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List of Acronyms

ECR - Short Experiences in Close Relationships

IES-R - Impact of Event Scale-Revised

PAI - Prenatal Attachment Inventory

PDQ - Prenatal Distress Questionnaire

PGS - Prenatal Grief Scale

1. Introduction

Bringing together the attachment discourse (Bowlby, 1977) and the advances in technology allowing for mothers-to-be to “see” and “hear” their child in utero, the literature supports the development of prenatal bonding or attachment during pregnancy (Kunkel & Doan, 2003; Van den Bergh & Simons, 2009). Correspondingly, Muller and Mercer (1993) devised the Prenatal Attachment Inventory as a measure of mother-infant attachment, which was defined as the quality of the bond between a woman and her fetus. Many factors have been found to predict the strength of the prenatal attachment, namely maternal age, anxiety, and stress attributed to specific events such as the COVID-19 pandemic (Tohme et al., 2022). Moreover, research converges in finding that prenatal attachment is a strong predictor of post-natal attachment (Dayton et al., 2010; Siddiqui & Hagglof, 2000; Theran et al., 2005). This correlation is further solidified with more recent results showing that prenatal attachment leads to a decrease in post-partum maternal anxiety, with both postpartum bonding and marital satisfaction playing a mediating role (Matthies et al., 2020).

Suffering from a miscarriage is a significantly distressing event for both parents (Adolfsson, 2011; Cote-Arsenault & Morrison-Beedy, 2001). Early research identified that mothers who had suffered prenatal loss were more anxious than mothers who had not, during the last trimester of pregnancy (Theut et al., 1988). Later research has extensively studied the effect of suffering a miscarriage on women, focusing on feelings of anxiety, shame, personal failure, and blame (Tsartsara & Johnson, 2006; Adolfsson et al., 2004), with correlations found between these feelings and anxieties about future pregnancies and losses (Nikcevic et al., 1999). Lazarides et al. (2023) found that previous prenatal loss was a contributing factor to significantly increased levels of stress and feelings of nervousness, as well as impaired mood across pregnancy in mothers who had suffered previous prenatal loss, when compared to women who have not experienced loss, the latter showing a gradual decrease in negative affect throughout gestation.

Two studies that investigated prenatal bonding in mothers having suffered previous prenatal loss, found that these mothers reported lower prenatal attachment scores than mothers who did not (Armstrong & Hutti, 1998; Gaudet et al., 2010). This could be explained by a negative correlation between prenatal maternal mental health, more specifically depression, anxiety or stress, and a mother’s ability to imagine and develop a healthy positive relationship with her child both pre- and post-partum (Dubber et al., 2015; Glover & Capron, 2017; Rubertsson et al., 2015). This inverse relationship could be acting as a defense mechanism, as the mother attempts to protect herself from the negative effects of another loss (Armstrong, 2004; Armstrong & Hutti, 1998; Gaudet et al., 2010; Hill et al., 2008). Interestingly, Branjerdporn et al. (2021) found that while women having experienced prior prenatal loss experienced more distress than women

who have not, there was no difference in prenatal attachment scores. It was argued that having received counselling following prenatal loss could have played a protective role during the current pregnancy, thus promoting similar levels of prenatal attachment between mothers who have and those who have not suffered previous prenatal loss.

A crucial aspect to account for when discussing grieving and overcoming the emotional distress related to prenatal loss, is the nature of the couple's relationship. Early research highlighted the toll this emotional experience can have on the couple, with some suggesting a potential breakdown in communication, due to guilt feelings or fears of another loss in subsequent pregnancies (Brownlee & Oikonen, 2004). Others highlighted that couples report a stronger relationship following a miscarriage, with Armstrong (2004) reporting a moderate significant correlation between maternal and paternal reports of trauma with regards to prenatal loss, suggesting the trauma is shared, and the partner is seen as a source of support and comfort. One approach to measuring couple's relationship quality is to focus on the couple's attachment in the relationship, as evidenced by a recent study indicating that maternal romantic attachment was positively correlated with prenatal attachment to the baby. In fact, secure romantic attachment plays a role in promoting resilience and facilitating support seeking in times of stress and distress; for instance, securely attached mothers reported higher prenatal attachment to their newborn compared to their counterparts (Priel & Besser, 2000). Furthermore, Göbel et al. (2019) found that avoidant romantic attachment in women predicted lower quality bonding with the fetus, while other studies found that those experiencing relationship anxiety were especially prone to lower prenatal bonding (Mazzeschi et al., 2015) and increased pregnancy worry (Trillingsgaard et al., 2011).

2. Objectives and significance

The current study is unique in that it is the first conducted in the Arab region focusing on the impact of previous prenatal loss on subsequent pregnancy and prenatal bonding. In the Arab world, there tends to be an expectation for married couples to have children right after getting married, and the topic of prenatal loss remains taboo. Feelings experienced by couples are rarely discussed and tend to be surrounded by guilt and sometimes, despair. The aims of this study were

- 1) to compare prenatal parental bonding (PAI) and parental distress (PDQ), between women who had experienced previous prenatal loss and those who did not,
- 2) to look for predictors of PAI and PDQ in both groups, and
- 3) to explore the protective role of attachment (ECR) in mediating the relationship between prenatal grief (PGS) from the previous loss and distress (PDQ)

3. Justification

Despite the literature converging in highlighting the significant correlation between romantic attachment and prenatal bereavement responses (Scheidt et al., 2012; Caldwell et al., 2023), no studies to date have integrated prenatal bereavement, romantic attachment, and prenatal bonding. Few studies have been conducted on prenatal loss in Arab world (Al-Maharma et al., 2016; Sereshti et al., 2016) with some finding a dissatisfaction from services following loss (Sereshti et al., 2016). We are currently conducting a study looking at the effect of the current COVID-19 stress on prenatal and postnatal bonding. We argue that the current study might provide more insight in terms of the long-lasting effects of maternal prenatal stress on bonding, highlighting the importance of coping with previous prenatal loss in order to promote healthy parent-child bonding in subsequent pregnancy.

Despite the widespread findings in the Western literature focusing on grief in relation to suffering a miscarriage, this remains undiscussed and under-researched in the Arab world, with, to our knowledge, very scarce and random psychological support provided to couples having suffered prenatal loss. This support could be seen as a preventive measure buffering the negative effects of loss and grief, as it is argued that these feelings tend to linger and could remain even after the birth of a healthy child. However, no interventions or support groups are set up in Lebanon, focusing on providing support during pregnancy and after birth of a healthy child following a previous prenatal loss.

4. Methodology

The sample consisted of $N = 99$ Lebanese women, aged between 22 and 46 years ($M = 31.26$, $SD = 4.44$). All women were in the 2nd and 3rd trimester of their pregnancy. Of these women, $n = 23$ had suffered previous pregnancy loss, through miscarriage (48%), congenital problems with the fetus (9%), or other reasons (43%). For 61% of these women, prenatal loss occurred in their first pregnancy, not more than 1 year prior to the current pregnancy. Questions regarding the number of children in the family and birth order were also included, but preliminary statistical analyses revealed that these factors did not significantly affect the dependent variables.

In terms of data collection, after receiving approval from the university Institutional Review Board, the principal investigator contacted gynecologists to describe the study. If they agreed to allow us to collect data from their patient pool, the research assistants then approached pregnant women on site, at the gynecologist's clinic. After summarizing the study and taking consent, the research assistant gave participants the booklet of questionnaires to complete as they are waiting for their appointment. Once completed, questionnaires were put in an envelope containing dummy questionnaires, to ensure anonymity.

Questionnaires included:

- The Prenatal Attachment Inventory (PAI; Muller & Mercer, 1993) is a 21-item self-report questionnaire measuring prenatal parent-infant bonding. The participants responded on a 4-point Likert scale from 4 representing “almost always” to 1 representing “almost never”. The total score ranges from 21 to 84, with higher scores indicating higher levels of prenatal attachment.
- The Prenatal Distress Questionnaire (PDQ; Yali & Lobel, 1999) is a 12-item self-report questionnaire providing an overall score of parents’ concerns and worries with regards to their pregnancy.
- The Short Experiences in Close Relationships – Revised (ECR-S; Wei et al., 2007) is a 12-item self-report questionnaire assessing attachment avoidance and attachment anxiety.
- The Prenatal Grief Scale (PGS; Toedter et al., 1988) is a 33-item self-report questionnaire that measures parents’ emotions and feelings in relation to prenatal loss (miscarriage).
- The Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997) is a 22-item self-report questionnaire assessing how much distress the participant felt after facing a stressful event.

Initially the aim was to collect data from 150 couples; however, data collection was slower than initially intended as many gynecologists reported a decrease in the number of pregnant women coming for ultrasounds in their third trimester due the ongoing and worsening economic situation in the country. As a result, we contacted monitoring rooms in various hospitals in an attempt to increase the number of participants. Given that this did not boost the numbers, we contacted new hospitals and clinics who gave us their approval. This enabled us to increase the number of participants by 30%. We also extended the data collection timeline.

As per the initial proposal, we intended to approach expectant couples. We therefore intended to include data from fathers as well, however only 2 answered our call for participation, therefore, their answers were disregarded. The low paternal participation rate could reflect family dynamics in Lebanon. Indeed, despite the changing trend whereby fathers tend to be more involved with children, a portion of the population, especially individuals from low SES or with traditional values, tend to believe that it is the mother’s role to take care of children and that mothers tend to be able to better describe the child than fathers could. We have seen low paternal participation in 2 studies we have conducted in Lebanon with parents of children below the age of 2, and 2 other studies with parents of children between 4 and 8. It is crucial to identify the factors which

could render fathers more involved in research, as their role as caregivers and as a support system is primordial throughout development, and could come a long way in supporting a family going through loss.

5. Results/findings

This study was the first to investigate the impact of prenatal loss on maternal perceptions of a current pregnancy and perceived distress. First, we ran 2 independent t-tests to compare prenatal parental bonding (PAI) and parental distress (PDQ), between mothers having experienced previous prenatal loss and those who have not. There were no significant differences between the 2 groups on neither PAI scores, $t(95) = -.83, p = .41$, nor PDQ total scores $t(95) = 1.57, p = .12$. Results showed no significant differences in prenatal attachment nor in parental distress between women who had suffered previous prenatal loss and those who have not. In terms of prenatal attachment, while these findings are not in line with most previous studies (Armstrong & Hutti, 1998; Gaudet et al., 2010), they converge with more recent literature highlighting no differences in prenatal attachment despite higher distress in women with prior prenatal loss (Branjerdporn et al., 2021; Lazarides et al., 2023). One explanation put forward by previous studies emphasized that pregnancy anxiety tends to be higher earlier in the pregnancy, with the overall maternal fetal relationship increasing later in the pregnancy, which aligns with our current sample which consisted solely of women in their second and third trimesters (Göbel et al., 2019; Tsartsara & Johnson, 2006; Walsh et al., 2014). It could therefore be hypothesized that women could have overcome the fear of loss of the earlier stage of their pregnancy, thus allowing for attachment behaviors.

Second, we looked for correlates of PAI and PDQ by running correlations between the dependent variables and ECR-avoidance, ECR-anxiety, age, and having suffered previous loss or not. There were no significant correlations with the PAI, and the PDQ Total was only significantly correlated with ECR-Anxiety, with $r(93) = .26, p < .05$. These results are at odds with prior research (Armstrong & Hutti, 1998; Chrzan-Detkos & Lockiewicz, 2015; Gaudet et al., 2010). Indeed, previous studies highlighted that prenatal emotional proximity, an aspect of maternal-fetal bonding, tends to be impaired by prenatal maternal anxiety (Göbel et al., 2018), and that high stress levels experienced during pregnancy led to lower prenatal attachment (Coşkun et al., 2019). The contradictory results in this study could be explained from a cultural perspective, namely considering the social desirability bias, present in the Middle East region (Benstead, 2018). Indeed, the cultural expectation to repress any negative emotions with regards to pregnancy and the stigma around talking about miscarriage could explain why none of these constructs significantly correlated with prenatal distress. This should be further emphasized for women who have suffered previous miscarriages as it could relate to potential shame and guilt that could accompany this experience (Adolfsson et al., 2004). Thus, it can be posited that the associated

concerns that may accompany certain aspects of being a mother in Lebanon may have led to a need to answer the questions in the survey in a 'socially acceptable manner'.

We then ran hierarchical regression analyses to look for predictors of PDQ, one for the sample of women who did not suffer previous loss and one for those who did. For the first group, the predictors were inputted such that Model 1 included, ECR-avoidance and ECR-anxiety, while Model 2 included ECR-avoidance, ECR-anxiety, and age. Results revealed that in the first model, ECR-anxiety was a significant predictor of PDQ Total scores, with $F(2,64) = 3.34$, $p < .01$, and it accounted for 9.5% of the variation in the model. However, introducing age (Model 2) did not significantly predict variation in the model. In other words, looking for predictors of perceived distress during pregnancy, attachment anxiety was the only significant predictor for women who did not suffer previous prenatal loss. This is consistent with Trillingsgaard et al. (2011), where women with anxious adult attachment also exhibited more stress and worry during their pregnancy than women with the avoidant attachment style. One explanation for this finding is that mothers with anxious attachment styles may be more likely to doubt and worry about their relationships, which is a tendency that could spill over into more distress and worry over their unborn child. In contrast, women scoring high on avoidant adult attachment tend to be less engaged and exhibit less sensitive caregiving (Mills-Koonce, 2011).

For those who did suffer prenatal loss, predictors were inputted such that Model 1 included ECR-avoidance and ECR-anxiety, Model 2 added age, Model 3 further added PGS total, while Model 4 added IES-R total to the variables in the previous model. Results revealed that in the first model, ECR-Avoidance and ECR-Anxiety were not significant predictors of PDQ, with $F(2,16) = .84$, $p = .45$. Introducing age (Model 2) explained an additional 20% of variation in the model with $F(3,15) = 2.10$, $p = .05$. Lastly, adding PGS Total scores (Model 3) explained an additional 33% of the model, with $F(4,14) = 5.83$, $p < .01$, whilst adding IES-R Total scores (Model 4) to the regression model did not explain any additional variation in the model, $F(5,13) = 4.37$, $p = .79$. In other words, in the sample of women who did suffer a previous loss, attachment insecurity was not found to be a significant predictor; however, prenatal grief was found to be a stronger predictor than attachment in relation to perceived distress during a pregnancy following loss. Grief in general is closely associated with increased distress (Boelen et al., 2003). The current findings are in line with previous research on the topic, where both bereavement or grief and psychological distress were correlated in situations of loss (Middleton et al., 1997), with women with prior loss reporting higher scores of grief and psychological distress than their counterparts (Gaudet et al., 2010). Indeed, women have portrayed loss as a life changing event that causes feelings of worry and fear of subsequent pregnancies (Cote-Arsenault & Morrison-Beedy, 2001).

Finally, given that PGS Total scores were found to significantly predict PDQ Total scores in the loss group, we investigated the protective role of attachment (ECR-Avoidance and

ECR-Anxiety) in mediating the relationship between prenatal grief (PGS) and distress (PDQ) in the current pregnancy. Results revealed no mediating effect of ECR-anxiety between PGS and PDQ; but there was a causal effect between the independent variable PGS and the dependent variable PDQ ($p = 0.03$), with PGS explaining 49% of the variation in the PDQ. Results also revealed no mediating effect of ECR-avoidance between PGS and PDQ.

6. Recommendations

Based on our findings we recommend

- Setting up psychological support and psychoeducation interventions during pregnancy, to help the family emotion regulate and decrease the stress ensuing from potential unresolved grief or guilt from previous losses.
- Promoting maternal and paternal prenatal attachment, as well as parental mentalizing (including emotion expression), to decrease postnatal difficulties in parents and to increase realistic and genuine perception of the child before and after birth.
- Focusing on the role of social and partner support, namely in terms of emotion expression, in increasing prenatal attachment and healthy family dynamics.
- Providing awareness sessions focusing on the impact of prenatal parental mental health on child adjustment and development throughout infancy.
- Running support group for mothers who have suffered prenatal loss, in an effort to grief and feel supported
- Setting up, if necessary, parenting groups during the first year of the infant's life promoting secure attachment practices ensuring healthy development and genuine perception of the infant.

Future research could

- Look at the efficacy of interventions or support groups in decreasing the negative effects of prenatal loss on parents and promoting healthy parent child bonding in subsequent pregnancy.
- Investigate child adjustment in later years, comparing families who have suffered prenatal loss with those who have not.
- Include fathers in the model.
- Delve deeper into reasons behind the loss, whether the pregnancy is the results of fertility treatment or not, and its impact on feelings during pregnancy and child adjustment measures in the first year of life.

6. Impacts (societal impacts, and/or legal impacts and/or policy impacts)

Interventions with women who have not suffered prenatal loss should focus on decreasing their anxiety in relationships in general, given that attachment anxiety was found to be the only significant predictor of pregnancy distress. Interventions with

women who have suffered prenatal should be targeted towards dealing with loss and working through grief, as prenatal grief was found to be the strongest predictor of pregnancy distress. The insignificance of romantic attachment in predicting prenatal distress is inconsistent with prior research considering secure attachment as a protective factor buffering the negative effect of grief and distress (Bifulco et al., 2004; Caldwell et al., 2023; Sabuncuoglu & Berkem, 2006). This could be explained by the types of attachment measures used whereby this study only assessed attachment avoidance and anxiety in relation to romantic relationships, in contrast with measuring an overall state and representations of the self and other. Our findings could suggest a change in focus towards coping with grief, rather than targeting overall romantic attachment in cases of loss, and emphasizes the importance of healthy coping with prenatal loss.

We believe our results will be relevant in the below fields

- Focusing specifically on mothers who have suffered previous losses, setting to help the family emotion regulate and decrease the stress ensuing from potential unresolved grief or guilt from previous losses.
- Providing awareness sessions focusing on the impact of prenatal parental mental health and grieving prenatal loss, in an effort to break the stigma and pressure felt by women who have gone through loss on

This can directly impact policy as we can promote the creation and application of new initiatives supporting paid leave for mothers and fathers following loss. Surveys can be sent out to employees in order to anonymously ask about their pregnancy experience, whether or not they suffered loss, and asked to rate the level of support they felt they received in the workplace, be it emotional support or flexible working hours. Based on these surveys and on employees perception of support, targeted workshops and/or emotional support program could be set in place by external parties such as NGOs, universities, or mental health platforms. This could help parents/prospective parents in terms of their overall wellbeing, and in turn affect their wellbeing in the workplace.

In addition, organizations could raise awareness and join hands with governments, NGOs, universities, or mental health start-ups, to create campaigns aiming of normalizing talking about emotions relating to prenatal loss. This could be done through reels, short video testimonies, or even webinars and support groups providing safe spaces to talk. To our knowledge, there are no organizations specifically targeting prenatal loss. Some promote women sexual health but do not focus specifically on loss, for instance WISH, and Siira (a mental health platform through which we occasionally run support groups for couples who have suffered prenatal loss).

From our results, we cannot suggest a specific type of therapeutic interventions as there are many which have been found to be efficient; our results pinpoint the potential target of the intervention, be it romantic attachment to partners during pregnancy, or grief management in the case of prenatal loss.

8. Benefits to Arab countries in terms of issues related to the Arab Family

The main impact relates to a possible reconceptualization of parenting roles. For instance, we can argue for psychoeducation and awareness sessions aimed at involved fathers in child-rearing and sharing parental responsibilities. Our findings emphasize the importance of giving women the time and support to grieve pregnancy loss. It is also crucial to raise awareness about the possible factors leading to loss, decreasing the direct blame on women. This could also be translated into lobbying for new policy allowing women who have suffered prenatal loss paid leave or paid sessions with a professional helping them manage grief and potential guilt.

Other implications relate to destigmatizing mental health discussions in general, and more specifically in helping women overcome prenatal loss, and possibly decreasing distress in an ongoing pregnancy. Support group for prenatal loss can be anonymous as a first step towards breaking the barrier to talk in a region where talk of emotions can still be taboo.

9. Conclusions

Despite the widespread findings in the Western literature focusing on grief in relation to suffering a miscarriage, this remains an undiscussed and under-researched topic in the Arab world, with, to our knowledge, very scarce psychological support provided to couples having suffered prenatal loss. Thus, it is important to introduce intervention programs for parents, targeting prenatal and postpartum support, be it for promoting secure romantic attachment or coping with grief. This support could be seen as a preventive measure buffering the negative effects of loss and grief, as it is argued that these feelings tend to linger and could remain even after the birth of the child.

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