Exploring the Maternal Experience of Pregnancy After Loss

Olivia Lambi, BSc (Hons), MSc

Submitted in partial fulfilment of the requirements for the degree of

Doctorate in Clinical Psychology

School of Health and Wellbeing

College of Medical, Veterinary and Life Sciences

University of Glasgow

February 2025

Contents

List of Tables

List of Figures

Acknowledgements

I would like to say a huge thank you to Professor Andrew Gumley. Thank you for your patience, support, and always having the answers to my many questions. I have learned so much from you during this process, which has not only helped to shape this thesis, but has also influenced the way I think about my clinical work.

Thank you to my field supervisor, Dr Marisa Forte. I am incredibly grateful for your guidance and invaluable expertise. Thank you for all your encouragement and for always helping me keep the mothers at the heart of this research.

A heartfelt thank you to the women who so graciously shared their experiences in this study - this research would not have been possible without you.

My sincere thanks to Dr Paul Cannon for his assistance with the systematic review search strategy. And a massive thank you to Johanna Johnstone for being my lovely review partner.

Thank you to all my friends, near and far, for your unwavering support over the years. Thank you for understanding when I've gone radio silent during this process (on several occasions) and for always welcoming me back with open arms.

I will never be able to put into words the love and gratitude I have for my family. To my mum, Claire, my dad, James and my sister, Mathilde, thank you for everything, but especially for teaching me what truly matters in life. Thank you for encouraging me to follow my dreams, even when the road to get there has at times been hard. Thank you for teaching me that it's ok to fail, and for reminding me to pick myself up and try again - because if you reach for the moon, you might just catch the stars.

And finally, thank you to Bradley. Thank you for coming with me on this adventure to Scotland and for always supporting me every step of the way. I am so grateful for our life together. I love you very much.

Chapter One: Systematic Review

The Impact of Perinatal Loss on the Mother-Foetus Relationship in Subsequent Pregnancies: A Systematic Review

Prepared in accordance with the author requirements for Infant Mental Health Journal; https://onlinelibrary.wiley.com/page/journal/10970355/homepage/forauthors.html

Abstract

Perinatal loss is associated with adverse psychological outcomes for mothers and infants born following a loss. This systematic review evaluated whether perinatal loss influences the mother–foetus relationship in subsequent pregnancies and examined associated clinical factors. Six electronic databases—CINAHL, PsycINFO, Web of Science, Embase, MEDLINE and Google Scholar—were searched for quantitative studies on the mother–foetus relationship following perinatal loss. A narrative synthesis was conducted, with risk of bias assessed using the Appraisal Tool for Cross-Sectional Studies, the JBI Checklist for Quasi-Experimental Studies, and the CASP Cohort Checklist. Of 888 identified articles, 15 met inclusion criteria (11 cross-sectional, 2 longitudinal, 2 quasi-experimental). The mother–foetus relationship was assessed using the Prenatal Attachment Inventory, Maternal Antenatal Attachment Scale, and Maternal–Foetal Attachment Scale. Twelve studies included comparison groups, 9 comparing individuals with and without a history of loss. Although group differences rarely reached statistical significance, those with prior loss consistently reported lower prenatal attachment. Some evidence suggested that the type of loss and stage of pregnancy influences the relationship. Findings on mental health and interventions were mixed. This review highlights the need for methodologically robust research and improved measures to better capture the psychological experience of pregnancy after loss.

Introduction

Perinatal loss is a broad term which, in the current review, includes a range of experiences, such as miscarriage, stillbirth, ectopic pregnancy, termination of pregnancy (TOP), and early neonatal death. Perinatal loss data varies widely, both internationally and within the UK. Using the available data, it is estimated that approximately 1 in 5 pregnancies in the UK end in loss (Tommy's, 2024).

While extensive research has demonstrated a clear link between perinatal loss and a variety of adverse psychological outcomes for some mothers (Blackmore et al., 2011; Daugirdaitė et al., 2015; DeMontigny et al., 2020; Reardon & Craver, 2021), a majority of women go onto to become pregnant again (Love et al., 2010; Roseingrave et al., 2022; NHS, 2023). There is some evidence to suggest that children born after a loss are more likely to present with disorganised attachment to their primary caregiver (Al-Maharma et al., 2016; Heller & Zeanah, 1999; Hughes et al., 2001), suggesting that previous loss impacts early attachment processes. Furthermore, qualitative research suggests that how a mother mentally prepares for the birth of a child following perinatal loss differs from the typical experience. For example, she may try to avoid visualising the future child or her role as a mother (Mills et al., 2014). A mother's caregiving system undergoes significant transformation during pregnancy as they prepare for parenthood (George & Solomon, 2008). The Caregiving System has evolved to *provide* protection and care for the infant and is complimentary to the infant's attachment system, which is motivated to *seek* care and protection. George and Solomon (2008, page 35) propose that "assaults to the caregiving system," such as perinatal loss, can leave it "immobilised." They suggest that feelings of helplessness and vulnerability may trigger a fear response which, without organised coping mechanisms, results in a disconnect from the caregiving system. Following perinatal loss, many women experience a profound sense of powerlessness and uncertainty regarding their ability to carry a pregnancy to term (Wojnar et al., 2011). When a mother conceives again, lingering feelings of grief, loss, and helplessness, may disrupt the activation of the caregiving system and hinder her ability to process and prepare for the transition to motherhood.

Over the past decades, various quantitative studies have sought to measure the prenatal relationship between mothers and pregnancies after a loss, producing heterogeneous results and differing conclusions. Research has mostly investigated 'prenatal attachment' as

an approach to capture and define this relationship. There has been debate about the validity of measuring 'attachment' during pregnancy (Walsh et al., 2013; Wittkowski et al., 2020). This is because the widely accepted conceptualisation of attachment— which describes the *infant's* relationship with their caregiver, who serves as a secure base for exploration and in times of distress- cannot, by nature, be applied to the prenatal period. Nonetheless, a significant psychological shift does occur for the mother during the pregnancy period, understood as the maturation and activation of the Caregiving System (George & Solomon, 2008), which anticipates the infant's arrival and drives a range of psychological and behavioural preparations. There is a lack of consensus on the most appropriate approach to measure attachment/caregiving processes during pregnancy (Wittkowski et al., 2020), with uncertainty regarding what prenatal attachment measures truly assess and whether they capture a consistent underlying construct across studies. While researchers generally agree that prenatal attachment reflects a mother's emotions and behaviours toward the foetus, existing measures differ significantly in their focus. Some assessments emphasise visualisation of and direct interactions with the current foetus, while others take a multidimensional approach, incorporating emotional responses to the pregnancy state, focus on the maternal role, and expectations of the postnatal relationship, in addition to the frequency and intensity of these experiences. The variability in measurement highlights the need for greater conceptual clarity.

The studies that have thus far investigated the mother-foetus relationship following perinatal loss, have utilised a variety of designs, predominantly a mixture of cross-sectional designs both with and without a comparative group, often comparing those with a loss history to those without. Other study designs include observational cohort designs, which track the trajectory of the relationship over pregnancy and quasi-experimental designs which look to target 'prenatal attachment' through intervention.

Lee, McKenzie & Horsch (2017) conducted an integrative review of the literature that looked at the impact of perinatal loss on the mother-foetus relationship. However, this review did not include a detailed critical appraisal of the methodological quality of the selected studies. Key aspects such as the psychometric properties of the measures used, whether confounding variables were controlled, risk of bias and type II error were not thoroughly assessed. While they provided a brief overview of each study's conclusions, including

whether significance thresholds were met, they did not include numerical data, such as effect sizes. There was limited insight into the signals in the data or the potential impact of study methodology on the findings, which reduced the depth of their analysis. Furthermore, since this review further studies have been completed which have investigated the mother-foetus relationship following loss in the perinatal period.

Objectives

The current review proposes to complete an up-to-date systematic review in accordance with the PRISMA 2020 guidelines (Page et al., 2021), to evaluate whether perinatal loss, of any type, impacts the mother- foetus relationship in a subsequent pregnancy. Given the well-established link between perinatal loss and adverse mental health outcomes, a secondary purpose is to investigate whether other psychological and clinical variables are associated with the mother-foetus relationship in this population.

Method

The current review was registered on Prospero on the 15th April 2024 (ID: CRD42024517927). The original review objective also included the post-natal relationship, however was amended in August 2024 due to feasibility.

Eligibility Criteria

Population: We included studies that investigated the mother-foetus relationship in a current pregnancy after perinatal loss. Studies that retrospectively considered the relationship were excluded.

Exposure: The population must have experienced a minimum of one perinatal loss, at any point of the perinatal period, from conception to the early neonatal period. Perinatal loss must be defined, i.e. stage of loss in weeks or defined as miscarriage/stillbirth/induced abortion/neonatal death.

Comparison: We included studies that investigated perinatal loss, both with and without a comparison group. This included: mothers without a loss history or the differing types of perinatal loss (e.g., miscarriage, stillbirth, TOP, early neonatal death).

Outcomes: The study must have measured the mother-foetus relationship using a validated, quantitative, psychometric tool. This included studies that investigated prenatal

attachment, attitudes to pregnancy or any other aspect of the relationship that could be measured quantitatively. The mother-foetus relationship must have been a primary or secondary variable of interest. Any clinical and psychological outcomes must have also been measured quantitatively.

Study design and report characteristics: We included cross-sectional, experimental and cohort study designs, published in English in a peer-reviewed scientific journal. Experimental studies could include the outcome of interventions on the mother-foetus relationship. We excluded single case study designs, dissertations and conference abstracts. There were no date restrictions on the studies that could be included.

Search Strategy

A University of Glasgow librarian was consulted to aid the selection of databases and development of draft search strings. Keywords were extracted from three relevant papers and database glossaries to refine the search strategy. The search strategy was validated by seeing if the previously identified papers were retrieved. All three papers were found. The librarian reviewed the final strategy for accuracy, and full search terms are in Appendix 1.1 (page 76). EndNote was used was used to store and organise the results.

Information Sources

On 10th May 2024, OL conducted a search of CINAHL and APA Psycinfo (EBSCOhost) and Web of Science (Clarivate). On the 13th May 2024, OL searched Embase and Medline (Ovid). Backward citation methods were used on the 21st June 2024, which included searching the reference list of the identified eligible studies for additional relevant studies. On the 24th June 2024, forward citation methods were undertaken, which involving searching Google Scholar to identify and screen relevant studies that had referenced the eligible texts. The searches were conducted again on 1st of April 2025.

Selection Process

After removing duplicates, the primary researcher (OL) screened titles and abstracts against inclusion and exclusion criteria, with a second reviewer (JJ) independently screening 10%. Discrepancies were discussed and resolved. OL then screened full texts, with JJ reviewing 25% independently, and discrepancies were resolved with the pair.

Data Extraction Process

A data extraction form was designed based on the guidance in the Cochrane Handbook of Systematic Reviews (Li et al., 2019). OL extracted data for all eligible studies.

Data Items

We collected data on:

- The author, year and country of report.
- The study design, including details of any comparison groups.
- Participant characteristics. The number of participants, ethnicity, the mean ages and standard deviations.
- Pregnancy characteristics. How "type" of perinatal loss was defined. Where possible, the proportion of the sample with each type of loss. The stage of the current pregnancy and how this was defined. Where possible, the mean, standard deviation and range of the gestation stage of the sample.
- The tool which measured the mother-foetus relationship and at how many time points.
- Other mental health and wellbeing outcomes and how these were measured.
- The key findings in relation to the review questions. This included *p* values, confidence intervals and effect sizes, where reported. For studies that did not report effect sizes but provided sufficient data, effect sizes were calculated. Cohen's *d* was used as the measure of effect size due to its suitability for comparing group means. Interpretation followed conventional parameters: $d = 0.2$ for a small effect, $d = 0.5$ for a medium effect, and $d = 0.8$ for a large effect.
- Any missing or unclear data was noted.

Synthesis Methods

It was anticipated that meta-analyses could not be undertaken due to heterogeneity of study designs, types of loss, outcome measures and how they were used. Therefore, a narrative synthesis method was planned. This synthesis followed the framework proposed by Popay et al. (2006), involving four stages: developing a theory of the relationship between perinatal loss and the subsequent mother-foetus relationship, completing a

preliminary synthesis, exploring relationships within and between studies and assessing the robustness of the synthesis. To aid the analysis of the patterns and relationships across studies, the results of the data extraction process were presented in 3 different tables, grouped by study design: cross-sectional, quasi-experimental cohort and observational cohort design. Patterns were identified by examining consistencies and differences in outcomes, with specific attention given to whether studies reported significant *p*-values and the effect sizes. Within this process, methodological factors such as design, outcome measures, study power and risk of bias were also considered, particularly to identify potential sources of heterogeneity.

Risk of Bias Assessment

Due to varied study designs, risk of bias was assessed using different tools. The Appraisal Tool for Cross-Sectional Studies (AXIS; Downes et al., 2016) consists of 20 yes/no/don't know questions; the JBI Checklist for Quasi-Experimental Studies (Barker et al., 2024) uses 13 criteria with a yes/no/unclear response format; and the CASP Cohort Study Checklist (Critical Appraisal Skills Programme, 2024) includes 12 questions, also following the yes/no/don't know format. None of these tools provide a total or cut off score; instead, they encourage critical appraisal, where the appraiser is expected to consider each question's answer in the context of the study, focusing on its strengths and weaknesses. For all tools, a higher number of "yes" responses indicates a lower risk of bias, while multiple "no," "don't know," or "can't tell" responses suggest potential bias, requiring careful interpretation of the study findings.

The primary researcher (OL), independently applied the tools to each study and recorded supplementary information that justified the judgements. The researchers also made note of any missing or inconsistent results that might indicate risk of bias. A second reviewer (JJ) applied the tools to 25% of the studies, ensuring to include at least one study that used each risk of bias tool. Any differences in findings between the two researchers were resolved with a discussion, with the option of a third reviewer, if needed.

Results

The search identified 864 unique articles, and a further 24 from forward and backward searches (see Figure 1.1). After screening, 15 studies were included: 11 cross-sectional, 2

observational cohort, and 2 quasi-experimental. Tables in Appendices 1.2 – 1.4 (pages 79-85) demonstrate a full overview of the included studies. Sample sizes ranged from 24 to 342 participants, with a mean sample size of 101 participants. Recruitment occurred across various settings, including maternity clinics, support groups, and the internet. Eight studies were in Europe, five in North America, two in Asia, and one in Australia. Ethnicity was unreported in 11 studies; in the four that did, most participants were White/Caucasian. The mean age of women with perinatal loss across studies was 30.88 years.

Twelve studies used a comparison group, while the remaining three cross-sectional studies focused exclusively on women with a history of perinatal loss. Of the 12 comparison studies, 9 compared women who had experienced perinatal loss with those who had not and two of these studies (one cohort) also compared mothers with experience of loss to fathers with experience of loss. One study compared mothers who had experienced a therapeutic abortion with those who had undergone an elective abortion. The two quasi-experimental studies evaluated interventions aimed at enhancing maternal-foetal attachment in women with a history of perinatal loss, using a control treatment as a comparison.

Six studies investigated any type of perinatal loss, four focused exclusively on early perinatal loss (up to 20, 22 or 24 weeks), three examined losses from the second trimester to early neonatal death, and three explored therapeutic abortion for foetal anomaly, with one of these studies comparing therapeutic to elective abortion.

Within the cross-sectional studies, four recruited women at any stage of pregnancy, with reported mean gestational ages ranging from 12 to 29 weeks. One cross-sectional study recruited participants at their first antenatal visit (mean gestation of 12 weeks), three recruited women in their second trimester only, one recruited participants in either the second or third trimester, and two recruited women exclusively in the third trimester. One observational cohort study collected relationship data in both the first and third trimesters, while another measured it once in the second trimester and twice in the third. In both the quasi-experimental studies, baseline measurements were collected in the first trimester, followed by at least one additional measurement during the prenatal period.

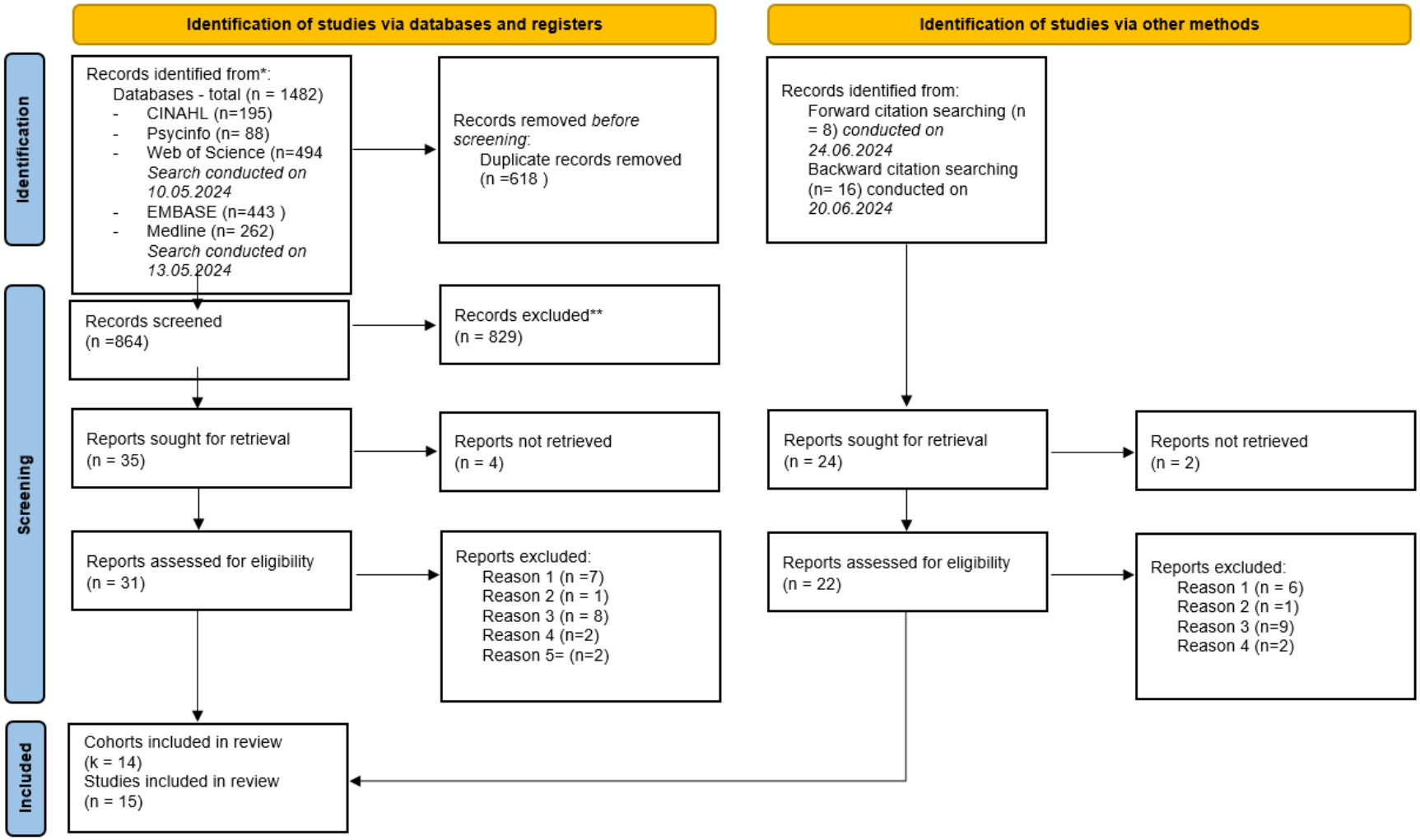

Figure 1. 1

PRISMA Flowchart

Note. Reason 1: Did not measure mother- foetus relationship; Reason 2: Not investigating pregnancy loss as a primary or secondary variable of interest; Reason 3: Not a novel study in a peer reviewed journal or a case study; Reason 4: did not measure relationship using a quantitative, validated measure; Reason 5: Full text not available in English

Risk of Bias Results

Cross-Sectional Studies

Eleven studies were assessed using the Appraisal Tool for Cross-Sectional Studies (AXIS) (see Table 1.4). Eight studies lacked justification or details on sample size determination. Many had small samples, limiting generalisability and increasing the likelihood of Type II errors, particularly as lower attachment scores were consistently observed in the loss group compared to controls, but rarely reached statistical significance. Larger studies (Chemouny & Wendland, 2024; Kelmanson, 2024 ;) showed differing trends, such as the influence of gestational age and knowledge of the infant's sex on prenatal attachment scores. These findings highlight the importance of adequate sample sizes to determine the true nature of the relationships between perinatal loss and the mother-foetus relationship.

All studies used opportunity sampling, often from high-risk pregnancy clinics or support groups. This recruitment strategy risks excluding women who have experienced perinatal loss but do not seek specialised care, leading to unrepresentative samples. Only two studies reported the proportion of individuals who declined participation, raising concerns about recruitment bias. Additionally, the sensitive nature of the topic likely resulted in samples disproportionately including individuals with heightened emotional salience to the study's subject matter, potentially skewing results.

Most cross-sectional studies used validated tools, adequately defined outcomes, and presented their methods appropriately to allow replication. Several studies failed to sufficiently discuss limitations, such as small sample sizes and responder bias. Additionally, while most studies reported ethical approval and informed consent, a few lacked clarity in these areas.

Table 1.4

Appraisal Tool for Cross-Sectional Studies (AXIS)

	Armstrong and Hutti (1998)	Armstrong (2002)	Armstrong (2004)	Branjerdporn et al. (2021)	Chemouny and Wendland (2024)	Gaudet et al. (2010)	Kelmanson (2024)	Mehran et al. (2013)	O'Malley et al. (2020)	Smorti et al. (2020)	Yilmaz and Beji (2013).
1. Were the aims/objectives of the study clear?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
2. Was the study design appropriate for the stated aim(s)?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3. Was the sample size justified?	N	Y	N	Y	N	N	Y	N	N	N	Y
4. Was the target/reference population clearly defined? (Is it clear who the research was about?)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5. Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	N	Y	Y	N	N	N	Y	N	N	N	N
6. Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	N	N	N	N	N	N	Y	N	N	N	N
7. Were measures undertaken to address and categorise non-responders?	N	N	N	N	N	N	N	N	N	N	Y
8. Were the risk factor and outcome variables measured appropriate to the aims of the study?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9. Were the risk factor and outcome variables measured correctly using instruments/ measurements that had been trialled, piloted or published previously?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
10. Is it clear what was used to determined statistical significance and/or precision estimates? (e.g., p values, CIs)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11. Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
12. Were the basic data adequately described?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

13. Does the response rate raise concerns about non-response bias?	DNK	DNK	DNK	DNK	DNK	DNK	DNK	DNK	DNK	DNK	N
14. If appropriate, was information about non-responders described?	N	N	N	N	N	N	N	N	N	N	N
15. Were the results internally consistent?	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
16. Were the results for the analyses described in the methods, presented?	Y	Y	Y	Y	Y	N/a	Y	Y	Y	Y	Y
17. Were the authors' discussions and conclusions justified by the results?	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y
18. Were the limitations of the study discussed?	Y	Y	N	N	Y	N	Y	N	Y	Y	N
19. Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?	DNK	N	DNK	N	N	DNK	N	N	N	N	DNK
20. Was ethical approval or consent of participants attained?	DNK	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note. Y= Yes; N= No; DNK= Do not know; N/A= Not Applicable

Quasi-Experimental Studies

Limitations included unclear reporting on whether control groups received care comparable to intervention groups and not enough follow-up to assess the long-term impact of interventions. Both studies lacked details on intervention development, content, timing, and frequency. Côté-Arsenault et al. (2014) assessed outcomes at three time points, but the alignment of these points with the intervention delivery timeline was unclear. Similarly, Baghdari et al. (2016) measured outcomes before and after the intervention but did not specify when the intervention ended relative to the pregnancy. Researcher-led facilitation in both studies also introduced potential bias.

Another limitation was participant attrition, particularly in Baghdari et al. where dropouts occurred in both groups, raising concerns about bias and statistical power. The small sample size and the wide confidence intervals in the Côté-Arsenault et al. study suggests low statistical power, making it difficult to draw definitive conclusions. Furthermore, neither study adequately controlled for all important covariates, such as baseline attachment scores or gestational age, further weakening the reliability and generalisability of their findings.

Table 1.5

JBI Critical Appraisal Checklist for Quasi-Experimental Design

	Baghdari et al. (2016)	Cote-Arsenault et al. (2014)
1. Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	Y	Y
2. Were the participants included in any comparisons similar?	Y	Y
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	U	U
4. Was there a control group?	Y	Y
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	N	N
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	N	N
7. Were the outcomes of participants included in any comparisons measured in the same way?	Y	Y

8. Were outcomes measured in a reliable way?	N	Y
9. Was appropriate statistical analysis used?	N	Y

Note. Y=Yes; N=No; U= Unclear

Observational Cohort Studies

The cohort studies had relatively acceptable recruitment strategies, however again employed opportunity sampling which may have led to underrepresentation of some groups. Both indicated issues with attrition. Beauquier-Maccotta et al. (2022) did not report how many participants completed the PAI at Time 3, raising concerns about statistical power and the likelihood of a Type II error. Tsartsara and Johnson (2006) reported low follow-up rates, with only 50% of the miscarriage group and 61% of the control group completing follow-up, however did not provide reasons for dropouts or demographic details, limiting interpretability. Furthermore, the Tsartsara and Johnson study exhibited issues with the consistency of its results. Specifically, the MAAS scores at Time 1 were reported in two separate tables and within the text, but these scores did not align. This discrepancy was not addressed in the text, raising the possibility of a reporting error or potential data manipulation. Either scenario undermines confidence in the reliability of the reported findings. Both studies could have benefited from better consideration of confounders, such as ethnicity, social support, and the number of previous losses, which are commonly identified as important variables in this population. Additionally, more robust analytical approaches, such as regression or ANCOVA, to consider the role of confounding factors in the analysis.

Table 1.6

Critical Appraisal Skills Programme (CASP) Checklist for Cohort Studies

	Beauquier-Maccotta et al. (2022)	Tsartsara and Johnson (2006)
Section A: Are the results valid?		
1. Did the study address a clearly focused issue?	Y	Y
2. Was the cohort recruited in an acceptable way?	Y	Y
3. Was the exposure accurately measured to minimise bias?	Y	Y

4. Was the outcome accurately measured to minimise bias?	Y	Y
5. (a) Have the authors identified all important confounding factors?	N	N
5. (b) Have they taken account of the confounding factors in the design and/or analysis?	N	Y
6. (a) Was the follow up of subjects complete enough?	CT	N
6. (b) Was the follow up of subjects long enough?	Y	Y
Section B: What are the results?		
7. What are the results of this study?	See Table 1.2	See Table 1.2
8. How precise are the results?	N	N
9. Do you believe the results?	N	N
Section C: Will the results help locally?		
10. Can the results be applied to the local population?	N	N
11. Do the results of this study fit with other available evidence?	CT	CT
12. What are the implications of this study for practice?	CT	CT

Note. Y= Yes; N= No; CT= Can't Tell

Across many of the study designs, small sample size was a recurrent issue, likely reducing statistical power and the ability to draw meaningful conclusions. While many studies used *p* values (<.05), the inclusion of confidence intervals would have improved the precision and reliability of the findings. Moreover, inconsistent reporting of participant attrition and lack of clarity in recruitment methods (who was approached and who declined to take part) often hindered assessments of potential recruitment and responder biases. These limitations suggest that the findings should be interpreted cautiously, with generalisability to broader populations significantly constrained by methodological weaknesses.

Relationship measures

Across the 15 studies, there were three tools used to quantify the mother-foetus relationship. Seven of the studies (six cohorts) used the Prenatal Attachment Inventory (PAI; Muller & Mercer, 1993), five used the Maternal Antenatal Attachment Scale (MAAS; Condon, 1993), and three used the Maternal Foetal Attachment Scale (MFAS; Cranley, 1981). All three seek to measure 'prenatal attachment'.

Prenatal Attachment Inventory (PAI)

The PAI (Muller & Mercer, 1993) was developed as a unidimensional, 21-item scale to measure prenatal attachment. Later research (Siddiqui et al., 1999; Bielawska-Batorowicz & Siddiqui, 2008; Siddiqui et al., 2000) identified five factors within the measure: Fantasy,

Interaction, Affection, Differentiation of Self from Foetus, and Sharing with Others. While the total subscale showed good internal consistency (Cronbach's alpha = 0.86), the five subscales less so (alpha < 0.70). Pallant et al.'s (2014) evaluation concluded that the original unidimensional structure was not appropriate and that the five-factor solution lacked support.

Of the six cohorts that used the PAI, five focused on the total PAI score, while one used the five subscales. Across the studies, the mean total score ranged from 46.3 to 60. Three cohorts with cross-sectional designs compared loss and control groups who did not have experience of loss, all reporting lower PAI scores in the loss group, though statistical significance varied. Armstrong and Hutti (1998) found significant differences, while Armstrong (2002) and Yilmaz and Beji (2013) found small, non-significant differences. Armstrong (2002) also found that PAI scores were higher in mother's who had experienced loss compared to father's who had experienced loss, with a moderate effect size; although this difference did not reach significance. Similarly, Beauquier-Maccotta et al. (2022), who employed a longitudinal design, observed lower PAI scores in the loss group compared to controls, in both the first and third trimesters, but the difference was only significant in the first trimester. Finally, Smorti et al. (2020) compared the five PAI construct scores between therapeutic and elective abortion groups. They found that the therapeutic abortion group scored higher across all five PAI subscales, with significant differences in Affection, Fantasy, and Sensitivity. However, all subscales showed moderate to large effect sizes, suggesting meaningful differences between groups.

While there is consistency in the direction of effect, differences in significance and effect sizes may stem from variations in methodological quality, loss type, and gestational age. Furthermore, given the findings by Pallant et al. (2014), the studies included in this review that have used the PAI may lack both validity and reliability. Most studies used the unidimensional total score, likely overlooking the multidimensional nature of the mother-foetus relationship and perhaps limiting sensitivity to loss or pregnancy stage differences. The five factor model has demonstrated inadequate Cronbach alpha scores (< 0.70), therefore reducing the reliability of these findings. Additionally, using the PAI in early trimesters is debated, as it includes questions about foetal movement, which typically occurs later in pregnancy.

Maternal Foetal Attachment Scale (MFAS)

The MFAS measures maternal behaviours reflecting "affiliation and interaction" with the foetus (Cranley, 1981). It consists of 24 items across five constructs: differentiation of self from the foetus, interaction with the foetus, attributing characteristics and intentions to the foetus, giving of self, and role-taking. While the total MFAS score demonstrates good internal consistency, with Cronbach's alpha ranging from 0.76 to 0.92, the reliability of its subscales is more variable, with scores ranging from 0.57 to 0.74. The validity of the five-factor model has been questioned (Muller & Ferketich, 1993), however, like the PAI, using a total score may oversimplify the complexity of the mother-foetus relationship.

Three studies in the present review administered the MFAS to women who have experienced perinatal loss; two cross-sectional designs and one quasi-experimental. Two studies used the total score and one used the five constructs. In the studies that used total scores, the MFAS mean scores ranged from 45.10 to 75.75 in the loss group. Both Mehran et al. (2013) and O'Malley et al. (2020) found that those with a history of loss scored lower on the MFAS. However, the differences between groups were small and not statistically significant. The only exception to this was that the loss group scored significantly lower in the "differentiation from self" construct in the Mehran et al. (2013) study. Baghdari et al. (2016) found a nursing intervention significantly increased MFAS scores compared to a control.

As previously addressed, direct comparisons across these three studies are difficult due to the various designs, loss type, and current gestation. Furthermore, each of these studies present with significant limitations, namely small sample sizes, reducing generalisability and likelihood of observing any effect.

Maternal Antenatal Attachment Scale (MAAS)

The MAAS (Condon, 1993) is a 19-item tool which assesses feelings, behaviours, and attitudes toward the foetus, scored on a five-point Likert scale. The two subscales measure: the intensity of preoccupation with the foetus and the quality of the emotional experiences, with total Cronbach's alpha ranging from .69 to .87 and subscale values from 0.77 to 0.80 (Condon, 1993; Schwerdtfeger & Goff, 2007). The MAAS is deemed suitable for the entire pregnancy, as it doesn't include items on foetal movement.

The MAAS was used in five studies: three cross-sectional, one observational cohort and one quasi-experimental design. All groups used the individual constructs, and only Branjerdporn et al. (2021) did not use the 'total' score. Mean Total scores ranged from 63.96 – 80.80, Quality scores ranged from 35.96 – 51.00, and Intensity scores 24.57 – 29.6. As with the PAI and MFAS studies, findings consistently showed lower attachment scores in the loss group, though differences were often non-significant. Tsartsara and Johnson (2006) found lower scores across all subscales in the loss group during the first trimester, and Branjerdporn et al. (2021) reported a similar, also non-significant, trend in the second trimester. Gaudet et al. (2010) observed a slight, non-significant, decrease in quality scores and an increase in intensity scores for the loss group, both non-significant. In the third trimester, Tsartsara and Johnson (2006) found higher scores in the loss group, but again differences remained non-significant. Tsartsara and Johnson (2006) and Gaudet et al.'s (2010) diverging findings regarding the direction of difference for the two constructs, suggests that attachment processes following loss are more nuanced, highlighting the need for further exploration. However again, variations in loss experiences and gestational timing across studies make direct comparisons of MAAS scores challenging.

Gestational Age and Type of Loss

The impact of both gestational age and type of perinatal loss on the mother-foetus relationship reveals complex, interrelated patterns. Gaudet et al. (2010) was the only study to examine the impact of loss type on attachment, finding significantly lower attachment scores only in women who experienced early neonatal death. Further analysis of loss types was not possible due to insufficient data. In studies focusing on specific types of loss, as well as those examining loss more generally, lower attachment scores were almost consistently observed in the loss group compared to controls, regardless of gestational age, though the magnitude and significance of these differences varied.

For early perinatal losses, O'Malley et al. (2020) and Tsartsara and Johnson (2006) both reported lower attachment scores in the first trimester for the loss group, though not statistically significant. Tsartsara and Johnson (2006) observed that while attachment scores increased for both groups across pregnancy (reaching statistical significance and large effect sizes), the loss group's total and quality scores surpassed those of the control group by the third trimester (although this did not reach significance). However, Kelmanson's (2024)

cross-sectional study found a *decrease* in attachment scores with advancing gestational age following early loss. This inconsistency in direction may indicate the influence of additional covariates that affect attachment development across pregnancy stages.

For later perinatal losses (second trimester and beyond), Armstrong and Hutti (1998) and Branjerdporn et al. (2021) both found lower attachment scores in the loss group during the second and third trimesters. Armstrong and Hutti reported a significant difference, while Branjerdporn observed a moderate effect size that was not significant. Beauquier-Maccotta et al. (2022) found that attachment scores in the therapeutic abortion group increased more sharply from early to mid-pregnancy, before slowing. By the third trimester, the attachment scores in the group without a loss experience, had surpassed those in the therapeutic abortion group, suggesting a unique attachment trajectory for therapeutic abortion, characterised by rapid early increases that plateau as pregnancy progresses. Smorti et al. (2020) found higher third-trimester attachment scores in women who had a therapeutic abortion compared to elective abortion, though only some differences were significant.

Five studies specifically investigated the effect of gestational age on attachment, with generally consistent but some varying results. Armstrong (2002) found attachment scores increased in the second trimester, although still remained lower in the loss group. Gaudet et al. (2010) and Chemouny and Wendland (2024) observed attachment scores rising as pregnancy progressed. Longitudinal studies (Beauquier-Maccotta et al., 2022; Tsartsara & Johnson, 2006) also showed increasing attachment scores with gestational age in both loss exposure groups, though the rate of increase differed. As noted previously, Kelmanson (2024) found a negative association, suggesting a differing pattern that needs further exploration.

Overall, while lower attachment scores following perinatal loss are a common finding, variations based on both gestational age and type of loss highlight the complexity of this relationship. These findings suggest that gestational age and type of loss interact to produce different attachment trajectories. Some types of loss prompt rapid attachment increases at specific stages, while others show more gradual or even decreasing attachment as pregnancy progresses.

Predictors of Mother-Foetus Relationship

Eight studies investigated other clinical, demographic and psychological predictors of the mother-foetus relationship. Beauquier-Maccotta et al. (2022) found that those who scored above the clinical threshold for perinatal grief had significantly lower attachment scores in the first trimester. However, anxiety, depression, and PTSD symptoms were not significantly correlated with attachment. Armstrong (2002) also found no support for trauma symptoms as a predictor of prenatal attachment in the second trimester. Branjerdporn et al. (2021) found no significant interactions between mental health, adult attachment, and the mother-foetus relationship.

In contrast, Gaudet et al. (2010) found that depression significantly predicted attachment quality, while anxiety predicted attachment intensity, suggesting distinct roles for these mental health factors. However, grief, while negatively correlated with attachment, was not a significant predictor. The differences in findings highlight the complexity of identifying psychological predictors of attachment and suggest that other factors, like gestational age or type of loss, may moderate the relationship. Gaudet et al. (2010) also found that maternal role identification, pregnancy acceptance, and knowledge of the baby's gender predicted higher attachment scores, contrasting with Chemouny and Wendland (2024), who found that not knowing the baby's sex was linked to higher attachment scores. Differences in tools and loss types may account for these varying results.

Yilmaz and Beji (2013) found that having living children was linked to higher attachment scores, suggesting a protective effect in subsequent pregnancies after loss. However, O'Malley et al. (2020) found parity was not a significant predictor and Tsartsara and Johnson (2006) found that primigravida mothers had higher attachment scores compared to multigravida mothers. Chemouny and Wendland (2024) reported no significant effect of previous perinatal losses, miscarriage management, or time between pregnancies on attachment scores. Similarly, Tsartsara and Johnson (2006) reported no effect of previous miscarriages on attachment scores.

Quasi-Experimental Cohort studies

The quasi-experimental studies by Cote-Arsenault et al. (2014) and Baghdari et al. (2016) aimed to improve prenatal attachment through nursing/midwifery interventions. Cote-

Arsenault et al. (2014) used a home-visit intervention based on Swanson's Theory of Caring, focusing on acknowledging prior perinatal loss, reducing anxiety and promoting prenatal attachment (the exact process for this is not clear). The study found no significant differences in attachment scores between the intervention and control groups, with only a non-significant increase in quality scores. Baghdari et al. (2016) assessed the effectiveness of a pregnancy-adaptation training package aimed at improving maternal-foetal attachment and observed a significant increase in attachment scores in the intervention group. However, both studies have limitations that hinder drawing definitive conclusions.

Discussion

This review aimed to evaluate whether perinatal loss influences the mother–foetus relationship in subsequent pregnancies. A secondary aim was to investigate whether other clinical or psychological variables are associated with the mother-foetus relationship in pregnancies after loss. Fifteen studies were included, encompassing a mix of cross-sectional, longitudinal observational, and quasi-experimental designs.

Impact of Pregnancy Loss on the Mother-Foetus Relationship

Overall, the reviewed studies provided limited evidence that perinatal loss impacts the mother–foetus relationship in subsequent pregnancies. Most studies did not identify statistically significant differences between individuals who had experienced a loss and those who had not. However, some evidence suggested that early neonatal loss and elective Termination of Pregnancy (TOP) may have detrimental effects on subsequent mother-foetus relationships (e.g., Gaudet et al., 2010; Smorti et al., 2020). Furthermore, longitudinal studies indicated statistically significant differences that were observed during the first trimester only, with individuals with a history of therapeutic TOP exhibiting lower attachment scores compared to those without a history of loss (Beauquier-Maccotta et al., 2022).

The review underscores that prenatal attachment scores tend to increase throughout the course of pregnancy across all types of losses. This finding aligns with broader pregnancy literature, which has similarly demonstrated that prenatal attachment typically strengthens as pregnancy progresses (Çelik & Güneri, 2020; Close et al., 2020). The current review

contributes to this evidence by highlighting that the experience of perinatal loss, as well as the nature of loss, influences the trajectory of this increase, although further research is needed to explore this in more depth.

Although many of the observed differences between loss groups did not reach statistical significance, this review highlights that, across studies, individuals with a history of loss consistently report lower prenatal attachment scores compared to those without such a history. While individual studies may conclude that a history of loss has minimal impact on prenatal attachment compared to those without such an experience, the consistency of this finding across multiple studies suggests an underlying effect that warrants further attention.

Sample Size and Relationship Measures

There are several potential reasons for the lack of statistically significant differences observed in the reviewed studies. A recurring issue is small sample sizes, which raises concerns about whether studies have sufficient statistical power to detect differences to begin with. Another important consideration is the sensitivity and validity of the measures used to capture the psychological transition that occurs during pregnancy. George and Solomon (2008) describe pregnancy as a period during which the "Caregiving System" becomes activated and matures. During pregnancy, women are experiencing a necessary reorganisation of self as they begin to prioritise caregiving over seeking care for themselves. This shift involves contemplating their role as parents, expressing concerns about their ability to provide care, and necessary anxieties that are thought to, in part, help drive the transition to motherhood.

All the included studies in the review relied on "prenatal attachment" measures to capture the psychological experiences of pregnant women. In a general sense, these measures place significant emphasis in capturing a mother's sensitivity towards her baby. For example, the emotions she feels about her baby, and if she interacts with them during the pregnancy. However, as George and Solomon argue, sensitivity is not the dominant influence on the child's attachment relationship with their caregiver. Rather, it is the mother's sensitivity to the child's *need for protection* that is most significant to caregiving and attachment processes. Furthermore, while it makes sense that the emotions a mother feels about her baby would be associated with the relationship, emotions alone do not provide enough

information to suggest how the relationship is affected. Maternal caregiving representations are also influenced by internal defensive strategies, which will become activated during times of caregiving distress. Defensive strategies can manifest as emotional distance to the infant or as an over-active and heightened caregiving response. In some cases there is a lack of an organised, defensive strategy, which results in feelings of helplessness and triggers 'abdication' of care (George & Solomon, 2008). These caregiving strategies are influenced by caregivers own care experiences, trauma and loss and have been linked to the different infant attachment styles (Solomon & George, 2011). Using the caregiving system framework to conceptualise the mother-foetus relationship, it could be argued that measures of prenatal attachment do not fully capture the most critical aspect of the transition to motherhood: a mother's perception of her ability to provide care and comfort to her baby. This limitation may contribute to the lack of statistically significant findings in the reviewed studies, as the measures may not adequately reflect the nuanced psychological processes underpinning the caregiving transition during pregnancy. Furthermore, while there has been some evidence to suggest that infants born subsequent to loss are more likely to be categorised as having a disorganised attachment, there has been limited research to indicate that prenatal attachment predicts infant attachment styles (Mercer & Ferkehch, 1990). Therefore, using such measures will likely provide little insight into if and how perinatal loss might impact subsequent infant attachment.

Impact of Mental Health

The findings of the review found inconclusive evidence regarding the impact of mental health on the mother–foetus relationship. While Gaudet et al. (2010) reported that higher levels of anxiety and depression were associated with poorer prenatal attachment, and Beauquier-Maccotta et al. (2022) found that grief predicted lower attachment scores, other studies did not provide statistical evidence of a significant mental health impact. In a review using a broader pregnancy population, Rolle et al. (2020) found that depression was generally negatively associated with prenatal attachment, however similarly noted that this relationship is not always observed in pregnancies following loss.

Father – Foetus Relationship

The findings from Armstrong (2002) indicate that loss may affect mothers and fathers

differently, with mothers scoring higher on the PAI than fathers. This difference did not reach statistical significance. Similarly, Armstrong's (2004) study using the same participant cohort, found that gender was not a significant predictor of PAI scores in the regression analysis. However, the primary focus of the current review was not to explore the perinatal experiences of fathers who have previously experienced perinatal loss. Therefore, at present we have not attempted to understand the nuances of the father-foetus relationship, how it differs from the mother- foetus relationship and the appropriateness of how this is measured. Investigating this in future research could be valuable, as the psychological needs of fathers in this context are often underexplored.

Intervention Studies

Drawing conclusions from the intervention studies is challenging due to significant methodological limitations. However, a systematic review on interventions aimed at enhancing the maternal–foetal relationship in general pregnancy, found that interventions were effective. Notably, counselling interventions that included pregnancy and attachment education, in addition to increased focus on the foetus, were particularly beneficial (Abasi et al., 2021). More methodologically rigorous intervention studies are needed to further investigate the effectiveness of such approaches in pregnancies following loss.

Protective Factors

The studies included in the current review gave limited attention to factors that may serve as protective influences following perinatal loss. For instance, "nesting networks" which provide social and emotional support during pregnancy, have been found to prevent adverse mental health outcomes for mothers (Hinton et al., 2023). Some studies in the review also suggest that other factors, such as the presence of existing children or knowing the sex of the baby, may serve as a protective factor against poorer relationship outcomes (Gaudet et al., 2010; Yilmaz & Beji, 2013). Further research exploring potential protective factors in greater depth would have great clinical utility.

Limitations

The current review has some limitations, such as the inherent subjectivity of narrative syntheses, which is more vulnerable to personal bias in interpreting and presenting findings than other approaches, e.g. meta-analysis. In addition, while the review attempted to

conceptualise patterns across different types of perinatal losses, methodological limitations and heterogeneity restricted the ability to draw robust conclusions. Consequently, the findings are largely descriptive and hypothesis-generating rather than definitive. The review could have benefitted from incorporating qualitative studies, which might have offered a more nuanced understanding of the mother-foetus relationship that is difficult to capture through unidimensional prenatal attachment measures.

Recommendations for Clinical Practice

The Lancet series "Miscarriage Matters" (Quenby et al., 2021) highlights the long-term psychological impacts of miscarriage, noting that healthcare systems often downplay its significance and don't always address the psychological consequences. While this review cannot draw definitive conclusions, it emphasises that for some, the difficulties arising from all types of perinatal loss may not resolve on their own and may potentially affect future pregnancies. Recommendations from The Lancet have already led to changes, such as individualised care plans for mothers experiencing a minimum of a single miscarriage (Scottish Government, 2023). However, this review underscores the possible need to expand these efforts to include routine assessments of the parent–foetus relationship, to identify and address potential difficulties early on.

Conclusion

In summary, the current review did not find significant evidence to suggest that the mother-foetus relationship is impacted by previous perinatal loss. The review indicates that future studies should prioritise larger sample sizes, robust methodologies, and better control of clinical and demographic variables. In addition, future studies should consider the development and use of more valid measures for understanding the psychological processes that occur during pregnancy (e.g. activation of the caregiving system). Such research is critical for enhancing the quality and responsiveness of care provided to parents following a loss.

Declaration

This research received no external funding. The authors declare no conflict of interest.

References

Abasi, E., Keramat, A., Borghei, N. S., Goli, S., & Farjamfar, M. (2021). Evaluating the effect of prenatal interventions on maternal–foetal attachment: A systematic review and meta-analysis. *Nursing Open, 8*(1), 4-16. https://doi.org/10.1002/nop2.648

Al-Maharma, D. Y., Abujaradeh, H., Mahmoud, K. F., & Jarrad, R. A. (2016). Maternal grieving and the perception of and attachment to children born subsequent to a perinatal loss. *Infant Mental Health Journal, 37*(4), 411-423. https://doi.org/10.1002/imhj.21570

Armstrong, D., & Hutti, M. (1998). Pregnancy after perinatal loss: the relationship between anxiety and prenatal attachment. *Journal of Obstetric, Gynaecologic, & Neonatal Nursing*, *27*(2), 183-189. https://doi.org/10.1111/j.1552-6909.1998.tb02609.x

Armstrong, D. S. (2002). Emotional distress and prenatal attachment in pregnancy after perinatal loss. *Journal of nursing scholarship*, *34*(4), 339-345. https://doi.org/10.1111/j.1547-5069.2002.00339.x

Armstrong, D. S. (2004). Impact of prior perinatal loss on subsequent pregnancies. *Journal of Obstetric, Gynaecologic & Neonatal Nursing*, *33*(6), 765-773. https://doi.org/10.1177/0884217504270714

Baghdari, N., Sahebzad, E. S., Kheirkhah, M., & Azmoude, E. (2016). The effects of pregnancy-adaptation training on maternal-foetal attachment and adaptation in pregnant women with a history of baby loss. *Nursing and midwifery studies*, *5*(2).

Barker, T. H., Habibi, N., Aromataris, E., Stone, J. C., Leonardi-Bee, J., Sears, K., Hasanoff, S., Klugar, M., Tufanara, C., Moola, S., & Munn, Z. (2024). The revised JBI critical appraisal tool for the assessment of risk of bias for quasi-experimental studies. *JBI Evidence Synthesis*, *22*(3), 378-388. https://doi.org/10.11124/jbies-23-00268

Beauquier-Maccotta, B., Shulz, J., De Wailly, D., Meriot, M. E., Soubieux, M. J., Ouss, L. Grossmaitre, C., Salomon, L., Golse, B., Ville, Y., & Missonnier, S. (2022). Prenatal attachment, anxiety and grief during subsequent pregnancy after medical termination of pregnancy. Attachment to which child? *Journal of Gynaecology*

Obstetrics and Human Reproduction, *51*(4), 102353. https://doi.org/10.1016/j.jogoh.2022.102353

Blackmore, E. R., Côté-Arsenault, D., Tang, W., Glover, V., Evans, J., Golding, J., & O'Connor, T. G. (2011). Previous prenatal loss as a predictor of perinatal depression and anxiety. *The British Journal of Psychiatry*, *198*(5), 373-378. https://doi.org/10.1192/bjp.bp.110.083105

Branjerdporn, G., Meredith, P., Wilson, T., & Strong, J. (2021). Maternal–foetal attachment: Associations with maternal sensory processing, adult attachment, distress and perinatal loss. *Journal of Child and Family Studies*, *30*, 528-541. https://doi.org/10.1007/s10826-020-01876-1

Çelik, F., & Güneri, S. (2020). The relationship between adaptation to pregnancy and prenatal attachment in high-risk pregnancies. *Psychiatria Danubina*, *32*(suppl. 4), 568-575.

Chemouny, M., & Wendland, J. (2024). The experience of miscarriage and its impact on prenatal attachment during the following pregnancy: a mixed-methods study. *Midwifery*, 104072. https://doi.org/10.1016/j.midw.2024.104072

Close, C., Bateson, K., & Douglas, H. (2020). Does prenatal attachment increase over pregnancy? *British Journal of Midwifery*, *28*(7), 436-441. https://doi.org/10.12968/bjom.2020.28.7.436

Condon, J. T. (1993). The assessment of antenatal emotional attachment: development of a questionnaire instrument. *British journal of medical psychology*, *66*(2), 167-183. https://doi.org/10.1111/j.2044-8341.1993.tb01739.x

Côté-Arsenault, D., Schwartz, K., Krowchuk, H., & McCoy, T. P. (2014). Evidence-based intervention with women pregnant after perinatal loss. *MCN: The American Journal of Maternal/Child Nursing*, *39*(3), 177-186. https://doi.org/10.1097/nmc.0000000000000024

Cranley, M. S. (1981). Development of a tool for the measurement of maternal attachment during pregnancy. *Nursing Research*, *30*(5), 281-284. https://doi.org/10.1097/00006199-198109000-00008

Critical Appraisal Skills Programme. (2024). *CASP Checklist for Cohort Studies [online]*. CASP UK. https://casp-uk.net/casp-tools-checklists/cohort-study-checklist/

Daugirdaitė, V., van den Akker, O., & Purewal, S. (2015). Posttraumatic stress and posttraumatic stress disorder after termination of pregnancy and reproductive loss: a systematic review. *Journal of pregnancy*, 2015(1), 646345. https://doi.org/10.1155/2015/646345

DeMontigny, F., Verdon, C., Meunier, S., Gervais, C., & Coté, I. (2020). Protective and risk factors for women's mental health after a spontaneous abortion. *Revista latino-americana de enfermagem*, *28*, e3350. https://doi.org/10.1590/1518-8345.3382.3350

Downes, M. J., Brennan, M. L., Williams, H. C., & Dean, R. S. (2016). Development of a critical appraisal tool to assess the quality of cross-sectional studies (AXIS). *BMJ open*, *6*(12), e011458. https://doi.org/10.1136/bmjopen-2016-011458

Gaudet, C., Séjourné, N., Camborieux, L., Rogers, R., & Chabrol, H. (2010). Pregnancy after perinatal loss: association of grief, anxiety and attachment. *Journal of reproductive and infant psychology*, *28*(3), 240-251. https://doi.org/10.1080/02646830903487342

George, C., & Solomon, J. (2008). The caregiving system: A behavioural systems approach to parenting. *Handbook of attachment: Theory, research, and clinical applications*, *2*, 833-856.

Heller, S. S., & Zeanah, C. H. (1999). Attachment disturbances in infants born subsequent to perinatal loss: A pilot study. *Infant Mental Health Journal: Official Publication of the World Association for Infant Mental Health*, *20*(2), 188-199. https://doi.org/10.1002/(sici)1097-0355(199922)20:2<188::aid-imhj6>3.0.co;2-h

Higgins, J., & Thomas, J. (2022). *Cochrane Handbook for Systematic Reviews of Interventions V. 6.3 [updated 2022].* https://training.cochrane.org/handbook/current

Hinton, L., Dumelow, C., Hodgkinson, J., Montgomery, C., Martin, A., Allen, C.,Tucker, K., Green, M.E., Wilson, H., McManus., Chappell, L.C., & Band, R. (2023). 'Nesting

networks': Women's experiences of social network support in high-risk pregnancy. *Midwifery*, *120*, 103622. https://doi.org/10.1016/j.midw.2023.103622

Hughes, P., Turton, P., Hopper, E., McGauley, G. A., & Fonagy, P. (2001). Disorganised attachment behaviour among infants born subsequent to stillbirth. *Journal of child psychology and psychiatry, 42*(6), 791-801. https://doi.org/10.1111/1469-7610.00776

Kelmanson, I. A. (2024). Manifest anxiety and maternal–foetal attachment in pregnant women with previous foetal losses. *Journal of Reproductive and Infant Psychology*, *42*(1), 45-61. https://doi.org/10.1080/02646838.2022.2056882

Lee, L., McKenzie-McHarg, K., & Horsch, A. (2017). The impact of miscarriage and stillbirth on maternal–foetal relationships: an integrative review. *Journal of reproductive and infant psychology, 35*(1), 32-52. https://doi.org/10.1080/02646838.2016.1239249

Li, T., Higgins, J. P. T., & Deeks, J. J. (2019). Collecting data. In J. P. T. Higgins, J. Thomas, J. Chandler, M. Cumpston, T. Li, M. J. Page, & V. A. Welch (Eds.), *Cochrane handbook for systematic reviews of interventions* (Version 6.5). Cochrane. https://doi.org/10.1002/9781119536604.ch5

Love, E. R., Bhattacharya, S., Smith, N. C., & Bhattacharya, S. (2010). Effect of interpregnancy interval on outcomes of pregnancy after miscarriage: retrospective analysis of hospital episode statistics in Scotland. *Bmj*, *341*. https://doi.org/10.1136/bmj.c3967

Mehran, P., Simbar, M., Shams, J., Ramezani-Tehrani, F., & Nasiri, N. (2013). History of perinatal loss and maternal–foetal attachment behaviours. *Women and Birth*, *26*(3), 185-189. https://doi.org/10.1016/j.wombi.2013.04.005

Mercer, R. T., & Ferkehch, S. L. (1990). Predictors of parental attachment during early parenthood. *Journal of Advanced Nursing*, *15*(3), 268-280. https://doi.org/10.1111/j.1365-2648.1990.tb01813.x

Mills, T. A., Ricklesford, C., Cooke, A., Heazell, A. E. P., Whitworth, M., & Lavender, T. (2014). Parents' experiences and expectations of care in pregnancy after stillbirth or neonatal death: a metasynthesis. *BJOG: An International Journal of Obstetrics & Gynaecology*, *121*(8), 943-950. https://doi.org/10.1111/1471-0528.12656

Muller, M. E., & Mercer, R. T. (1993). Development of the prenatal attachment inventory. *Western journal of nursing research*, *15*(2), 199-215. https://doi.org/10.1177/019394599301500205

Müller, M. E., & Ferketich, S. (1993). Factor analysis of the maternal fetal attachment scale. *Nursing Research*, *42*(3), 144-147. https://doi.org/10.1097/00006199-199305000-00004

O'Malley, E. G., Walsh, M. C., Reynolds, C. M., Kennelly, M., Sheehan, S. R., & Turner, M. J. (2020). A cross-sectional study of maternal-foetal attachment and perceived stress at the first antenatal visit. *Journal of reproductive and infant psychology*, *38*(3), 271-280. https://doi.org/10.1080/02646838.2019.1637516

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. https://doi.org/10.1136/bmj.n71

Pallant, J. F., Haines, H. M., Hildingsson, I., Cross, M., & Rubertsson, C. (2014). Psychometric evaluation and refinement of the Prenatal Attachment Inventory. *Journal of Reproductive and Infant Psychology*, *32*(2), 112-125. https://doi.org/10.1080/02646838.2013.871627

Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., & Duffy, S. (2006).*Guidance on the conduct of narrative synthesis in systematic reviews*. *A product from the ESRC methods programme* (Version 1). ESRC Methods Programme.

Quenby, S., Gallos, I. D., Dhillon-Smith, R. K., Podesek, M., Stephenson, M. D., Fisher, J., ... & Coomarasamy, A. (2021). Miscarriage matters: the epidemiological, physical, psychological, and economic costs of early perinatal loss. *The Lancet*, *397*(10285), 1658-1667. https://doi.org/10.1016/s0140-6736(21)00682-6

Reardon, D. C., & Craver, C. (2021). Effects of perinatal loss on subsequent postpartum mental health: A prospective longitudinal cohort study. *International journal of*

environmental research and public health, *18*(4), 2179. https://doi.org/10.3390/ijerph18042179

Rollè, L., Giordano, M., Santoniccolo, F., & Trombetta, T. (2020). Prenatal attachment and perinatal depression: A systematic review. *International journal of environmental research and public health*, *17*(8), 2644. https://doi.org/10.3390/ijerph17082644

Roseingrave, R., Murphy, M., & O'Donoghue, K. (2022). Pregnancy after stillbirth: maternal and neonatal outcomes and health service utilization. *American Journal of Obstetrics & Gynaecology MFM*, *4*(1), 100486. https://doi.org/10.1016/j.ajogmf.2021.100486

Schwerdtfeger, K. L., & Goff, B. S. N. (2007). Intergenerational transmission of trauma: Exploring mother–infant prenatal attachment. *Journal of traumatic stress*, *20*(1), 39-51. https://doi.org/10.1002/jts.20179

Scottish Government. (2023). *Equality, opportunity, community: Programme for Government 2023-24*. The Scottish Government. https://.gov.scot/publications/programme-government-2023-24/pages/5/

Smorti, M., Ponti, L., Bonassi, L., Cattaneo, E., & Ionio, C. (2020). Centrality of Pregnancy and Prenatal Attachment in Pregnant Nulliparous after Recent Elective or Therapeutic Abortion. *Frontiers in psychology*, *11*, 607879. https://doi.org/10.3389/fpsyg.2020.607879

Solomon, J., & George, C. (2011). Disorganization of maternal caregiving across two generations. *Disorganized attachment and caregiving*, 25-51.

Tommy's. (2024). *Miscarriage statistics*. Tommy's. https://tommys.org/baby-loss-support/miscarriage-information-and-support/miscarriage-statistics

Tsartsara, E., & Johnson, M. P. (2006). The impact of miscarriage on women's pregnancy-specific anxiety and feelings of prenatal maternal–foetal attachment during the course of a subsequent pregnancy: An exploratory follow-up study. *Journal of Psychosomatic Obstetrics & Gynaecology*, *27*(3), 173-182. https://doi.org/10.1080/01674820600646198

Walsh, J., Hepper, E. G., Bagge, S. R., Wadephul, F., & Jomeen, J. (2013). Maternal–foetal relationships and psychological health: emerging research directions. *Journal of Reproductive and Infant Psychology*, *31*(5), 490-499. https://doi.org/10.1080/02646838.2013.834311

Wittkowski, A., Vatter, S., Muhinyi, A., Garrett, C., & Henderson, M. (2020). Measuring bonding or attachment in the parent-infant-relationship: A systematic review of parent-report assessment measures, their psychometric properties and clinical utility. *Clinical Psychology Review*, 82, 101906. https://doi.org/10.1016/j.cpr.2020.101906

Wojnar, D. M., Swanson, K. M., & Adolfsson, A. S. (2011). Confronting the inevitable: A conceptual model of miscarriage for use in clinical practice and research. *Death studies*, *35*(6), 536-558. https://doi.org/10.1080/07481187.2010.536886

Yilmaz, S. D., & Beji, N. K. (2013). Effects of perinatal loss on current pregnancy in Turkey. *Midwifery*, *29*(11), 1272-1277. https://doi.org/10.1016/j.midw.2012.11.015

Chapter Two: Major Research Project

Caregiving Expectations in Pregnant People Following Pregnancy Loss: A Cross-Sectional Study

Prepared in accordance with the author requirements for Infant Mental Health Journal; https://onlinelibrary.wiley.com/page/journal/10970355/homepage/forauthors.html

Plain Language Summary

Title: Caregiving Expectations in Pregnant People Following Pregnancy Loss: A Cross-Sectional Study

Background

During pregnancy, mothers become increasingly emotionally invested in their unborn child, imagining their future role as a mother and their relationship with their baby. Research has found that these prenatal caregiving expectations can predict the quality of the relationship with the baby during infancy.

Current research has found a number of negative outcomes that are linked to experience of pregnancy loss, including grief, post-traumatic stress and anxiety, which can persist into the next pregnancy and after birth. Studies have also suggested that following a pregnancy loss, the mother-infant relationship is more likely to be adversely affected. There is some evidence to suggest that the way mothers mentally prepare for a baby following a loss is different, although so far the findings have been contradictory and of variable quality.

Aims and Questions

What do caregiving expectations look like in women who are currently pregnant following one or more pregnancy losses? Do experiences of grief, trauma, anxiety or social support predict caregiving expectations?

Method

We recruited people from the UK who are currently in their second or third trimester of pregnancy and have experienced at least one pregnancy loss, at any stage of the pregnancy. Study leaflets were distributed across Ayrshire, Scotland in NHS Maternity Clinics, in addition to support groups. We also advertised the study online through pregnancy forums, support groups, and baby loss charities on platforms like Reddit, Instagram, and X. Participants completed online self-report questionnaires. These captured participants' expectations of their future relationship with their baby, in addition to details of current grief, anxiety, trauma and social support. We also collected demographic and pregnancy details, such as: the number, stage of the previous loss and time since the loss.

Main Findings and Conclusions

We gathered information from 83 pregnant individuals and found that, overall, participants reported high levels of optimal caregiving expectations, reflecting commitment to and enjoyment of their baby. There was moderate agreement with caregiving expectations that reflected a mother finding it difficult to separate from their baby and expectations that their child will meet some of their emotional needs. We found that stronger social support was associated with more optimal caregiving expectations. Mental health outcomes did not generally predict caregiving expectations, except for anxiety, which was linked to feelings of helplessness when caring for the baby. Additionally, caregiving expectations were influenced by factors such as the level of deprivation in the area where participants lived, whether they already had children, and the timing of their pregnancy.

This study highlights how pregnancy loss can impact mothers during future pregnancies and offers valuable insights into the role of mental health and social support in shaping pregnancy experiences. While more research is needed to build on these findings, this study offers valuable insights for clinicians to consider when supporting the psychological wellbeing of mothers who have previously experienced pregnancy loss.

Abstract

Pregnancy loss can have lasting psychological effects, potentially influencing subsequent pregnancies. While caregiving expectations during pregnancy can predict caregiving behaviour and attachment, little is known about caregiving expectations after loss. This cross-sectional study aimed to characterise caregiving expectations in pregnant women with a history of pregnancy loss and identify their psychological predictors. Eighty-three pregnant women with experience of pregnancy loss were recruited in the UK. Participants completed the Prenatal Caregiving Experiences Questionnaire, Perinatal Grief Scale, Impact of Events Scale- Revised, Perinatal Anxiety Screening Scale, and Medical Outcome Study Social Support Survey. Data were analysed using descriptive statistics and hierarchical regression via SPSS. The sample exhibited high scores for caregiving expectations corresponding to secure attachment and moderate scores corresponding to insecure-preoccupied and disorganised attachment (role reversal). Higher social support was associated with optimal caregiving expectations, while anxiety was predictive of helplessness expectations. Trauma and grief did not significantly predict any caregiving expectation. Other factors, including deprivation, presence of other children, and pregnancy timing, influenced caregiving expectations. The findings suggest that women with a history of pregnancy loss exhibit caregiving expectations reflecting organised caregiving patterns, which are minimally impacted by mental health factors. Future research should involve larger, more diverse samples.

Introduction

Sadly, pregnancy loss affects around 1 in 5 pregnancies (Tommy's, 2024). While definitions of pregnancy loss can vary across settings (Malory, 2024), this research uses pregnancy loss as an umbrella term, encompassing the loss of a foetus or baby at any stage of pregnancy, during birth, or within the first days of life. This includes miscarriage, termination of pregnancy, ectopic pregnancy, stillbirth, and early neonatal death. The literature has demonstrated a clear link between pregnancy loss and experiences of grief, post-traumatic stress and anxiety for the mother (Armstrong, 2002; Daugirdaitė et al., 2015; DeMontigny et al., 2020). For some, these experiences can persist into the next pregnancy (Armstrong, 2002; Bergner et al., 2008) and after the birth of a healthy baby (Blackmore et al., 2011; Reardon & Craver, 2021). In children born subsequent to miscarriage, 45% of infant attachments were categorised as disorganised, compared to the expected rate of 15% found in normative samples (Heller & Zeanah, 1999). This finding suggests miscarriage negatively impacts attachment processes in subsequent pregnancies, but as of yet little is known of the mechanisms of why this might be.

The Caregiving System

Attachment theory provides a theoretical framework in which to understand the adaptive relationship between an infant and caregiver, which functions to provide the child a safe and secure base from which to explore their world (Bowlby, 1982). The Caregiving System (George & Solomon, 2008) compliments the attachment system, outlining a set of organised behaviours guided by the caregiver's representation of the parent-child relationship and motivations to provide protection, care and comfort to the child. The caregiving system develops from infancy, but it is thought to mature during pregnancy and early postnatal experiences (George & Solomon, 2008). It is influenced by attachment experiences, as well as social support and experience of trauma and loss. There is evidence that a mother's caregiving expectations – her internal representations of herself as a mother, the child and the developing caregiving relationship - during pregnancy can predict post-natal caregiving behaviour and infant attachment (Crawford & Benoit, 2009; Dayton et al., 2010; Røhder et al., 2019, 2020; Solomon & George, 2011).

Qualitative research suggests that mothers "hold back" from bonding with the foetus in subsequent pregnancies after loss, to protect themselves from the pain of another loss

(Mills et al., 2014). Côté-Arsenault and Donato (2007) found that mothers felt more secure in their pregnancy after passing the point of the previous loss, allowing themselves to develop a "restrained expectation" of what it would be like to care for a baby, demonstrating a shift from "pregnancy focus" to "baby focus". This reflects a protective distancing strategy, but it remains unclear whether this is reflected in their prenatal caregiving expectations.

Many studies have used quantitative measures of 'prenatal attachment' to investigate attachment processes during pregnancy following a loss. They have generally failed to find statistically significant differences in attachment scores between pregnant individuals who have experienced a loss and those who have not (Armstrong, 2002; Branjerdporn et al., 2021; Gaudet et al., 2010; O'Malley et al., 2020; Yilmaz & Beji, 2013). However, the validity of measuring 'prenatal attachment' itself has been challenged (Wittkowski et al., 2020). Attachment is the interplay and reciprocity between parent (showing an interplay of encouragement, support and caregiving) and child (exploring and seeking comfort), optimally measured by observational, behavioural situations between the two. This complicates drawing definitive conclusions based on such measures of 'prenatal attachment,' where such reciprocity or lack thereof, is unavailable to observation or memory. While there continues to be limited knowledge regarding caregiving expectations in this population, this would offer a more coherent way of measuring an understanding the maturing attachment / caregiving system during pregnancy.

The role of grief and support

Perinatal grief has been found to differ from other forms of grief, in that it does not follow the typical stages and processes (Corr, 1993). Moulder (1994) proposed the level of grief is based on the degree of the 'attachment' with the foetus and the degree of investment in the pregnancy, which is influenced by the timing of the loss within pregnancy. Arnold and Gemma (1994) theorised parents mourn their future as parents and the image of the child who could have been, a process that may begin earlier due to reproductive technology (Furlong & Hobbins, 1983). These theories, therefore, might provide some explanation as to why studies have shown mothers delay building mental representations of their foetus and themselves as mothers in pregnancies following loss (Mills et al., 2014) , in a bid to protect themselves from future grief experiences.

Moulder's (1994) model suggests grief is related to the meaning the pregnancy held for the person and its impact on their life role. Ward et al. (2023) found that donating milk following a pregnancy loss, helped mothers to 'fulfil' their caregiving role, finding the "need to provide for their child" was of the highest importance. This theory of grief incorporates the role of expectations of caregiving that form during pregnancy. As yet, little is known about how unfulfilled expectations affect caregiving expectations in subsequent pregnancies.

Spousal and social support help mitigate severity of perinatal and other forms of grief (DeMontigny et al., 2020; Moulder, 1994). When a mother's attachment system is activated, she often seeks support from her attachment figures, such as her own mother, grandparents, or partner (Mikulincer et al., 2002). George and Solomon (1996) suggest that the quality of this support will contribute to the mother's expectation of her ability to protect her baby and whether her baby is worth protecting. Little is known on how social support influences caregiving expectations prenatally and following experience of attachment related loss.

Aims

The aim of this study was to explore the experience of pregnancy loss and caregiving by using the Prenatal Caregiving Experiences Questionnaire to characterise caregiving expectations in pregnant people who have previously experienced one or more pregnancy losses. The secondary aim was to investigate predictors (grief, trauma, anxiety and social support) of caregiving expectations.

Method

The study used a quantitative, cross-sectional design. The study was approved by the NHS Research Ethics Committee (IRAS Project ID: 337799), NHS Ayrshire and Arran Research and Development Team, and the University of Glasgow.

Participants and Recruitment

From June to December 2024, the study recruited pregnant people who were in their second or third trimester of pregnancy and who had previously experienced one or more losses at any stage of a pregnancy. We chose to recruit people in their second or third

trimester, because the chance of pregnancy loss decreases in the latter stages of pregnancy (Brigham et al., 1999) and therefore the nature of the study was felt to be less distressing for participants. The study recruited people who resided in the UK and could speak English. The study was advertised through leaflets distributed in Community Midwives' clinics across Ayrshire, Scotland and Scottish baby loss support groups. The leaflets included a link and QR code that directed participants to the study website. An electronic version of the leaflet, along with the website link, was also promoted online via support groups and baby loss charities on Reddit, Instagram and X. A purpose made Instagram and X page was also constructed for further outreach.

Materials

The Prenatal Caregiving Experiences Questionnaire

The Prenatal Caregiving Experiences Questionnaire (PCEQ; Brennan & George, 2013) is a 40-item self-report measure assessing women's expectations of their future relationship with their child. It includes five subscales that reflect distinct patterns of caregiving: *Commitment and Enjoyment* (positive feelings toward the child), *Discourages Closeness* (emotional distance), *Sentimental and Heightened* (difficulty separating), *Helpless and Out of Control* (the child will be out of control and they will struggle with care), *and Role Reversed and Merged* (child fulfilling a caregiving role). Responses are rated on a 1–5 Likert scale, and mean subscale scores are calculated. The PCEQ is adapted from the post-natal version which has shown cross-cultural validity and internal consistency (Røhder et al., 2019). Research has demonstrated it can predict postnatal parental care and infant attachment (Røhder et al., 2020).

The Perinatal Grief Scale

The Perinatal Grief Scale (PGS; Potvin et al., 1989) is a 33 item self-report questionnaire. It consists of three subscales rated on a 1-5 Likert Scale: Active grief, Difficult Coping and Despair. The responses are summed for each of the subscales and combined to generate a total score. Higher scores indicate greater levels of grief and a score of 91 has been specified as the clinical cut off for concern (Toedter et al., 2001). The PGS is considered to be the most psychometrically well-established measure of perinatal grief (Wright & Carpenter, 2023).

The Impact of Events Scale- Revised

The Impact of Events Scale - Revised (IES-R; Weiss, 2007) is a 22-item self-report measure of PTSD symptoms, with three subscales: Intrusion, Avoidance, and Hypervigilance, rated on a five-point Likert scale, from 0 to 4. Subscale means and a total score are calculated, with scores of 24 – 32 indicating some PTSD symptoms, 33-36 suggesting probable PTSD, and 37+ indicating severe PTSD which impacts immune functioning. Serrano and Lima (2006) adapted the IES-R for miscarriage trauma, demonstrating adequate internal consistency (Cronbach's α = .87 and .69). We similarly modified the IES-R to reference "pregnancy loss."

The Perinatal Anxiety Screening Scale

The Perinatal Anxiety Screening Scale (PASS; Somerville et al., 2014) is a 31 item, self- report questionnaire that uses a 4 point Likert Scale. Total scores range from 0 to 93, with 0- 20 indicating minimal anxiety, 21 - 41 indicating mild to moderate anxiety and 42 - 93 severe anxiety. The global score has been found to demonstrate excellent reliability and good validity (Somerville et al., 2014).

The Medical Outcome Study Social Support Survey

The Medical Outcome Study-Social Support Survey (MOS-SSS; Sherbourne & Stewart, 1991) is a 19-item scale assessing social support across four subscales: Emotional/Informational Support, Tangible Support, Affectionate Support, and Positive Social Interaction. Responses are rated on a 1–5 Likert scale, with mean scores calculated for subscales and the total. The MOS-SSS has strong psychometric properties and is suitable for use in pregnancy populations (Bedaso et al., 2021).

Demographic and Pregnancy Data

Routine demographic and pregnancy information was also gathered. This included: age, gender, ethnicity, relationship status, education, employment, post code, number of living children, current trimester, number of pregnancy losses, gestational week the last pregnancy loss occurred, whether the current pregnancy was planned, how long after the previous loss they became pregnant and if they received any psychological follow up following the loss. Deprivation scores were determined by converting postcodes into a 1-10 score using the Socioeconomic Index for Small Areas (SEISA; Higher Education Statistics Agency, 2025). SEISA is based on Census data and provides a standardised score using the

same methodology for all four nations in the UK, with 1 being associated with high levels of deprivation and 10 associated with the least deprivation.

Research Procedure

Participants were directed to the study website hosted on the GDPR compliant Qualtrics platform. The site included an information sheet detailing the study topic, types of questions, and details of anonymity. The only identifiable information collected were postcodes and email addresses for those requesting a summary of findings. Email addresses were stored separately and deleted after the summary was sent. Postcodes were deleted after being converted into deprivation scores. The information sheet also provided helpline contact details.

Interested participants proceeded to consent forms, followed by the questionnaires, which could be completed within 7 days. Upon completion, a debrief page with support contacts was provided.

Study data were stored on Qualtrics before being downloaded as an SPSS file and saved to a University of Glasgow OneDrive account, accessible only to researchers. After study completion, the anonymised dataset was uploaded to the Open Science Framework.

Data Analysis Plan

SPSS was used for data analysis. Descriptive statistics determined the mean and median PCEQ subscale scores. Five hierarchical linear regressions were conducted to identify predictors of each of the PCEQ subscale.

A bivariate correlation matrix was used to assess relationships between variables and guide regression model construction. Although some variables violated parametric assumptions, Pearson's correlation was used because it allowed us to examine both confidence intervals and p-values. Supplementary Spearman's rho was conducted to check for non-parametric discrepancies, and differences between the methods were noted. Collinearity among independent variables was assessed with $r > .7$.

Independent T-tests and Mann-Whitney U tests were used to explore differences in PCEQ scores based on categorical pregnancy variables (e.g., whether the current pregnancy was planned). Statistically significant differences or medium effect sizes ($d \geq 0.5$, $r \geq .3$; DATAtab, n.d.-a, n.d.-b) were included in the regression models.

Hierarchical regression models used the entry method in two steps: Step 1 included demographic and pregnancy data, and Step 2 added psychological variables measured by the PGS, PASS, IES-R, and MOS-SSS. Where normality and homoscedasticity assumptions were violated, we employed bootstrapping with 4,000 samples, to provide robust estimates of coefficients and bias-corrected and accelerated (BCa) confidence intervals (seed set to 12345). Multicollinearity was assessed by confirming VIF values <10 and tolerance values >0.1.

Sample Size

Two priori power analysis calculations were conducted using G*Power, to determine the lower and upper estimate of the sample size required to test the study aims. The lower bound estimate assumed 9 independent variables, based on the expectation that demographic and clinical relationships identified in prior research would be included, alongside the 4 psychological variables. The upper bound estimate considered 18 independent variables would be included in the model. The results indicated that, using a significance level of $\alpha = .05$, a power of .80, and assuming a medium effect size, the required sample size ranges from $N = 114$ to 150 to accommodate an estimated 9 to 18 predictor variables.

Results

Demographic and pregnancy data are presented in Table 1, for 83 pregnant women who had previously experienced a pregnancy loss. The majority of the sample were English (*n*= 64, 77.1%), White (*n*= 79, 95.2%), and married (*n*=56, 67.5%). The level of deprivation in the sample varied, with the largest proportion identified as being from the least deprived areas in the UK (*n*= 24, 28.9%). Ten people did not provide detectable post codes and were excluded from this analysis. Regarding education, all participants had completed statutory education, and 67 participants (80.7%) had obtained a Bachelor's, Master's, or Doctoral level degree.

Forty-three participants (51.8%) had experienced a single pregnancy loss. The majority of participants (*n*=65, 78.3%) reported that their most recent loss occurred between 6 and 15-weeks of gestation. Most participants (*n*=78, 94%) had not given birth since their last loss, and most (*n*=54, 65.1%) did not have any living children outside of the current pregnancy. Fifty-three participants (63.9%) were in the second trimester and the remaining sample in the third trimester. The majority of the sample (*n*=63, 75.9%) had become pregnant again within 12-months of their last loss.

Table 2.1

Descriptive Statistics for Demographic and Pregnancy Variables

		M	*SD*
Age *N*=83		33.7	3.9
		Frequency (*n*)	Percentage (%)
Country *N*=83	England	64	77.1
	Wales	2	2.4
	Northern Ireland	4	4.8
	Scotland	13	15.7
Deprivation *n*= 73	1 - Most Deprived	3	3.6
	2	11	13.3
	3	18	21.7
	4	17	20.5
	5- Least deprived	24	28.9
Ethnicity *N*=83	Asian or Asian British	1	1.2
	Black, Black British, Caribbean or African	2	2.4
	Mixed or Multiple Ethnic Groups	1	1.2
	White	79	95.2
Relationship Status *N*=83	Civil Partnership	1	1.2
	Co-habiting	24	28.9
	In a relationship but living separately	1	1.2
	Married	56	67.5
	Single	1	1.2
Highest Level of Education *N*=83	No formal qualifications	0	0
	Scottish Standard Grades/ GCSEs	0	0
	Scottish Highers/ A-levels or equivalent	4	4.8
	College Qualifications	7	8.4
	Bachelor's degree	34	41.0

	Master's Degree	25	30.1
	Doctorate or Professional Degree	8	9.6
	Other	5	6.0
Employment Status	Employed (full time, part-time)	76	91.6
N=83	Self-employed	7	8.4
	Student	0	0
	Retired	0	0
	Homemaker	0	0
	Unemployed	0	0
	Other	0	0
Number of Living Children	0	54	65.1
N=83	1	25	30.1
	2	3	3.6
	>2	0	0
Number of Pregnancy Losses	1	43	51.8
N=83	2	23	27.7
	3	11	13.3
	4	3	3.6
	≥5	3	3.6
Gestational Age of Last Loss	>6 weeks	8	9.6
N=83	6-10 weeks	48	57.8
	11-15 weeks	17	20.5
	16-20 weeks	3	3.6
	21-24 weeks	2	2.4
	25- 30 weeks	2	2.4
	31-36 weeks	1	1.2
	37-40 weeks	0	0
	>40 weeks	2	2.4
Psychological Follow Up	Yes	37	44.6
N=83	No	55.4	55.4
Given Birth Since	Yes	5	6.0
N=83	No	78	94.0
Current Pregnancy Trimester	Second Trimester (13-27 weeks)	53	63.9
N=83	Third Trimester (28-40 weeks)	30	36.1
Was the current pregnancy planned?	Yes	76	91.6
N=83	No	7	8.4

Time between loss and current pregnancy *N*=83	<3 months	18	21.7
	3 – 6 months	23	27.7
	6 – 12 months	22	26.5
	12- 18 months	5	6.0
	18 – 24 months	8	9.6
	>24 months	7	8.4

Table 2.2 presents mean and median scores for the psychological measures, in addition to skewness and reliability analysis. Among the PCEQ subscales, *Commitment and Enjoyment* had the highest mean (*M* = 4.57, *SD* = 0.45), indicating high agreeability with this caregiving expectation within the sample*. Role Reversed and Merged* followed (*M* = 3.57, *SD* = 0.74), suggesting moderate agreement. *Sentimental and Heightened* Caregiving had a mean of 3.32 (*SD* = 0.95). The lowest scores were found in *Discourages Closeness* (*M* = 1.97, *SD* = 0.54) and Helpless and Out of Control (*M* = 1.87, *SD* = 0.62), indicating lower agreement to these subscales. The reliability analysis of the PCEQ revealed Cronbach's α values ranging from 0.82 to 0.90 for *Commitment and Enjoyment, Sentimental and Heightened, Helpless and Out of Control*, and *Role Reversed and Merged* caregiving expectations, indicating high internal consistency. In contrast, the *Discourages Closeness* subscale had a Cronbach's α of 0.68, suggesting weaker reliability compared to the other subscales.

Regarding the IES-R scores within the sample, *Intrusion* symptoms were the highest rated (*M* = 1.67, *SD* = 0.89), compared to *Avoidance* and *Hyperarousal* symptoms (*M* = 1.05, *SD*=0.71; *M* = 1.12, *SD* = 0.78). The total score was *M* = 28.43, *SD* = 14.04; a range of 24-32 indicates PTSD symptoms. For the PGS, *Active Grief* had the highest score (*M* = 35.12, *SD* = 8.03), followed by *Difficulty Coping* (*M* = 30.22, *SD* = 9.72) and *Despair* (*M* = 25.86, *SD* = 9.21), with the total grief score (*M* = 91.23, *SD* = 25.49) reflecting levels of grief at the clinical cut off. The PASS revealed a mean score of 39.05 (*SD* = 17.54), indicating that most participants experienced moderate anxiety. The MOSS-Social Support Survey indicated generally high perceived social support, particularly in *Affectionate Support* (*M* = 4.57, *SD* = 0.67) and *Tangible Support* (*M* = 4.24, *SD* = 0.65), followed by *Positive Social Interaction* (*M* = 4.14, *SD* = 0.80) and *Emotional* and *Informational Support* (*M* = 3.91, *SD* = 0.78). The total

mean support score was high (*M* = 4.12, *SD* = 0.64), reflecting a strong sense of social support.

Table 2.2

Descriptive Statistics and Reliability for PCEQ, IES, PGS, PASS and MOS-SSS

Variable	*M*	*SD*	*Mdn*	*IQR*		Skewness	Kurtosis	Cronbach's α
				25th Percentile	75th Percentile			
PCEQ Commitment and enjoyment	4.57	0.45	4.75	4.38	4.88	-1.68	2.82	0.82
PCEQ Discourages closeness	1.87	0.54	1.80	1.40	2.20	0.59	-0.23	0.68
PCEQ Sentimental and heightened	3.32	0.95	3.40	2.80	4.00	-0.22	-0.71	0.82
PCEQ Helpless and out of control	1.87	0.62	1.71	1.43	2.14	0.91	0.37	0.90
PCEQ Role reversed and merged	3.57	0.74	3.63	3.00	4.13	-0.15	-0.30	0.83
IES-R Avoidance	1.05	0.71	1.00	0.50	1.63	0.87	1.00	0.79
IES-R Intrusion	1.67	0.89	1.75	0.88	2.38	0.26	-0.52	0.88
IES-R Hyperarousal	1.12	0.78	1.00	0.33	1.67	0.40	-0.54	0.74
IES-R Total	28.43	14.04	27.00	17.00	38.00	0.35	0.04	0.89
PGS Active Grief	35.12	8.03	35.00	31.00	42.00	-0.34	-0.302	0.85
PGS Difficulty Coping	30.22	9.72	31.00	24.00	37.00	0.08	-0.56	0.89
PGS Despair	25.86	9.21	25.00	19.00	33.00	0.17	-0.84	0.90
PGS Total	91.23	25.49	93.00	75.00	109.00	-0.01	-0.60	0.96
PASS Total	39.05	17.54	38.00	25.00	51.00	0.425	0.134	0.95
MOS-SSS Emotional and Informational support	3.91	0.78	4.00	3.50	4.50	-0.45	-0.21	0.92
MOS-SSS Tangible support	4.24	0.65	4.25	4.00	4.75	-1.04	1.72	0.85
MOS-SSS Affectionate Support	4.57	0.67	5.00	4.34	5.00	-2.14	4.95	0.90
MOS-SSS Positive Social Interaction	4.14	0.80	4.00	3.67	5.00	-0.75	-0.01	0.88
MOS-SSS Total	4.12	0.64	4.21	3.74	4.63	-0.69	0.177	0.95

Correlations, T-test and Mann-Whitney U Analyses

Table 2.3 (see Appendix 2.1**,** page 90) details the bivariate correlation matrix which revealed significant or notable relationships between each PCEQ subscale and several demographic and pregnancy variables (e.g., age, deprivation, education level, number of children, number of prior pregnancy losses, gestational age of loss, and time since last loss). Therefore, these variables were entered in the first step of each regression model.

The correlation matrix also highlighted several relationships between all of the Caregiving Expectation Subscales and each of the psychological questionnaires (IES, PGS, PASS, and MOSS), either using total scores or individual subscales (see Appendix 2.1, page 90). These relationships included both significant findings and *r* values with wide confidence intervals. Lower scores in the PGS subscale *Difficulty coping* was significantly associated with greater *Commitment and Enjoyment scores* (*r*= -0.19), as was greater social support (*r*= 0.27). *Sentimental and Heightened* scores were significantly correlated with higher IES (*r*=0.30), PGS (*r*=0.36) and PASS (*r*=0.41) scores. *Helpless and Out of Control* was significantly associated with greater IES *hyperarousal* (*r*=0.25), PGS (*r*=0.26), and PASS (*r*=0.33) scores, and poorer social support (*r*=-0.25). No significant associations were found between psychological variables and *Role Reversal and Merged* or *Discourages Closeness*.

The correlation matrix revealed collinearity ($r > .7$) between the subscales of the IES-R, PASS, PGS, and MOS-SSS (see Appendix 2.2, page 91). To address this, total scores were used instead of multiple subscales. Multicollinearity diagnostics were also checked in the regression models for robustness. Consequently, the second step of each regression model included total scores for the IES-R, PGS, PASS, and MOS-SSS.

Independent T-tests and Mann-Whitney U tests explored the effects of categorical pregnancy variables (see Appendices 2.3 and 2.4, pages 93 and 94). The only significant finding was that *Discourages Closeness* scores were higher in participants who had not given birth since their last loss ($U = 315.00$, $z = 2.31$, $p = .019$, $r = 0.25$). Including this variable in the first regression step did not notably change the model's fit, so no variables from these comparisons were included in the regression models.

Regression Analyses

Five hierarchical linear regressions were conducted to investigate the predictors of each of the PCEQ subscales. The results are displayed in Tables 2.7-12.

Commitment and Enjoyment

For the *Commitment and Enjoyment* subscale, the Shapiro-Wilk test indicated that the residuals violated the assumption of normality. Therefore, bootstrapping was employed.

Table 2.7 is the summary of results of hierarchical regression modelling for the PCEQ Commitment and Enjoyment subscale.

Table 2.7

Summary of Hierarchical Regression Models for PCEQ Commitment and Enjoyment (using Bootstrap Coefficients)

	Bootstrap								
	B	Bias	*SE*	*p*	95% CI		R^2	Adjusted R^2	ΔR^2
					LL	*UL*			
Model 1							.12	.02	
(Constant)	4.63	0.04	0.49	<.001	3.57	5.75			
Age	-0.00	0.00	0.01	.747	-0.03	0.02			
Deprivation	-0.05	0.00	0.03	.058	-0.10	0.00			
Number of children	0.08	0.01	0.09	.365	-0.09	0.30			
Education	0.02	0.00	0.05	.702	-0.07	0.10			
Number of pregnancy losses	0.01	0.00	0.05	.891	-.010	0.11			
Gestational age at last loss	0.04	0.00	0.03	.106	-0.02	0.09			
Time since last pregnancy loss	0.06	0.00	0.04	.132	-0.02	0.14			
Model 2							.23	.09	.12
(Constant)	3.59	.12	.75	<.001	1.80	5.38			
Age	-0.01	0.00	0.02	.599	-0.04	0.02			
Deprivation	-0.05	0.00	0.02	**.019**	-0.10	-0.02			
Number of living children	0.09	0.01	0.10	.362	-0.08	0.35			
Education level	0.04	-0.01	0.05	.400	-0.05	0.10			
Number of previous pregnancy losses	0.04	0.01	0.06	.533	-0.08	0.17			
Gestational age at last loss	0.05	0.00	0.03	.120	-0.02	0.10			
Time since last pregnancy loss	0.07	0.00	0.04	.060	0.00	0.16			
Trauma	0.23	0.00	0.01	.451	-0.02	0.01			

Grief	0.00	0.00	0.00	.973	-0.00	0.01
Anxiety	0.00	0.00	0.01	.479	-0.01	0.01
Social Support	-0.01	0.00	0.09	**.007**	0.07	0.42

Note.
* p<.05

Model 1 accounted for 11.8% of the variance but was not statistically significant, R^2= .118 *F* (7, 64) =1.22, *p*=.304. None of the variables in this model reached significance, although deprivation did approach significance (*B*=−.05, bootstrapped *p*=.058) with lower deprivation associated with lower *Commitment and Enjoyment* scores.

The addition of psychological variables into the model accounted for 23.5% of the variance, although this change was not statistically significant (ΔR^2=.116, Δ*F* (4, 60) =2.27, *p*=.073). The overall model was also not statistically significant, R^2=.234, *F* (11, 60) =1.66, *p*=.104

In the final model, two predictors were significant. Deprivation was a significant negative predictor (*B*=−.05, bootstrapped *p* =.019), while social support emerged as a significant positive predictor (*B*=.234, *p*=.007), indicating that higher deprivation and greater social support was associated with higher *Commitment and Enjoyment Scores*.

Discourages Closeness

Table 2.8 is the summary of results of hierarchical regression modelling for the PCEQ *Discourages Closeness* subscale. This model met the assumptions of normality and homoscedasticity. Model 1 accounted for 26.7% of the variance, R^2= .27 *F* (7, 64) =3.32, *p*=.004. Significant predictors in this model included the time since the most recent pregnancy loss (*β* = -0.32, *p* = .007), with longer intervals between pregnancies being associated with lower scores in this PCEQ subscale. Having fewer living children approached significance (*β* = -0.23, *p* = .051).

This addition of psychological variables marginally improved the fit of the model, increasing the variance explained to 35.4%, although this change was not statistically significant, ΔR^2=.09, Δ*F* (4, 60) =2.03, *p*=.102. However, the overall model was significant (R^2=.35, *F* (11, 60) =2.99, *p*=.003). In Model 2, significant predictors of higher scores on the *Discourages Closeness* Caregiving Representation included: less time since the most recent pregnancy loss (β = -0.13, *p* = .001), fewer living children (β = -0.23, *p* = .048), lower education level (β = -0.24, *p* = .032), and lower social support (β = -.33, *p* = .008).

Table 2.8

Summary of Hierarchical Regression Models for PCEQ Discourages Closeness

	B	*SE*	β	*t*	*p*	95%		R^2	Adjusted R^2	ΔR^2
						LL	UL			
Model 1								**.27***	**.19***	N/A
(Constant)	2.97	0.59		5.06	<.001	1.80	4.143			
Age	-0.01	0.02	-0.06	-0.52	.602	-0.04	0.03			
Deprivation	0.02	0.02	0.11	0.95	.343	-0.03	0.07			
Number of children	-0.21	0.10	-0.23	-1.99	.051	-0.42	0.00			
Education	-0.08	0.05	-0.20	-1.75	.084	-0.18	0.01			
Number of pregnancy losses	-0.00	0.05	-0.01	-0.05	.96	-0.11	0.10			
Gestational age at last loss	-0.04	0.04	-0.11	-1.01	.319	-0.11	0.04			
Time since last loss	-0.11	0.04	-0.32	-2.81	**.007**	-0.19	-0.03			
Model 2								**.35***	**.24***	.09
(Constant)	4.51	0.82		5.52	<.001	2.88	6.14			
Age	-0.01	0.02	-0.07	-0.58	.564	-0.05	0.03			
Deprivation	0.03	0.02	0.12	1.11	.274	-0.02	0.07			
Number of children	-0.21	0.10	-0.23	-2.02	**.048**	-0.41	-0.00			
Education	-0.10	0.05	-0.24	-2.19	**.032**	-0.20	-0.01			
Number of pregnancy losses	-0.01	0.06	-0.02	-0.14	.891	-0.12	0.10			
Gestational age at last loss	-0.03	0.04	-0.08	-0.68	.498	-0.10	0.05			
Time since last loss	-0.13	0.04	-0.38	-3.36	**.001**	-0.21	-0.05			
Trauma	-0.00	0.01	-0.07	-0.40	.694	-0.02	0.01			
Grief	-0.00	0.00	-0.17	-0.96	.340	-0.01	0.00			
Anxiety	0.00	0.01	0.05	0.24	.812	-0.01	0.01			
Social Support	-0.25	0.09	-0.35	-2.73	**.008**	-0.44	-0.07			

Note.

** p*<.05

Sentimental and Heightened

The *Sentimental and Heightened* subscale met the assumptions of normality and homoscedasticity for linear regression. Table 2.9 shows the summary of results. Model 1 was not statistically significant, R^2=.12, *F* (7, 64) =1.23, *p*=.300, indicating that the predictors in this model did not explain a significant amount of variance. Furthermore, none of the individual demographic or pregnancy-related predictors were significant. Model 2 accounted for an additional 11% of the variance, ΔR^2=.11, Δ*F* (3, 61) =2.14, *p*=.087, although this change did not reach significance. While the addition of psychological variables improved the model's fit, Model 2 also failed to reach significance overall, R^2=.23, *F* (10, 61) =1.62, *p*=.12 and none of the psychological predictors reached significance.

Table 2.9

Summary of Hierarchical Regression Models for PCEQ Sentimental and Heightened

	B	*SE*	*β*	*t*	*p*	95% CI		R^2	Adjusted R^2	ΔR^2
						LL	*UL*			
Model 1								.12	.02	N/A
(Constant)	6.01	1.21		4.99	<.001	3.60	8.41			
Age	-.06	.04	-0.23	-1.75	.086	-.13	.01			
Deprivation	-.08	.05	--.21	-1.71	.093	-.18	.01			
Number of living children	.01	.21	0.00	0.03	.980	-.42	.43			
Education	-.06	.10	-0.079	-.064	.523	-.25	.13			
Number of pregnancy losses	.07	.11	.0073	0.59	.555	-.15	.29			
Gestational age at last loss	.04	.08	0.067	0.55	.583	-.11	.19			
Time since last pregnancy loss	.03	.08	0.053	0.42	.676	-.13	.20			
Model 2								.23	.09	.11
(Constant)	4.60	1.67		2.76	.008	1.26	7.95			

Age	-.04	.04	-.15	-1.11	.274	-.11	.03
Deprivation	-.06	.05	-.14	-1.14	.261	-.15	.04
Number of living children	.06	.21	.04	0.28	.777	-.36	.48
Education	-.11	.10	-.13	-1.10	.278	-.30	.09
Number of pregnancy losses	-.05	.11	-.05	-0.40	.692	-.27	.18
Gestational age at last loss	.02	.08	.03	0.20	.842	-.14	.17
Time since last pregnancy loss	.04	.08	.06	0.46	.645	-.12	.20
Trauma	-.01	.01	-.15	-0.77	.444	-.04	.02
Grief	.001	.01	.17	0.85	.401	-.01	.02
Anxiety	.02	.01	.34	1.57	.122	-.01	.04
Social Support	-.01	.19	-.01	-0.06	.955	-.39	.37

Note.
* p<.05

Helpless and Out of Control

The assumption of normality for the residuals was violated in the original regression model (Shapiro-Wilk p = .002). To address this, bootstrapping was employed. Table 2.10 is the summary of results of hierarchical regression modelling for the PCEQ Helpless and Out of Control subscale. Model 1 explained 21.8% of the variance in helplessness (R^2 = .29, F (7, 64) = 2.55, p = .022). The only significant predictor was having fewer living children, (B=−.27, bootstrap p=.014). Model 2 explained an additional 18.0% of the variance (ΔR^2 = .18, F (4, 60) = 4.49, p =.003), resulting in a total R^2 = .40, F (11, 60) = 3.61, p < .001.

In the final model, significant predictors included lower number of living children (B = -0.218, bootstrap p = .022), lower level of education (B =-0.12, bootstrap p = .008), less time between the current pregnancy and most recent loss (B = -0.10, bootstrap p = .039), and higher anxiety symptoms (B = 0.02, bootstra$p$ = .009). These findings suggest that a shorter interval between the loss and subsequent pregnancy, fewer living children, and lower educational attainment are associated with greater caregiving expectations of helplessness.

Furthermore, even when these factors are accounted for, greater anxiety emerges as significant contributors to increased helplessness.

Table 2.10

Summary of Hierarchical Regression Models for PCEQ Helpless and Out of Control (Bootstrap Coefficients)

	Bootstrap								
	B	Bias	*SE*	*p*	95% CI		R^2	Adjusted R^2	ΔR^2
					LL	*UL*			
Model 1							**.22***	**.13***	N/A
(Constant)	3.17	0.04	0.70	<.001	1.81	4.66			
Age	-0.02	0.00	0.02	.267	-0.06	0.02			
Deprivation	0.03	0.00	0.03	.393	-0.04	0.09			
Number of children	-0.27	0.00	0.11	**.014**	-0.50	-0.05			
Education	-0.07	0.00	0.05	.123	0.02	0.02			
Number of pregnancy losses	0.07	0.00	0.06	.284	-0.06	0.20			
Gestational age at last loss	-0.03	0.00	0.04	.335	-0.11	0.05			
Time since last pregnancy loss	-0.08	-0.01	0.05	.107	-0.17	0.00			
Model 2							**.40***	**.29***	**.18***
(Constant)	3.28	0.03	1.07	.004	1.30	5.58			
Age	-0.00	0.00	0.02	.829	-0.05	0.04			
Deprivation	-0.05	0.00	0.03	.102	-0.01	0.12			
Number of living children	-0.24	0.00	0.11	**.022**	-0.47	-0.04			
Education level	-0.12	0.00	0.05	**.008**	-0.22	-0.02			
Number of previous pregnancy losses	-0.01	0.00	0.06	.807	-0.13	0.10			
Gestational age at last loss	-0.04	0.01	0.04	.253	-0.11	0.10			
Time since last pregnancy loss	-010	-0.01	0.05	**.039**	-0.18	-0.03			
Trauma	-0.01	0.00	0.01	.454	-0.02	0.01			

Grief	-0.00	0.00	0.00	.441	-0.01	0.00
Anxiety	0.02	0.00	0.01	**.009**	0.01	0.04
Social Support	-0.17	-0.01	0.10	.104	-.363	0.01

Note.

* p<.05

Role Reversed and Merged

The *Role Reversed and Merged* subscale met the assumptions of normality and homoscedasticity for linear regression. Table 2.11 is the summary of the results. Model 1 accounted for 16.0% of the variance in *Role Reversal* scores, but was not statistically significant, R^2= .16, F (7, 64) = 1.74, p = .116. Among these predictors, more time since the most recent pregnancy loss significantly predicted *Role Reversal* (β = .28, p = .025), while being younger in age was significant (β = −.26, p = .048).

In Model 2, the addition of psychological variables increased the explained variance to 24.3%, though this change was not significant, ΔR^2=.08, ΔF (3, 61) =1.66, p=.172. In this model, the time since the most recent pregnancy loss remained a significant predictor (β = .32, p = .012), while none of the psychological variables were significant. Overall, Model 2 was not statistically significant R^2, F (11, 60) = 1.75, p = .083.

Table 2.11

Summary of Hierarchical Regression Models for Role Reversed

	B	*SE*	β	*t*	*p*	95% CI		R^2	Adjusted R^2	ΔR^2
						LL	*UL*			
Model 1								.160	.068	N/A
Constant	5.26	0.88		6.00	<.001	3.51	7.01			
Age	-0.05	0.03	-0.26	-2.02	**.048**	-0.10	0.00			
Deprivation	-0.06	0.04	-0.20	-1.71	.093	-0.13	0.01			
Number of children	0.11	0.16	0.08	0.69	.495	-0.20	0.42			
Education	-0.01	0.07	-0.02	-0.15	.880	-0.15	0.13			
Number of pregnancy losses	-0.02	0.08	-0.03	-0.23	.819	-0.18	0.14			
Gestational age of last loss	0.05	0.06	0.10	0.83	.408	-0.06	0.15			

Time pregnancy loss	0.14	0.06	0.28	2.30	**.025**	0.02	0.25			
Model 2								.24	.11	.08
Constant	3.70	1.23		3.00	.004	1.23	6.17			
Age	-0.05	0.03	-0.25	-1.86	.068	-0.10	0.00			
Deprivation	-0.06	0.04	-0.19	-1.58	.119	-0.13	0.02			
Number of children	0.14	0.15	0.11	0.92	.36	-0.17	0.45			
Education	-0.00	0.07	-0.01	-0.04	.965	-0.14	0.14			
Number of pregnancy losses	-0.02	0.08	-0.03	-0.26	.796	-0.19	0.15			
Gestational week of last loss	0.06	0.06	0.12	0.98	.329	-0.06	0.16			
Time since pregnancy loss	0.15	0.06	0.32	2.58	**.012**	0.03	0.27			
Trauma	-0.01	0.01	-0.28	-1.45	.152	-0.03	0.01			
Grief	0.00	0.01	0.05	0.25	.805	-0.01	0.01			
Anxiety	0.01	0.01	0.36	1.69	.097	-0.00	0.03			
Social Support	0.26	0.14	0.24	1.83	.072	-0.02	0.54			

Discussion

The present study aimed to investigate prenatal caregiving expectations in mothers with a history of pregnancy loss. A secondary aim was to examine the psychological predictors of each caregiving expectation. Caregiving expectations were assessed using the Prenatal Caregiving Expectations Questionnaire (PCEQ), which measures five constructs of caregiving. Three of these constructs correspond to organised caregiving dimensions: *Commitment and Enjoyment* (corresponding to Secure Attachment)*, Discourages Closeness* (Insecure-Dismissing), and *Sentimental and Heightened* (Insecure-Preoccupied). The remaining two constructs, *Helpless and Out of Control* and *Role Reversed and Merged*, correspond to disorganised attachment.

In the current sample, women showed high scores on the *Commitment and Enjoyment* scale. Røhder et al. (2019) similarly observed high scores in both mothers with a diagnosis of

severe mental illness and a non-clinical control group. More recently, Røhder et al. (2024) sought to revise the PCEQ to better accommodate Danish perinatal populations. They encountered challenges in validating an 'optimal' caregiving scale, noting minimal variability and potential ceiling effects in participants' scores on the scale. They suggested that inflated scores might stem from social desirability bias and that the presence of C*ommitment and Enjoyment* expectations alone, does not necessarily predict optimal caregiving. They propose optimal caregiving is also influenced by the absence of other 'sub-optimal' representations, suggesting that in this instance, it would be more useful to consider all five scales together. While there may be questions regarding the construct validity of the *Commitment and Enjoyment* scale, the current study found significant negative correlations with the grief subscale *difficulty coping*, in addition to significant positive correlations between all but one of the social support subscales – findings that align with what we would expect from this caregiving representation.

In the current sample, moderate scores were observed on the *Role Reversed and Merged* caregiving scale, similar to findings in mothers with psychosis, who scored higher than non-clinical controls (Røhder et al., 2019). However, Røhder et al. (2024) struggled to validate this scale as an independent caregiving expectation, finding that it overlapped with the *Sentimental and Heightened* scale. Our study also found moderate scores on the *Sentimental and Heightened* scale, similar to those in a small psychopathology population (Røhder et al., 2019). The PCEQ-Revised (Røhder et al., 2024) combines items from both scales into a single *Anxious Hyper-activation* scale. In a non-clinical sample of 300 Danish women, this scale yielded moderate mean scores. These findings suggest that the observed scores in the current study may be typical, but further research with the revised scale is needed to confirm this hypothesis.

The lowest scores in our sample were for *Discourages Closeness* and *Helplessness and Out of Control* subscales. *Helplessness* scores closely resembled those of control groups in Røhder et al.'s (2019) study. Furthermore, Røhder et al. (2024) found that higher *Helplessness* scores were uniquely predicted by low-quality, low-intensity prenatal attachment styles, measured by the MAAS (Condon, 1993). Interestingly, Kelmanson (2024) reported that in a

sample of mothers pregnant after loss, one third of mothers exhibited caregiving styles characterised by low quality and intensity, suggesting a different pattern from our findings.

Low scores on the *Discourages Closeness* scale are surprising, as prior research suggests mothers pregnant after loss often use strategies to emotionally distance themselves from their baby (Mills et al., 2014). However, recruitment was primarily conducted through charity web pages and support groups, suggesting the sample may skew towards individuals who are more help-seeking, which may be reflected in the caregiving expectations we see in this sample. Despite attempts to recruit through maternity clinics, only one participant was enrolled this way. This could reflect the sensitive nature of the topic and the possibility that those who employ more emotionally distancing strategies may be less inclined to take part, and therefore are not represented in the sample. Furthermore, research has struggled to support the *Discourages Closeness* scale within the five-factor PCEQ, suggesting it may not fully capture this construct (Røhder, 2019). Future research on the original PCEQ's factor structure in a normative UK sample is recommended to address construct validity concerns.

Deprivation and Social Support

Living in areas of greater deprivation was found to significantly predict higher *Commitment and Enjoyment* scores. This finding was unexpected, as previous research has indicated that higher deprivation is typically associated with insecure attachment styles in adults (Van IJzendoorn & Bakermans-Kranenburg, 1996). Mothers in highly deprived areas are more likely to face increased stressors such as violence, housing instability, and economic hardship, factors that are believed to impact attachment and impair a caregiver's ability to be emotionally available and responsive to an infant's needs (Bradley & Corwyn, 2002). A post hoc analysis did not reveal significant differences between deprivation quintiles. The findings may reflect social desirability influencing responses to the *Commitment and Enjoyment* scales, as suggested by Røhder et al. (2024). However, it is worth noting that the collective sample was highly educated and reported strong social support. Research shows maternal education in deprived areas predicts greater closeness, support, and satisfaction in mother-child relationships (Rawatlal et al., 2015). Furthermore, Chen and Miller (2012) argue that deprivation doesn't always lead to poorer outcomes, as resilience can emerge

through exposure to positive caregiving figures who model emotion regulation and trustworthiness during times of stress.

George and Solomon (2008) suggest that the quality of support a mother experiences during moments when her own threat system is activated, plays a critical role in shaping her internal working model of caregiving. This aligns with our findings, where greater social support predicted higher *Commitment and Enjoyment*, while lower support predicted higher *Discourages Closeness* expectations. In light of the overall high levels of social support observed in this sample, it is possible that individuals from more deprived areas may have benefited from unique opportunities to develop resilience, facilitated through their own positive experiences of care and support. Such experiences may have contributed to the formation of an internal caregiving framework that prioritises protection and comfort for their baby, even in the context of adversity.

Trauma, Grief and Anxiety

The literature links pregnancy loss with poorer mental health outcomes. In this sample, mean scores reflected mild to moderate trauma, grief, and anxiety. Despite these findings, we did not observe any evidence to suggest that mental health predicted caregiving expectations, with the exception of anxiety, which was found to significantly predict *Helplessness and Out of Control* expectations. This aligns with research that's found limited interaction between mental health and prenatal attachment (Armstrong, 2002; Beauquier-Maccotta et al., 2022; Branjerdporn et al., 2021;).After accounting for pregnancy and demographic variables, anxiety predicted *Helplessness and Out of Control* caregiving expectations. Similarly, Røhder et al. (2024) found trait anxiety predicted Helplessness expectations in a non-clinical sample. This caregiving style reflects difficulty regulating emotions when responding to a child's needs, with behaviour often appearing "threatened or frozen" (Solomon & George, 2011). These findings suggest that anxiety experienced during pregnancy, and perhaps its impact on emotional well-being, attention, and cognitive processes, may disrupt the expected psychological transition from seeking care for oneself to providing care for a child.

Time Between Pregnancies

A shorter interval between pregnancies predicted higher *Helplessness and Out of Control* caregiving scores. Women who have experienced pregnancy loss often feel powerless and uncertain about carrying a pregnancy to term (Wojnar et al., 2011). Becoming pregnant again shortly after such an experience may not provide sufficient time for emotional recovery, leaving mothers feeling less in control and more worried about the possibility of another loss. Conversely, longer intervals between pregnancies were associated with increased *Role Reversal and Merged* and *Discourages Closeness* expectations. Similar to conceiving "too soon" following a loss, extended time to conceive may heighten uncertainty about the feasibility of carrying a pregnancy to term, potentially leading to emotional distancing strategies (Mills et al., 2014). Furthermore, the emotional difficulties encountered during prolonged attempts to conceive, may intensify the perception that having a child will fulfil unmet emotional needs and may influence caregiving expectations. Qualitative research would be beneficial to explore how length of time to conceive shapes caregiving expectations.

Previous Living Children

Having more children was linked to lower scores on the *Discourages Closeness* and *Helpless and Out of Control* caregiving scales, supporting findings by Røhder et al. (2024) and Yilmaz and Beji (2013). This suggests that prior motherhood experience may serve as a protective factor, likely providing an established caregiving framework and greater confidence compared to first-time mothers.

Sentimental and Heightened Caregiving

None of the demographic, pregnancy, or psychological variables significantly predicted *Sentimental and Heightened* caregiving scores, contrasting with research which has found anxiety to predict *Anxious-Hyperactive* caregiving (Røhder et al., 2024). The findings suggest that factors not captured by the present study may more strongly influence these caregiving expectations in individuals with a history of loss.

Strengths and Limitations

A key strength of this study is its focus on caregiving expectations in individuals with prior pregnancy loss, offering a more meaningful psychological construct than "prenatal

attachment," as caregiving expectations can predict postpartum attachment (Solomon & George, 2011). Additionally, the current study has attempted to identify predictors of specific caregiving expectations, providing valuable insights into how factors such as trauma, grief, anxiety and social support might shape these constructs. This offers a more nuanced understanding that can inform potential intervention to enhance psychological wellbeing for both mother and child.

This study has several limitations. The relatively small sample size limited our ability to meet the requirements of the a priori power calculation, reducing the generalisability of the findings and increasing the likelihood of a type II error. The sample was homogenous: predominantly white, highly educated mothers from lower-deprivation areas. This lack of diversity makes it challenging to generalise the findings to the wider population, particularly to individuals from more deprived areas or different ethnic backgrounds. Furthermore, the recruitment strategy may have over-represented help-seeking individuals and under-represented those who use emotional distancing strategies, further limiting generalisability. We primarily recruited participants via the internet, which proved more effective than in-person recruitment; however, this method has several limitations. Although we clearly stated our inclusion criteria in participant facing materials and embedded relevant screening questions in the demographic questionnaire, the nature of internet recruitment meant we could not fully verify that all participants met these criteria. Additionally, reliance on internet-based recruitment may have excluded individuals without internet access, potentially leaving out those from higher deprivation areas.

Future Research and Recommendations

In addition to including participants from more diverse populations and recruitment settings, future research would benefit from adopting alternative methodological approaches to deepen the understanding of prenatal caregiving expectations following pregnancy loss. For instance, adopting the recent PCEQ-Revised (PCEQ-R; Røhder et al., 2024) or using a longitudinal approach to track caregiving expectations across pregnancy and into early infancy, which would provide valuable insights into how the caregiving system evolves and how this later relates to the parent-infant relationship. Furthermore, employing qualitative methods could capture the complexity and contextual nuances of prenatal

caregiving expectations in a way that quantitative measures may overlook. Given the limited number of significant predictive factors identified in this study, qualitative research may help uncover unanticipated themes, shedding light on previously unidentified risk and protective factors.

Another way to conceptualise the psychological shift that occurs during pregnancy is through the framework of matrescence (Raphael, 1973). Matrescence describes a developmental transition, similar to adolescence, in which a person undergoes psychological, emotional, and social changes as they become a mother. While this theory overlaps with the caregiving system, it offers a broader perspective by capturing the internal and contextual experiences that accompany the transition to motherhood and the transformation of identity. This identity shift continues to evolve across the lifespan (e.g., as children transition from infancy to adulthood) and is influenced by the socio-cultural expectations of what it means to be a "good mother," along with the inner struggles of embracing or resisting these norms. Matrescence acknowledges the internal complexity that accompanies the prioritisation of caregiving, including the grief of letting go of a former identity and the challenge of balancing multiple roles (mother, partner, friend, professional). Additionally, it normalises the spectrum of emotional experiences that accompany motherhood, including uncertainty, depression and ambivalence. Therefore, matrescence could provide an important lens for understanding how the broader psychological transition to motherhood can shape, and potentially disrupt, the caregiving system.

This perspective is particularly relevant in the context of pregnancy after pregnancy loss. Societal attitudes toward pregnancy loss, such as silence, blame, and the expectation to "move on and try again", might further complicate a mother's sense of self and her perception of being a "good" mother. The societal expectation to feel only joy in a subsequent pregnancy may create inner conflict, guilt, and anxiety about fully embracing maternal identity after loss, potentially influencing caregiving expectations and behaviours. Future research that considers how matrescence, the caregiving system, and pregnancy loss intersect, may offer deeper insight into how prior loss shapes the psychological transition to motherhood and caregiving in subsequent pregnancies.

While further research is needed to expand on our findings, the study highlights important implications for pregnancy services. Recent policy developments have acknowledged the connection between pregnancy loss and maternal well-being, leading to recommendations for routine mental health screening to ensure appropriate support (NHS Scotland, 2025). In line with this, healthcare providers should also recognise previous pregnancy loss as a risk factor when caring for expectant mothers, particularly those without living children and with poor social support. Clinicians should remain attentive to potential challenges in the developing mother-foetus relationship, as early identification of difficulties could enable timely interventions, fostering more holistic care not only for the mother, but also for her growing child.

Conclusion

In summary, this study is the first to examine caregiving expectations in pregnant mothers who have experienced previous loss. The findings are indicative of expectations that reflect organised caregiving behaviours, particularly those that are related to balanced and anxious-overactive caregiving. The findings highlight the significant roles that social support, anxiety, deprivation, children and the timing of subsequent pregnancies play in shaping caregiving expectations, and the limited effect of trauma and grief. However, the small, homogenous sample and potential recruitment bias suggest that further research, particularly with more diverse populations, is needed to validate these findings and provide further insight.

Declaration

This research received no external funding. The authors declare no conflict of interest.

References

Armstrong, D. S. (2002). Emotional distress and prenatal attachment in pregnancy after perinatal loss. *Journal of Nursing Scholarship*, 34(4), 339-345. https://doi.org/10.1111/j.1547-5069.2002.00339.x

Arnold, J., & Gemma, P. B. (1994). *A child dies: A portrait of family grief (*2nd ed.). Charles Press.

Beauquier-Maccotta, B., Shulz, J., De Wailly, D., Meriot, M. E., Soubieux, M. J., Ouss, L., ... & Missonnier, S. (2022). Prenatal attachment, anxiety and grief during subsequent pregnancy after medical termination of pregnancy. Attachment to which child?. *Journal of Gynecology Obstetrics and Human Reproduction*, *51*(4), 102353. https://doi.org/10.1016/j.jogoh.2022.102353

Bedaso, A., Adams, J., Peng, W., & Sibbritt, D. (2021). The relationship between social support and mental health problems during pregnancy: a systematic review and meta-analysis. *Reproductive health*, *18*(1), 1-23. https://doi.org/10.1186/s12978-021-01209-5

Bergner, A., Beyer, R., Klapp, B. F., & Rauchfuss, M. (2008). Pregnancy after early pregnancy loss: a prospective study of anxiety, depressive symptomatology and coping. *Journal of Psychosomatic Obstetrics & Gynecology*, 29(2), 105-113. https://doi.org/10.1080/01674820701687521

Blackmore, E. R., Côté-Arsenault, D., Tang, W., Glover, V., Evans, J., Golding, J., & O'Connor, T. G. (2011). Previous prenatal loss as a predictor of perinatal depression and anxiety. *The British Journal of Psychiatry*, *198*(5), 373-378. https://doi.org/10.1192/bjp.bp.110.083105

Bowlby, J. (1982). Attachment and loss: retrospect and prospect. *American journal of Orthopsychiatry*, *52*(4), 664. https://doi.org/10.1111/j.1939-0025.1982.tb01456.x

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual review of psychology*, *53*(1), 371-399. https://doi.org/10.1146/annurev.psych.53.100901.135233

Branjerdporn, G., Meredith, P., Wilson, T., & Strong, J. (2021). Maternal–fetal attachment: Associations with maternal sensory processing, adult attachment, distress and perinatal loss. *Journal of Child and Family Studies*, *30*, 528-541. https://doi.org/10.1007/s10826-020-01876-1

Brennan, J., & George, C. (2013). *Prenatal Caregiving Experiences Questionnaire* [Unpublished manuscript]. Mills College.

Brigham, S. A., Conlon, C., & Farquharson, R. G. (1999). A longitudinal study of pregnancy outcome following idiopathic recurrent miscarriage. *Human Reproduction*, *14*(11), 2868-2871. https://doi.org/10.1093/humrep/14.11.2868

Chen, E., & Miller, G. E. (2012). "Shift-and-persist" strategies: Why low socioeconomic status isn't always bad for health. *Perspectives on psychological science*, *7*(2), 135-158

Condon, J. T. (1993). The assessment of antenatal emotional attachment: development of a questionnaire instrument. *British journal of medical psychology*, *66*(2), 167-183. https://doi.org/10.1111/j.2044-8341.1993.tb01739.x

Corr, C. A. (1993). Coping with dying: Lessons that we should and should not learn from the work of Elisabeth Kübler-Ross. *Death studies*, *17*(1), 69-83. https://doi.org/10.1080/07481189308252605

Côté-Arsenault, D., & Donato, K. L. (2007). Restrained expectations in late pregnancy following loss. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, *36*(6), 550-557. https://doi.org/10.1111/j.1552-6909.2007.00185.x

Crawford, A., & Benoit, D. (2009). Caregivers' disrupted representations of the unborn child predict later infant-caregiver disorganized attachment and disrupted interactions. *Infant Mental Health Journal*, *30*(2), 124–144. https://doi.org/10.1002/imhj.20207

DATAtab. (n.d.-a). *Mann-Whitney U test – A simple explanation.* DATAtab. https://datatab.net/tutorial/mann-whitney-u-test

DATAtab. (n.d.-b). *Effect size for independent t-test – A simple explanation*. DATAtab. https://datatab.net/tutorial/effect-size-independent-t-test

Daugirdaitė, V., van den Akker, O., & Purewal, S. (2015). Posttraumatic stress and posttraumatic stress disorder after termination of pregnancy and reproductive loss: a systematic review. *Journal of pregnancy*, *2015*(1), 646345. https://doi.org/10.1155/2015/646345

Dayton, C. J., Levendosky, A. A., Davidson, W. S., & Bogat, G. A. (2010). The child as help in the mind of the mother: The influence of prenatal maternal representations on parenting behaviour. *Infant Mental Health Journal, 31*(2), 220–241. https://doi.org/10.1002/imhj.20253

DeMontigny, F., Verdon, C., Meunier, S., Gervais, C., & Coté, I. (2020). Protective and risk factors for women's mental health after a spontaneous abortion. *Revista latino-americana de enfermagem*, 28. https://doi.org/10.1590/1518-8345.3382.3350

Furlong, R. M., & Hobbins, J. C. (1983). Grief in the perinatal period. *Obstetrics & Gynecology, 61*(4), 497-500.

Gaudet, C., Séjourné, N., Camborieux, L., Rogers, R., & Chabrol, H. (2010). Pregnancy after perinatal loss: association of grief, anxiety and attachment. *Journal of reproductive and infant psychology*, *28*(3), 240-251. https://doi.org/10.1080/02646830903487342

George, C., & Solomon, J. (2008). The caregiving system: A behavioral systems approach to parenting. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2nd ed., pp. 833-856). Guilford Press.

Heller, S. S., & Zeanah, C. H. (1999). Attachment disturbances in infants born subsequent to perinatal loss: A pilot study. *Infant Mental Health Journal: Official Publication of the World Association for Infant Mental Health*, 20(2), 188-199. https://doi.org/10.1002/(sici)1097-0355(199922)20:2<188::aid-imhj6>3.0.co;2-h

Higher Education Statistics Agency. (2025). 'Socioeconomic Index for Small Areas'. https://hesa.ac.uk/data-and-analysis/research/seisa

Kelmanson, I. A. (2024). Manifest anxiety and maternal–foetal attachment in pregnant women with previous foetal losses. *Journal of Reproductive and Infant Psychology*, *42*(1), 45-61. https://doi.org/10.1080/02646838.2022.2056882

Malory, B. (2024). Linguistic Challenges in Communicating about Pregnancy Loss. *Tommy's.* https://www.tommys.org/our-research/our-research-projects/impact-language-experiences-baby-loss

Mikulincer, M., Gillath, O., & Shaver, P. R. (2002). Activation of the attachment system in adulthood: threat-related primes increase the accessibility of mental representations of attachment figures. *Journal of personality and social psychology*, *83*(4), 881. https://doi.org/10.1037//0022-3514.83.4.881

Mills, T. A., Ricklesford, C., Cooke, A., Heazell, A. E. P., Whitworth, M., & Lavender, T. (2014). Parents' experiences and expectations of care in pregnancy after stillbirth or neonatal death: a metasynthesis. *BJOG: An International Journal of Obstetrics & Gynaecology*, *121*(8), 943-950. https://doi.org/10.1111/1471-0528.12656

Moulder, C. (1994). Towards a preliminary framework for understanding pregnancy loss. *Journal of Reproductive and Infant Psychology*, *12*(1), 65-67. https://doi.org/10.1080/02646839408408869

NHS Scotland. 2025. *Delivery Framework for Miscarriage Care in Scotland*. NHS Scotland. https://www.publications.scot.nhs.uk/files/dl-2025-02.pdf

O'Malley, E. G., Walsh, M. C., Reynolds, C. M., Kennelly, M., Sheehan, S. R., & Turner, M. J. (2020). A cross-sectional study of maternal-fetal attachment and perceived stress at the first antenatal visit. *Journal of reproductive and infant psychology*, *38*(3), 271-280. https://doi.org/10.1080/02646838.2019.1637516

Potvin, L., Lasker, J., & Toedter, L. (1989). Measuring grief: A short version of the Perinatal Grief Scale. *Journal of Psychopathology and Behavioural Assessment*, *11*(1), 29-45. https://doi.org/10.1007/bf00962697

Rawatlal, N., Pillay, B. J., & Kliewer, W. (2015). Socioeconomic status, family-related variables, and caregiver–adolescent attachment. *South African Journal of Psychology*, *45*(4), 551-563. https://doi.org/10.1177/0081246315588906

Reardon, D. C., & Craver, C. (2021). Effects of perinatal loss on subsequent postpartum mental health: A prospective longitudinal cohort study. *International journal of*

environmental research and public health, *18*(4), 2179. https://doi.org/10.3390/ijerph18042179

Røhder, K., Baumann, M. V., Karstoft, K. I., Schleicher, I., George, C., & Harder, S. (2024). The prenatal caregiving expectations questionnaire-revised version: Factor structure, internal consistency, and initial construct validity. *Infant Mental Health Journal*, *45*(5), 541-556. https://doi.org/10.1002/imhj.22128

Røhder, K., MacBeth, A., Agnete Davidsen, K., Gumley, A., Brennan, J., George, C., & Harder, S. (2020). Antenatal caregiving representations and perinatal behaviour in mothers with severe lifetime psychopathology. *Infant Mental Health Journal*, *41*(1), 56-68. https://doi.org/10.1002/imhj.21824

Røhder, K., Nyström-Hansen, M., MacBeth, A., Davidsen, K. A., Gumley, A., Brennan, J.,

George, C., & Harder, S. (2019). Antenatal caregiving representations among expectant mothers with severe mental illness: a cross-sectional study. *Journal of reproductive and infant psychology*, *37*(4), 370-383. https://doi.org/10.1080/02646838.2019.1578868

Serrano, F., & Lima, M. L. (2006). Recurrent miscarriage: psychological and relational consequences for couples. *Psychology and Psychotherapy: Theory, Research and Practice*, *79*(4), 585-594. https://doi.org/10.1348/147608306x96992

Sherbourne, C. D., & Stewart, A. L. (1991). The MOS social support survey. *Social science & medicine*, *32*(6), 705-714. https://doi.org/10.1016/0277-9536(91)90150-b

Solomon, J., & George, C. (2011). Disorganization of maternal caregiving across two generations. *Disorganized attachment and caregiving*, 25-51.

Somerville, S., Dedman, K., Hagan, R., Oxnam, E., Wettinger, M., Byrne, S., Coo, S., Doherty, D., & Page, A. C. (2014). The perinatal anxiety screening scale: development and preliminary validation. *Archives of women's mental health*, *17*, 443-454. https://doi.org/10.1007/s00737-014-0425-8

Toedter, J., Lasker, J. & Janssen, H. (2001). International comparison of studies using the perinatal grief scale: a decade of research on pregnancy loss. *Death studies*, *25*(3), 205-228.

Tommy's. (2024, December 12). Baby Loss Statistics. Tommy's. Together, for every baby. https://www.tommys.org/baby-loss-support/pregnancy-loss-statistics

Van IJzendoorn, M. H., & Bakermans-Kranenburg, M. J. (1996). Attachment representations in mothers, fathers, adolescents, and clinical groups: a meta-analytic search for normative data. *Journal of consulting and clinical psychology*, *64*(1), 8. https://doi.org/10.1037//0022-006x.64.1.8

Ward, G., Adair, P., Doherty, N., & McCormack, D. (2023). Bereaved mothers' experience of expressing and donating breast milk: An interpretative phenomenological study. *Maternal & child nutrition*, *19*(1) e13473. https://doi.org/10.1111/mcn.13473

Weiss, D. S. (2007). The Impact of Event Scale-Revised. In J.P. Wilson, & T.M. Keane (Eds.) *Assessing psychological trauma and PTSD: a practitioner's handbook (2nd ed., pp. 168-189).* New York: Guilford Press. https://doi.org/10.1007/978-0-387-70990-1_10

Wittkowski, A., Vatter, S., Muhinyi, A., Garrett, C., & Henderson, M. (2020). Measuring bonding or attachment in the parent-infant-relationship: A systematic review of parent-report assessment measures, their psychometric properties and clinical utility. *Clinical Psychology Review*, *82*, 101906. https://doi.org/10.1016/j.cpr.2020.101906

Wojnar, D. M., Swanson, K. M., & Adolfsson, A. S. (2011). Confronting the inevitable: A conceptual model of miscarriage for use in clinical practice and research. *Death studies*, *35*(6), 536-558. https://doi.org/10.1080/07481187.2010.536886

Wright, P. M., & Carpenter, J. (2023). A Review of the psychometrics of perinatal grief instruments. *Illness, Crisis & Loss*, *31*(1). https://doi.org/10.1177/10541373231163260

Yilmaz, S. D., & Beji, N. K. (2013). Effects of perinatal loss on current pregnancy in Turkey. *Midwifery*, *29*(11), 1272-1277.

Appendices

Appendix 1.1 – Search Strategies

CINAHL via EBSCOhost.

Limiters/Expanders:

Expanders – Apply equivalent-subjects

Search modes – Boolean/Phrase

Search string:

S1. (MH "Abortion, Spontaneous") OR (MH "Abortion, Habitual") OR (MH "Pregnancy Outcomes")

S2. (MH "Perinatal Death")

S3. TI (("pregnancy loss*" or miscarriage or "spontaneous abortion*" or "planned abortion*" or stillbirth or stillborn or "perinatal death*"))

S4. S1 OR S2 OR S3

S5. (MH "Attachment Behaviour") OR (MH "Prenatal Bonding")

S6. (MH "Mother-Child Relations") OR (MH "Mother-Infant Relations") OR (MH "Parent-Child Relations")

S7. TI ((attachment or bond* or connection or relationship or mother-foetus or mother-fetus or mother-infant)) OR AB ((attachment or bond* or connection or relationship or mother-foetus or mother-fetus or mother-infant))

S8. S5 OR S6 OR S7

S9. TI((("next" or "subsequent") n2 (pregnan* or child*))) OR AB ((("previous" or "next" or "subsequent") n2 (pregnan* or child*)))

S10. S4 AND S8 AND S9

APA Psycinfo via EBSCOhost.

Limiters/Expanders:

Expanders – Apply equivalent-subjects

Search modes – Boolean/Phrase

Search string:

S1. DE "Induced Abortion" OR DE "Spontaneous Abortion"

S2. TI (("pregnancy loss*" or miscarriage or "spontaneous abortion*" or "planned abortion*" or stillbirth or stillborn or "perinatal death*")) OR AB(("pregnancy loss*" or miscarriage or "spontaneous abortion*" or "planned abortion*" or stillbirth or stillborn or "perinatal death*"))

S3. S1 OR S2.

S4. DE “Attachment Disorders” OR DE “Attachment Style” OR DE “Attachment Behavior” OR DE “Attachment Theory”

S5. DE “Mother Child Communication” or DE “Mother Child Relations”

S6. TI ((attachment or bond* or connection or relationship or mother-foetus or mother-fetus or mother-infant)) OR AB ((attachment or bond* or connection or relationship or mother-foetus or mother-fetus or mother-infant))

S7. S4 OR S5 OR S6

S8. TI(((“next” or “subsequent”) n2 (pregnan* or child*))) OR AB (((“previous” or “next” or “subsequent”) n2 (pregnan* or child*)))

S9. S3 AND S7 AND S8

Web of Science via Clarivate

Search string:

1. TS=(“pregnancy loss*” or miscarriage or “spontaneous abortion*” or “planned abortion*” or stillbirth or stillborn or “perinatal death*”) and Preprint Citation Index (Exclude – Database)
2. TS= (attachment or bond*or connection or relationship or mother-foetus or mother-fetus or mother-infant relationship)
3. TS= ((“previous” or “next” or “subsequent”) NEAR/2 (pregnan* or child*)) and Preprint Citation Index (Exclude – Database)
4. #1 AND #2 AND #3 Preprint Citation Index (Exclude-Database)

Embase via Ovid

Search string:

1. first trimester abortion/ or legal abortion/ or recurrent abortion/ or imminent abortion/ or selective abortion/ or abortion/ or surgical abortion/ or second trimester abortion/ or previous abortion/ or induced abortion/ or spontaneous abortion/ or incomplete abortion/ or third trimester abortion/ or inflammation-induced abortion/ or septic abortion/ or medical abortion/ or therapeutic abortion/ or hormonal abortion/ or complete abortion/

2. stillbirth/

3. perinatal death/ or fetus death/

4. (“pregnancy loss*” or miscarriage* or “spontaneous abortion*” or “planned abortion” or stillbirth or stillborn or “perinatal death*”).ti,ab.

5. 1 or 2 or 3 or 4

6. emotional attachment/

7. mother child relation/
8. (attachment or bond* or connection or relationship or mother-foetus or mother-fetus or mother-infant). ti,ab.
9. 6 or 7 or 8
10. (("previous" or "next" or "subsequent") adj2 (pregnan* or child*)).ti,ab.
11. 5 and 9 and 10

Medline via Ovid

Search String

1. Abortion, Habitual/ or Abortion, Spontaneous/ or Abortion, Criminal/ or Abortion, Induced/
2. Stillbirth/
3. Fetal Death
4. ("pregnancy loss**" or miscarriage* or "spontaneous abortion*" or "planned abortion" or stillbirth or stillborn or "perinatal death*").ti,ab.
5. 1 or 2 or 3 or 4
6. Mother- Child Relations/
7. (attachment or bond* or connection or relationship or mother-foetus or mother-infant).ti,ab.
8. 6 or 7
9. (("previous" or "next" or "subsequent") adj2 (pregnan* or child*)).ti,ab.
10. 5 and 8 and 9

Appendix 1.2

Table 1.1

Summary of Cross-sectional Studies

Study	Country	Ethnicity	Pregnancy Group/s	*N*	Age of Mother (Years)		Pregnancy Loss Characteristics	Current Pregnancy Stage	Relationship Measure	Other Mental Health Outcomes	Results
					M	*SD*					
Armstrong and Hutti (1998)	USA	Not reported	Pregnancy loss history	16	31.5	N/a	Second trimester miscarriage; Stillbirth; Early-neonatal death. No further information on proportion of sample.	Second or third trimester	PAI	Anxiety: POQ	<u>Comparison of PAI Scores Between Loss Exposure Groups:</u> Loss group PAI *M (SD*): 54.68 (14.36) Control PAI *M (SD)*: 64 (8.114) *Mdiff*: 9.32. *p=.0482* Summary: The loss group had significantly lower PAI scores than the control group.
			Without loss	15	26	N/a					
Armstrong (2002)	USA	Caucasian – 90% Other - 10% (details not reported)	Pregnancy loss history - mothers and fathers)	40 x 2	32.7	5.5	Loss at any stage of gestation. *M(SD)*= 22.6 (12.3) weeks	Second trimester	PAI	Depression: CES-D. Anxiety: POQ	<u>Comparison of PAI Mean Scores Between Loss Exposure Mothers:</u> Loss mothers PAI: *M (SD*) = 56.53 (12.2). First Pregnancy mothers: *M (SD)* = 58.76 (9.1). Successful pregnancy mothers: *M (SD)* = 60.23 (7.7) <u>Mean difference</u> Pregnancy loss – first pregnancy group = -2.23, *d*= 0.22 (small effect size) Pregnancy loss – successful pregnancies = -3.7, *d*=0.36 (small effect size). Summary: PAI scores were lowest in the loss group. However, all PAI differences between mothers reported to be insignificant. *p* value not reported. <u>Loss Fathers PAI Mean Scores:</u> *M (SD)*= 51.85 (9.1) <u>Mean difference</u> (Loss mothers – Loss fathers) = 4.68. *d*= 0.43 (small – moderate). Fathers in the loss group had lower PAI scores. However, reported to be insignificant. *p* value not reported. <u>Additional Correlates of PAI:</u> For all parents and exposure groups, PAI scores increased as gestational age at time of interview increased (*r*=0.32, *p* = .004.)
			First pregnancy (no loss history) – mothers and fathers	33 x 2	29.7	5.6					
			History of successful pregnancies (no loss history) – mothers and fathers	30 x 2	29.5	5.0					
Armstrong (2004).	USA	White – 95% Other – 5% (details not reported)	Pregnancy loss mothers and fathers	40 x 2	32.6	4.6	Loss at any stage of gestation. *M(SD)*= 22.6 (12.3) weeks	Second trimester	PAI	Trauma: IES. Anxiety: POQ. Depression: CES-D	No significant difference in PAI between parents (see above). Multiple regression models to investigate whether IES scores, gender, IES x gender interaction were predictive of PAI. Reported to not be significant. No statistical data provided.

Branjerdporn et al. (2021)	Australia	Caucasian – 80% Other – 20% (details not reported) Caucasian – 82% Other – 18% (details not reported).	Pregnancy loss history Without loss	41 67	30.13 30.12	4.97 4.19	Foetal loss ≥20 weeks gestation. Neonatal death ≤28 days of life. Further information of the sample not provided	At any stage of gestation. Loss group: Range: 25 – 33 weeks; *M (SD)* = 28.90 (2.15). Without loss: Range: 13 - 41.60 weeks; *M (SD)*= 33.06 (6.48)	MAAS	Adult attachment: ASQ. Mental Health: MHI-38. Sensory Profile: AASP. Infant development – Bayley III	<u>Comparison of MAAS Subscale Means Between Loss Exposure Groups:</u> Loss group: MAAS Quality *M (SD)* = 49.5 (3.63) Control: MAAS Quality *M (SD)*= 51.35 (3.16) *Mdiff*: 1.85, *p* = .77, *d*= 0.54 (moderate effect size) Loss group: MAAS Intensity *M (SD)*= 27.62 (5.41) Control: MAAS Intensity *M (SD)*= 28.7 (4.6) *Mdiff* : 1.08, *p*= .77, *d*= 0.22 (small effect size) Summary: MAAS Quality and Intensity scores are lower in the loss group compared to control. The Quality subscale had a moderate effect size while the Intensity (subscale) had a small. However, neither were significant. Differences in total MAAS scores between groups was not investigated. <u>Additional Correlates of MAAS:</u> MAAS was not significantly correlated with any adult psychological outcomes. MAAS Quality of Attachment was positively correlated with Bayley III "adaptive behaviours", *r*= .40, *p*= ≤ .05. Regression analysis revealed that while quality of attachment predicted Bayley III "adaptive behaviours", the addition of perinatal loss was not significant, *β*= 0.01, *S.E*= 8.66 (*F, R^2,* and *p* values of this model was not reported).
Chemouny and Wendland (2024)	France	Not reported	Pregnancy loss history only	267	30.84	4.46	Loss before 20 weeks of gestation. Loss before 12 weeks: *N*= 206 Loss at 12 weeks: *N*= 32 Loss after 12 weeks: *N*=29	Any stage of gestation. Range: 2- 40 weeks. M= 21.1 weeks, SD= 9.51	PAI	Resilience: CD-RISC. Partner support: Marital Support Questionnaire Body experience questionnaire	<u>PAI Score</u> *M (SD)* = 54.8 (12.3) <u>PAI Score Correlates</u> Not knowing the sex of the child led to higher PAI scores (*F* = 15.9, *p*<.001, partial *η*2=0.153. No significant difference in PAI according to medical miscarriage management, number of miscarriages and length of time between the current pregnancy and the miscarriage. Better body image was positively correlated to PAI, *r= 0.194*, *p*< 0.01. PAI was not significantly correlated with resilience (statistics not provided). Sense of control was positively correlated to PAI, *r= 0.222*, *p* <0.001. PAI was not significantly correlated to number of losses, *r*= 0.05, *p*= >0.5. PAI was positively correlated to gestation, *r*= 0.471, *p*<0.001. PAI was negatively correlated to maternal age, *r*= -0.206, *p*<0.001
Gaudet et al. (2010)	France	Not reported	Pregnancy loss history Without loss	96 74	29.8 27.0	4.01 4.07	Elective abortion up to 14 weeks: *N*=8; *M (SD)* =7.63 (2.2) weeks Therapeutic abortion: *N*=36; *M (SD)* =24.56 (7.14) weeks Miscarriage: *N*=27 *M (SD)*=12.48 (7.54) weeks Stillbirth: *N*=17; *M (SD)*=26.59 (7.12) weeks Neonatal death up to 6 days old: *N*=8; *M (SD)* birth and loss 36.63 (5.99) weeks	Any stage of pregnancy. Weeks *M(SD)*= 22.4 (10.24) weeks	MAAS	Anxiety and depression: HADS Grief: PSG Adaption to Pregnancy: PSEQ	<u>Comparison of MAAS Total and Subscale Mean Scores Between Loss Exposure Groups:</u> Loss group: MAAS total *M (SD)*= 63.96(10.9) Control MAAS total *M (SD)*=64.08 (7.36) *Mdiff*: 0.12, *p* >.05, *d*= 0.013 (minimal effect size) Loss group MAAS Quality *M (SD)*: 35.96 (5.5) No Loss MAAS Quality *M (SD):* 37.14 (3.69) *Mdiff*: 1.18 , *p*> .05 , *d*= 0.25 (small effect size) Loss group MAAS Intensity *M (SD)*: 24.57 (6.03) No Loss MAAS Intensity *M (SD)*: 23.55 (4.76) *Mdiff*: 1.02 *p* >.05, *d*= 0.18 (small effect size) Summary: MAAS Total scores and Quality scores were lower in the loss group compared to the control group, however this difference was small and not significant. MAAS Intensity scores were higher in the loss group compared to the control group. Again, this was not significant. <u>MAAS Correlates:</u> Those aware of gender had greater attachment. (*t* (94) = −2.42; *p*<.05). Attachment was higher in pregnancies that were further along (*F* (2, 93) =5.39; *p*<.01). Prenatal attachment negatively correlated with perinatal grief (*r*=.31; *p*<.01) and depression (*r*=−.36; *p*<.01). Those who had experienced neonatal loss had lower MAAS Intensity (*t* (94) =−2.09; *p*<.05) compared to other experiences of loss. Attachment intensity was negatively correlated with anxiety symptoms (*r*=−.21; *p*<.05).

										Regression analysis HADS, PSEQ, PGS scores, and stage of pregnancy predicted Quality of attachment in the loss group, explaining 51.6% of the variance (F (5, 90) = 19.18, p < .0001, R^2 = .52). Anxiety (β = 0.00, p = .99) and grief (β = -0.04, p = .67) were not significant predictors. A regression analysis showed that HADS, PSEQ, PGS scores, and stage of pregnancy predicted prenatal attachment Intensity in the loss group, explaining 32.6% of the variance (F (5, 90) = 8.68, p < .0001, R^2 = .33). Depression (β = -0.05, p = .66) and grief (β = -0.14, p = .27) were not significant predictors.
Kelmanson (2024)	Russia	Not reported	Pregnancy loss history	100	31.0	88.0	Previous experience of miscarriage <22 weeks. Range: 5-18 weeks. Median: 13 weeks	Any stage of pregnancy. Range: 4 – 35 weeks. Median: 12 weeks.	MAAS	Anxiety: TMAS.	MAAS Mean Scores: MAAS Total *M (SD)*: 79 (12) MAAS Quality *M (SD)*: 51 (6) MAAS Intensity *M (SD)*: 28 (7) MFA style: Low quality – Low intensity: 32%; High quality – High intensity: 40 %; High quality – Low intensity: 20%; Low quality – High intensity: 8% Regression Analysis: A hierarchical multiple regression identified predictors of MAAS Quality. Stage 1: maternal age, gestational age, previous abortions, parity, maternal education, and marital status. The overall model F (6, 93) = 3.30, p = .005, ΔR^2 = .18 (medium effect size). Only gestational age was individually significant (β = -0.43, t (100) = -3.99, p < .001). Stage 2: the addition of TMAS scores accounted for an additional 17% of the variance (ΔR^2 = .17), resulting in a significant change (F (1, 92) = 24.41, p < .001). The overall model R^2 increased to 0.35, indicating a large effect size. A hierarchical multiple regression identified predictors of MAAS Intensity. Stage 1: maternal age, gestational age, previous abortions, parity, maternal education, and marital status. The model was significant, F (6, 93) = 3.05, p = .009, explaining 16% of the variance (ΔR^2 = .16, p = .009). Only parity was individually significant (β = 0.70, t (100) = 3.32, p = .001), with the primipara group showing higher intensity. Stage 2: Addition of TMAS scores explained additional 2% (ΔR^2 = .02) of variation. Change in R^2 was insignificant: F (1, 92) = 1.33, p = .251. The overall model had medium effect size (R^2 = 0.18). ANCOVA: When adjusted for gestational age and parity, MFA style significantly predicted TMAS (F (3, 91) = 5.841, p = .001.) MFA style significantly predicted anxiety levels: anxious or ambivalent preoccupation had the highest levels of anxiety, while those with a positive quality of attachment but low preoccupation had the lowest. The effect size of the found association was moderate ($\varepsilon 2$ = 0.20)
Mehran et al. (2013)	Iran	Not reported	Pregnancy loss history Without loss (first pregnancy)	50 50	24.89 27.26	4.22 4.7	Foetal loss at any stage of pregnancy: N= 39. Abortion (no further definition given): N=14. Infant loss (no further definition given): N = 12.	Third trimester. Loss group: *M (SD)* = 34.6 (3.9) weeks. Without loss: *M (SD)* =32.7 (3.76) weeks.	MFAS	N/a	MFAS Subscale Means Between Loss Exposure Groups: Differentiation: Loss group= 78.25; Control= 83.21. Role Taking: Loss group= 78.43; Control = 79.12. Giving of self: Loss group= 73.5; Control= 73.8. Attribution of characteristics: Loss group = 59.91; Control= 63.8. Interaction with foetus: Loss group= 60.8; Control= 62 Across all categories except giving of self, the loss group scored lower than the control group. No significant differences reported between any of the categories except differentiation of self from foetus which was lower in the loss group. Statistical data not provided, including p values. Effect sizes could not be calculated.
O'Malley et al. (2020)	Ireland	Not reported	Pregnancy loss history	28	31.20**	4.9 **	Loss before 24 weeks. No further information given.	First antenatal visit. *M(SD)*=12.3 (2.1)	MFAS	Stress: PSS	MFAS Total Means Between Loss Exposure Groups: Loss group *M (SD)* =45.1 (5.1) Control *M (SD)* = 47.2 (6.7) *Mdiff* =2.1, p= 0.149, d= 0.35 (small effect size)

			Without loss	51						Summary: MFAS scores are lower in the loss group, although this is small and not significant. Regression Analysis: A hierarchical regression identified predictors of MFAS, including parity, maternal age, and pregnancy intention. Pregnancy intention significantly predicted MFAS after controlling for age and parity (β = 4.5, 95% CI [1.2, 7.9], p = .008). The model had an adjusted R^2 of 0.082. The F-statistic and p-value for the overall model were not reported.
Smorti et al. (2020)	Italy	Not reported	Previous elective abortion	23	36.04	5.88	Elective or therapeutic abortion. Exclusion criteria is miscarriage or stillbirth. No further information given.	Third trimester (> 32 weeks). Further data not provided.	PAI	Trauma: CES	Comparison of PAI Construct Scores Between Exposure Groups Differentiation: Elective abortion *M (SD)*= 12.48 (2.35) Therapeutic abortion *M (SD)*= 13.54 (1.97) *Mdiff* = 1.06, *p*=0.203, *d*=0.49 (moderate effect size) Affection: Elective abortion *M (SD)*= 16.39 (2.46) Therapeutic abortion Affection *M (SD)*= 18.45 (2.11) *Mdiff*= 2.06 *p*= 0.023 *d*=0.9 (large effect size) Fantasy: Elective abortion *M (SD)*= 5.65 (2.64) Therapeutic abortion Fantasy *M (SD)*= 8.09 (2.07) *Mdiff*= 2.44 p= 0.011 d= 1.02 (large effect size) Sensitivity: Elective abortion *M (SD)*= 12 (2.59) Therapeutic abortion Sensitivity *M (SD)*= 14.27 (1.74) *Mdiff*= 2.27, *p*= 0.013 *d*=1.03 (large effect size) Interaction: Elective abortion M (SD): 13.74 (3.39) Therapeutic abortion Interaction M (SD): 15.82 (3.37) *Mdiff*: 2.08 *p*=0.103 *d*= 0.62 (moderate effect size) Summary: Across all subscales, the Therapeutic Abortion group scored higher than the Elective Abortion group. However, only Affection, Fantasy and Sensitivity were significant.
			Previous therapeutic abortion	11	39.54	5.33					
Yilmaz and Beji (2013)	Turkey	Not reported	Previous loss history	128	29.93	5.07	Pregnancy loss. (Not defined). No further information given.	20+ weeks. Further data not reported.	PAI	Depression: CES-D. Coping with stress: Ways of Coping Inventory	Comparison of Total PAI Mean Scores Between Loss Exposure Groups Loss group *M (SD)*= 60 (10.43) Control *M (SD)*= 61.14 (9.93) *Mdiff* = 1.14, *p*= 0.314, *d*= 0.11 (small effect size) Summary: PAI scores were lower in the loss group, however this was a small difference and not significant. PAI Correlates In the loss group, PAI was higher in those with living children than without. *Mdiff*: 3.88, *p*= 0.035, *d*= 0.38 (small effect size). Did not investigate whether psychological variables predicted PAI.
			Without Loss	214	28.02	5.18					

Appendix 1.3

Table 1.2

Summary of Observational Cohort Studies

Study	Country	Ethnicity	Participant Group/s	*N*	Age of Mother (Years)		Pregnancy Loss Characteristics	Pregnancy Stage at Baseline	Time Points	Relationship Measure	Other Mental Health Outcomes	Results
					M	*SD*						
Beauquier-Maccotta et al. (2022)	France	Not reported	History of medical termination	25	33.6	2.6	Medical termination for foetal abnormality *M (SD)*= 24.8 (5.9) weeks	20 weeks	3 x during pregnancy. T1: 20 weeks T2: 27 weeks T3: 35 weeks	PAI	Post-Traumatic Stress: PCLS. Depression: EPDS Anxiety: STA Grief: scale PGS	<u>PAI scores in Loss group over time:</u> T1 *M (SD*) = 46.3 (11.5) T2 *M (SD)* = 55.4 (10.2) T3 *M (SD)*= 58 (10.1) <u>T2- T1 :</u> *Mdiff* = 9.1, *p*=.003, *d*= 0.515 (medium) <u>T3- T2:</u> *Mdiff*= 2.7, *p*= 0.235, *d*= 0.256 (small) <u>T3-T1:</u> *Mdiff*= 11.8, *p*<.001 , *d*=1.08 (large) <u>PAI scores in control group over time (SD not reported):</u> T1 *M* = 55.4 T2 *M*= 52.1 T3 *M*= 65 <u>Mdiff of PAI scores between the loss and control group over time:</u> T1 = 9.1, *p*= .039 T2= 3.3, *p*= .272 T3= 7, *p*= .092 Summary: PAI scores were significantly lower in the loss group than the control group at T1. Although, PAI scores were lower in the loss group at T3, this was not significant. PAI scores were higher in the loss group at T2, however again, this was not significant. Within the loss group, PAI scores increased over time however it appears that this is not in a steady fashion. <u>Other variables</u> At T1, those subjects in the loss group with PGS scores over the clinical threshold had significantly lower prenatal attachment: *M (SD)* 36.2 (12.3) vs. 49.6 (10.1), *p* = 0.022. There was no significant correlation between PAI scores and STAI-SA, PCLS or EPDS at any time.
			"Low risk" reference group	N/a	N/a	N/a						

Tsartsara and Johnson (2006)	UK	Not reported	Loss group Without loss	10 25	30.4	6.1	Miscarriage (loss up to 24 weeks). *M(SD)* = 10.4 (2.8) weeks. Exclusion criteria: a "sole history" of still birth/ neonatal death or elective abortion.	First trimester. Range: 8 – 12 weeks. *M (SD)* = 10.4 (1.2)**	T1: 1st trimester T2: 3rd trimester	MAAS	Anxiety: Pregnancy outcome questionnaire (POQ)	<u>MAAS Total Mean Scores at T1:</u> Loss *M (SD)*: 65.9 (10.4) Without loss *(SD)*: 70.8 (10.3) *Mdiff*: 4.9, *p*= .208, *d*= 0.47 *(*medium*)* <u>MAAS Quality Mean Scores at T1:</u> Loss *M (SD)*: 37.6 (5.9) Without loss *M (SD)*: 41.5 (6.6) *Mdiff*: 3.9, *p*= .119, *d*= 0.62 (medium) <u>MAAS Intensity Mean Scores at T1:</u> Loss *M (SD)*: 25.1 (4.2) Without loss *(SD)*: 25.2 (4.4) *Mdiff*: 0.1, *p*= .9, *d*= 0.023 (minimal effect) <u>MAAS Total Mean Scores at T2:</u> Loss *M (SD)*: 80.8 (3.1) Without loss *(SD)*: 78.5 (10.2) *Mdiff*: 2.3, *p*= not reported, *d*= 0.31 (small) <u>MAAS Quality Mean Scores at T2:</u> Loss *M (SD)*: 46.4 (1.1) Without loss *(SD)*: 44.7 (4.8) *Mdiff*: 1.7, *p*= .459 , *d*= 0.49 (medium) <u>MAAS Intensity Mean Scores at T2:</u> Loss *M(SD)*: 29.6 (2.8) Without loss *M(SD)*: 29.5 (6.0) *Mdiff*: 0.1, *p*= .987 *d*= 0.021 (very small) ** Two different sets of results were reported for T1. The reason for this is unclear. The results are presented as they are in the report.* <u>MAAS total Mdiff between T1 and T2 in the Loss Group:</u> T1 *M(SD)* = 58.4 (6.3) T2 *M(SD)* = 80.8 (3.1) *Mdiff*= 22.4 *p*= .05, *d*=4.51 (very large) <u>MAAS Quality Mdiff between T1 and T2 in the Loss group:</u> T1 *M(SD)* = 33.2 (3.2) T2 *M(SD)*= 46.4 (1.1) *Mdiff*=13.2, *p*= .002, *d*= 5.51 (very large effect) <u>MAAS Intensity Mdiff between T1 and T2 in the Loss group:</u> T1 *M(SD)* = 22.6 (3.4) T2 *M(SD)*= 29.6 (2.8) *Mdiff*= 7, *p* =.035 , *d* = 2.25 (large) Summary: At time 1, the loss group scored lower than the control group in all MAAS constructs, however no difference was significant. At T2, the loss group had higher total and quality scores, but there was no difference in intensity scores compared to the control group. Again, this was not significant. In the loss group, MAAS total, quality and intensity scores significantly increased over time.

Appendix 1.4

Table 1. 3

Summary of Quasi-Experimental Cohort Studies

Study	Country	Ethnicity	Comparison Groups	*N*	Age of Mother (Years)		Pregnancy Loss Characteristics	Pregnancy Stage at Baseline	Time Points	Relationship Measure	Other Mental Health Outcomes	Results
					M	*SD*						
Baghdari et al. (2016)	Iran	Not reported	Pregnancy adaption intervention	28	27.19	4.05	Previous foetal or neonatal death (gestational time frame not specified) within the last 5 years. No further data on recruited sample	14 to 20 weeks. No further information reported.	T1: Pre intervention. Gestation 14-20 weeks. T2: Post intervention. Gestation age not reported.	MFAS	Adaption to pregnancy: PSEQ	<u>Comparison of MFAS Scores:</u> Intervention T1 *M (SD)* = 66.25 (15.33) Intervention T2 *M (SD)* = 75.75 (14.4) *Mdiff* = 9.5, *p* < .001 Control T1 M (SD)= 59.93 (22.1) Control T2 M (SD)= 60.81 (15.9) *Mdiff*= 0.88 *p*= .231 Intervention Change M(SD)= 9.32 (0.93) Control Change M (SD) = 0.88 (6.54) *Mdiff*= 8.44, *p*< .001 Summary: In the intervention group, the MFAS scores significantly increased by a large amount. The MFAS scores in the control group did not change. <u>Other variables:</u> Age was negatively correlated to MFAS scores, *r*= -0.413, *p*= 0.002
			Control Intervention	27	25.86	3.55						
Cote-Arsenault et al. (2014)	USA	Caucasian: 88% African American: 4% Hispanic: 4% Other: 4%	Nursing Intervention	13	32.3	4.94	At least one previous miscarriage, still birth or neonatal loss. Range: 4 – 39 weeks. Mode: 6 weeks	Before 18 weeks gestation. Nursing Intervention *M(SD)*= 13.84 (3.34). Control Intervention *M(SD)*= 14.8 (4.23).	T1: "Baseline" (*M* gestation age of 14.2 weeks). Time 2: 22 to 24 weeks gestation. Time 3: 32 to 34 weeks gestation	MAAS	Anxiety: PAS and STAI Depression: CES-D Self-Mastery: PM	<u>Estimated Mdiff in MAAS Subscales between Intervention and Control Conditions, Between Time 2 and 3:</u> (Controlling for: time 1 outcomes, gestational age at time 1, obstetrical history, time of loss and correlations induced by repeated measures) Quality: Mdiff = 4.73, 95% CI −29.89,39.36- , *p* = .775 Intensity: Mdiff = -0.27, 95% CI −2.25,1.72- , *p* = .780 Global: Mdiff = -0.04, 95% CI −1.17,1.08- , *p* = .937 Summary: The intervention group scored higher in the MAAS quality construct compared to the control intervention, however this was not a significant difference. There was no difference between the intervention group and control in Intensity and Global MAAS scores.
			Control Intervention	11	30.6	3.8						

Note: Maternal-foetal attachment scale (CMFAS); Maternal Antenatal Attachment Scale (MAAS); Prenatal attachment Inventory (PAI); Maternal-foetal attachment scale (MFAS); Hospital Anxiety and Depression Scale (HADS); Pregnancy Anxiety Scale (PAS) ;The Pregnancy Outcome Questionnaire (POQ); State -Trait Anxiety Inventory (STAI); Taylor's Manifest Anxiety Scale (TMAS); *The Perceived Stress Scale (PSS);* Depression Adjective Checklist (DACL); The Centre for Epidemiologic Studies-Depression Scale (CES-D), Edinburgh postnatal depression scale (EPDS); Perinatal grief scale (PGS); Centrality of Events Scale (CES); The Impact of Events Scale (IES); Post-Traumatic checklist scale (PCLS); The Mental Health Inventory-38 (MHI-38); Attachment Style Questionnaire (ASQ); Connor-Davidson Resilience Scale (CD-RISC)The Personality Research Form (PRF); Pearlin Mastery Scale (PM); *Prenatal* Self-Evaluation Questionnaire (*PSEQ)*; The Adolescent/Adult Sensory Profile (AASP);the Bayley Scales of Infant Development (BSID); Infant temperament Assessment(IFA)

Appendix 1.5

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Page 6
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 7
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Pages 8-10
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 10
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Pages 10 - 11
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 11
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Pages 76-78
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Page 11
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Page 12
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Page 12
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Page 12
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 13
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Page 12
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Pages 12 - 13
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Page 12

Section and Topic	Item #	Checklist item	Location where item is reported
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 12 and 13
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Page 12
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/a
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/a
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Page 12 and 13
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	N/a
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Page 15
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Page 15
Study characteristics	17	Cite each included study and present its characteristics.	Page 13, 14, 79-86
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Pages 16-21
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Pages 79 - 86
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Pages 16 - 27
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Pages 21-27
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Pages 21-27
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/a
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Page 19 and 20
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	N/a
DISCUSSION			

Section and Topic	Item #	Checklist item	Location where item is reported
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Pages 27-31
	23b	Discuss any limitations of the evidence included in the review.	Pages 27 – 31
	23c	Discuss any limitations of the review processes used.	Page 30- 31
	23d	Discuss implications of the results for practice, policy, and future research.	Page 30- 31
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 10
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Page 10
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Page 10
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Page 31
Competing interests	26	Declare any competing interests of review authors.	Page 31
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	N/a

Appendix 2.1

Table 2.3

Correlation Matrix of PCEQ Subscales with Demographic, Pregnancy, and Psychological Variables

	Age	SES	Education	N Children	N Pregnancy losses	Gestation of Last loss	Time Between Pregnancy and Loss	IES Avoidance	IES Intrusion	IES Hyperarousal	IES total	PGS Active Grief	PGS Difficulty Coping	PGS Despair	PGS Total	PASS	MOS-SSS Emotion &Information	MOS-SSS Tangible	MOS-SSS Affection	MOS-SSS Positive Interaction	MOS-SSS Total
PCEQ Commitment and enjoyment	.04 [-.18, 0.25]	**-.25*** [-.45, -0.02]	.05 [.17, 0.26]	.09 [0.13, 0.31]	.03 [-.19, 0.24]	.08 [.13, 0.30]	.17 [-.05, 0.37]	0.05 [-.17, .26]	-0.08 [-.29, .14]	-0.22 [-.41, .00]	-0.09 [-.30, .13]	0.02 [-.20, .23]	**-0.19†** [-.39, .03]	-0.08 [-.29, .14]	-0.09 [-.30, .12]	-0.03 [-.24, .19]	**0.25*** [.03, .44]	**0.27*** [.06, .46]	**0.19†** [-.03, .39]	0.17 [-.05, .37]	**0.27*** [.05, .46]
PCEQ Discourages closeness	**-.25*** [-.44, -.03]	.06 [-.18, .28]	-.20 [-.40, .02]	**-.29*** [-.48, -.08]	-.07 [-.28, .15]	-.08 [-.29, .14]	**-.35*** [-.53, -.15]	-0.14 [-.35, .08]	0.04 [-.18, .25]	0.05 [-.17, .26]	-0.02 [-.24, .20]	-0.03 [-.25, .18]	0.07 [-.15, .28]	-0.01 [-.22, .21]	0.01 [-.20, .23]	-0.00 [-.22, .21]	-0.20 [-.40, .02]	-0.14 [-.35, .08]	0.00 [-.22, .22]	-0.17 [-.37, .05]	-0.18 [-.38, .039]
PCEQ Sentimental and heightened	**-.22*** [-.42,-.01]	-.21 [-.42, .02]	-.17 [-.38, .04]	-.01 [-.23, .21]	.02 [-.20, .23]	.05 [-.17, .26]	-.07 [-.28, .15]	**0.28*** [.07, .47]	**0.24*** [.03, .43]	0.18 [-.04, .38]	**0.30*** [.09, .48]	**0.33*** [.13, .51]	**0.33*** [.11, .51]	**0.36*** [.15, .53]	**0.36*** [.15, .53]	**0.41*** [.21, .58]	-0.15 [-.35, .07]	-0.14 [-.34, .080]	-0.02 [-.23, .20]	-0.19 [-.39, .03]	-0.16 [-.36, .06]
PCEQ Helpless and out of control	**-.22*** [-.041, -0.00]	.06 [-.18, 0.28]	-.17 [-.38, .04]	**-.27*** [-.46, -.05]	.00 [-.21, .22]	-.05 [-.26, .17]	**-.25*** [-.44, -.04]	0.06 [-.15, .28]	0.17 [-.05, .37]	**0.25*** [.04, .44]	0.20 [-.02, .39]	**0.20†** [-.02, .40]	**0.32*** [.11, .50]	**0.21†** [-.01, .40]	**0.26*** [.04, .45]	**0.33*** [.12, .51]	**-0.23*** [-.42, -.01]	**-0.24*** [-.43, -.021]	-0.09 [-.30, .13]	**-0.27*** [-.46, -.06]	**-0.25*** [-.44, -.039]
PCEQ Role reversed and merged	-.14 [-.35, .07]	-.22 [-.43, .01]	-.06 [-.27, .16]	.04 [-.18, .26]	-.05 [-.26, .17]	.04 [-.18, .26]	.21 [-.01, .41]	0.15 [-.07, .35]	0.06 [-.16, .27]	-0.09 [-.30, .13]	0.06 [-.16, .27]	0.17 [-.04, .38]	-0.06 [-.27, .16]	0.10 [-.12, .31]	0.07 [-.15, .28]	0.16 [-.05, .37]	0.11 [-.11, .32]	0.17 [-.04, .37]	0.11 [-.11, .32]	0.03 [-.19, .24]	0.12 [-.10, .33]

Note. Table 2.3 presents the Pearson's correlation coefficients (*r*) and their corresponding confidence intervals for the study variables.

* Pearson's correlation $p < .05$

† Spearman's Rho $p < .05$

†† Spearman's Rho $p > .05$

Appendix 2.2

Table 2.4

Correlation Matrix of Demographic, Pregnancy, and Psychological Variables

	Age	Deprivation	Education	N Children	N Pregnancy losses	Gestation of Last loss	Time Between Pregnancy and Loss	IES Avoidance	IES Intrusion	IES Hyperarousal	IES total	PGS Active Grief	PGS Difficulty Coping	PGS Despair	PGS Total	PASS	MOS-SSS Emotion &Information	MOS-SSS Tangible	MOS-SSS Affection	MOS-SSS Positive Interaction	MOS-SSS Total
Age		.20 [-.034, .409]	.06 [-.16, .27]	**.27*** [.05, .46]	.17 [-.05, .37]	.15 [-.07, .35]	**.30*** [.09, .49]	-.18 [-.38, .04]	-.13 [-.34, .09]	.01 [-.20, .23]	.14 [-.34, .08]	-.15 [-.35, .07]	-.17 [-.37, .05]	-.11 [-.32, .11]	-.15 [-.35, .07]	-.20 [-.40, .02]	.02 [-.19, .24]	.06 [-.28, .15]	.14 [-.35, .08]	.00 [-.21, .22]	-.02 [-.21, .22]
Deprivation			.09 [.15, .31]	.03 [-.201 .26]	.03 [-.20, .26]	.09 [-.15, .31]	.09 [-.15, .31]	-.14 [-.35, .10]	-.10 [-.33, .13]	-.09 [-.32, .14]	-.14 [-.36, .09]	-.15 [-.37, .08]	-.15 [-.36, .09]	-.16 [-.37, .08]	-.16 [-.38, .07]	-.21 [-.42, .02]	.04 [-.19, .27]	.147 [-.09, .36]	.086 [-.15, .31]	.10 [-.12, .32]	.09 [-.15, .31]
Education				.146 [-.07, .35]	.15 [-.07, .35]	.10 [.12, .31]	.07 [-.15, .28]	-.11 [-.32, .11}	.107 [-.111, .316]	.07 [-.15, .28]	.03 [-.19, .25]	-.04 [-.25, .18]	.00 [-.21, .22]	.00 [-.22, .21]	-.01 [-.23, .20]	.08 [-.14, .29]	-.18 [-.38, .04]	-.02 [-.23, .20]	**-.25†** [-.44, -.04]	-.13 [-.34, .09]	-.17 [-.37, .05]
N Children					.17 [-.05, .37]	.14 [-.07, .35]	.10 [-.12, .31]	-.04 [-.25, .18]	.21 [-.01, .41]	.10 [-.12, .31]	.13 [-.09, .33]	.03 [-.19, .24]	.02 [-.20, .24]	.03 [-.19, .24]	.025 [-.193, .241]	.04 [-.18, .26]	-.10 [-.31, .12]	-.02 [-.23, .20]	-.13 [-.34, .09]	-.06 [-.30, .13]	-.09 [-.30, .13]
N Pregnancy losses						.08 [-.13, .30]	-.03 [-.25, .18]	.11 [-.11, .32]	.18 [-.03, .38]	**.31*** [.11, .50]	**.24*** [.03, .44]	**.23*** [.01, .42]	**.36*** [.15, .53]	**.27*** [.06, .46]	**.31*** [.10, .49]	**.28*** [.07, .47]]	**-.22*** [-.41, .00]	-.02 [-.24, .20]	-.07 [-.28, .15]	**-.26*** [-.45, -.04]	-.19 [-.39, .03]
Gestation of Last Loss							-.02 [-.23, .20]	0.13 [-.09, .34]	0.21 [-.01, .41]	0.22 [.00, .41]	0.23* [.02, .43]	0.20 [-.02, .40]	0.20 [-.01, .40]	0.14 [-.08, .34]	0.19 [-.027, .39]	0.10 [-.12, .31]	-0.03 [-.25, .19]	-0.07 [-.28, .15]	0.01 [-.21, .22]	-0.05 [-.26, .17]	-0.04 [-.26, .18]
Time Between the Last Loss and Current Pregnancy								-0.06 [-.27, .16]	-0.02 [-.24, .20]	-0.12 [-.33, .10]	-0.07 [-.29, .14]	-0.17 [-.37, .05]	-0.15 [-.35, .07]	-0.13 [-.337, .09]	-0.16 [-.36, .06]	-0.11 [-.32, .11]	-0.07 [-.28, .15]	-0.15 [-.36, .07]	-0.19 [-.39, .03]	0.06 [-.16, .28]	-0.08 [-.29, .14]
IES Avoidance									**0.30*** [.09, .48]	**0.31*** [.10, .49]	**0.66*** [.52, .77]	**0.36*** [.16, .54]	**0.41*** [.21, .57]	**0.46*** [.275, .62]	**0.44*** [.24, .60]	**0.46*** [.27, .62]	**-0.33*** [-.51, -.12]	-0.15 [-.35, .07]	-0.18 [-.38, .04]	-0.15 [-.36, .07]	**-0.27*** [-.46, -.06]
IES Intrusion										**0.77*** [.66, .84]	**0.88*** [.83, .92]	**0.63*** [.48, .74]	**0.60*** [.44, .72]	**0.62*** [.46, .74]	**0.65*** [.50, .76]	**0.70*** [.57, .793	**-0.36*** [-.54, -.16]	**-0.24*†† ** [-.44, -.03]	**-0.30*†† ** [-.49, -.09]	**-0.26*†† ** [-.45, -.05]	**-0.35*** [-.52, -.14]
IES Hyperarousal											**0.85*** [.78, .90]	**0.64*** [.49, .75]	**0.68*** [.54, .78]	**0.66*** [.52, .77]	**0.70*** [.57, .79]	**0.71*** [.58, .80]	**-0.37*** [-.55, -.17]	**-0.26*†† ** [-.45, -.04]	**-0.36*** [-.54, -.16]	**-0.33*** [-.51, -.12]	**-0.39*** [-.56, -.19]
IES Total												**0.68*** [.54, .78]	**0.69*** [.56, .79]	**0.72*** [.60, .81]	**0.74*** [.62, .82]	**0.78*** [.67, .85]	**-0.44*** [-.60, -.25]	**-0.27*†† ** [-.46, -.06]	**-0.35*** [-.53, -.14]	**-0.30*** [-.50, -.10]	**-0.41*** [-.58, -.22]
PGS Active Grief													**0.84*** [.76, .89]	**0.84*** [.76, .89]	**0.94*** [.91, .96]	**0.71*** [.58, .80]	**-0.26*** [-.45, -.05]	-0.12 [-.33, .09]	-0.20 [-.40, .02]	**-0.31*** [-.50, -.11]	**-0.27*** [-.46, -.05]
PGS Difficulty Coping														**0.85*** [.77, .90]	**0.95*** [.92, .97]	**0.73*** [.62, .82]	**-0.46*** [-.62, -.27]	**-0.33*** [-.51, -.13]	**-0.31*** [-.49, -.10]	**-0.44*** [-.60, -.24]	**-0.47*** [-.62, -.28]
PGS Despair															**0.95*** [.92, .97]	**0.77*** [.66, .84]	**-0.39*** [-.56, -.19]	**-0.26*†† ** [-.45, -.04]	**-0.35*** [-.52, -.14]	**-0.39*** [-.55, -.18]	**-0.40*** [-.57, -.20]
PGS Total																**0.78*** [.68, .85]	**-0.40*** [-.57, -.20]	**-0.26*†† ** [-.45, -.05]	**-0.30*** [-.49, -.10]	**-0.404*** [-.57, -.21]	**-0.41*** [-.57, -.21]
PASS																	**-0.47*** [-.62, -.29]	-0.18 [-.38, .037]	**-0.34*** [-.52, -.13]	**-0.41*** [-.59, -.22]	**-0.44*** [-.60, -.24]
MOS-SSS Emotional/informational support																		**0.61*** [.45, .73]	**0.65*** [.51, .76]	**0.75*** [.63, .83]	**0.94*** [.91, .96]

MOS-SSS Tangible Support					**0.62*** [.47, .74]	**0.60*** [.44, .72]	**0.78*** [.68, .85]	
MOS-SSS Affectionate Support						**0.66*** [.51, .76]	**0.79*** [.70, .86]	
MOS-SSS Positive Social Interaction							**0.87*** [.80, .91]	
MOS-SSS Total								

Note. Table 2.4 presents the Pearson's correlation coefficients (*r*) and their corresponding confidence intervals for the study variables.

* Pearson's correlation $p < .05$

† Spearman's Rho $p < .05$

†† Spearman's Rho $p > .05$

Appendix 2.3

Table 2.5

Mean PCEQ Scores (Sentimental Heightened and Role Reversed) by Categorical Pregnancy Variables, with Independent T Test Statistics.

	Yes		No		*t*(81)	*p*	Cohen's *d*
	M	*SD*	*M*	*SD*			
Sentimental Heightened							
Psychological Follow Up	3.39	0.85	3.26	1.03	0.61	.543	0.14
Subsequent Childbirth	3.12	0.96	3.33	0.95	-0.48	.633	-0.22
Planned Pregnancy	3.33	0.96	3.23	0.91	0.26	.796	0.10
Second Trimester	3.23	0.90	3.47	1.02	-1.08	.285	-0.25
Role Reversed							
Psychological Follow Up	3.46	0.75	3.66	0.72	-1.24	.217	-0.28
Subsequent Childbirth	3.90	0.69	3.55	0.74	1.04	.301	0.48
Planned Pregnancy	3.59	0.74	3.29	0.62	1.06	.292	0.42
Second Trimester	3.54	0.78	3.62	0.66	-0.49	.624	-0.11

Note. Second Trimester: Yes= Second Trimester; No=Third Trimester

Appendix 2.4

Table 2.6

Median PCEQ Scores (Commitment and Enjoyment, Discourages Closeness, Helplessness) by Categorical Pregnancy Variables, with Mann-Whitney U Test Statistics

	Yes			No			*U*	*z*	*p*	*r*
	Mdn	25th Percentile	75th Percentile	*Mdn*	25th Percentile	75th Percentile				
Commitment and Enjoyment										
Psychological Follow Up	4.63	4.25	4.88	4.75	4.47	4.88	966.50	1.07	.285	.12
Subsequent Childbirth	4.75	4.38	5.00	4.69	4.38	4.88	160.50	-0.67	.505	-.07
Planned Pregnancy	4.75	4.38	4.88	4.63	3.50	5.00	219.50	-0.77	.441	.08
Second Trimester (No = third trimester)	4.63	4.38	4.88	4.75	4.47	4.88	870.00	0.72	.473	.07
Discourages Closeness										
Psychological Follow Up	1.80	1.50	2.40	1.80	1.40	2.20	771.50	-0.73	.463	.08
Subsequent Childbirth	1.20	1.10	1.70	1.80	1.40	2.40	315.00	2.31	**.019**	.25
Planned Pregnancy	1.80	1.40	2.20	1.80	1.60	2.60	306.00	0.66	.509	.07
Second Trimester (No = third trimester)	1.80	1.40	2.30	1.80	1.55	2.25	864.50	0.66	.507	.07
Helplessness										
Psychological Follow Up	1.86	1.50	2.29	1.57	1.34	2.09	657.50	1.78	.076	.20
Subsequent Childbirth	1.57	1.18	1.96	1.75	1.43	2.21	249.00	1.04	.316	.11
Planned Pregnancy	1.71	1.36	2.14	1.86	1.79	2.71	353.50	1.44	.151	.16
Second Trimester (No= third trimester)	1.71	1.36	2.18	1.82	1.43	2.11	813.00	0.17	.864	.02

Appendix 2.5 – STROBE Reporting Checklist for Cross-sectional Studies

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	39
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	42
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	43-45
Objectives	3	State specific objectives, including any prespecified hypotheses	45
Methods			
Study design	4	Present key elements of study design early in the paper	45
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	45 - 46
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	45 - 46
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	45 - 48
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	46 - 48
Bias	9	Describe any efforts to address potential sources of bias	48
Study size	10	Explain how the study size was arrived at	49
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	46 – 48
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	48-49, 108
		(*b*) Describe any methods used to examine subgroups and interactions	48- 49
		(*c*) Explain how missing data were addressed	N/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/a
		(*e*) Describe any sensitivity analyses	N/a
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	49, 50, 51
		(b) Give reasons for non-participation at each stage	49
		(c) Consider use of a flow diagram	N/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	49-53
		(b) Indicate number of participants with missing data for each variable of interest	49
Outcome data	15*	Report numbers of outcome events or summary measures	52-53
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	52- 62
		(*b*) Report category boundaries when continuous variables were categorized	52
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	53-54
Discussion			
Key results	18	Summarise key results with reference to study objectives	62 - 64
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	66-67
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	69
Generalisability	21	Discuss the generalisability (external validity) of the study results	66-67
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	69

Appendix 2.6 - MRP Proposal

The MRP Proposal can be accessed on the Open Science Framework from the following link: https://osf.io/zxakh

Appendix 2.7 - NHS IRAS REC letter of favourable opinion

Appendix 2.8 – NHS Ayrshire and Arran R&D Email of Approval

Appendix 2.9 - Participant information sheet, consent form and debrief

The participant information sheet, consent form and debrief can be accessed on the Open Science Framework via the following links:

Participant information sheet: https://osf.io/gra83/

Participant consent form: https://osf.io/qvzyr

Participant debrief: https://osf.io/u89mh

Appendix 2.10 – Study questionnaires

The questionnaires can be assessed on the Open Science Framework via the following links:

The adapted Impact of Events Scale - Revised: https://osf.io/zgpjv

The Prenatal Caregiving Expectations Questionnaire: https://osf.io/h4vcj

The demographic questionnaire: https://osf.io/b2x4z

The pregnancy questionnaire: https://osf.io/kdqj8

Appendix 2.11 - Data Analysis Plan

The data analysis plan can be found at the Open Science Framework via the link: https://osf.io/ugzr3

Appendix 2.12 - SPSS Syntax file

The SPSS Syntax file can be found at the Open Science Framework via the link: https://osf.io/myvn6

Appendix 2.13 - Data availability statement

After completing the dissertation and viva examination, I will dedicate time to preserving and sharing the anonymised data on the Open Science Framework. I will transfer ongoing responsibility for the preservation and archiving of my data to my University supervisor upon completion of the DClinPsy.