

# The Posttraumatic Impact of Recurrent Pregnancy Loss in Both Women and Men

## Posttraumatische Auswirkungen von wiederholten Spontanaborten bei Frauen wie Männern



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recurrent pregnancy loss, posttraumatic stress, gender difference, emotional stress

### Schlüsselwörter

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### ABSTRACT

**Introduction** Recurrent pregnancy loss is usually associated with significant psychological distress for both partners of the couple. It may act as a traumatic experience resulting in a posttraumatic stress disorder. The object of this study is to examine the posttraumatic impact of recurrent pregnancy loss on men and women and their interdependencies.

**Methods** Cross-sectional study. All couples referred to the special unit for recurrent pregnancy loss between March 2019 and October 2020 were asked to participate with a sample size of 105 couples and 17 women. They were invited to complete a questionnaire package estimating the prevalence of posttraumatic stress, with anxiety, depression, lack of social support and dysfunctional coping strategies as contributing risk factors. Couple data were analysed with the Actor Partner Interdependence Model, taking the couple as a dyad.

**Results** The response rate was 82.3 percent, with posttraumatic stress being measured in 13.7% of the women versus 3.9% of the men ( $p = 0.017$ ). For women, number of curettages, controlled for the number of losses, correlated with the severity of posttraumatic stress ( $p < 0.05$ ). Higher levels of anxiety, depression and lack of social support in women correlated positively with posttraumatic stress in their partners. The men's coping strategy "trivialization and wishful thinking" as well as "avoidance" correlated with more severe posttraumatic stress in the female partners (both  $p < 0.05$ ).

**Conclusion** The posttraumatic risks within a couple with recurrent pregnancy loss are interdependent. Recurrent pregnancy loss clinics should assess posttraumatic risks of both partners in their routine diagnostic process.

### ZUSAMMENFASSUNG

**Einleitung** Wiederholte Spontanaborte sind oft mit einer erheblichen psychischen Belastung für Paare behaftet. Die Verluste können als traumatisches Ereignis wirken, was zu einer posttraumatischen Belastungsstörung führen kann. Ziel dieser Studie ist es, die posttraumatische Belastung durch wiederholte Spontanaborte bei Männern und Frauen sowie deren Wechselwirkungen zu untersuchen.

**Methoden** Es handelt sich um eine Querschnittsstudie. Von März 2019 bis Oktober 2020 wurden alle Paare, die in der Spezialsprechstunde für wiederholte Spontanaborte vorstellig wurden, gefragt, ob sie an der Studie teilnehmen möchten. Die Stichprobengröße betrug 105 Paare und 17 Frauen. Die Paare wurden gebeten, ein Fragebogenpaket zur Einschätzung ihrer psychischen Risiken wie posttraumatischer Stress, Ängstlichkeit, Depression, Mangel an sozialer Unterstützung sowie ihrer Bewältigungsstrategien auszufüllen. Die Paardaten wurden mit dem Akteur-Partner-Interdependenz-Modell analysiert, in dem das Paar als Dyade betrachtet wird.

**Ergebnisse** Die Rücklaufquote betrug 82,3%. Bei 13,7% der Frauen und 3,9% der Männer ( $p = 0,017$ ) zeigte sich posttraumatischer Stress. Bei Frauen korrelierte die Anzahl der Küretta-

gen, kontrolliert auf die Anzahl von Fehlgeburten, mit der Ausprägung des posttraumatischen Stresses ( $p < 0,05$ ). Höhere Werte bei Ängstlichkeit, Depression und dem Mangel an sozialer Unterstützung der Frauen zeigten eine positive Korrelation mit dem posttraumatischen Stress ihres Partners. Die Bewältigungsstrategie „Trivialisierung und Wunschdenken“ wie auch ein Vermeidungsverhalten des Mannes korrelierten mit einem höheren Grad an posttraumatischem Stress ihrer Partnerinnen (jeweils  $p < 0,05$ ).

**Schlussfolgerung** Das posttraumatische Risiko innerhalb eines Paares mit wiederholten Spontanaborten zeigt eine gegenseitige Beeinflussung. In Sprechstunden für wiederholte Spontanaborte sollte dieses Risiko im Rahmen der Routinediagnostik mit erfasst werden.

## Introduction

About 1–3% of couples trying to conceive experience a recurrent loss of pregnancy (RPL) [1, 2, 3]. A recent consensus guideline by the European Society of Human Reproduction and Embryology (ESHRE) defines RPL as the loss of two or more pregnancies [1]. Several risk factors are discussed such as genetic abnormalities, age, antiphospholipid syndrome, uterine anomalies, hereditary and acquired thrombophilia, endocrinologic and metabolic disorders, infections, male and lifestyle factors [1, 2, 4]. For 50–75% of couples, the cause of their RPL remains unknown [3].

The unexpected loss of the child can lead to a strong reaction of grief and a feeling of endless sadness [5, 6]. Further, this grief can evolve into psychological disorders, such as depression, anxiety and progress to a posttraumatic stress disorder (PTSD) [7]. An excerpt from the ICD-10 defines PTSD as a “delayed or protracted response to a stressful event or situation (of either brief or long duration) of an exceptionally threatening or catastrophic nature, which is likely to cause pervasive distress in almost anyone” [8]. With pregnancy loss being strongly associated with suicide as well [9], the recent series “Miscarriage matters” from the Lancet Journal states the investigation of treatment options for affected women with mental health illness as an urgent research priority [10]. Contributing risk factors are a lack of social support or poor marital adjustment, a history of psychiatric illness, childlessness and prior pregnancy loss [7, 11].

Up to 50% of women suffer from a psychological morbidity after pregnancy loss [11]. Of these, between 25–39% experience symptoms of posttraumatic stress [7]. Most studies however describe a decrease in severity of psychological risk with time [6, 7, 12, 13].

Because pregnancy loss is a physical experience undertaken by women, the concerns surrounding the event are attributed primarily to them and not to men [14]. However, there is an increasing body of evidence suggesting a significant and adverse psychological health also in their, mostly male, partners [15, 16, 17, 18].

Still, there is a consensus that men tend to grieve less intensely after a pregnancy loss [12] with being at a lower psychological risk [6, 7, 12, 13, 17, 19, 20]. A prospective cohort study examined the psychological risks of couples over a 9-month period after they had received a diagnosis of a pregnancy loss at a gestational age of  $< 20$  weeks [21]. After three months, in women versus men, posttraumatic stress was diagnosed in 26% versus 8% of the cases. The severity decreased modestly over time showing no strong evidence of gender differences.

Only limited data exist regarding the impact of the clinical management of a first-trimester pregnancy loss (surgical, medical and expectant management) on the mental health of the affected couple. Kong et al. found a significantly higher posttraumatic stress incidence for women with an active intervention (surgical and medical) with the highest scores for the surgical evacuation [22]. A recent study assumes an improvement of emotional health regarding depression, isolation, grief, coping and despair with a shorter duration of treatment which is achieved by a surgical intervention [23].

The aim of this study was to examine the prevalence and severity of posttraumatic stress symptoms in both men and women experiencing RPL, with a focus on the interdependence within a couple. In addition, the impact of different coping strategies and potential influencing factors on posttraumatic stress symptoms of the affected couples were analyzed.

## Material and Methods

### Ethical approval

The Institutional Review Board of the Heidelberg University Medical Faculty (No. S-422/2018) approved the study. The 1964 Helsinki Declaration and its later amendments or comparable ethical standards and the ethical standards of the institutional and national research committee were respected for all procedures in this study involving human participants. The study has been registered in [www.drks.de](http://www.drks.de) with the registration number DRKS00014965.

## Study design

All women and men referred to the special unit for RPL in the Department of Gynecological Endocrinology and Fertility Disorders, at the University Women's Hospital, Heidelberg, between March 2019 and October 2020 with two (or more) RPL (according to the ESRHE criteria [1]) were invited to participate in this study. Patients with less than two pregnancy losses, age under 18 years, inadequate knowledge of the German language or refusal to participate were excluded from the study. The study was approved by the Institutional Review Board of the Heidelberg University Medical Faculty (No. S-422/2018).

## Data collection and measures

The couples were invited to participate at their first appointment at the special unit for RPL. In case of agreement, an identical self-report questionnaire package was handed to both man and woman. If one of the two refused, their partner was still eligible to participate. The completion of the questionnaire occurred prior to the clinical investigation of risk factors for RPL.

### Impact-of-Event-Scale-Revised (IES-R)

The IES is an inventory first developed by Horowitz et al. [24] with its two domains intrusion and avoidance of posttraumatic stress. In 1996, Weiss and Marmar introduced a modified version IES-R with the addition of a third domain: Hyperarousal [25]. This final version, translated to German, comprises 22 items, each belonging to one of the three subscales which were used in the present study [26]. The three subscales are composed of seven items for intrusion (e.g., "Whenever I was reminded of the event, the feelings returned"), eight items for an avoidance behavior (e.g., "I tried not to think about it"), and seven items for hyperarousal symptoms (e.g., "I found it difficult to concentrate"). The responses of the German-language version are recorded on a four-point response scale ("not at all" = 0, "rarely" = 1, "sometimes" = 3, "often" = 4). The IES-R assesses the symptoms of the last seven days.

To diagnose a possible PTSD case, Maercker and Schützwohl developed an equation to calculate the prevalence [26]. It shows high internal consistency (Cronbach's alpha: 0.79–0.90) and diagnosed 80% of patients correctly in a sample of 158 patients validated with a structured clinical interview.

### ScreenIVF

In this study subscales of the ScreenIVF, originally developed as a screening instrument for psychological stress in couples undergoing fertility treatment (validated by Verhaak et al. with a sensitivity of 69% and specificity of 77% [27]), were used. Utilizing a four-point Likert scale, the risk for anxiety, depression and lack of social support were analyzed. Anxiety was assessed with 10 items from the short form of the State and Trait Anxiety Inventory (STAI) with a cut-off score  $\geq 24$  by adding the score of each item [28]. Seven items from the Beck Depression Inventory [29] were used to estimate the risk of depression with a cut-off score  $\geq 4$ . Thirdly, five items from the Inventory of Social Involvement (ISI) accounted for the social support with a score  $\leq 15$  defining a lack of support

[30]. The German version of the ScreenIVF was first used by Volmer et al. [31].

### Coping

The different coping styles were assessed with a modified version for pregnancy loss of the Freiburg Questionnaire about Coping with Illness validated for the German language [32, 33]. The domains are: depressive coping (5 items, e.g. "to withdraw from other people"), active problem-orientated coping (5 items, e.g. "to make active efforts to solve the problem"), distraction and self-enhancement (7 items, e.g. "seeking success and self-affirmation") and trivialization and wishful thinking (4 items, e.g. "down-playing the significance of the loss"). A five-point Likert scale was used to indicate how much the respective statement applies to the individual.

### Partnership

Partnership satisfaction and impairment of sexual life were both assessed each with a self-developed visual analogue scale from 1 to 10. Satisfaction was retrieved with the question "How happy would you rate your partnership at the moment?" and impairment of sexual life with "How much has your sex life been affected by the repeated pregnancy losses?"

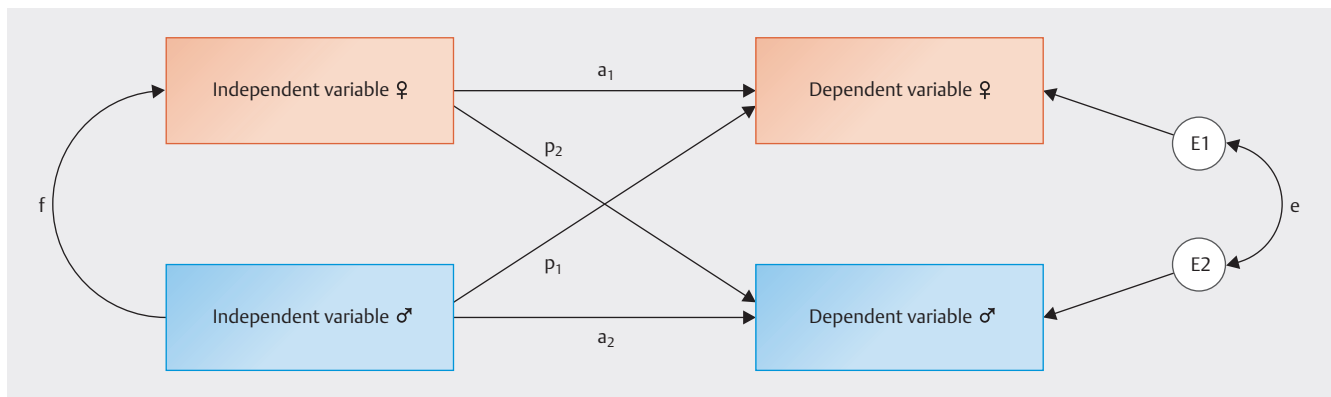
## Data analysis

The data of the 227 participants were analyzed with SPSS Statistics Version 26. Descriptive analysis was conducted for sociodemographic parameters, gynecologic history and psychological impact. The interrelations of data were analyzed with a correlation analysis. For the couple comparisons, only the 105 male/female couples were included.

In case of an incomplete questionnaire, missing values were supplemented by the mean value of the answered items. The prerequisite was that at least 80% of the items belonging to the particular subscale were completed, otherwise this subscale was excluded completely from evaluation.

For the comparison of men and women, the Student's *t* test or the  $\chi^2$  test were used, according to the scale level. For the correlation analyses, Pearson and Kendall-tau-b correlation coefficients were calculated.

Additionally, couples were analyzed with the Actor Partner Interdependence Model with Multilevel Modeling (APIM\_MM) for distinguishable variables (man and woman) provided by David A. Kenny [34]. It assumes that characteristic features influence not only the person him- or herself ( $a_1$  and  $a_2$  in ► Fig. 1; actor effect – intrapersonal effect), but also the partner ( $p_1$  and  $p_2$  in ► Fig. 1; partner effect – interpersonal effect) as a familiar person. The curved line *f* states the correlation and therefore the similarity of the two independent variables within the couple and the curved line *e* states the correlation between the residual terms, whose interdependence cannot be explained by the APIM (► Fig. 1) [35]. Actor and partner effects are presented as partial correlations. For its calculation, the web-based program APIM\_MM (<http://davidakenny.net/DyadR/DyadRweb.html>) was used.



► **Fig. 1** Theoretical model of the APIM (Actor Partner Interdependence Model).

## Results

### Sociodemographic data

In total, 138 couples were invited to participate in this study, with 105 couples and 17 women returning the questionnaires (response rate 82.2%). Patient characteristics are shown in ► **Table 1**.

Of all participants, 71.3% finished high school or had a higher qualification. The mean duration of the partnership was  $8.61 \pm 5.32$  years and the desire to have children was  $3.00 \pm 2.19$  years (mean  $\pm$  standard deviation). On average,  $5.04 \pm 4.95$  months passed since the last pregnancy loss and the presentation in the clinic. The majority of pregnancy losses were early losses before the 12<sup>th</sup> week of gestation (94.3%). Late pregnancy losses, between the 12<sup>th</sup> and 24<sup>th</sup> week of gestation, were found in 5.7% of the cases.

### Prevalence of posttraumatic stress

The percentage of women with the potential diagnosis of a PTSD was significantly higher, with 13.7% compared to 3.9% of men ( $p = 0.017$ ) (► **Table 2**). Women showed significantly higher scores on the subscale intrusion ( $p < 0.001$ ), hyperarousal ( $p < 0.001$ ) and the total score of the IES-R ( $p < 0.001$ ) as well. In women, the most endorsed symptom cluster was intrusion, with an average of  $14.36 \pm 8.57$  points, whereas in men, the avoidance subscale with  $12.12 \pm 8.26$  points was noted predominantly. Furthermore, as contributing risk factors, about every second woman showed a risk for anxiety (50.4%) and depression (48.1%). The proportion of men with a risk for anxiety and depression as potential risk factors for posttraumatic stress was significantly lower ( $p < 0.001$ ) with 17.3% and 14.4%. In contrast to this, there was no significant gender difference regarding the perceived social support (lack of social support as risk factor: 32.5% of women and 32.7% of men).

► **Table 1** Characteristics of patients.

	Women	n	Men	n
Age (y)	$35.0 \pm 4.5$	122	$36.1 \pm 5.5$	104
BMI (kg/m <sup>2</sup> )	$24.5 \pm 4.8$	121	$26.1 \pm 4.1$	90
Gravidity	3 (2/7)	122		
Parity	0 (0/4)	122		
Pregnancy losses	3 (2/7)	122		
≥ 1 Curettage	86.9%	106/122		
Childlessness	65.3%	79/121	65.4%	68/104
Smoking	8.2%	10/122	19%	20/105

Data are presented as mean  $\pm$  standard deviation, median (min/max) or percent.

► **Table 2** Women and men “at risk”.

	Women	Men	P value
Potential PTSD	<b>13.7</b> (16/117)	<b>3.9</b> (4/103)	0.017
Anxiety	<b>50.4</b> (60/119)	<b>17.3</b> (18/104)	<0.001
Depression	<b>48.4</b> (59/122)	<b>14.4</b> (15/104)	<0.001
Lack of social support	32.5 (39/120)	32.7 (34/104)	0.976
Total “at risk”	<b>68.9</b> (84/122)	<b>44.8</b> (47/105)	<0.001

PTSD = posttraumatic stress disorder

Data are presented as % (n/N). Statistical analysis by  $\chi^2$  test. Significant results (P value <0.05) are marked **bold**.► **Table 3** APIM of couple's dynamics for psychological risks and coping strategies associated with posttraumatic stress (presented only if partner effects were significant).

	Avoidance (IES-R)	Depression	Anxiety	Lack of social support	Trivialization and wishful thinking
Actor effects					
a1 ( $\beta$ )	<b>0.77**</b> (0.773)	<b>0.486**</b> (0.424)	<b>0.511**</b> (0.495)	<b>-0.367**</b> (-0.385)	<b>0.595**</b> (0.606)
a2 ( $\beta$ )	<b>0.824**</b> (0.794)	<b>0.604**</b> (0.73)	<b>0.458**</b> (0.458)	-0.098 (-0.085)	<b>0.611**</b> (0.594)
Partner effects					
p1 ( $\beta$ )	<b>0.321*</b> (0.224)	0.151 (0.186)	0.079 (0.083)	0.074 (0.074)	<b>0.25*</b> (0.218)
p2 ( $\beta$ )	-0.013 (-0.007)	<b>0.246*</b> (0.155)	<b>0.31*</b> (0.235)	<b>-0.361**</b> (-0.338)	0.072 (0.052)
f	0.041*	0.143*	0.215*	0.131*	0.255*
e	0.159	0.054	0.088	0.141	-0.069

a1 = actor effect (woman); a2 = actor effect (man); e = partial correlation for PTSD controlling for actor and partner variables; f = correlation of the independent variables; p1 = partner effect from men to women; p2 = partner effect from women to men;  $\beta$  = standardized effect; \* =  $p < 0.05$ , \*\* =  $p < 0.001$ . Significant Actor and Partner effects are marked **bold**.

## Couple as a dyad

The analysis through APIM is presented in ► **Table 3** with posttraumatic stress as the dependent variable. A partner effect from the man's coping strategy “trivialization and wishful thinking” and the IES-R subscale “avoidance” was revealed on the posttraumatic stress of their female partner. Elevated depression and anxiety scores as well as a low perceived social support of the women correlated with an increase of the posttraumatic symptoms of their male partner.

## Posttraumatic stress and coping strategies

The correlations of potential PTSD and coping strategies are presented in ► **Table 4**. In both sexes, strong correlations (correlation coefficient > 0.5) were found between the depressive coping strategy and anxiety as well as posttraumatic stress. The coping

strategy “trivialization and wishful thinking” correlated strongly with posttraumatic stress.

## Risk and protective factors for posttraumatic stress

To establish risk and protective factors, we studied the correlations between posttraumatic stress (and contributing psychological risks) and numbers of pregnancy losses, curettages, age, time since the last pregnancy loss, satisfaction of partnership and childlessness.

## Number of pregnancy losses

Only depression correlated with the number of losses for women ( $p = 0.048$ ). For men, positive correlations with the subscale intrusion of the IES-R ( $p = 0.046$ ), anxiety ( $p = 0.027$ ) and depression ( $p = 0.012$ ) were detected.

► **Table 4** Potential PTSD and coping strategies.

	Depressive coping		Active and problem-orientated coping		Distraction and self-enhancement		Trivialization and wishful thinking	
	Women	Men	Women	Men	Women	Men	Women	Men
Total IES-R <sup>a</sup>	0.72**	0.67**	0.30**	0.29**	0.20*	0.45**	0.61**	0.63**
IES-R: Intrusion <sup>a</sup>	0.58**	0.59**	0.29**	0.37**		0.38**	0.55**	0.60**
IES-R: Avoidance <sup>a</sup>	0.47**	0.44**				0.27**	0.47**	0.53**
IES-R: Hyper-arousal <sup>b</sup>	0.54**	0.44**		0.17*	0.17**	0.31**	0.36**	0.28**

Note: Only significant correlations are shown. IES-R = Impact of Event Scale-Revised

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; <sup>a</sup> correlation coefficient by Pearson; <sup>b</sup> correlation coefficient by Kendall-tau-b

### Number of curettages

For the number of curettages, we examined the correlation (controlled for number of pregnancy losses) only in women, since men are not undergoing procedure. The number of curettages correlated with posttraumatic stress ( $p = 0.035$ ) and the intrusion domain ( $p = 0.030$ ). Women with no curettage at all showed a significantly less posttraumatic stress than women who had at least one curettage ( $p = 0.0049$ ).

### Age

A higher age, controlled for number of curettages and childlessness, correlated with a lower score of the subscale intrusion ( $p = 0.017$ ) in women. In men, a higher age was associated with a lower risk for depression ( $p = 0.018$ ).

### Time since the last pregnancy loss

A longer period of time revealed a positive correlation with the avoidance subscale of the IES-R ( $p = 0.02$ ), but a negative correlation for the risk for depression ( $p = 0.046$ ) in women. There was no correlation with any of the psychological risks for men.

### Satisfaction of partnership

Men and women were classified into a risk and no-risk group (no psychological risk in any of the domains). Both sexes showed a higher satisfaction of partnership and less impairment of sexual life ( $p < 0.001$ ) when showing no risk.

### Childlessness

There was no correlation with any of the psychological risks in both sexes for having at least one child or being childless, respectively.

## Discussion

This cross-sectional study analyzes the posttraumatic distress and coping behaviors of women and men affected by RPL. A large proportion of women shows a significantly higher prevalence of posttraumatic stress (with depression and anxiety as contributing risk factors). These findings are in line with previous studies indicating high mental risks for couples with RPL [12, 13, 17, 19, 20, 36, 37].

Although many participants (86.3% of women and 96.1% of men) did not reach the threshold for PTSD criteria suggesting a potential diagnosis, their average scores were still comparable with those of other traumatized populations. Maercker et al. studied PTSD rates, using the IES-R as well, in German adult crime victims with the incident taking place between 3 and 14 months prior to the survey [38]. Our study of patients with RPL reveals a total score of 35.5 (mean of both sexes) versus 24.05 for the adult crime victims. The comparison of the posttraumatic stress symptom severity between the two groups emphasizes the high risk in couples with RPL.

The number of curettages was associated with a higher posttraumatic stress prevalence with more intrusive symptoms in women. This reflects the findings of a prospective randomized controlled trial, showing that posttraumatic stress symptoms are more pronounced in women with an active intervention (both surgical and medical evacuation) compared to expectant management [22]. Therefore, attending physicians should also consider the potential negative psychological impact of an active intervention when discussing the treatment options with the affected woman.

The man's traditional gender role expects him to act as the protector and supporter of the woman, which applies even more during pregnancy [39]. These common stigmata may hinder him from seeking and receiving support [18]. Disenfranchised grief can be a consequence [37, 40]. Additionally, men tend to cope with a suppression of their outward grief reactions and an avoidance behavior [16, 37, 41].

The analysis of the couple as a dyad revealed that women suffered from higher posttraumatic stress if their partner was showing an avoidant, trivializing coping behavior. The man's reluctance of showing grief openly may result in his partner feeling isolated and left alone with her grief. Additionally, if the woman scored high for anxiety, depression or had a low perceived social support, her partner was found to indicate a significantly higher severity of posttraumatic stress. The posttraumatic stress of men did not correlate with the time passed since the last pregnancy loss, the number of pregnancy losses, partnership satisfaction or sexual impairment. For men, their posttraumatic stress may not be confined by the pregnancy losses themselves, but by concern



for their partner's well-being. In line with Kagami et al., we highlight the need on the relevance of a couple-based psychological care to provide an opportunity to exchange their thoughts and feelings [36].

We did not find evidence of the psychological stress being more pronounced if there is only a short period of time between attending the RPL unit and the last pregnancy loss. This finding is in contrast to previous studies [20, 21, 42]. Moreover, already having children was no protective factor for any psychological risks in our analysis, which also contrasts previous findings [6, 11, 36].

Further, the number of pregnancy losses showed weaker correlations with the psychological risks than expected. Klock et al. suggested that the psychological impact may be accountable to the failure of meeting the reproductive goal and therefore the conventional way of life, rather than the number of losses [43]. Fertility may be seen as a validator for femininity or masculinity and a major aspect of physical integrity.

The impact of RPL on mental health has to be interpreted carefully, as the observed gender differences might not only be related to the pregnancy losses themselves but rather represent an already existing gender difference in the population. In our study, women compared to men, showed a 3.5 higher rate for potential PTSD, highlighting the impact of gender but also of RPL, too. The higher impact on women might be partly explained by the physical process of carrying the baby in their own body. Moreover, traditional gender roles make it harder for men to express weakness as it contradicts the expected masculine role [16, 44, 45]. This stereotyping could lead to lower reporting of symptoms on self-report instruments [46, 47].

For both sexes, we confirm studies stating the positive influence of an active and problem-orientated coping strategy on the psychological outcome [48, 49]. For women, the lowest psychological impact is found when using the coping strategy of distraction and self-enhancement, which is assumed to be an adaptive strategy for events with no or few options of active control [50].

## Limitations

The sample was obtained in a special unit for RPL at a university hospital, so the findings may not be comparable to all couples with RPL. The cross-sectional study design is not suitable to analyze any causal relationships. Our participants were generally well-educated, which may cause a selection bias. Data were collected via screening questionnaires, instead of professional interviews, which was described to be the gold standard to assess psychological disorders [51].

Moreover, we did not have information regarding the psychological status of the participants prior to their pregnancy losses, but we tried to minimize this influence by specifically asking about their feelings in relation only to the losses. Still, this lack of information could have led to an overestimation of the psychological impact as previous studies report a stronger psychological impact on individuals with a history of mental illness [52].

Further, a comparison group with couples not being exposed to RPL was not part of the present study. This may help to identify differences between men and women which are not due to gender but rather caused by RPL alone.

This study only included heterosexual cis-women and -men. There is a lack of research for homosexual, transgender or non-binary couples and their experiences of pregnancy loss, as they may experience more challenges with less perceived support of society.

## Conclusions

In summary, alarmingly high rates of posttraumatic stress were detected in couples affected by RPL, with it being significantly more prevalent in women. Our findings should encourage men to express and communicate their grief to their partner as an avoidant and trivializing behavior can increase the posttraumatic stress of their partner.

A training of healthcare professionals in the identification of patients at risk to provide targeted information on mental health services is urgently needed. We encourage RPL clinics to include an assessment of psychological risks of both partners in their routine diagnostic process. Undetected mental disorders may lead to long-term adverse consequences not only for the individual patient but for the public health system.

## Note

This study was presented in part as a poster at the annual meeting of the European Society of Human Reproduction and Embryology (ESHRE) in June 2021.

## Consent to participate

Informed consent was obtained from all individual participants included in the study.

## Authors' Roles

T.W., B.D., M.S. and R-J.K. were responsible for the original study concept and proposal. L.L., T.S. and R-J.K. conducted the data collection. E.K., P.S., M.S. and T.W. developed the methodology and contributed statistical advice. E.K. compiled and analyzed the data and wrote the first draft. All authors took part in preparing the manuscript, participated in critical discussion about its content and approved the final version of the paper.

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## Data Availability

The data used and analyzed in the current study are available from the corresponding author R-J.K. (Ruben.Kuon@med.uni-heidelberg.de) upon reasonable and justified request.

## Clinical Trial

Registration number (trial ID): DRKS00014965 | Title of the study: "Erleben von und Umgang mit wiederholten Fehlgeburten bei Frauen und ihren Partnern"

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## Conflict of Interest

The authors declare that they have no conflict of interest.

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