

# Anxiety following miscarriage and the subsequent pregnancy

## A review of the literature and future directions

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### Abstract

**Objective:** This is the first comprehensive review to summarize the research literature regarding anxiety symptomatology and disorders following miscarriage. **Methods:** Both “controlled” and “uncontrolled” designs are considered, with the inferential limitations of studies lacking comparison groups highlighted. **Results:** The limited research available suggests that miscarrying women are at increased risk for anxiety symptoms immediately following miscarriage and continuing until approximately 4 months post-loss. Beyond 4 months, reports are inconsistent. There is

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evidence to suggest increased risk for some anxiety disorders in the 6 months following loss; however, studies using larger sample sizes and comparison groups are needed. **Conclusions:** This is the first review to consider the incidence of anxiety disorders following miscarriage, as well as the psychological impact of loss on the pregnancy subsequent to miscarriage, and the impact on partners of miscarrying women. Areas warranting further study are noted and are intended to guide future investigation.

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### Introduction

More research is beginning to address the distress of women and their partners when a miscarriage occurs. While miscarriage (typically defined in the research literature as the spontaneous termination of an intrauterine pregnancy prior to 28 weeks of gestation resulting in fetal death), is fairly common, occurring in 10–20% of clinically recognized pregnancies [1], women are often unprepared for the event and experience a range of psychological reactions. The prevalence of depressive symptoms and disorders following miscarriage has been the focus of much of the research [2–9]. In some part, this may be attributable to the perception of miscarriage as a loss event. Although miscarriage also has been viewed as a traumatic event [10], it is only in the last decade that the focus of research in this area has broadened to include the occurrence of anxiety symptoms and disorders in women who have miscarried. This broader focus on anxiety following miscarriage stems in part from: (1) the finding that there is often an increase in

anxiety during the postpartum period [11–21], and anxiety, therefore, may also play a role in the post-loss period, and (2) the fact that as with depression, in general, women are more likely than men to be diagnosed with certain anxiety disorders, such as Panic Disorder and Generalized Anxiety Disorder (GAD) [22,23]. In addition, there are many issues about which miscarrying women can be worried and anxious, including, for example, physical problems following the Dilatation and Evacuation (D&E) procedure (e.g., continued bleeding or discharge), possible underlying medical illness or genetic factors that may have contributed to the loss and fears about their procreative competence. Both clinicians and physicians should be aware of the possibility that in addition to grief and depression, miscarrying women may display significant increases in anxiety after the loss and during the subsequent pregnancy, including the onset of anxiety disorders.

This article is the first to review the current state of research regarding miscarriage as a risk factor for anxiety and intends to serve as the impetus for further study in this area. We first consider the prevalence of anxiety symptoms following miscarriage (independent of anxiety disorders), as this is the area that has received the majority of research attention to date. The section begins with a discussion of

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“uncontrolled” studies (i.e., those lacking comparison groups) and progresses to the more methodologically sophisticated studies that employed comparison groups (what we will call “controlled” studies). The limited research concerning anxiety disorders follows, with Anxiety Disorder, Not Otherwise Specified (NOS), Obsessive–Compulsive Disorder (OCD), Panic Disorder, Phobic disorders and Post-Traumatic Stress Disorder (PTSD) considered individually. Because of the scarcity of research within the area of miscarriage and anxiety disorders, the latter section is not divided into controlled and uncontrolled studies. We next examine issues surrounding the relationship between anxiety and pregnancies subsequent to miscarriage, and we end with a discussion regarding what is known about anxiety reactions in the partners of miscarrying women. To gather resources for this review, an extensive literature search was conducted using *Medline*, *PsychInfo* and *PubMed*. Additionally, the reference lists from relevant articles were scanned for pertinent sources that may not have been included in the electronic databases listed above.

Attempting to integrate the research findings into a concise synopsis is challenging due to inconsistent methodological practices across the studies. The first obstacle encountered is the lack of consensus among researchers, physicians and the law regarding the definition of miscarriage in terms of the timing of the loss. Whereas physicians typically define miscarriage as loss prior to 20 weeks of gestation, researchers have varied and typically use a range spanning from 20 to 28 weeks of gestation [7,24]. Discrepancies exist within the legal system as well, as evidenced by the variation in state laws regarding the gestational age at which parents obtain fetal burial rights [25], for example. In addition, the inclusion of different loss samples (e.g., spontaneous abortion, stillbirth, neonatal death, Sudden Infant Death Syndrome (SIDS)), use of varied measurement tools for the assessment of anxiety, varied timing of the initial measurement after the loss and follow-up assessments, as well as a lack of, or the use of inappropriate, comparison groups all further contribute to the difficulty in making generalizations from the literature. There are limits to the inferences that can be made, and this must be considered when interpreting the findings. Acknowledging the difficulties of comparison, however, does not diminish the importance of integrating the findings into a cohesive summary in such a way as to facilitate the identification of promising directions of future study.

Because the intent of the current paper is to provide a comprehensive review of the literature regarding the relationship between miscarriage and anxiety symptoms and disorders, the studies reviewed focus on miscarriage prior to 28 weeks of gestation unless otherwise noted. The exceptions involve topic areas where there are few studies (e.g., anxiety disorders, partners’ reactions) and where those studies included mixed samples of women experiencing miscarriages, stillbirths, neonatal deaths and SIDS deaths. Although a mixed perinatal loss sample is

not ideal, in large part, because the losses may represent distinct clinical entities and require different comparison groups, these initial studies are important guides for future investigation.

### Anxiety symptoms

Although there is a dearth of research specifically examining the relationship between miscarriage and anxiety, the research that has been conducted focuses mainly on the incidence of increased anxiety symptomatology, rather than specific anxiety disorders, following miscarriage. It is critical to note that relatively few of these studies employ a comparison group of women without recent reproductive loss. This methodological design determines what can and cannot be inferred from the findings. Without appropriate comparison groups (e.g., pregnant women or women unexposed to recent reproductive events), it is impossible to state with any degree of confidence that increased anxiety symptoms experienced after a miscarriage are related to the reproductive loss as opposed to factors related to pregnancy in general, or to other factors common in women of reproductive age.

Although studies without appropriate comparison groups cannot provide definitive answers regarding increased rates of anxiety following miscarriage, such studies are reviewed below because they represent the initial work in this important area and have laid the foundation for further investigation. Overall, these studies indicate increased anxiety symptoms post-miscarriage and therefore provide support for further examination of anxiety symptoms and disorders employing more rigorous (and costly) research methodology.

#### “Uncontrolled” studies

A prospective study by Cecil and Leslie [26] used the State and Trait Anxiety Inventory (STAI) [27] to assess anxiety in women who miscarried during the first trimester of pregnancy. Statistical analysis demonstrated that there was a significant decrease in state anxiety over the 6-month period after the loss ( $P < .005$ ) with the greatest decline occurring between the initial assessment, immediately following the loss (i.e., “after they returned from theatre following surgery”) ( $M = 47.6$ ), and the second interview, 23 days after the first assessment ( $M = 39.0$ ). One factor complicating the interpretation of these results is the high attrition of participants between the first and second assessment periods. Of the 48 women who completed the first assessment, only 26 returned for the second assessment. In this study, state anxiety levels were elevated following miscarriage, as opposed to trait anxiety, which as would be expected, remained stable over time. Given that trait anxiety levels were consistent with other nonclinical samples (i.e., working women in Ireland and the United States), these results suggest that these miscarrying women were

responding to the experience of an anxiety-provoking event and were not necessarily individuals prone to anxiety.

Lee et al. [28], Prettyman et al. [29] and Nikcevic et al. [30] also found increased anxiety following loss, with the latter two also reporting greater increases in anxiety symptoms relative to depressive symptoms following miscarriage. These studies both employed the Hospital Anxiety and Depression Scale (HADS) [31], which includes seven 4-point Likert scale items that assess anxiety symptoms. With higher scores indicating greater anxiety, Zigmond and Snaith [31] defined cutoff scores of  $\leq 7$  for “noncases,” 8–10 for “doubtful” or subthreshold cases (also referred to as “clinically significant anxiety” in some studies) and 11 for definite “cases.” Unfortunately, no distinction between trait and state anxiety can be made using the HADS. Prettyman et al. [29] found that 41% of miscarrying women ( $N=65$ ) showed significant levels of anxiety within the first week after the loss, while 22% reported significant levels of depressive symptoms. This discrepancy in symptoms remained at 12 weeks after the miscarriage, with 32% of women continuing to show elevated anxiety levels, whereas 6% displayed increased depressive symptoms. Mirroring this finding, Nikcevic et al. [30] had a sample of 138 miscarrying women complete the HADS and found that 42% reported significant levels of anxiety as compared to the 15% displaying clinically significant depressive symptoms. The mean time elapsed between miscarriage and assessment was 163 days. These studies elucidate a pattern of significantly elevated anxiety levels in miscarrying women, often greater than their levels of increased depressive symptomatology.

Nikcevic et al. [32] examined whether awareness of the cause of miscarriage influenced women’s psychological distress and found that both women who knew the cause of the miscarriage ( $N=87$ ) and those who did not ( $N=56$ ) displayed elevated anxiety levels at 4 weeks after the loss. Using the HADS and a repeated-measures design, they found that 47% of the women who knew the cause of the miscarriage exhibited elevated anxiety symptoms at 4 weeks post-loss as compared with 66% of the women who did not know the cause of the miscarriage. There was, however, a significant decrease in the number of clinically significant anxiety cases for both groups between the 4-week assessment and a 4-month follow-up ( $P<.001$ ). It is interesting to note that depressive symptoms were not significantly elevated in either group at 4 weeks or 4 months after the loss. In contrast to the Nikcevic et al. [32] findings, two studies found that anxiety symptoms did not abate with the passage of time following a miscarriage. In a recent study by Walker and Davidson [33], miscarrying women were assessed with the HADS at 3 weeks ( $N=40$ ) and 3 months ( $N=37$ ) after the loss. At 3 weeks, 50% of the sample displayed clinically significant levels of anxiety, while at 3 months, 45% were found to have clinically significant anxiety symptoms. The difference between the two assessments was not significant, demonstrating that anxiety symptoms did not decrease significantly over the 3-month follow-up. In this investiga-

tion, no differences were found between women who experienced warning signs of early pregnancy loss, such as physical pain or bleeding, and those that did not. A longitudinal study by Cordle and Prettyman [34] revealed similar findings, with no significant differences in the elevated anxiety scores on the HADS of miscarrying women ( $N=50$ ) at 12 weeks and 2 years after the loss. Even more telling is their finding that there was no significant difference in the number of clinically significant cases at 12 weeks and 2 years, therefore revealing the stability of anxiety symptoms over the 2 years. It is possible, however, that these results can be explained by the inability of the HADS to distinguish state anxiety from trait anxiety.

There is relatively little research on the incidence of anxiety symptoms in women who have experienced recurrent losses. Of the two studies that examine anxiety in relation to multiple losses, Klock et al. [35] assessed 57 women who had an average of 3.3 (S.D. = 1.6) miscarriages. The mean scores for state ( $M=44.5$ ) and trait ( $M=43.0$ ) anxiety levels for these miscarrying women were elevated above previously established scores for nonclinical samples (mean was approximately 36 for both dimensions). Using a repeated-measures design, Roswell et al. [36] investigated the effect of an intervention on levels of anxiety and depression in women who have experienced recurrent loss. Thirty-seven women, with an average of 2.9 miscarriages (S.D. = 0.9), completed the HADS at three assessment periods over the course of approximately 4 months. At the first assessment, an average of 5.3 weeks after the loss, 48.6% of women reached the threshold for caseness for anxiety symptoms. By the third assessment (an average of 16.6 weeks after the loss), 27% of the women continued to display morbidly elevated anxiety levels. Roswell et al. [36] note that at approximately 4 months after the loss, the incidence of miscarrying women reaching caseness for anxiety was still three times greater than the rate for the community samples cited by Lee et al. [28].

At least one study did not find support for increased anxiety symptoms in women who miscarried. A retrospective study performed by Tunaley et al. [37] used the Profile of Mood States (POMS) questionnaire [38] to assess the level of anxiety in miscarrying women ( $N=22$ ) between 3 and 6.5 months after the loss. Comparing the mean level of anxiety symptoms of the sample with the standardization norms for the POMS revealed that the anxiety level of the miscarriage cohort ( $M=13.1$ ) was significantly lower than that of female psychiatric outpatients ( $M=20.7$ ) but not significantly different than female college students ( $M=13.9$ ). The appropriateness of comparing miscarrying women with both female psychiatric outpatients and college students is questionable in that they all represent distinct populations, ones that may differ substantially from one another on many other sociodemographic variables such as age, education and socioeconomic status, for example.

In one of the few prospective studies of miscarriage, Statham and Green [39] compared the anxiety levels of

women who had never been pregnant previously ( $N=487$ ) with women who had previously experienced either a miscarriage or what they termed, an “unsuccessful pregnancy” ( $N=98$ ) (i.e., stillbirth, birth of an ill or handicapped child, or terminations for medical reasons). Results from the STAI revealed that the women who experienced a miscarriage or problematic pregnancy outcome previously had higher trait anxiety scores ( $M=40.6$ ) than women experiencing their first pregnancy ( $M=38.7$ ;  $P<.05$ ). The study did not mention, however, whether the obtained trait anxiety scores for both groups were significantly elevated above rates for otherwise similar women unexposed to either reproductive loss or pregnancy.

#### “Controlled” studies

There are five primary studies that utilized at least one comparison group when assessing for symptoms of anxiety following miscarriage. Using the HADS, Thapar and Thapar [9] found that miscarrying women reported significantly greater anxiety within 24 h ( $N=60$ ) and at 6 weeks ( $N=51$ ) following loss as compared to a comparison group of pregnant women ( $N=62$  and  $52$ , at each assessment period, respectively). At the first assessment, the miscarriage group had a median score of 9 on the HADS anxiety subscale as compared to a median score of 4 for the pregnant cohort ( $P<.001$ ). Although the gap in anxiety symptom scores between the two groups decreased at 6 weeks, the difference remained significant ( $P<.01$ ). Janssen et al. [2], using the Symptom Checklist (SCL-90-R) [40], found that miscarrying women ( $N=227$ ) endorsed more symptoms of anxiety than the comparison cohort of women who delivered a living baby ( $N=213$ ) at both 2.5 months ( $P<.0005$ ) and 6 months ( $P<.0005$ ) follow-up. At approximately 2.5 months after the loss, 22% ( $N=49$ ) of miscarrying women scored what Janssen et al. [2] categorized as “high” or “very high” on the anxiety subscale. By the 12- and 18-month follow-ups, however, the difference in anxiety scores between the loss group and the comparison group was no longer statistically significant. Lee et al. [28] assessed the frequency of both anxiety and depressive symptoms in miscarrying women ( $N=39$ ) at 1 week and 4 months after the loss. At 1 week, 35.9% of the miscarriage cohort showed increased anxiety symptoms on the HADS, significantly higher than the previously reported 7.6% of women from the community sample. Anxiety levels remained significantly elevated 4 months after the loss, with 28.2% of miscarrying women still reaching caseness. This study also produced an interesting finding regarding the prevalence of depressive symptoms as compared to anxiety symptoms. At both 1 week and 4 months after the loss, miscarrying women reported greater levels of anxiety (35.9% and 28.2%, respectively), than depressive symptoms (7.7% and 5.1%, respectively). Because many studies have not examined anxiety and depressive symptomatology separately, it remains to be seen if this finding will be replicated in future studies.

Castille et al. [41] and Beutel et al. [42] went one step further and included community cohorts in addition to pregnant comparison groups. Castille et al. [41] employed a community cohort ( $N=290$ ) frequency-matched to women in the miscarriage cohort ( $N=224$ ) on language of interview, age, education and season of interview. The pregnant cohort ( $N=277$ ) was found to be similar to the miscarriage cohort on age, socio-demographic and reproductive characteristics. Anxiety symptoms were assessed using the Composite Anxiety Symptom Scale (CASS), a scale constructed by Castille et al. specifically for their study. Items for the CASS were drawn from the Psychiatric Epidemiology Research Interview (PERI) [43] to assess symptoms of GAD, panic disorder and agoraphobia. Women in the miscarriage cohort had significantly higher levels of anxiety ( $M=24$ ) than both the pregnant cohort ( $M=20.4$ ) and the community cohort ( $M=20.2$ ) within 4 weeks after the miscarriage ( $P<.05$ ). Beutel et al. [42] also included an age-matched community comparison group ( $N=125$ ) in addition to a pregnant comparison group ( $N=80$ ). The STAI was used to assess anxiety symptoms in all three groups. They found that anxiety symptoms in the miscarriage group ( $N=125$ ) were significantly higher than both the pregnant and community groups immediately following the loss ( $P<.001$ ). Differences in anxiety symptoms between the miscarriage and comparison cohorts were no longer significant by the 6-month follow-up.

Cumulatively, these studies clearly provide support for the claim that anxiety symptoms are significantly elevated following a pregnancy loss. The use of comparison groups unexposed to loss increases our confidence that the increase in anxiety levels may in fact be a consequence of the loss rather than a part of the reproductive process in general. Because it has been demonstrated that pregnancy alone seems to have an effect on the psychological well-being of women, comparison groups allow one to further tease apart the effect of miscarriage from the effect of simply becoming pregnant. Thus, the findings from the five studies, which employed comparison groups studies, suggest that there is a significant risk for an immediate elevation of anxiety symptoms in women who miscarry, and that this increase may be sustained as long as 6 months after the loss, although results have been mixed. To date, controlled studies examining the duration and intensity of anxiety symptoms beyond 6 months after miscarriage are rare, with the one exception being the work of Janssen et al. [2]. Additionally, the finding of Lee et al. [28] of higher levels of anxiety symptoms than depressive symptoms post-miscarriage highlights the possibility that miscarrying women may be as affected, if not more affected, by anxiety than by the depression that has been well-documented over the last few decades. While the studies without comparison groups do not allow for this type of supposition, they provide a gauge as to the degree of anxiety symptoms that might be expected in women following a miscarriage. These findings certainly have repercussions for the treatment of

women who have experienced a loss, specifically that treatment needs to be provided in a timely manner as the distress seems greatest immediately following the loss.

### Anxiety disorders

Considering that miscarriage is often a traumatic and unanticipated event in the life of a woman and results in increased anxiety symptomatology, it seems reasonable that the experience of a miscarriage may increase a woman's risk for an episode of an anxiety disorder. However, as it is only recently that anxiety in general has received attention in miscarriage research, there is substantially less available literature on the incidence of specific anxiety disorders. This is surprising if, as mentioned previously, one considers the fact that women in general are more likely than men to be diagnosed with an anxiety disorder over the course of their lifetime. Another impetus guiding the investigation of anxiety disorders following miscarriage involves the existing literature examining the incidence of anxiety disorders during pregnancy and the postpartum period [11,12,14–21,44–52]. For example, most studies of Panic Disorder in the postpartum period have found increased onset or an exacerbation of symptoms. The results of studies of panic disorder are less clear for pregnancy. Some studies have found a decrease in symptoms during pregnancy [14,49,50], while Cohen et al. [46] found no change in symptoms. Researchers examining OCD have found some evidence that women are more vulnerable to onset during pregnancy and the postpartum period [18,48,51,52]. Despite the mixed results, it is likely that there is some feature of the reproductive process that influences the course of anxiety disorders during pregnancy and the postpartum period. This leads to a natural curiosity about miscarriage as a possible risk factor for anxiety disorders. Research interest in this area has increased very recently. The current section reviews the published studies according to the primary outcome of interest, presented in alphabetical order.

#### *Anxiety Disorder, NOS*

Using the Structured Clinical Interview for DSM-III-R (SCID) [53], Lee et al. [47] found that 2 of 150 miscarrying women (1.3%) met the criteria for Anxiety Disorder NOS 6 weeks after the loss. It is unclear whether any of the 18 women who were diagnosed with Major Depressive Disorder with the SCID 6 weeks post-loss may have had a comorbid diagnosis of Anxiety Disorder NOS. In addition, although 12 of the original sample of 209 women (6%) had a past history of psychiatric illness, it is unclear how many of the 150 women who completed the SCID had such a history. Because a comparison group was not employed, this further limits the inferences that can be drawn from the data.

#### *Generalized Anxiety Disorder*

There currently are no studies examining the relationship between miscarriage and GAD. Because it has been shown that stress exacerbates the symptoms of the disorder, it is plausible that experiencing a miscarriage might also exacerbate GAD symptoms. Research regarding this association is needed.

#### *Obsessive–Compulsive Disorder*

In an uncontrolled study, Neziroglu et al. [48] investigated the onset of OCD in 106 women and found that three of the five subjects who had miscarriages or elective abortions reported onset during pregnancy. Symptoms resolved after the termination of pregnancy, suggesting that some aspect of the pregnancy (e.g., hormonal change; pregnancy-related stressors) may be associated with OCD.

In the first study to examine the prevalence of anxiety disorders in a miscarriage cohort using a frequency-matched comparison group, Geller et al. [54] assessed both a miscarriage cohort ( $N=229$ ) in the 6 months following loss and a matched community cohort of women who had not been pregnant in the last year ( $N=230$ ), using the Diagnostic Interview Schedule (DIS) [55]. They found that miscarrying women were significantly more likely to experience an episode of OCD as compared to the community sample matched on age, education, language of interview (English or Spanish) and season of interview. Specifically, miscarrying women were eight times more likely to experience a recurrent episode of OCD as compared to the community cohort. The significant increase in OCD in miscarrying women was maintained even after comorbid cases of anxiety and depression were removed from the analysis.

#### *Panic Disorder*

Two of the three studies that examined the relationship between miscarriage and Panic Disorder did not include a comparison group. Specifically, Klein et al. [12] conducted a retrospective study of former Panic Disorder patients ( $N=20$ ) using telephone interviews. Of the total 51 pregnancies reported, nine ended in miscarriage and six were aborted. When these two categories were combined, they found that there was no significant change in reported panic level during the first trimester of pregnancy relative to panic level after termination. The small sample size, reliance on retrospective self-report data, and the combining of the miscarriage and aborted groups limit what can be extracted from this study. Wisner et al. [19] examined the relationship between pregnancy and Panic Disorder onset over the course of 5 years in a sample of 22 women with a history of Panic Disorder. Of the total sample, there were 45 pregnancies, 65% of which were carried to full term. Two of the 10 women who miscarried experienced an episode of Panic Disorder in the immediate post-loss

period, but no specific information was provided about the remaining eight miscarrying women. While interesting, it is difficult to interpret this finding without a comparison group. Geller et al. [54], whose research design included a matched comparison group of community women without recent reproductive events, found no elevated risk for panic disorder following miscarriage. Additional research in this area is warranted.

#### *Phobic disorders*

Geller et al. [54] also assessed for agoraphobia as a separate entity and all phobic disorders combined (including Social Phobia, agoraphobia and other specific phobias) in their matched comparison group study and found no increased risk following miscarriage. Although many women and their partners seek to socially isolate themselves following a miscarriage [56], which may contribute to the avoidance associated with recurrent social anxiety, there appeared to be no elevated risk for social phobia specifically. However, Geller et al. [54] suggest that the possible contribution of miscarriage to risk for these and other anxiety disorders merits further study in investigations using larger sample sizes and unexposed cohorts.

#### *Post-Traumatic Stress Disorder*

The onset of PTSD symptoms and PTSD in the post-miscarriage time period has only very recently received attention in the literature. Salvesen et al. [57] were the first to report a case of PTSD in a study comparing the psychological distress levels of women who experienced an elective pregnancy termination due to ultrasound-detected fetal anomalies with the psychological responses of women following a spontaneous abortion or a perinatal death. Of the 36 women included in the study, one woman in the perinatal loss group (representing 3% of the total sample) met the DSM-IV criteria for PTSD. Bowles et al. [58] cited anecdotal evidence suggesting that 10% of women reporting a loss before the 20th week of gestation meet the DSM-IV criteria for Acute Stress Disorder (ASD) in the month following the loss, with approximately 1% meeting the criteria for PTSD a month after the loss. A controlled, longitudinal study by Engelhard et al. [59] found that 25% of the 113 women experiencing a pregnancy loss ( $M=11.4$  weeks of gestation) met the criteria for PTSD one month after the loss. The severity scores as measured by the Posttraumatic Stress Symptom Scale-Self-Report version (PSS-SR) [60] for the women experiencing PTSD ( $M=28.61$ ) were twice as high as the non-PTSD group ( $M=14.60$ ) at 1 month after the loss. In the previously discussed study by Walker and Davidson [33], 15% of 40 miscarrying women met the criteria for a diagnosis of ASD according to the DSM-IV criteria, as assessed by the Structured Clinical Interview for Dissociative Disorders (SCID-D) [61]. While this research provides insight into

the risk of PTSD and ASD, it highlights the importance of including comparison groups in order to determine whether rates are truly increased, and it introduces the related issue of what is the most appropriate comparison group (e.g., women experiencing a trauma event unrelated to reproductive loss, women experiencing an earlier miscarriage as compared to a later miscarriage).

In summary, the limited data available indicates that miscarrying women appear at risk for onset of OCD, ASD and PTSD after the loss event. The only study to report the risk of disorder for miscarrying women relative to non-pregnant women was the Geller et al. [54] study, with 3.5% of miscarrying women developing OCD as compared with 0.04% of community women. The rates of ASD and PTSD in existing studies are not as easy to interpret due to the lack of comparison groups.

As GAD and Social Phobia have not been studied following miscarriage, it is impossible to make any inferences about the incidence of these two disorders in women who miscarry. Future studies examining these disorders are necessary in order to ascertain whether there is any increased risk following miscarriage.

#### **Anxiety and pregnancy subsequent to miscarriage**

Acknowledgement of both the distress women experience after a pregnancy loss, and the fact that as many as 50% of women who miscarry become pregnant again within a year following the miscarriage [62], has led researchers to examine anxiety symptoms in the pregnancy subsequent to perinatal loss [2,9,39,63–69]. Several studies have delineated the experiences of women after loss events through the use of interviews, without employing comparison groups. For example, Cote-Arsenault and Mahlangu [64] collected descriptive, open-ended questionnaire responses related to the current pregnancy from a convenience sample of 72 pregnant women with at least one prior perinatal loss (including miscarriage, stillbirth or neonatal death), and reported themes of heightened pregnancy-related anxiety and guarded emotions in the women's responses. Crowther [65] reported that over one-third of the 48 pregnant women who had a previous stillbirth or neonatal death, and with whom she conducted personal interviews at their first antenatal clinic visit, were hospitalized related to anxiety about their current pregnancy. It is unclear how this sample was selected, however. As relevant comparison groups were not included in these studies, the meaning of these results is unclear.

Of the studies that employed a comparison group, most report that pregnancies following perinatal loss involve heightened anxiety relative to first pregnancies. Theut et al. [68] compared 25 expectant couples with a history of perinatal loss within the previous 2 years (64% had experienced miscarriage prior to 20 weeks of gestation) with 31 primiparae expectant couples at 8 months gestation,

a time beyond the point when the previous pregnancy had ended. They reported an elevation of anxiety related to the pregnancy experience, assessed with the Pregnancy Outcome Questionnaire (POQ) [68], in the mothers with a previous loss. No significant differences were found between the groups on a measure of more generalized anxiety (trait scale of the STAI). Armstrong and Hutti [63] reported significantly greater levels of pregnancy-related anxiety as measured with the POQ in a convenience sample of 16 pregnant women with a prior perinatal loss (including miscarriage in the second trimester, stillbirth or neonatal death) relative to 15 pregnant women at a similar gestational stage who were experiencing their first pregnancy. Janssen et al. [2] found that women who had a history of pregnancy loss had greater symptoms of anxiety ( $P=.03$ ) than women in a pregnant comparison cohort unexposed to loss. Similarly, Thapar and Thapar [9] reported that women who experienced a prior miscarriage had significantly higher anxiety scores on the HADS as compared to women who had no history of a miscarriage.

In a matched comparison group design that examined the effect of a woman's belief about the cause of the miscarriage on psychological adjustment, Franche and Mikail [66] examined the emotional adjustment of 31 pregnant women with a perinatal loss occurring in the prior pregnancy (55% reported that the loss had occurred within the first trimester; 22%, within the second trimester; 10%, within the third trimester; and 13% reported a neonatal death) relative to 31 pregnant women without a history of such loss matched on gestational age at the time of assessment (i.e., between 10 and 24 weeks of gestation). Although no group differences were reported on the STAI, those with a prior reproductive loss reported significantly more pregnancy-specific anxiety on the POQ, which was associated with a belief that their own behavior affects the health of the fetus. For the comparison group, there was less perceived self-criticism as POQ scores were associated with the belief that it was the behavior of health care professionals that affects the health of the fetus. Franche and Mikail [66] also found significantly elevated anxiety scores and sense of personal responsibility in those with a previous loss relative to the comparison group.

An often hypothesized moderator of anxiety reactions in the subsequent pregnancy is the time elapsed since reproductive loss. Hughes et al. [67], who studied a cohort of 60 pregnant women whose previous pregnancy had ended in loss after 18 weeks of gestation, relative to a cohort of 60 matched women without a history of such loss, found that women with a prior loss were at greater risk for state anxiety (measured with the STAI) during the third trimester of the subsequent pregnancy and 1 year postpartum, but not in the early postpartum period. However, when time since loss was included in analyses, Hughes et al. [67] found that women who conceived less than 1 year after the loss accounted for the difference. Results for women who became pregnant more than 1 year following loss were similar to their

matched counterparts at all time points assessed, prompting the advisement that women wait 12 months before attempting conception.

These studies indicate that women with a history of reproductive loss experience greater anxiety in their subsequent pregnancy as compared to pregnant women unexposed to prior loss. Although it may be justifiable for women with a loss history to experience anxiety about the prospect of yet another loss, it does not appear that a subsequent pregnancy necessarily results in psychopathology. In fact, for miscarrying women experiencing grief and depression, a subsequent pregnancy might promote healing [70–72]. Whether risk for anxiety during a subsequent pregnancy might be impacted by the time since reproductive loss remains to be determined. Research addressing whether conceiving again right away or waiting until women have resolved their grief and depressive symptoms helps limit anxiety in the subsequent pregnancy, would assist health care providers in advising women. Regardless, the availability of clinical intervention for women with a loss history who display increased levels of anxiety about the current pregnancy may be beneficial and may prevent the anxiety from advancing to a significant degree. There is a need for further research in this area. There also is the need to consider the inclusion of the most appropriate comparison group with which to compare the specific miscarriage sample and to address the particular research question (e.g., primiparous women may be less appropriate as a comparison group than multiparous women, with or without history of loss).

### Partner's reaction to the loss

A severely neglected area of miscarriage research is that of the partner's reaction to the loss. To date, there has been little rigorous research addressing the impact on male partners, and no published research regarding the female partner's response in the case of lesbian couples. Despite study designs that limit what can be gleaned from the initial studies regarding impact of miscarriage on male partners, we review this brief literature with appropriate cautions and emphasize the need for systematic work in this important area.

While most of the research in this area has focused on case studies [73–76], there have been a limited number of studies that have quantitatively measured the psychological responses of male partners. Black [77] conducted semi-structured phone interviews to examine the role of the male as a support resource, while Johnson and Puddifoot [78] used the Perinatal Grief Scale (PGS) [79] to assess the grief response in male partners. Few researchers have addressed the very specific question regarding incidence of anxiety symptoms in the male partners of women who have miscarried. Specifically, Beutel et al. [80] assessed 56 couples that experienced a miscarriage (mean of 10 weeks of

gestation) using the STAI. Men displayed significantly lower ( $P \leq .05$ ) anxiety scores ( $M=41.1$ ) than women ( $M=45.3$ ) immediately after the loss. The scores provided were mean total anxiety scores; therefore, it is impossible to compare state and trait anxiety between the two groups. It also is unclear how much of the males' anxiety resulted from the loss or their concern for their partners. Finally, it is not clear whether the anxiety scores of males are significantly elevated as compared to a male cohort unexposed to loss, which is more meaningful than simply knowing that men scored lower on anxiety symptoms than women. As mentioned previously, this is a finding that may be anticipated solely on the knowledge that women are diagnosed more often with anxiety disorders.

A study by Daly and Harte [81] found that in the 6 weeks following miscarriage, 36% of male partners ( $M=25$ ) were classified as displaying morbid levels of anxiety as assessed by the HADS (i.e., a score greater than 10). Again, although a seemingly striking result, clear interpretation is not possible because of the absence of a comparison group unexposed to loss. A study by Vance et al. [82] assessing anxiety and depression with the Delusions–Symptoms–States Inventory of Anxiety and Depression [83] in parents who lost a child by stillbirth, neonatal death or SIDS found that 14.2% of bereaved fathers displayed anxiety or depression symptoms 2 months after the loss as compared to 2.7% of the comparison group of fathers who had a live-born infant of the same sex born at the same time and at the same hospital ( $P < .001$ ). It is unclear, however, how many of the men in either the bereaved group or the comparison group specifically endorsed the seven anxiety symptom items as opposed to the seven depression symptom items.

In summary, the initial uncontrolled studies suggest that males may be affected by the loss of future children, but that their coping strategies may differ from women, including the use of maladaptive behaviors, such as substance use [82]. Additionally, while the anxiety levels of male partners may not reach the levels of women, at least two of the studies provide preliminary support for increased anxiety symptoms in males up to 2 months after the loss. As the few studies that have addressed partners' reactions to miscarriage have been uncontrolled, with the exception of the Vance et al. [82] study, and focused on male partners, systematic work in this emerging area of interest that employs appropriate comparison groups and male, as well as female, partners of miscarriage women is sorely needed. With greater numbers of lesbian couples making the decision to have children, research regarding the impact of miscarriage on female partners is needed. In addition to addressing the female partner's responses to the loss itself (and how these responses may differ from those of male partners), there also may be other issues unique to lesbian couples that require attention (e.g., if the choice for one partner to conceive was made only after the other partner miscarried).

## Conclusion

Although research on the psychological sequelae of miscarriage has increased in the last decade, it is only recently that the area of anxiety symptoms and disorders has received attention. Similar to the progression of research on miscarriage and depressive symptomatology and disorders [5], the systematic study of both anxiety symptoms and disorders is necessary to increase the scope of our understanding of miscarriage and its consequences. What is known based on the limited research is that miscarriage women are at increased risk for anxiety symptoms immediately following miscarriage and continuing until approximately 4 months after the loss event. The picture is less clear beyond the 4-month time period, with conflicting reports of anxiety symptoms at 6 months after the loss. Regarding anxiety disorders, the risk for onset of OCD in the 6 months following the loss appears increased, but additional work employing larger sample sizes is warranted. It seems that miscarriage women also may be at an increased risk for ASD and PTSD, however, the lack of comparison groups in existing studies precludes a definitive interpretation.

Further interpretation of the research is limited by the aforementioned small sample sizes, lack of comparison groups, and use of mixed samples, as well as the measures employed. It currently is the exception to find studies that include a comparison cohort, although this methodological component is vital to make inferences from the data. Additionally, future research needs to focus on the specific anxiety disorders, including GAD as well as panic disorder. The paucity of research in this area suggests that anxiety disorders may frequently go undetected in miscarriage women. This is especially troublesome considering the likelihood of miscarriage women becoming pregnant soon after the loss event. To advance the findings of previous research, it is necessary to be consistent with the form of measurement and the time period at which symptoms and disorders are measured. Similarly, adhering to a specific time frame of gestation for miscarriage will facilitate generalization of the findings. As is the case with the depression literature, studies that employ larger sample sizes can examine potential effect modifiers such as age, number of living children and attitude toward the pregnancy on anxiety [5]. It is also important that measures are able to tie the anxiety symptoms with the loss event. Thus, it is recommended that future research employ measures that can distinguish between characteristic levels of anxiety and state anxiety. While the HADS is used quite frequently in this area of research, it cannot be used to make this distinction and as such, studies using the HADS do not allow comment regarding how much of the anxiety is attributable to the loss event.

The incidence of anxiety symptoms and disorders in male and female partners has largely been ignored in the past, as has the effect of the reproductive loss on the relationship of the couple [84]. The little published research that exists indicates that these issues need to be investigated

more systematically. Closely related to this is the effect of miscarriage on siblings, as well as any disrupted attachment between existing children and their mother. It is very likely that the miscarriage impacts and is experienced as stressful by the entire family, especially if the mother herself is experiencing psychological distress. It is therefore also important to assess the level of functional impairment women experience following a miscarriage, as this is the feature that often separates a natural anxiety response from a debilitating one. Severe impairments in interpersonal and social functioning in a woman who has miscarried are likely to affect not only the woman but also her relationships with her partner and other children.

Another area needing further exploration is the relationship between anxiety symptoms and disorders in women who miscarry and the cause of the miscarriage. In a study comparing miscarrying women who experienced a chromosomally normal loss with women who had a chromosomally abnormal loss, Neugebauer et al. [85] found that 70% of the women with a chromosomally normal loss experienced at least one negative life event in the months before the loss as compared to 52% of the women with a chromosomally abnormal loss. Because anxiety symptoms were not assessed, inferences about how this information impacted the women's level of anxiety are not possible. Walker and Davidson [33] did assess anxiety symptoms in a study comparing miscarrying women who perceived physical signs (i.e., bleeding or pains) as warnings of a problematic pregnancy with women who did not perceive any warnings of a possible pregnancy loss. While no significant differences were found between the two groups in terms of anxiety, the sample as a whole reported elevated anxiety levels at both 3 weeks and 3 months after the loss. Future studies should examine the relationship between anxiety and the level of information a woman receives regarding possible causes of the miscarriage. The findings of such studies could potentially inform clinicians about the appropriateness and therapeutic effect of providing women with this type of information.

A major area of needed improvement concerns the overlap of depression and anxiety when assessing anxiety symptoms and disorders. It is known that depressive and anxiety symptomatology are often comorbid, and, thus, it is difficult to tease apart these two constructs. In addition, there is similarity in the risk factors and symptom patterns of these disorders, further complicating distinguishing between the two. Castille et al. [41] attempt to address this issue with the creation of the CASS, which specifically targets the anxiety symptoms used for diagnosis of GAD, panic disorder and agoraphobia in the DSM-IV. While a limitation of the measure is the lack of items assessing the specific symptoms of OCD and PTSD, it appears to be the first attempt to obtain a pure measure of anxiety in miscarrying women.

In summary, future studies need to employ methodologically sound procedures in order to advance the growing body of literature in this area. Comparison groups are an absolute necessity to make definitive statements about

anxiety following miscarriage; and it is vital that appropriate comparison groups be utilized. It is these types of issues that must be addressed during the planning stages of research to allow clear interpretation and to ensure the generalizability of the findings. The anxiety research performed thus far has laid a solid foundation for future growth in this area. Building on the preliminary findings of the current anxiety symptoms and disorders research will allow more comprehensive treatment of women who experience miscarriage.

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