian, 19% Other	Emotion co-regulation coded for in strange situation procedure (SSP)
69	Håkansson 2018	Norway	Assessment	Cross sectional study	43 mother-infant dyads	Females 100% caregivers; Females 34.9% infants	NR	Mothers 31 years (6.4); Infants 8.6 months old (3.8)	Clinical population	NR	Parental Reflective Function (PRF) measured in the Parent Development Interview-Revised (PDI-R2)
71	Håkansson 2018	Norway	Assessment	Cross sectional study	43 mother-child dyads	Female 100% caregivers; NR Children	NR	Mothers 31.0 years (6.4)	Physician referral	NR	Parental Reflective Function (PRF) assessed in Parent Development Interview (PDI)
70	Håkansson 2019	Norway	Assessment	Cohort study	43 mother-infant dyads	Female 100% caregivers; Children NR	NR	Mothers 31.0 years (6.4); Children M= 8.6 months (3.8)	Clinical population	NR	Parental reflective functioning (PRF) assessed in the Parent Development Interview-Revised (PDI-R2)
72	Heron-Delaney 2016	Australia	Assessment	Cross sectional study	36 infants (including 3 sets of dizygotic twins) and 33 mothers	Female 100% caregivers; Female 40% children	NR	Mothers equal to or greater than 35 years of age 40%; Infant 11.63 days (2.69)	General population	NR	Reflective functioning assessed in Parent Development Interview (PDI)
76	Jussita 2021	Finland	Intervention	Randomised controlled trial	90 pregnant women and their children. Intervention (n=47) and control group (n=48).	Female 100% caregivers; Children NR	NR	Median age of mothers 24 years (range 17-40); Children NR	Clinical population	NR	Prenatal Parental Reflective Functioning Questionnaire (P-PRQ)

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
77	Kearney 2018	United States	Intervention	Cohort study	69 mother-infant dyads	Female 100% caregivers; infants NR	NR	Mothers 28.5 years (6.47); Infants 8.2 months	Clinical population	42% Black/African, 33% Caucasian, 20% Latinx, 5% Mixed	Reflective Functioning Scale
78	Kirk 2015	United Kingdom	Assessment	Cohort study	18 mother-child dyads	Female 100% caregivers; children NR	NR	Mothers NR; Children starting age 8 months old	General population	NR	Mind-mindedness was coded during free-play sessions
79	Koren-Karrie 2002	Israel	Assessment	Cohort study	129 mother-child dyads	Female 100% caregivers; Female 53% children	NR	Mothers 31.6 years (NR); Children 13.28 months (NR)	General population	NR	Insightfulness Assessment coded through video segments
80	Kretchmar 2005	United States	Intervention	Case report	1 mother-child dyad	Female 100% caregiver; Female 100% child	NR	Mother 18 years old; Child 6 months old	Foster	NR	Reflective functioning measured through qualitative analysis of semi-structured interviews
81	Krink 2018	Germany	Assessment	Cross sectional study	50 mother-infant dyads	Female 100% caregivers; Female 48% infants	NR	Mothers 33.0 years (5.44); Infants 5.86 months (1.86)	Clinical population	NR	Parental reflective functioning questionnaire (PRF)
82	Lalonde 2015	United States	Intervention	Case report	1 mother-infant dyad	Females 100% caregivers; Females 0% infant	NR	Mother NR; Infant 2 years old	Clinical population	NR	Reflective functioning measured by parent-child interaction
84	Laranjo 2008	Canada	Assessment	Cohort study	50 mother-infant dyads	Female 100% caregivers; Female 52% infants	NR	Mothers 19-44 years old ; infants at time 1 12-13 months of age	General population	NR	Maternal mind-mindedness was assessed in videotaped free-play session
85	Laranjo 2010	Canada	Assessment	Cohort study	61 mother-child dyads	Females 100% caregivers; Females 59% children	NR	Mothers 19-44 years of age; Children 12-13 months old	General population	80% Caucasian, 10% Arab, 10% Black/African	Maternal mind-mindedness coded for in video-taped interactions
83	Laranjo 2013	Canada	Assessment	Cohort study	84 mother-infant dyads	Female 100% caregivers; Female 60% children	NR	Mothers 31.2 years old (4.51); Children M 12.6 months old (1.1) at T1	General population	NR	Mind-mindedness was assessed during mother-child free play sessions
86	Larkin 2019	United Kingdom	Intervention	Non-randomised experimental study	Intervention group consisted of 90 women. Control group consisted of 151 mothers when women were either pregnant or had a young infant	Females 100% caregivers; Intervention group 58% female children; Control group 48% female children	NR	BabyWind group mothers 28.52 years old (7.12); Control group mothers 29.60 years old (6.64); BabyWind children 25.85 weeks (2.14); Control children 28.55 weeks (4.29)	General population	Intervention Group: 95% Caucasian, 5% Other; Control Group 96% Caucasian, 5% Other	Maternal mind-mindedness measured from a filmed infant-mother interaction
87	Larkin 2021	United Kingdom	Assessment	Cohort study	Only study 2 looked at mother-infant dyad (N=56)	Females 100% caregivers, Infant NR	NR	Mothers= 32.31 (4.42), Infants= 27 weeks (2.92)	General Population,	89% Caucasian, 7% Asian, 3% Black/African, 1% Mixed	Mind-mindedness coding scheme

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
88	Lavelli 2019	Italy	Assessment	Cohort study	20 Italian mother-infant dyads, 20 West African first-generation immigrant mothers and their infants born in Italy, and 20 Cameroonian Nso dyads participated in the stud	Females 100% caregivers; Italian infants 50% girls; immigrant infants 50% girls; Nso infants 60% girls	NR	Immigrant mothers 28.75 years (6.44); Nso mothers 29.25 (8.23); Italian mothers 33.20 years (4.20)	General population	NR	Co-regulation coded for in mother-infant interactions
89	León 2020	Spain	Assessment	Cross sectional study	50 mother-father-child triads	Caregivers NR; Females 42% infants	NR	Mothers 31.52 years (4.84); fathers 33.58 years old (5.83); infants 26.70 months (7.77)	Clinical population	NR	Parental reflective functioning using the Parent Development Interview-Revised, Short Version (PDI-R)
90	Letourneau 2020	Canada	Intervention	Randomised controlled trial	30 mother-infant dyads	Females 100% caregivers; Infants NR	NR	Mothers 27.8 years old (4.17); infants 12.5 months (10.0)	Clinical population	57% Caucasian, 23% Black/African, 10% Indigenous, 10% Asian	Reflective Function Scale (RF Scale)
92	Licata 2013	Germany	Assessment	Cross sectional study	47 children with mothers	Female 100% caregivers; Female 62% children	NA	6.9 months at assessment of maternal mind-mindedness; 9 months at assessment of child temperament, 24 months at assessment of child empathy	General population	NR	Meins and Fernyhough's (2010) method of assessment of mind-mindedness during first year of life
91	Licata 2016	Germany	Assessment	Cohort study	56 mother-infant dyads	Females 100% caregivers; Infants NR	NR	Mothers 33 years (4.23); infants 6.94 months (.66)	General population	NR	Maternal mind-mindedness (MM) was assessed using videotaped free play session
93	Longobardi 2015	Italy	Assessment	Cross sectional study	26 mother-infant dyads	Females 100% caregivers; Females 58% infants	NR	Mothers 36.46 years (2.16); Infants 16 months	General population	NR	Mind-mindedness (MM) coded for in interviews
95	Longobardi 2018	Italy	Assessment	Cohort study	25 mother-child dyads	Females 100% caregivers; Females 56% children	NR	Mothers 36.50 years (2.20); Children at first assessment 5.30-16.10 months old	General population	NR	Mind-related comments were assessed from a 15-min play session
94	Longobardi 2021	Italy	Assessment	Cross sectional study	25 mother-child dyads	Female 100% caregivers; Female 56% caregivers	NR	Mothers 36.50 years (2.20); Children approximately 16 months old	General population	NR	Mind-mindedness was coded for in a free-play setting
98	Marcoux 2017	Canada	Assessment	Cross sectional study	38 mother-infant dyads	Females 100% caregivers; Females 39% infants	NR	Clinical mothers 32 years of age; Control mothers 33 years of age; Clinical group infants 53 weeks; control infants 55 weeks	Clinical population	BPD= 63% Caucasian, 33% Healthy Control= 70% Caucasian, 30% Other	MM from 2 min of videotaped mother-infant free play

(Continued)

S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
99	Martinez-Torteya 2018	United States	Assessment	Cohort study	125 mother-infant dyads	Females 100% caregivers; Females 45% infants	NR	Mothers 28.82 years old (5.45); Infants 6-7 months old	Clinical population	63% Caucasian, 24% Black/African, 4% Asian, 3% Latinx, 3% Mixed, 3% Other	The Insightfulness Assessment was completed using video clips of mother-infant interactions
100	McElwain 2011	United States	Assessment	Cohort study	1,249 mother-infant dyads	Females 100% caregivers; Females 48% infants	NR	Mothers 28.3 years of age (5.61); Infants 15 months old at first assessment	General population	77% Caucasian, 12% Black/African, 6% Latinx, 5% Other/Mixed	Maternal mental state talk coded for in play session
101	McMahon 2016	Australia	Assessment	Cohort study	150 mother-infant dyads	Females 100% caregivers; Females 44% infants	NR	Mothers age at infant birth 33.5 (4.6); Infant age first home visit 7.22 months (.80 weeks)	General population	NR	Mind-mindedness was assessed through a free-play interaction
106	Meins 2002	United Kingdom	Assessment	Cohort study	57 mother-infant dyads	Female 100% caregivers; Female 47% infants	NR	Mothers NR; Children 6 months old at first assessment	General population	95% Caucasian, 5% Mixed	Maternal mind-mindedness coded in free-play session
104	Meins 2011	United Kingdom	Assessment	Cross sectional study	206 mother-infant dyads	Females 100% caregivers; Females 52% infants	NR	Mothers 28.08 years (5.48); Infants 8.52 months old (0.48)	Clinical population	Study 1: 99% Caucasian; Study 2: 100% Caucasian	Maternal mind-mindedness assessed in a free-play session
105	Meins 2012	United Kingdom	Assessment	Cohort study	206 mother-infant dyads	Females 100% caregivers; Females 52% infants	NR	Mothers 28.1 years (5.48); Infants 8.5 months (0.48) at phase 1	General population	99% Caucasian, 1% Other	Maternal mind-mindedness was coded for in free-play interaction
102	Meins 2013	United Kingdom	Assessment	Cohort study	206 mother-child dyads	Females 100% caregivers; Females 52% children	NR	Mothers 28.08 years (5.48); Children 8.52 months (0.48)	General population	99% Caucasian, 1% Other	Mind-mindedness assessed in free play session
103	Meins 2013	United Kingdom	Assessment	Cohort study	171 mother-infant dyads	Females 100% caregivers; Females 49% infants	NR	Mothers 28.08 years (5.48); Infants 8.52 months (0.48) at phase 1	Clinical population	98% Caucasian	Mind-mindedness (MM) assessed in free-play session
107	Miligan 2015	Canada	Assessment	Cohort study	76 mother-infant dyads	Females 100% caregivers; Infants NR	NR	Mothers 31.58 years (3.53); Infants 6 months old	Clinical population	70% Caucasian	Mind-mindedness coded for in variation on the Empty Chair technique
108	Moreno 2006	United States	Assessment	Non-randomised experimental study	79 mother-infant dyads	Females 100% caregivers; Females 49% infants	NR	Mothers NR; Infants 3.44 months old (.19)	General population	89% Caucasian, 11% Other	Co-regulation coded for in interaction session
109	Nijssens 2018	Belgium	Assessment	Cohort study	76 families	Female 50% caregivers; Females 59% children	NR	Mothers 29.31 years (3.00); fathers 31.48 years (4.39); Children 10.11 months old (1.24)	General population	NR	Parental Reflective Functioning Questionnaire (PRFQ)
110	Nijssens 2020	Belgium	Assessment	Cohort study	76 first-time parental couples and their infants	Females 59.2% infants	NR	Mothers 29.31 years (3); Fathers 31.48 years (4.39); Infants 10.11 months old (1.24)	General population	NR	Parental Reflective Functioning Questionnaire

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
112	Øie 2020	Norway	Assessment	Cross sectional study	43 mother-infant dyads (All cases (N=43) were included in the analyses, and there was no missing data)	Females 100% caregivers; Females 34.9% infants	NR	Mothers 31.07 years (6.37); Infants 8.56 months (3.79)	Clinical population	NR	PRF was assessed by the Parent Development Interview
114	Pajulo 2009	Finland	Intervention	Non-randomised experimental study	18 mother-baby dyads	Females 100% caregivers; Children NR	NR	Mothers 25 years (5.9); Children 4 months old at final assessment	Clinical population	94% Caucasian, 6% Other	Maternal reflective functioning—Pregnancy Interview (PI)
113	Pajulo 2012	Finland	Intervention	Non-randomised experimental study	34 mother-infant dyads	Females 100% caregivers; Infants NR	NR	Mothers 25.1 years (5.8); Infants 3 months old at first assessment	High-risk	NR	Maternal reflective functioning (Pregnancy Interview)
116	Pawlby 2010	United Kingdom	Assessment	Cohort study	99 mother-infant dyads	Females 100% caregivers; Infants with inpatient mothers 40% female; Infants with healthy mothers 47% female	NR	Healthy mothers 30.5 years (4.6); Mothers with schizophrenia 34.6 years (5.2); Mothers with depression 32.2 (7.2); Mothers with mania 29.0 (5.2); Infant 10.6 weeks (8.8)	Clinical population	50% Caucasian, 34% Black/African, 2% Latinx, 16% Asian	Mind-mindedness (MM) coded for in free-play interaction
117	Perez 2018	United Kingdom	Intervention	Case report	1 mother-infant dyads	Female 100% caregiver; Female 0% infant	NR	NR; Infant 2.5 months at first session	Clinical population	NR	Reflective triangular space measured by Adult Attachment Interview
118	Planalp 2019	United States	Assessment	Cohort study	135 families	Females 59.3% caregivers; females 52.6% infants	NR	Mothers 29.34 years old (5.32) at first visit; fathers 3.79 years old (5.62) at first visit; Infants 3 months old at first visit	General population	89% Caucasian, 11% Other	Mind-mindedness measured in still face paradigm
119	Polansky 2006	United States	Intervention	Cohort study	7 mother-child dyads	Females 100% caregivers; Children NR	NR	Mothers in their twenties and one in their forties; Children NR	Clinical population	89% Black/African, 11% Caucasian	Maternal sensitivity coded for in interviews
120	Porter 2003	United States	Assessment	Cross sectional study	56 mother-infant dyads	Females 100% caregivers; Females 55% infants	NR	Mothers 25.0 years (3.6); Infants 6 months old	General population	95% Caucasian, 5% Latinx	Co-regulation coded for in free-play interaction
121	Poeharst 2021	Netherlands	Intervention	Non-randomised experimental study	18 mother-toddler dyads	Female 100% caregivers; Female 32% toddlers	NR	Mothers 37.3 years (3.9); Toddlers 2.4 years (0.6)	Clinical population	NR	Interpersonal Mindfulness in Parenting scale
122	Putnam 2002	United States	Assessment	Cohort study	58 mother-infant dyads	Females 100% caregivers; Females 48% infants	NR	Mothers 16-37 years old; Infants age range 29-31 months	General population	96% Caucasian, 2% Asian, 2% Black/African	Co-regulation measured in a delay gratification task
123	Quitmann 2012	Germany	Assessment	Cross sectional study	30 mothers without a diagnosis of depression (with their infants) and 23 mothers diagnosed with depression (with their infants)	Females 100% caregivers; Females 43% infants	NR	Mothers 27-45 years old; Infants 3-12 months old	Clinical population	NR	Insightfulness Assessment (IA)

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
124	Ramsauer 2014	Germany	Assessment	Cross sectional study	19 depressed mother-infant dyads and 20 nonclinical mother-infant dyads	Females 100% caregivers; Infants with depressed mothers 31.6% female; Infants with nonclinical mothers 50% female	NR	Depressed mothers 35.5 years (4.8); Non-clinical mothers 35.8 (3.9); Infants with depressed mothers 7.5 months (2.9); Infants with non-clinical mothers 7.4 (1.9)	Clinical population	100% Caucasian	Maternal insightfulness was assessed in the Insightfulness Assessment (IA)
127	Riva Crugnola 2018	Italy	Assessment	Cross sectional study	85 mother-infant dyads	Females 100% caregivers; Infants with adolescent mothers 59%; Infants with adult mothers 44%	NR	Adolescent mothers 18.73 years old (1.67); Adult mothers 32.02 years old (3.67); Infants 3.41 months (.30)	General population	100% Caucasian	The Reflective Functioning Scale (RF) assessed in the Adult Attachment Interview
126	Riva Crugnola 2019	Italy	Assessment	Cross sectional study	63 mother-infant dyads	Females 100% caregivers; Female 54% infants	NR	Mothers 18.63 years old (1.87); Infants NR	General population	NR	Reflective functioning measured in Adult Attachment Interview
128	Riva Crugnola 2021	Italy	Intervention	Non-randomised experimental study	44 parent-child dyads	Female 100% caregivers; Female 34% children	NR	Intervention group mothers mean age of 18.44 (1.91); Control group mothers mean age of 17.33 (1.82)	General population	NR	Maternal mind-mindedness was assessed from a video-taped 5-min free-play session
129	Rossignol 2013	Canada	Intervention	Non-randomised experimental study	8 mother-infant dyads	Females 100% caregivers; Females 50% infants	NR	Mothers aged 27, 24 and 30 years old; Infants 23 months and 25 months	High risk mothers recruited	NR	Reflective functioning measured in Parent development interview
133	Rutherford 2013	United States	Assessment	Cross sectional study	21 mother-infant dyads	Females 100% caregivers; Children NR	NR	Mothers 30 years (6); Children under the age of 2	Clinical population	19% Black/African, 43% Caucasian, 10% Latinx, 29% NR	Parental Reflective Functioning Questionnaire (PRFQ)
131	Rutherford 2015	United States	Assessment	Cross sectional study	59 mother-infant dyads	Females 100% caregivers	NR	Mothers 27 years (6); Infants 5 months (1)	General population	55% Black/African, 18% Caucasian, 12% Latinx, 2% Asian, 2% Native American, 12% Other, 3% Did Not Report	The Parental Reflective Functioning Questionnaire (PRFQ)
134	Rutherford 2017	United States	Assessment	Cohort study	63 mother-infant dyads	Females 100% caregivers; Females 50% infants	NR	Mothers 29 years (5); Infants were between 5-10 months old	General population	49% Caucasian, 22% Black/African, 10% Latinx, 3% Asian, 5% Other, 1% Mixed, 10% NR	Parental Reflective Functioning Questionnaire (PRFQ)
132	Rutherford 2018	United States	Assessment	Cross sectional study	50 mother-infant dyads	Females 100% caregivers; Infants NR	NR	Mothers 28 years (6 years); infant age 8 months (5)	Ethnic minority	48% Black/African, 30% Caucasian, 10% Latinx, 2% Asian, 2% Mixed, 8% Other	Parental reflective functioning questionnaire (PRFQ)

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
135	Sadler 2013	United States	Intervention	Randomised controlled trial	105 families	Females 100% caregivers; Did not complete 24-month interview infant females 48%; Completed 24-month interview infant females 48%	NR	Mothers 19.6 years old (2.5); Did not complete 24-month interview infant gestational age 38.4 weeks (3.1); Completed 24-month interview infant gestational age 39.2 (2.1)	Clinical population	Non-completers: 83% Latinx, 14% Black/African, 3% Other; Completers: 55% Latinx, 33% Black/African, 12% Other	Reflective functioning (RF) in Parent Development Interview (PDI)
136	Salo 2019	Finland	Intervention	Randomised controlled trial	45 mother-infant dyads	Females 100% caregivers; Infants NR	NR	Mothers NR; Infants 1 years old at post-intervention assessment	Clinical population	NR	Reflective functioning measured in parent development interview (PI)
137	Salo 2021	Finland	Assessment	Cohort study	556 parent-infant dyads	Female 74% caregivers; NR children	NR	Mothers 29.47 years (4.54); Fathers 31.5 years (4.66); Children approximately 3 months old at 1st follow up	General population	NR	Parental Reflective Functioning Questionnaire-Fi
138	Sansavini 2015	Italy	Assessment	Cohort study	40 mother-infant dyads	Females 100% caregivers; Female extremely low gestational age infants 55%; Female full term 45%	NR	ELGA fathers 37.8 years old (5.6); FT fathers 37.5 (4.5); ELGA mothers 36.9 (5.2); FT mothers 34.6 (3.2); ELGA infants 12.2 months corrected age (0.3); FT infants 12.2 months (0.4)	General population	NR	Co-regulation was assessed using the Revised Relational Coding System (R-RCS) in a free-play session
139	Schacht 2017	United Kingdom	Intervention	Non-randomised experimental study	Study 1 (secondary analysis): Participants were 99 infants and their mothers; Study 2: 22 completed the intervention.	Study 1: Females 100% caregivers; Infants with psychologically well mothers 47% female; Infants with mothers with severe mental illness (SMI) 40% female; Study 2: Females 100% caregivers; Infants 55% female	NR	Study 1: Mothers NR; infants 10.6 weeks (8.8); Study 2: Mothers 33 years (5.10); infants 13 weeks (8.2)	Clinical population	Study 1: 50% Caucasian, 34% Black/African, 16% Asian, 2% Latinx; Study 2: 59% Caucasian	Mind-Mindedness coded for in mother-infant interaction
140	Schaefer 2016	Brazil	Intervention	Case series	2 mother-infant dyads	Females 100% caregivers; Females 50% infants	NR	Mother case 1 38 years old; Mother case 2 21 years old; Infant case 1 32 weeks; infant case 2 32 weeks	General population	NR	Checklist for Clinical Assessment of Mentalization
141	Schechter 2006	United States	Intervention	Non-randomised experimental study	32 mother-infant dyads	Females 100% caregivers; Infants NR	NR	Mothers 30 years old (NR); Infants 32 months old (NR)	Clinical population	88% Latinx, 12% Black/African	Reflective Functioning (RF) was measured by coding maternal narrative responses to the Working Model of the Child Interview (WMCi)
142	Schultheis 2019	United States	Assessment	Cross sectional study	97 mother-infant dyads	Females 100% caregivers; Infants NR	NR	Mothers 28.14 years (6.64); Infants 6.14 months (3.29)	Ethnic minority	49% Black/African, 26% Caucasian, 12% Latinx, 3% Asian, 1% Indigenous, 5% Other, 4% Didn't Report	Parental Reflective Functioning Questionnaire (PRFQ)

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
143	Senehi 2018	United States	Assessment	Cohort study	95 mother-toddler dyads	Females 100% caregivers; Females 52% toddlers	NR	Mothers 28.01 years (7.15); toddlers 25.39 months (4.27)	Clinical population	88.4% Caucasian, 6.3% Black/African, 4.2% Latinx, 1.1% Other	Mentalization-related parenting behaviors (MRPBs) measured in book share task
145	Shai 2018	United Kingdom	Assessment	Cohort study	206 mother-infant dyads	Females 100% caregivers; Females 52% infants	NR	Mothers 28.1 years (5.48); infants 8.5 months (0.48) at 8-month assessment period	General population	99% Caucasian, 1% Other	Parental embodied mentalizing (PEM) was coded from a 20-min free-play session
146	Simonelli 2010	Italy	Assessment	Cohort study	38 mother-father-child triads	Females caregivers NR; Female 55% infants	NR	Mothers 32.68 years (4.19); fathers 34.62 (3.97)	General population	NR	Co-regulation coded for procedure for Trilogue Play
147	Slade 2005	United States	Assessment	Cohort study	40 mother-infant dyads	Females 100% caregivers; Females 50% infants	NR	Mothers 31.4 years old (NR)	Clinical population	94% Caucasian, 5% Black/African, 1% Mixed	Reflective functioning (RF) on Parent Development Interview (PDI)
148	Slade 2020	United States	Intervention	Randomised controlled trial	156 mother-infant dyads	Females 100% caregivers; Intervention infants 52.1% female; Control infants 53.3% female	NR	Intervention mothers 20.1 years old (2.8); Control mothers 20.0 years old (2.5); Intervention infant gestational age 38.8 weeks (2.6); Control infant gestational age 39.2 weeks (1.4)	Clinical population	68% Latinx, 24% Black/African, 4% Caucasian, 4% Other	Reflective functioning measured in the Parent Development Interview (PDI)
149	Sleed 2013	United Kingdom	Intervention	Randomised controlled trial	163 mother-infant dyads	Females 100% caregivers; Control infants 60% female; Intervention infants 61.4% female	NR	Control mothers 27.6 years old (5.6); Intervention mothers 26.2 years old (6.4); Control infants 4.4 months (4.6); Intervention infants 4.9 months (4.5)	Clinical population	51% Caucasian, 28% Black/African, 6% Asian, 14% Mixed, 1% Other	Reflective Functioning coded for in the Parent Development Interview (PDI)
150	Smaling 2016a	Netherlands	Assessment	Cohort study	123 mother-infant dyads	Females 100% caregivers; Females 44% infants	NR	Mothers 22.85 years (2.21); infants 19.97 months (0.85) at time 4	General population	89% Caucasian, 2% mixed, 9% other	Reflective functioning (RF), as measured by the Pregnancy Interview and Parent Development Interview
152	Smaling 2016b	Netherlands	Assessment	Cohort study	133 mother-infant dyads	Females 100% caregivers; Females 46% infants	NR	Mothers 22.86 years old (2.17); infants 6.02 months (0.41)	General population	89% Caucasian	Maternal reflective functioning assessed in the Pregnancy Interview-Revised
151	Smaling 2017	Netherlands	Assessment	Cohort study	96 mother-infant dyads	Females 100% caregivers; Females 46% infants	NR	Mothers 22.57 years (2.13); infants gestational age at birth 39.01 weeks (2)	General population	84.8% Caucasian, 9% Mixed; 6.2% Other	Reflective Functioning assessed in Pregnancy Interview
155	Stacks 2014	United States	Assessment	Cohort study	83 mother-infant dyads	Females 100% caregivers; Infants 40.8% female	NR	Mothers 30.04 years old (5.56); infants 7 months old at first assessment	Clinical population	73% Caucasian, 14% Black/African, <3% Latinx, 5% Asian, <3% Mixed, <3% Other	Reflective functioning was assessed with the Parent Development Interview

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
154	Stacks 2022	United States	Intervention	Non-randomised experimental study	75 mother-infant dyads	Females 100% caregivers; Infants 56% female	NR	Mothers 26.67 years old (6.11); Infants 9.64 months old (8.39) at baseline	Physician referral	52% Caucasian, 43% Black/African, 5% Latinx	Parental reflective functioning (PRF) was assessed with either the Pregnancy Interview (PI) or the Parent Development Interview- Revised Short Version (PDI)
156	Stephanie 2021	Germany	Assessment	Cross sectional study	50 mother-child dyads	Female 100% caregivers; Female 48% children	NR	Mothers mean 33.0 years (5.44); Children 5.86 months (1.86)	Clinical population	NR	Reflective Functioning Scale scored in AAI, Parental Reflective Functioning Questionnaire, and Mind-Mindedness Coding-System
157	Suardi 2020	Switzerland	Assessment	Cohort study	56 mother-child dyads	Females 100% caregivers; Females 52% children	NR	IPV-PTSD mothers 33.2 years of age (5.8); Non IPV-PTSD mothers 34.6 (5.7); IPV-PTSD group children 27.5 months (9.1); Non IPV-PTSD mothers 26.7 weeks (8.3)	Clinical population	NR	Mentalization was measured by the Parental Reflective Functioning (PRF) Scale
158	Suchman 2008	United States	Intervention	Non-randomised experimental study	8 mother-infant dyads	Females 100% caregivers; NR	NR	Mothers 34.63 (4.07); Infants 26 (8.02)	Physician referral	72% Caucasian, 14% Latinx, 14% Black/African	Reflective functioning measured in Parent Development Interview (PDI)
159	Suchman 2010	United States	Intervention	Randomised controlled trial	47 mother-infant dyads (data used from parent study randomized trial)	Females 100% caregivers; Females 48.9% infants	NR	Mothers 30.13 years old (6.54); Infants 17.68 months (13.82)	Physician referral	70% Caucasian, 21% Black/African, 9% Latinx	Reflective functioning measured in the Parent Development Interview
160	Suchman 2010	United States	Intervention	Randomised controlled trial	47 mother-child dyads in the Mothers and Toddlers Program (MTP) and Parent Education Program (PE)	Females 100% caregivers; MTP children 39% female; PE children 58% female	NR	MTP mothers 31.43 years (6.46); PE mothers 28.88 (6.50); MTP children 18.74 months (16.94); PE children 16.67 (10.27)	Clinical population	NR	Reflective functioning assessed in Parent Development Interview (PDI)
161	Suchman 2011	United States	Intervention	Randomised controlled trial	47 mother-infant dyads.	Females 100% caregivers; MTP infants 39% female; PE infants 58% female	NR	MTP mothers 31.43 years old (6.46); PE mothers 28.88 years old (6.50); MTP infants 18.74 months old (16.94); PE infants 16.67 months old (10.27)	Clinical population	NR	Reflective functioning (RF) measured using the Parent Development Interview (PDI)
162	Suchman 2012	United States	Intervention	Randomised controlled trial	24 mother-infant dyads	Females 100% caregivers; Females 41.7% infants	NR	Mothers 30.21 years old (6.39); Infants 18.54 years old (12.27)	Mothers enrolled in outpatient substance-use treatment	71% Caucasian, 21% Black/African, 8% Latinx	Reflective functioning measured in The Parent Development Interview (PDI)
163	Suttora 2020	Italy	Assessment	Cross sectional study	65 mother-infant dyads	Females 100% caregivers; Females 42% infants	NR	Mothers 36.72 (5.16); Infants 6.33 months old (0.26)	Clinical population	100% Caucasian	Maternal mind-mindedness (MM) was assessed in a videotaped interaction

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
164	Suttora 2020	Italy	Assessment	Cross sectional study	110 mother-infant dyads	Females 100% caregivers; Infants preterm 55.56% female; Infants fullterm 48.22%	NR	Mothers preterm 34.20 years (4.71); Mothers fullterm 35.05 (4.12); infants preterm 3.02 months (0.04); infants fullterm 3.01 months (0.04)	General population	100% Caucasian	Mind-mindedness was assessed dyadic face-to-face interactions
165	Suzuki 2020	Japan	Assessment	Cohort study	The Okayama data were drawn from 130 mother-child dyads. The Gleason data, collected in Boston, came from 24 mother-child dyads.	Okayama data: two year old infants 52% female, Females 100% caregivers. Gleason data: 50% infant females, Females 100% caregivers.	NR	Okayama data: Thirty-one children were two years old (mean age in months= 31.2, SD = 2.8); Gleason data: five children were two years old (mean age in months=28.0, SD = 1.6)	General population	NR	Mental state verbs (MSV) coded for in transcripts
166	Symons 2000	Canada	Assessment	Cohort study	46 mother-infant dyads	Females 100% caregivers; Females 46% infants	NR	Mothers 33.72 years old (NR); Infants 25.1 months (1.09)	Clinical population	100% Caucasian	Maternal sensitivity measured with the Attachment Behavior Q-set
167	Tanaka 2010	Japan	Assessment	Cohort study	322 caregiver-child dyads	Females 50% caregivers; Females 51.2% children	NR	Mothers 20 to 43 years; Fathers 20 to 58 years; Children aged 30 months	General population	NR	Diverse-desire task used as a TOM (theory of mind) index.
169	Turner 2008	United Kingdom	Intervention	Cross sectional study	64 mother-infant dyads	Females 100% caregivers; NR infants	NR	Mothers 28;59 years (5;84); Infant 4;23 months (2.85)	Clinical population	99% Caucasian, 1% Asian	Mentalization measured in the Projective Imagination test
170	Vaever 2020	Denmark	Assessment	Cohort study	71 mother-infant dyads	Females 100% caregivers; Nonclinical group female children 54.5%; Clinical group female children 44.4%	NR	Nonclinical mothers 30.57 years (4.20); Clinical mothers 30.63 (3.92); Nonclinical group gestational age at birth 40.67 weeks (1.22); Clinical group gestational age at birth 40.30 weeks (1.34)	Clinical population	NR	Parental Embodied Mentalizing (PEM) coded for in parent-child interaction
172	Vismara 2021	Italy	Assessment	Cohort study	80 parent-child dyads (40 couples)	Females NR caregivers; Female 44.2% children	NR	Mothers mean age 32.7 years (4.2); Fathers mean age (36.8 years (5.4); Children approximately 6 months old at 2nd assessment point	General population	NR	The Reflective Function Scale (RFS) was applied to the Adult Attachment Interview
173	Wendelboe 2021	Denmark	Assessment	Cohort study	344 mother-infant dyads	Female 100% caregivers, infant PPD (47.7%), No PPD (45.7%)	NR	Mother PPD= 32.3(4.6), No PPD= 31.4(4.6); Infant PPD= 3.2(2.1) months, No PPD= 2.9(1.6)	Clinical population	NR	Parental Reflective Functioning Questionnaire (PRFQ)
174	Williams 2018	Australia	Intervention	Non-randomised experimental study	45 mother-infant dyads	Females 100% caregivers; Infants NR	NR	Mothers 31.97 years (5.88); infants 15.10 months (9.75)	Clinical population	NR	The Parental Reflective Functioning Questionnaire (PRFQ)

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S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
175	Williams 2016	United Kingdom	Assessment	Cross sectional study	502 women	Females 100% caregivers; Females 49.2% infants	NR	Mothers 31.46 years (4.56); Infants 26.7 Weeks (12.08)	Clinical population	96% Caucasian, 2% Asian, <1% Black/African, <1% Mixed, <1% Other	The Metacognitions Questionnaire (short form) (MCQ-30)
176	Wong 2017	United States	Assessment	Cohort study	84 mother-infant dyads	Females 100% caregivers; Females 44.6% infants	NR	Mothers 29.25 (5.36); Infants 16 months old during lab visit for parent development interview	Clinical population	65% Caucasian, 22% Black/African, 4% Latinx, 5% Asian, 2% Mixed, 2% Other	RF measured in Parent Development Interview-Revised Short Form
177	Yatziv 2018	Israel	Assessment	Cohort study	102 mother-infant dyads	Females 100% caregivers; preterm infants 45.2% female; fullterm infants 51.2% female	NR	Full term mothers 36.85 years (4.67); preterm mothers 38.08 years (5.10); Full term infants 6.1 months (0.43); preterm infants 5.8 months (0.56)	General population	NR	Mind-mindedness (MM) assessed in mother-infant free-play interaction
178	Yatziv 2018	Israel	Assessment	Cohort study	134 families	Preterm infants 40% females; Full term infants 64% females	NR	Mothers 32.18 years (5.28); Fathers 34.23 (5.49); Infants 6.16 months (.50)	General population	NR	Maternal mind-mindedness (MM) measured in free-play interaction
179	Zacagnino 2016	Switzerland	Assessment	Cohort study	62 mother-child dyads	Female 100% caregivers	NR	NR	General population	NR	Reflective Self-function Scale
180	Zampini 2020	Italy	Assessment	Cross sectional study	24 mother-child dyads	Female 100% caregivers; Female 75% children	NR	Mothers in down syndrome group 41 years old (2.77); Mothers in typically developing group 36 years old (6.90); Children with down syndrome 25.38 months (4.96); Typically developing children 14.63 months (2.97)	Clinical population	NR	Co-regulation has been observed during 10-minute play sessions
181	Zeegers 2019	Netherlands	Intervention	Non-randomised experimental study	50 mother-child dyads	Females 100% caregivers; Females 60% children	NR	Mothers 35.06 years (4.19); Children 9.57 months (5.38)	Clinical population	78% Caucasian, 22% Other	Mind-mindedness coded in free-play session
Fathers only											
97	Madsen 2007	Denmark	Assessment	Cohort study	42 Expectant fathers	Females 0% caregivers; Children NA	NR	Fathers NR; Children approximately 5 months old at final assessment	General population	NR	Reflective functioning measured in Father Attachment Interview
144	Sethna 2012	United Kingdom	Assessment	Cohort study	38 father-infant dyads	Females 0% caregivers; Infants with depressed fathers 63.2% female; Infants with nondepressed fathers 63.2% female	NR	Fathers 35.89 years old (5.42); Infants 3 months old	Clinical population	95% Caucasian, 5% Other	The Paternal-Cognitive Attributions and Mentalizing Scale
168	Tetreault 2021	Canada	Assessment	Cross sectional study	67 father-infant dyads	Female 0% caregivers, Female 51% infants	NR	Father= 34.9 (6.4); infant= 7 to 8 months at time of recruitment, 18 months at time of initial assessment	General population	87.3% Caucasian	Meins Coding system (assessed 10 minute play session between father and infant)

(Continued)

S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
Families, parents, not specified											
19	Borghini 2016	Switzerland	Assessment	Cohort study	55 caregiver-child dyads	Females caregivers NR; Control group female infants 55%; Premature group females infants 52%	NR	Control mothers 32 years old (4.2); Control fathers 35.2 (5.6); Premature group mothers 31.2 (4.6); Premature group fathers 32.6 (6.1)	Clinical population	NR	Reflective functioning scale
20	Burkhardt 2017	United States	Assessment	Non-randomised experimental study	300 caregiver-child dyads	Female 91.3% caregivers; NR	NR	Caregivers 31.1 (6.2); Children under the age of 3	General population	65.3% Caucasian, 13.3% Latinx, 12% Black/African, 5% Asian, 4.3% Other	Parental Reflective Functioning Questionnaire (PRFQ)
22	Byrne 2019	United Kingdom	Intervention	Non-randomised experimental study	16 caregiver-child dyads	Female caregivers NR; female 44% children	NR	NR; Children 0-2 years	Clinical population	88% Caucasian, 12% Other	Reflective functioning assessed in the Parent Development Interview (PDI)
23	Camaioni 2004	Italy	Assessment	Cohort study	133 caregiver-child dyads	Female caregivers NR; female 47% children	NR	NR; Children 11 months 10 days	General population	NR	Questionnaire on Pointing Gesture (QPOINT)
29	Colonnesi 2019	Netherlands	Assessment	Cohort study	104 parent-child dyads	Caregivers NR; Female 53% children	NR	Parents 31.37 years (4.34); Children 3.73 months (0.42) at 4 months	General population	NR	Mind-mindedness assessed in a free-play session
48	Frolti 2021a	Italy	Intervention	Non-randomised experimental study	90 families	Parents NR; First child group 27% female; second child group 27% female	NR	Parents NR; First child group mean age 2.5 years; second group mean age of 3	Clinical population	NR	Parental Reflective Function Questionnaire (PRFQ)
49	Frolti 2021b	Italy	Intervention	Non-randomised experimental study	84 parent-child dyads (children diagnosed with mild Autism Spectrum Disorder - (ASD-grade 1) risk)	Group 1 children 24% female; group 2 children 24% female; Caregivers NR	NR	Group 1 children mean age of 23 months (1.41); group 2 children mean age of 24 months (1.25); Mothers 30 years (0.40); mean paternal age was 32.3 years (0.65).	Clinical population	NR	Parent reflective functioning questionnaire (PRFQ)
56	Genis 2020	France	Assessment	Cross sectional study	10 parents and their adopted children	Females 60% caregivers; Infants 67% female	NR	Infant 2 years old	Foster/adoptive	NR	Parental reflective functioning measured in Parent Development Interview
59	Georg 2018	Germany	Assessment	Cross sectional study	A clinical group with parents of infants/toddlers with early regulatory disorders (N=98) with a healthy control group (N=27)	Female clinical infants 40.80%; Female control infants 55.60%	NR	Clinical mothers 33.09 years (4.57); Control mothers 35.50 years (3.58); Clinical infants 8.77 months (2.84); Control infants 8.44 months (3.07)	Clinical population	NR	Parental Reflective Functioning Questionnaire (PRFQ)
60	Gill 2019	Norway	Intervention	Non-randomised experimental study	4 parents and 3 infants	Females 50% caregivers; Infants NR	NR	Parents NR; Infants were 4, 9, and 20 months old respectively	Clinical population	NR	Reflective functioning measured in interviews

(Continued)

S4 Sociodemographic characteristics of all included studies. (Continued)

Reference Number	Author, year	Country	Intervention	Study design	Total participants analyzed	Biological sex	Gender	Age in mean/range (standard deviation)	Type of population	Ethnicity	RF measure used
62	Goffin 2020	United States	Assessment	Cohort study	101 families	Female caregivers NR; Female 50% children	NR	Caregivers NR; Children first assessed at 7 months	General population	87% Caucasian, 5% Latinx, 3% Black/African, 3% Asian, 2% Other	Mind-minded (MM) comments assessed in snack and play sessions
73	Hobson 2016	United States	Intervention	Non-randomised experimental study	18 parent-child dyads	Female 89% caregivers; Female 11% children	NR	NR; baseline children age range = 2 years, 6 months to 12 years, 10 months	Clinical population	Children 100% Caucasian, Parents NR	Co-regulation coded in Relationship Development Assessment (RDA)
74	Hübert 2015	Australia	Intervention	Cohort study	83 parent-child dyads	Female 90% caregivers; female 42% children	NR	NR; children 13-88 months	Clinical population	72% Caucasian, 4% Indigenous, 24% Other	Caregiver reflective functioning coded for in Adult Attachment Interview (AAI) and Parent Development Interview (PDI)
75	Jenkins 2003	Canada	Assessment	Cohort study	40 families	Female caregivers NR; Female 50% children	NR	At time 1, Mothers 31.1 (3.3); Fathers 33.1 (5.1); At Time 1, older children 4.4 years (5.31), younger children 2.4 years (5.13)	General population	100% Caucasian	Mental state talk coded in observation sessions of families
96	Lunkenheimer 2011	United States	Assessment	Cohort study	Mother-child (N=163) and father-child (n=94) dyads	Female 63% caregivers; Female 47% children	NR	NR parents; Children 27-45 months	Clinical population	86% Caucasian, 5% Black/African, 8% Mixed	Dyadic affect and flexibility coded for in interaction task
111	Nyberg 2021	Sweden	Assessment	Cohort study	63 parent-child dyads	Female 75% caregivers; Female 49% children	NR	Caregivers NR; Children at time 1: mean 9.59 months (0.25)	General population	NR	Parental mind-mindedness was calculated from a videotaped free-play session
115	Pajulo 2018	Finland	Assessment	Cross sectional study	Pilot study: 203 families; Cohort: 3808 families	Sample 1: Females 64% caregivers; Sample 2: Females 71% caregivers	NR	Sample 1: Mothers 30.8 years old (NR); Fathers 32.8 (NR); Sample 2: Mothers 31.3 (NR); Fathers 33.2 (NR)	General population	NR	Parental reflective functioning (PRFQ)
130	Ruiz 2020	Austria	Assessment	Cross sectional study	322 parents of 173 children	Females 52% caregivers; Children 42.9% female	NR	Fathers 37.56 years old (6.18); Mothers 35.06 (5.43); Children 15.92 months (2.23)	General population	NR	Reflective Functioning (RF) assessed in Parent Development Interview (PDI)
153	Stacks 2019	United States	Intervention	Non-randomised experimental study	16 parent-child dyads	Females 68.8% caregivers; Female 50% children	NR	Parents M=21.69 years (4.53); Children 18.57 months (7.10)	Forensic/prison	75% Black/African, 25% Caucasian	Reflective functioning in Parent Development Interview (PDI)
171	Vik 2021	Norway	Intervention	Non-randomised experimental study	12 parent-child dyads	Female 92% caregivers; Female 50% infants	NR	Caregiver mean age 27 years old; Infants mean 9 months old	Clinical population	NR	Reflective functioning measured in Parent Development Interview (PDI)

S5: Types of intervention used

S5. Types of intervention used

Intervention	# of uses	Study design	Population	Location	Outcomes	ACE inclusion	RF pre-post score change
Administered in community							
Applied Behavior Analysis (ABA) and reflexive functions (RF) training	1	Mixed	Clinical	Italy	Interventions focused on improving parental mentalization skills and on enhancing parental RF seem to increase the quality of mentalization, ensuring behavioral changes in children with ASD.	No	↑ increased scores
BabyMind app	1	Qualitative	Other	United Kingdom	These data demonstrate the potential of interventions utilizing smartphone apps to improve parenting and children's developmental outcome in vulnerable and hard-to-reach groups.	No	↑ increased scores
Building Blocks Program	1	Qualitative	Other	United States	Preliminary results show positive results of the Building Blocks program in the parent-child relationship.	No	↑ increased scores
Community-based participatory research (CBPR) approach to the implementation and evaluation of a Wayne County's Baby Court project	1	Qualitative	Other	United States	Higher risk parents demonstrated significant changes in reflective functioning, as compared to those at lower risk, so this supports the effectiveness of infant-toddler court teams	No	↑ increased scores
Infant Mental Health-Home Visiting (IMH-HV)	1	Mixed	Clinical	United States	IMH-HV, a publicly funded intervention delivered by Community Mental Health therapists, is associated with improvements in PRF	Yes	□ mixed results; change varied with length of treatment and experience of the therapist
Minding the Baby® (MTB)	2	Mixed (2)	Other (2)	United States (2)	Mothers' capacity to reflect on their own and their child's experience improved over the course of the intervention in the most high-risk mothers; This study suggests that attempts to promote secure attachment in first children and reflectiveness in young mothers have been fruitful.	No (2)	↑ increased scores; ↑ increased scores
Mindful with your baby/toddler training	2	Mixed (2)	Other; Clinical	Netherlands (2)	The Mindful with your baby/toddler training may be a suitable intervention for mothers who show a combination of parental stress, internalizing symptoms, problems in the parent-child interaction, and/or child regulation problems.; The Mindful with your toddler training provided initial evidence supporting that Mindful with your toddler has the potency to improve maternal co-regulatory abilities	No (2)	↑ increased scores; □ mixed results; only some aspects of RF increased
Parent Training (PT)	1	Qualitative	Clinical	Italy	Parent training interventions are more beneficial when behavioural elements and reflective functioning elements are both included.	No	□ mixed results; reflective group showed significant improvements while the behavioural group stayed the same

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S5. Types of intervention used (Continued)

Intervention	# of uses	Study design	Population	Location	Outcomes	ACE inclusion	RF pre-post score change
Relationship Development Intervention (RDI)	1	Mixed;	Clinical;	United States;	Baseline scores for Co-Regulation were significantly correlated with improvements on the Autism Diagnostic Observation Schedule over time;	No;	NR;
Ububele Mother-Baby Home Visiting Programme	1	Mixed	Other	South Africa	Results demonstrate that this intervention is positively influencing levels of perceived support in mothers, their levels of knowledge regarding the relational needs of infants and their reflective function capacities in relation to their infants.	No	↑ increased scores
Administered in clinical setting							
Attachment and Child Health (ATTACH) intervention	1	Mixed	Other	Canada	These data from the ATTACH intervention support the assumption that RF can be changed through targeted psychoeducational practice, potentially leading to enhanced maternal-infant attachment security and lifelong health.	No	↑ increased scores
Caregiver joint attention intervention	1	Mixed	Other	United States	Children with autism are at risk for dysregulation and that early mother-child interactions may be an ideal context for the socialization of emotion regulation.	No	↑ increased scores
Clinician Assisted Videofeedback Exposure Session (CAVES)	1	Mixed	Clinical	United States	Maternal RF accounted for 11% of the variance in reduction of maternal negativity after accounting for baseline levels of negativity, so these data show that the CAVES model supports positive reflective functioning change.	Yes	NR
Focused Parent-Infant Psychotherapy (fPIP)	2	Mixed; Qualitative	Clinical (2)	Germany (2)	Results underscore the efficacy of brief fPIP in significantly reducing symptoms in infants with early regulatory disorder and their mothers. However, we did not find treatment effects on parental mentalizing, self-efficacy, and quality of parent-infant interaction. Our results showed only trends for superior effects of fPIP on increased maternal self-efficacy (MSAS) and decreased prementalizing (PRF-PM).	No (2)	□ mixed results, scores were inconsistent across measurements; ↑ increased scores
Lighthouse mentalization-based treatment Parenting Programme	1	Mixed	Clinical	United Kingdom	The programme may be effective in improving parenting confidence and sensitivity and that parents valued the programme and the changes it had helped them to bring about.	No	□ mixed results; no consistent improvement across participants

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S5. Types of intervention used (Continued)

Intervention	# of uses	Study design	Population	Location	Outcomes	ACE inclusion	RF pre-post score change
Marte Meo-therapy	2	Qualitative (2)	Outpatient; Clinical	Norway (2)	Video guidance using the Marte Meo method can be a critical intervention for vulnerable parents but should be coordinated with parents' primary treatments when complex parental mental health issues are involved.; Marte Meo-method supports mentalization and contributes to the distinction between I and You as the child's own emotions become more visible	Yes; No	↑ increased scores; NR
Mentalization-based treatment	1	Qualitative	Clinical	Germany	After the intervention, the mother became more open and loving, and acquired a more inquiring and flexible attitude that developed with the needs of her child. Their mentalization ability expanded. A mentalizing attitude strengthens the mother-child bond.	No	NR
Mother/baby co-residence prison intervention program	1	Mixed	Other	United States	There is a positive impact of a relational intervention on maternal depression as well as the trend for the impact of higher RF capacity on increased maternal satisfaction over the course of either a relational or educational intervention	No	□ mixed results; no consistent improvement across participants
Mothers and Toddlers Program (MTP)	5	Mixed (5)	Clinical;	United States (5)	Results show the potential value of attachment-based parenting interventions for improving mother- child relations and the importance of providing these interventions in clinic settings. Also, incremental improvement in RF, representation quality, and dyadic adjustment can be detected at 12 weeks and sustained at the 6-week follow-up.	No (4); Yes	↑ increased scores; NR; ↑ increased scores; ↑ increased scores; □ mixed results; improvement was not present post-treatment
Mother Infant Dialectic Behavioral Therapy (MI-DBT)	1	Mixed	Clinical	Australia	This innovative adaptation of mother-infant dialectical behavior therapy showed promising improvements in maternal borderline personality disorder symptoms and caregiver-infant relationships	No	↑ increased scores
Mount Sinai Hospital Therapeutic Nursery	1	Qualitative	Other	United States	Nursery staff had observed an enhanced reflective functioning capacity in the mother, an emerging mutuality and reciprocity in the dyad's interactions, and a more secure attachment between mother and child	No	NR
Promoting responsiveness, emotion regulation and attachment in young mothers and infants (PRERAYMI)	2	Qualitative; Mixed	General; Other	Italy (2)	The attachment based medium term intervention helped to improve adolescent mother-infant relationship, which is otherwise potentially at risk.; Adolescent mothers with secure attachment had higher scores of reflective functioning than did the adolescent mothers with insecure attachment [t(43) = 6.85; p = 0.000].	Yes; No	↑ increased scores; NR
Psychotherapeutic intervention in NICU	1	Qualitative	Other	Brazil	This intervention favored the promotion of maternal mentalizing capacity, reflecting directly in the interaction mother-infant.	No	↑ increased scores

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S5. Types of intervention used (Continued)

Intervention	# of uses	Study design	Population	Location	Outcomes	ACE inclusion	RF pre-post score change
Residential treatment program for substance abusing mothers	1	Mixed	Other	Finland	Mentalization-based treatment interventions that specifically target improvement in early relationship quality have the potential for a large and sustained impact in this high-risk group.	No	□ mixed results; no consistent improvement across participants
Single-session video-feedback intervention	1	Mixed	Clinical	United Kingdom	Mothers with SMI in Study 2 (n=22) had elevated levels of non-attuned comments. A single session of video-feedback to facilitate mindedness in mothers with SMI may have benefits for mother-infant interaction into the second year of life	No	□ mixed results; no consistent improvement across participants
Three interactive 4D ultrasound sessions	1	Quantitative	Outpatient	Finland	The negative results may be related to the small sample size, the patient-reported outcomes, or insufficient efficacy within this subpopulation.	No	□ mixed results; no change
Watch, Wait, and Wonder (3W)	1	Mixed	Other	Canada	Modifications to the 3W approach, when used with patients at risk, are proposed in order to improve reflective functioning.	No	□ mixed results; no consistent improvement across participants
Administered in both community and clinical settings							
Attachment theory-based parenting group	1	Qualitative	Other	United States	The mothers also reported that they were now considering their children's feelings, so these results support the effectiveness of a parenting group in increasing maternal sensitivity.	No	↑ increased scores
Circle of Security Parenting (COS-P)	2	Qualitative (2)	General; Other	Canada; Australia	This program led to an increase in parental reflective functioning and the improvement of parental representations in a mother to low risk, but not in a mother at higher risk.	No (2)	□ mixed results; no consistent improvement across participants; NR
Psychoanalytic Parent-Infant Psychotherapy (PIP)	5	Mixed (3); Qualitative (2)	Physician referral; Clinical (2); Forensic (2);	United Kingdom (4), South Africa	Although the overall level of RF did not increase significantly, there were qualitative changes, which the RF instrument currently does not measure (the Assessment of Representational Risk coding showed that intervention mothers showed a shift in how they talked about their babies in reducing hopelessness and hostility toward babies, compared to control). Preliminary study shows that mothers' ability to think about their own internal states and those of their babies increased after the course. Overall, the babies benefited from the program, and the mothers seemed more reflective when given time to process the experience; An attachment-based intervention may mitigate some of the risks to the quality of the parent-infant relationship for these dyads.	No (5)	□ mixed results (3); results not statistically significant; NR, ↑ increased scores