



# Premenstrual Syndrome: The Role of Emotion Regulation Strategies and Trait Meta-Mood

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## Abstract

The aim of the current study was to compare women with premenstrual syndrome (PMS) and with women in a non-PMS group with regard to emotion regulation strategies and trait meta-mood dimensions. Based on the results of an interview and screening tool, a total of 252 female college students were assigned to two groups including 126 women with PMS and 126 non-PMS women. Participants completed the Emotion Regulation Questionnaire (ERQ) and Trait Meta-Mood Scale (TMMS). The results showed that the women with PMS scored significantly higher on suppression ( $d=2.35$ ) and lower on reappraisal ( $d=0.50$ ), emotional clarity ( $d=0.64$ ) and emotional repair ( $d=0.81$ ) compared to non-PMS women. Women with PMS had trouble regulating their emotions and didn't use trait meta-mood strategies adaptively. The findings of our study could help both researchers and clinicians better understand some of the psychological difficulties experienced by women with PMS, and therefore explore and deliver effective interventions.

**Keywords** Emotion regulation · Trait meta-mood · Premenstrual syndrome · Reappraisal · Suppression · Emotional attention · Emotional clarity · Emotional repair

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## Background

Premenstrual syndrome (PMS) is a condition represented by a group of psychological and physical symptoms. It regularly occurs during the luteal phase of the menstrual cycle and remits by the end of menstruation (Sekigawa et al., 2004). Studies have shown that approximately 30–40% of reproductive women suffer from PMS, and 3–8% of menstruating women experience more severe symptoms, particularly psychological problems (Ryu & Kim, 2015). PMS is common; it is estimated that approximately 75% of women experience some degree of PMS during their life. During PMS, women experience substantial distress with symptoms such as fatigue, appetite changes, low energy, irritability, depressed mood, anxiety, and impulsive behavior (Dickerson et al., 2003; Jang et al., 2014; Steiner, 1997). Even though symptoms usually resolve within a few days after the onset of menstruation, they can significantly affect a woman's quality of life (Jang et al., 2014). Effective management of PMS is essential. Among nonpharmacological treatments, cognitive behavioral therapy (CBT) is effective in reducing the symptoms of premenstrual syndrome. CBT helps a person to identify and restructure negative thoughts and maladaptive behaviours to overcome internal and external triggers. Doing this can help to regulate negative emotions (Janda et al., 2015). Kancheva Landolt and Ivanov (2020) conducted a systematic review on the efficacy of CBT for PMS and found that it is an effective approach.

Women with PMS can interpret their physiological changes negatively, and regard them as a threatening factor, resulting in feeling anxiety and depressed moods (Ossewaarde et al., 2010). This could be related to an inability to regulate emotions in an adaptive manner (for example see, Petersen et al., 2016; Reuveni et al., 2016).

According to Blake's (1995) cognitive model of PMS, physiological changes are associated with psychological factors, including cognitive appraisal and coping skills. Research on Blake's model of PMS indicates that psychosocial variables such as experiencing of chronic stress, acceptance of PMS symptoms, self-efficacy, and silencing the self may play an important role in the etiology of PMS. If women with PMS interpret their physiological changes negatively, and don't use appropriate coping strategies, this can result in anxiety and depressed moods (Kleinstäuber et al., 2016). Therefore, since efficient emotional strategies play a role in stress management and better coping against stressors, maladaptive emotion regulation strategies may be associated with moderate to severe PMS.

## Emotion Regulation

Emotion regulation is a broad construct incorporating monitoring, evaluating, and modifying emotional reactions. Furthermore, it is related to the regulation of the underlying features of emotion such as physiological reactivity, social, behavioral, and cognitive processes (for review see, Gross, 2015). Emotion dysregulation is

related to many other psychiatric disorders, such as affective disorders. For example, people with generalized anxiety disorder (Roemer et al., 2009), attention deficit/hyperactivity disorder (Seymour et al., 2012), major depression (Beblo et al., 2012; Brockmeyer et al., 2012), borderline personality disorder (Carpenter & Trull, 2013; Svaldi et al., 2012), anorexia nervosa (Brockmeyer et al., 2012; Svaldi et al., 2012), bulimia nervosa, and binge eating disorder (Svaldi et al., 2012) may have deficits in emotion regulation.

Reappraisal and suppression are two common strategies that people use to deal with their negative emotions (Ussher & Perz, 2013). Reappraisal involves changing the meaning of emotional events so that they alter emotional experience (Gross & John, 2003). Studies have shown that people who use reappraisal have greater positive affect, better interpersonal functioning, and higher sense of well-being and this strategy leads to the decreased expression of negative emotions and maladaptive behaviors (Sai et al., 2016). Suppression is a maladaptive type of response modulation (i.e., is an avoidance strategy), and is defined as inhibiting ongoing emotion-expressive behavior. People who use suppression are less effective at regulating their emotions (Shiota & Levenson, 2009). Wu et al. (2016) showed that the severity of PMS was negatively associated with the habitual use of reappraisal, but positively associated with the habitual use of suppression. However, even though there is research to show that emotion dysregulation has a considerable role in mood disorders, there is considerably less research on the potential deficits in emotion regulation in women experiencing PMS (Dillon & LaBar, 2005).

Reuveni et al. (2016) showed that more emotion regulation deficits were observed in women experiencing PMS than women in their control group. However, they only used a questionnaire and not a structured interview to screen women, which may have led to errors in the diagnostic classification of participants. Eggert et al. (2016) compared women experiencing PMS and non-PMS women to examine explicit and implicit emotion regulation process. They showed that women with PMS use more dysfunctional emotion regulation strategies. To screen for mental disorders, they used telephone interviews. This method for screening may result in biased data because of a lack of ability to observe body language and eye contact, analyse jargon, may involve the use of confusing acronyms, and produce miscommunication with the interviewer.

## Trait Meta-mood

Meta-mood is a specific form of self-awareness and a term given to an individual's awareness of their emotions and the impact they have on an individual. In other words, beliefs that people have about their own moods and emotional abilities are known as trait meta-mood. Emotional attention, emotional clarity and emotional repair are three dimensions of trait meta-mood. Emotional attention refers to the person's perceived awareness of their mood and emotional experience; emotional clarity refers to person's perceived ability to discriminate feelings clearly; and emotional repair is the perceived ability to regulate moods (Salovey et al., 2002). To our knowledge, no prior studies have examined trait meta-mood dimensions in

women with PMS, but some studies have shown that trait meta-mood dimensions are related to a number of psychological factors which are similar to PMS symptoms (for a review see, Berrocal & Extremera, 2008). Studies have shown that high levels of emotional attention and low levels of emotional clarity and repair are associated with greater symptoms of depression (Salguero et al., 2012). People with low clarity may be at risk for psychopathology and mood disorders (Boden et al., 2013; Rubenstein et al., 2015; Thompson et al., 2015, 2017). They are often unable to efficiently regulate their emotions and may not be able to select and implement proper strategies to achieve emotion regulation goals. By contrast, people with high clarity use effective strategies to regulate their emotions (Gross & Jazaieri, 2014). Another dimension of trait meta-mood is emotional repair, which is a significant predictor of life satisfaction (Extremera & Fernández-Berrocal, 2005; Extremera et al., 2007; Salovey et al., 1995; Wong et al., 2007). It has been shown that individuals with low emotional repair are more likely to visit a health centre when their stress level is high (Goldman et al., 1996).

In addition to the discomfort women experience through pathophysiology in PMS, it is possible that aversive psychological symptoms might also occur. Because dimensions of trait meta-mood are related to psychological problems, it seems that examining these strategies in women with PMS might be important. It is likely that reinforcing these strategies in women with PMS might help to improve their psychological symptoms. However, there are few studies that have investigated the relation between PMS and emotion regulation. Additionally, of the small number of studies, many of them have notable limitations such as small sample size and inappropriate screening method. As far as we are aware, no study has directly tested trait meta-mood dimensions in women with PMS. We hypothesized that women with PMS are more likely to use maladaptive and less adaptive emotion regulation strategies and have more problems in trait meta-mood dimensions than non-PMS women.

## Methods

### Participants

Participants were 252 female college students aged 18–32 years ( $M=23.03$ ,  $SD=3.27$ ). All participants were fluent in Persian. Single participants comprised

**Table 1** Demographic Data across Conditions

Demographic	PMS $n=126$	Non-PMS $n=126$
Age, years, mean ( $SD$ )	22.87 (3.12)	23.20 (3.43)
Marital status (single), $n$ (%)	113 (89.7%)	98 (78.4%)
<i>Education</i>		
Bachelor, $n$ (%)	76 (60.3%)	73 (57.9%)
Master, $n$ (%)	45 (35.7%)	44 (34.9%)
Ph.D., $n$ (%)	5 (4%)	9 (7.1%)

84.1% of the sample and 59.1% were currently undertaking a bachelor's degree. Table 1 summarizes the participants' demographic data.

The inclusion criteria for participation were: primary diagnosis of PMS; aged between 18 and 44 years; able and willing to consent to participate in research and to sign written consent; speak Persian fluently; ability to participate in all assessments; no major gynecological problems (e.g., hysterectomy, gynecological cancer, infertility); no intake of benzodiazepines or antipsychotic medication; no SSRI medication, psychotherapy or miscellaneous hormonal treatment because of premenstrual complaints diagnostic; more than one year post-partum or never pregnant, and not currently breast feeding; and regular menstrual cycles between 24 and 32 days in duration.

Exclusion criteria were: current diagnosis of any mental disorder; history of drug and substance abuse; currently taking medications, herbal products or psychological treatment to treat PMS; pregnancy; need for immediate medical treatment or the need for concurrent therapeutic interventions; psychiatric disorders; current diagnosis of any mental disorder; and having serious thoughts about suicide.

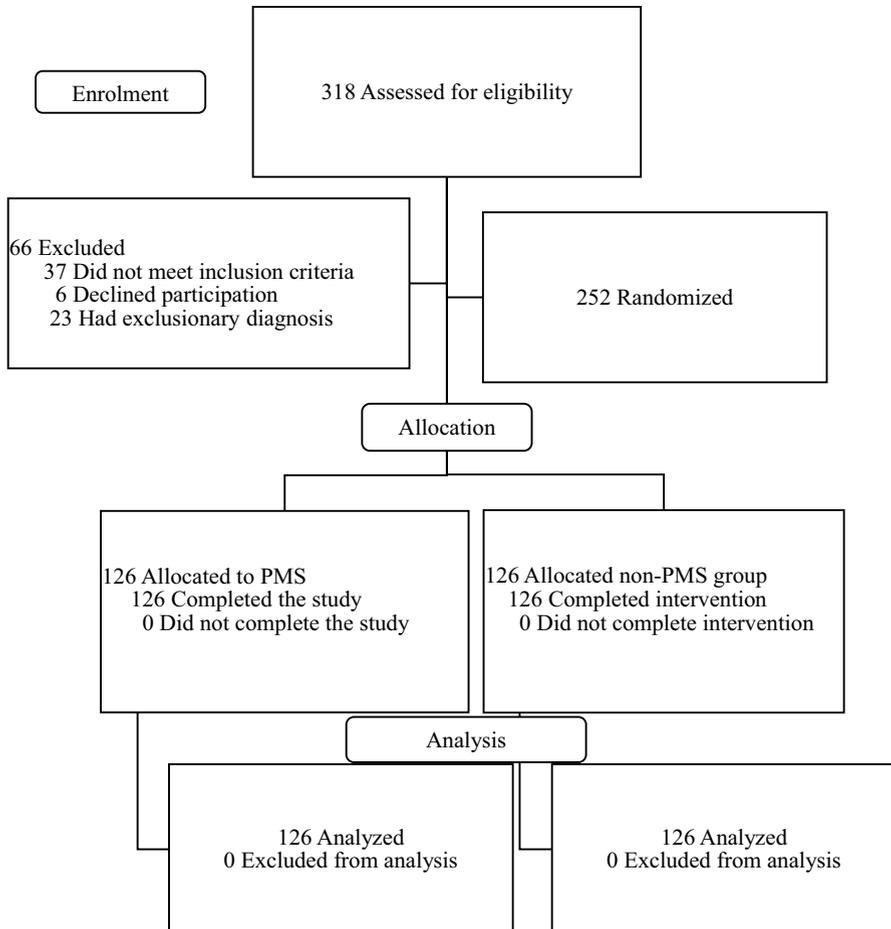
Figure 1 summarizes participant movement through the study. Three hundred and eighteen individuals were assessed for eligibility. Of these, 66 were excluded and 252 were eligible to participate and assigned to either the PMS group ( $n = 126$ ) or non-PMS group ( $n = 126$ ).

## Procedure

The participants were notified about the study via a university announcement. The participants were interviewed and evaluated by a clinical psychologist at the counselling centre of Ferdowsi University of Mashhad. In the first session, they were interviewed and screened for eligibility using the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown et al., 1994) and Premenstrual Symptoms Screening Tool (PSST; Steiner et al., 2003). To confirm the diagnosis of PMS, the participants were required to meet the following three criteria from the PSST: (1) From options 1–4, at least one item was identified as moderate or severe; (2) From options 1–14, at least four items was identified as moderate or severe; (3) From option 12 and 16, at least one item was identified as moderate or severe. Based on the results of the interview and screening tool, the participants were divided into two groups; PMS and non-PMS. In the second session, participants completed questionnaires including the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) and the Trait Meta-mood Scale (TMMS; Salovey et al., 1995). Reappraisal and suppression were measured using the ERQ and emotional attention, emotional clarity and emotional repair were measured using the TMMS. Questionnaires were completed by participants in a written format, and were completed anonymously.

## Measures

The Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown et al., 1994) is a semi-structured diagnostic interview designed to assess the presence,



**Figure. 1** Diagram illustrating participant flow during the study. Participants were tracked during enrolment, allocation, and analysis

nature, and severity of anxiety, mood, and somatoform disorders, as well as previous mental health history. The interview also contains a brief screen for psychotic symptoms and alcohol or substance abuse. This measure has demonstrated excellent-to-acceptable inter-rater reliability for the anxiety and mood disorders (Brown et al., 2001).

The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) is a 10-item self-report measure of two emotion regulation strategies: emotional suppression (four items, e.g., ‘I keep my emotions to myself.’) and cognitive reappraisal (six items, e.g., ‘I control my emotions by changing the way I think about the situation I’m in.’). Items were rated on a 7-point Likert rating scale (1 = strongly disagree, 7 = strongly agree), with higher scores reflecting higher use of the emotion regulation strategy. Gross and John (2003) reported internal consistency of  $\alpha = 0.73$  for the

original English ERQ-derived emotional suppression subscale and  $\alpha=0.79$  for the cognitive reappraisal subscale. In this study, we used the Persian version of Emotion Regulation Questionnaire (ERQ-P). The reliability of the two ERQ-P subscales is satisfactory as indicated by the level of internal consistency (0.81–0.91) and the high test–retest correlations (0.51–0.77) across a 5-week interval (Hasani, 2017).

The Premenstrual Symptoms Screening Tool (PSST; Steiner et al., 2003) is a validated self-report questionnaire that was developed as a screening tool in order to identify women with PMS. The PSST includes 14 premenstrual symptoms (e.g., ‘tearful/increased sensitivity to rejection, decreased mood/hopelessness’) and 5 items that measure impairment in five domains in accordance with the DSM criteria for PMS: (1) working capacity, (2) relationships with coworkers, (3) relationship with family, (4) social activities, and (5) home responsibilities. All items are rated on a four-point scale (not at all = 0, mild = 1, moderate = 2, severe = 3). Convergent validity was obtained with prospectively assessed premenstrual symptomatology (Bentz et al., 2012). In the Iranian version of PSST, internal consistency was found to be satisfactory (Cronbach’s alpha coefficient, 0.93). The content validity as assessed by Content Validity Ratio and Content Validity Index were desirable (0.7 and 0.8, respectively) (Hariri et al., 2013).

The Trait Meta-mood Scale (TMMS; Salovey et al., 1995) is a 30-item self-report measure which is designed to assess emotional intelligence. It consists of three scales including emotional attention (e.g., ‘I don’t pay much attention to my feelings.’), emotional clarity (e.g., ‘I almost always know exactly how I am feeling.’), and emotional repair (e.g., ‘Although I am sometimes sad, I have a mostly optimistic outlook.’). Items were rated on a 5-point Likert rating scale (1 = strongly disagree, 5 = strongly agree). Salovey et al. (1995) reported for each scale the internal consistency of these three scales by calculating Cronbach’s coefficient alpha (Attention:  $\alpha=0.86$ ; Clarity:  $\alpha=0.88$ ; Repair:  $\alpha=0.82$ ), and they reported also adequate convergent and discriminative validity for this scale. We used the well-validated Persian version of the TMMS. The reliability of the Persian version of the Trait Meta-Mood Scale using test–retest and internal consistency is 0.77 and its Cronbach’s coefficient alpha is 0.79 (Bayani, 2009).

## Results

### Statistical Analyses

To compare the groups (PMS and non-PMS) with regard to emotion regulation strategies and trait meta-mood dimensions, we conducted a multivariate analysis of variances (MANOVA). Reappraisal, suppression, emotional attention, emotional clarity, and emotional repair were used as dependent variables, and group membership (PMS or non-PMS) was used as the independent variable. Reported *p* values are two-sided. To guard against Type I errors, we conducted a Bonferroni test and the adjusted *p* value was set after this correction. All analyses were performed using IBM SPSS 25 software. All assumptions were checked and met, and there were no missing data.

## Assumptions Checking

Before using multivariate analysis of variance, we used BOX's M and Levene's tests to check the assumptions of the MANOVA. Based on the results of BOX's M test, the assumption of the homogeneity of the variance/covariance matrices was correctly met (*BOX's M* = 20.22;  $F = 1.32$ ;  $p = 0.18$ ). Also, according to the results of Levene's test, the assumption of the equality of error variances was met for reappraisal [ $F_{(1, 250)} = 2.50$ ,  $p = 0.12$ ]; suppression [ $F_{(1, 250)} = 2.88$ ,  $p = 0.09$ ]; emotional attention [ $F_{(1, 250)} = 0.58$ ,  $p = 0.48$ ]; emotional clarity [ $F_{(1, 250)} = 0.86$ ,  $p = 0.36$ ]; and emotional repair [ $F_{(1, 250)} = 2.99$ ,  $p = 0.08$ ].

## Main Analysis

The results of the MANOVA showed significant differences between groups ( $F_{(5, 246)} = 79.65$ ,  $p < 0.001$ ; *Wilks's  $\Lambda$*  = 0.38,  $d = 2.55$ ). The means (*M*), standard deviations (*SD*), and effect sizes of groups (PMS and non-PMS) for the dependent variables are presented in Table 2. The highest effect size was obtained for suppression. In the case of emotion regulation strategies and trait meta-mood subscales, the results showed that women with PMS obtained significantly higher scores in suppression [ $F_{(1, 250)} = 346.85$ ,  $p < 0.001$ ,  $d = 2.35$ ], and obtained significantly lower scores in reappraisal [ $F_{(1, 250)} = 16.09$ ,  $p < 0.001$ ,  $d = 0.50$ ]; emotional clarity [ $F_{(1, 250)} = 25.28$ ,  $p < 0.001$ ,  $d = 0.64$ ]; and emotional repair [ $F_{(1, 250)} = 40.60$ ,  $p < 0.001$ ,  $d = 0.81$ ] than women in the non-PMS group.

## Discussion

The results of our study showed that women with PMS scored significantly lower on reappraisal and higher on suppression compared to women in the non-PMS group. Our results are consistent with previous studies which indicate reappraisal is an effective emotion regulation strategy and is related to well-being, whereas

**Table 2** Descriptive statistics and univariate F-test

	PMS		non-PMS		Uni- variate F-tests <i>F</i> (1, 250)	Effect size <sup>a</sup> Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Reappraisal	26.52	7.99	30.45	7.55	16.09*	0.50
Suppression	19.04	3.60	11.25	3.01	346.85*	2.35
Emotional attention	33.05	9.69	35.21	10.28	2.94	0.22
Emotional clarity	28.89	7.71	33.98	8.33	25.28*	0.64
Emotional repair	30.42	6.59	35.46	5.95	40.60*	0.81

\*  $p < 0.01$

<sup>a</sup> Effect sizes reported as Cohen's *d*

suppression is a maladaptive strategy, and is related to psychopathology (e.g. Sai et al., 2016; Shiota & Levenson, 2009; Wu et al., 2016). Also, our results are consistent with studies which show emotional dysregulation in women with PMS (Eggert et al., 2016; Petersen et al., 2016; Reuveni et al., 2016). It seems that the development of PMS relates to an interaction between cyclic hormonal fluctuations and psychological factors, although we did not directly test what these interactions might be. According to Blake's (1995) cognitive model, it is assumed that physiological changes of PMS are associated with cognitive appraisal (i.e., the nature of symptoms and coping abilities). It could be that women with PMS use maladaptive strategies for coping with their psychological and physiological symptoms. That is, when they experience emotional and physiological changes in the premenstrual period, they cannot properly recognize and regulate their negative emotions, which leads to experiencing premenstrual symptoms more severely, distress, and dysfunction.

Another result from our study was that women with PMS scored significantly lower on emotional clarity compared to women in the non-PMS group. Our result is consistent with previous studies that have shown lower scores on clarity are positively associated with psychopathology (Boden et al., 2013; Rubenstein et al., 2015; Thompson et al., 2015, 2017). It seems that women who have psychological symptoms in their premenstrual cycle do not have good awareness of their emotions (i.e., a reduced clarity and inability to identify emotions properly). They are also less aware and less clear about their psychological needs (Boden et al., 2013), and they may not use adaptive strategies to regulate their mood and emotions. This is likely because using adaptive emotional regulation strategies is largely dependent upon knowledge of the experienced emotions.

The last finding of our study showed that women with PMS scored significantly lower on emotional repair compared to women in the non-PMS group. This is consistent with previous studies that have shown lower scores on emotional repair are associated with psychological problems (Extremera & Fernández-Berrocal, 2005; Salovey et al., 1995; Wong et al., 2007). Also, this result is consistent with Blake's model of PMS. Blake (1995) proposed that women with PMS might have trouble in repairing their unwanted emotions. Therefore, women who experience negative states and have inappropriate emotional repair might not be able to manage their moods effectively and may use maladaptive coping strategies. This may result in helplessness and low self-esteem. Therefore, when these women experience premenstrual cycle symptoms, they might respond using maladaptive strategies.

This study had several strengths. To our knowledge, it was the first study investigating the role of trait meta-mood dimensions in women with and without PMS. Most of the previous studies were administered with small to moderate sample size, but the sample size of our study was acceptable. Another strength was the administration of a clinical diagnostic interview to separate group membership. Despite these strengths, this study has some limitations. In our study, relationships among variables might be artificially inflated due to self-report measures. Our sample was limited to university students which may result in a lack of generalizability of the findings. Future research should include different groups of people and situations. The design of our study was cross-sectional, therefore it's not clear whether the differences in our variables preceded or followed the PMS. Future research should

include longitudinal studies and controlled experiments to further explore casual relations.

## Conclusions

On the basis of our findings, it seems that some women with PMS might have trouble regulating their emotions and also impaired emotional clarity and repair. Adaptive strategies may benefit women with PMS to decrease the distress caused by this disorder. Using maladaptive strategies is not useful and may make it difficult to tolerate symptoms in their premenstrual cycle. A more comprehensive understanding of these psychological factors may be important to delineate the specific psychological profile related to PMS. This may help clinicians and researchers to use or design treatments which consider these factors. We hope that the results of this study improve the knowledge about women with PMS.

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**Author Contributions** FN conceived and designed the study and contributed to the statistical analysis plan and data analysis. ShSh collected the data and FN and ShSh wrote the first draft of the manuscript. AM provided feedback on drafts of the manuscript. RSh commented on and edited several versions of the manuscript and provided technical suggestions. All authors contributed significantly to the study and approved the final version of the manuscript.

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## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest.

**Data Availability** All data generated or analyzed during this study are included in this published article.

**Ethics Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Consent to Participate** All participants provided written informed consent.

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