

## Original Article

# Prenatal emotion management improves obstetric outcomes: a randomized control study

Jian Huang<sup>1</sup>, He-Jiang Li<sup>1</sup>, Jue Wang<sup>1</sup>, Hong-Jing Mao<sup>2</sup>, Wen-Ying Jiang<sup>1</sup>, Hong Zhou<sup>1</sup>, Shu-Lin Chen<sup>3</sup>

<sup>1</sup>Department of Obstetrics and Gynecology, The First People's Hospital of Hangzhou, Hangzhou, China; <sup>2</sup>Department of Medical Psychology, The Seventh People's Hospital of Hangzhou, Hangzhou, China; <sup>3</sup>Department of Psychology, Zhejiang University, Hangzhou, China

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**Abstract:** Introduction: Negative emotions can cause a number of prenatal problems and disturb obstetric outcomes. We determined the effectiveness of prenatal emotional management on obstetric outcomes in nulliparas. Methods: All participants completed the PHQ-9 at the baseline assessment. Then, the participants were randomly assigned to the emotional management (EM) and usual care (UC) groups. The baseline evaluation began at 31 weeks gestation and the participants were followed up to 42 days postpartum. Each subject in the EM group received an extra EM program while the participants in the UC groups received routine prenatal care and education only. The PHQ-9 and Edinburgh Postnatal Depression scale (EPDS) were used for assessment. Results: The EM group had a lower PHQ-9 score at 36 weeks gestation, and 7 and 42 days after delivery ( $P < 0.01$ ), and a lower EPDS score 42 days postpartum ( $P < 0.05$ ). The rate of cesarean section in the EM group was lower than the UC group ( $P < 0.01$ ), and the cesarean section rate without a medical indication was lower ( $P < 0.01$ ). The duration of the second stage of labor in the EM group was shorter than the UC group ( $P < 0.01$ ). Conclusions: Prenatal EM intervention could control anxiety and depressive feelings in nulliparas, and improve obstetric outcomes. It may serve as an innovative approach to reduce the cesarean section rate in China.

**Keywords:** Psychological intervention, prenatal period, cesarean section rate, stage of labor

## Introduction

Pregnancy or childbirth is a persistent and strong source of stress for pregnant women; however, the emotional reaction may be more intense for nulliparas. Mental health problems, such as depression and anxiety during pregnancy and after childbirth, are very common worldwide. Women are often at high risk for emotional disorders during pregnancy [1]. The prevalence of depressive symptoms was 13.2% when measured with the EPDS and 8.4% with the PHQ during pregnancy [2]. In fact, anxiety, depression, and fear of childbirth among pregnant women not only impair maternal mental health, but also have a negative impact on the outcome for the mother and baby [3]. However, due to the possible adverse effect of drugs on the fetus, we should not use medications to treat anxiety or depression during pregnancy. Therefore, psychological interventions have an important role for pregnant patients. Several

studies have shown that [4] psychological interventions during pregnancy can reduce the incidence of prenatal and postpartum depression.

China's family planning policy has been implemented for more than 30 years. Chinese government advocates one child per couple for limiting population growth. Thus, the majority of Chinese pregnant women is nulliparous, and may be the main reason why many of them select caesarean section for delivery. Due to the lack of experience in childbirth and knowledge of delivery, many nulliparas fear natural childbirth. Indeed, it is commonly believed that if only one child is permitted, it would be better to choose a method of childbirth without pain. Furthermore, many Chinese people have the misconception that caesarean section is safer than natural childbirth. Some women are so afraid of vaginal delivery failure that they refuse to attempt natural childbirth, and have adamantly requested a caesarean delivery whether

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or not there is an indication. In addition, some pregnant women and their relatives request elective cesarean section because they want the child born on the “auspicious day”. Most of them rarely take into account the obstetric complications or adverse effects on neonatal health that are associated with caesarean delivery. As we know, obstetrics is a high-risk specialty. Sometimes changes in the childbirth process are unpredictable, and are often likely to endanger the mother and fetus. For some Chinese obstetricians, frequent medical disputes caused by dystocia may have a direct influence on the decision-making process for caesarean delivery. Their psychological bearing on medical risks is insufficient, so they prefer to choose cesarean delivery to avoid trouble, which may be one of the reasons for the high cesarean section rate.

The cesarean section rate has increased year-after-year in China since the implementation of family planning policy, which was approximately 20% in the early and mid-1990s, then 30%-40% in the late 1990s [5]. Indeed, many cesarean deliveries were without a medical indication. Recently, the proportion of cesarean sections in urban China was up to 49.2%, and 38.1% did not have a medical indication [6]. According to the WHO global survey in Asia [6]; China had the highest overall cesarean section rate (46.2%), and also had the highest cesarean section rate without indication (11.7%). The survey also pointed out that all types of cesarean sections are associated with a significant maternal mortality and morbidity index compared with spontaneous vaginal delivery.

Actually, China is experiencing the adverse consequences caused by a high cesarean section rate. In some areas of China, some obstetricians are skilled in the cesarean section technique, but have lost their skills in vaginal delivery and managing dystocia. Progress in the delivery of analgesics has been slowed by the high cesarean section rate. Cesarean delivery has a series of occult dangers associated with subsequent pregnancies. For example, there is an increased risk of uterine rupture, uterine scar pregnancy, and placental attachment to the operative incision, placental implantation, and pelvic and abdominal adhesions corresponding to the number of cesarean deliveries. Perinatal hysterectomy is significantly related to a previous cesarean delivery. Elective cesar-

ean section also increases the incidence of neonatal disease, such as neonatal respiratory distress syndrome [7], and sepsis [8]. Many experts opine that cesarean delivery should only be performed when there is a medical indication to improve maternal and perinatal outcomes [9].

The embarrassing “world first” cesarean section rate is causing widespread concern in China. Recently, the Chinese government has launched a project (Promoting the Rate of Natural Childbirth and Protecting the Health of Mother and Child) in an attempt to reduce the cesarean section rate, especially cesarean deliveries without a medical indication. In order to promote the development of a long-term equilibrium population, China’s family planning policy has a major adjustment since 2014. New policy aims to allow couples to have two children if either parent is an only child. Thus, the reduction of cesarean section is particularly important for nulliparas. We are trying to find positive and effective ways to reduce the cesarean section rate, especially without indication medical indication.

Therefore, if the emotional management (EM) can effectively reduce the cesarean section rate by controlling negative maternal emotions, this study will be very meaningful. We hypothesized that the emotional self-management group intervention program would control the feelings of nulliparas, including anxiety, depression, and fear of childbirth, and reduce the cesarean section rate and improve obstetric outcomes.

### Methods

#### *Participants*

The study was conducted in the First People’s Hospital of Hangzhou. Subjects were recruited randomly from the outpatient department of the Department of Obstetrics and Gynecology when they met the inclusion criteria: (1) nulliparous, (2) 31 weeks gestation, (3) singleton, cephalic presentation, and normal pelvimetry; (4) regular antenatal care, (5) expected to deliver in this department, and (6) the ability to schedule and fulfill questionnaires independently. The exclusion criteria were as follows: (1) obstetric complications; (2) surgical history; and (3) current or previous history of a mental

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disorder. All of the participants signed the informed consent form before the recruitment, and this study protocol was approved by the Ethics Committee of Hangzhou First People's Hospital.

### *Routine prenatal care and education*

All participants received routine prenatal care and education just as other pregnant women. Prenatal care included routine antenatal physical examination, such as blood pressure, weight, uterine fundal height, abdominal circumference, fetal presentation, fetal position, and fetal heart rate etc. All measurement data were collected. Prenatal education provided by pregnant women school in our hospital. The main objects of prenatal education in the school were all the pregnant women who were willing to receive prenatal examination and childbirth in our hospital and their spouses. The main courses were as follows: (1) provide instruction on nutrition and health knowledge during pregnancy; (2) describe the various modes of delivery; (3) promote of breastfeeding benefits etc.

### *Emotional management*

The antenatal EM was provided by an obstetrician and a psychiatrist jointly as co-trainers, and was based on the principles of cognitive behavioral therapy. Ten components were included in the EM intervention: (1) establish a relationship between the health care workers and the participants to achieve mutual trust and recognition; (2) determine the intervention objectives and schedule action contracts weekly; (3) provide instruction on relaxation intervention, including imagination and abdominal breathing; (4) make cognitive adjustments through cognitive reconstruction to alleviate anxiety and fear; (5) relieve anxiety and tension by scene simulation and stimulus exposure; (6) learn emotional self-regulation, and understand the relevant social resources; (7) master learning methods, and improve self-efficacy by group interaction; (8) teach prenatal knowledge, including the delivery process, such as changes in uterine contractions, benefits of natural delivery, and coping skills during delivery; (9) lead interactive intervention sessions between pregnant women and their spouses; ensure that adequate social support is available; (10) and visit the delivery rooms.

### *Psychological assessment*

(1) Depressive symptoms: The Chinese version of the Patient Health Questionnaire (PHQ-9) was used for participant self-assessment of depressive symptoms. The PHQ-9 has 9 items, is easy-to-use for self-assessment, and has a total score of 27 points ( $\geq 10$  points was considered positive). The reliability and validity of the PHQ-9 has been widely tested in a Chinese population, as well as in other countries [10]. The Chinese version of the Edinburgh Postnatal Depression Scale (EPDS) was used for postpartum depressive symptoms. The Chinese version of the EPDS has been tested and has good reliability and validity [11].

(2) Diagnosis of depression: The Chinese version of the Structured Clinical Interview for DSM Disorders (SCID) was validated by researchers in China, and has been used in many studies for Chinese subjects. The depression modules of the schedule were used in the current study as the gold standard diagnostic tool. The investigators were intensively trained in the use of the SCID in an epidemiologic study organized by the World Health Organization (WHO). A recent assessment of the degree of inter-rater reliability among the three psychiatrists involved in this study yielded  $R = 0.86$ .

### *Obstetric outcome assessment*

The obstetric outcome assessment included the cesarean section rate, especially the rate without medical indications. The duration of labor and each stage in natural delivery were recorded.

### *Procedures*

All outpatients in the Department of Obstetrics and Gynecology during October 1<sup>st</sup> 2012 to August 31<sup>st</sup> 2013 were being screened by the trained nurses. In the waiting room, when patients met the inclusion criteria, after the oral informed consent, they were asked to do the PHQ-9 test with the nurses' guide. When participants scored  $> 10$  on the PHQ-9, the research assistants would appoint them to do the diagnostic interview after the written informed consent in a week. At the same time, the results of the antenatal physical examination for every participant were collected by research assistants when a participant was enrolled. After the baseline assessment, con-

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**Table 1.** Participant characteristics

	EM group	UC group
Cases	100	100
Age (M ± SD)	28.5 ± 2.4	28.8 ± 2.5
Educational level		
Below high school	5.8	6.9
High school	25.4	26.7
University or above	68.8	66.4

sented participants were randomly assigned into EM intervention or usual care (UC) care. The UC care in this department included routine prenatal care and education care (the content of the education care program as mentioned before). In the EM intervention arm, 10 subjects and their husbands would be assigned as a union, and accept the EM intervention in 6 weeks. 10 (100 subjects) unions were recruited in the EM group, and also 100 subjects were recruited in the UC group. All subjects were measured at baseline, 36 weeks gestation, and at 1 week and 42 days postpartum. All obstetric outcomes were collected by research assistants from the clinical records.

### Data analytic procedures

Data analysis was performed using Student's *t*-test and a chi-squared test. Statistical tests were two-sided. *P* values < 0.05 were considered statistically significant. Differences were evaluated using SPSS (version 11.0; SPSS, Inc., Chicago, IL, USA).

## Results

### Participants' demographic characteristics

All of the participants were > 22 years of age and < 35 years of age. The average age of the EM and UC groups was 28.5 ± 2.4 and 28.8 ± 2.5 years, respectively. The educational levels of the 2 groups were as follows: EM group, junior high school or below (5.8%), high school (25.4%), and university or above (68.8%); and UC group, junior high school or below (6.9%) high school (26.7%), university or above (66.4%). There were no significant differences between the two groups with respect to maternal age, gestational age, education, and health status (*P* > 0.05) (see **Table 1**).

### Missing data during the follow up measures

In the EM group, of 100 participants, 2 were lost to follow-up for various reasons. Three

additional cases patients were lost to follow-up 7 days postpartum because of delivery in other hospitals. Thirteen additional patients were lost to follow-up 42 days postpartum, among them 5 returned to other cities for recuperation, 4 were unwilling to continue assessment, and 4 could not be contacted. Therefore, of the EM group, 95 patients were followed for 7 days after delivery, 82 patients were followed for 42 days postpartum, and the total loss rate was 18%.

In the UC group, 12 patients were lost to follow-up at the start of observation, in which 8 patients lost connection and 4 patients failed to answer the follow-up assessment. Six additional patients were lost to follow-up 7 days postpartum in which 3 transfers delivered, 2 were unwilling to continue the assessment, and 1 lost contact. Eleven additional patients were lost to follow-up 42 days postpartum, in which 6 returned to other cities, 5 were unwilling to continue assessment, and 1 lost connection. Finally, in the UC group, 82 patients were followed 7 days after delivery, 71 patients were followed for 42 days postpartum, and the total loss rate was 29%. The loss rate for the two groups was significantly different (*P* < 0.01), **Figure 1**.

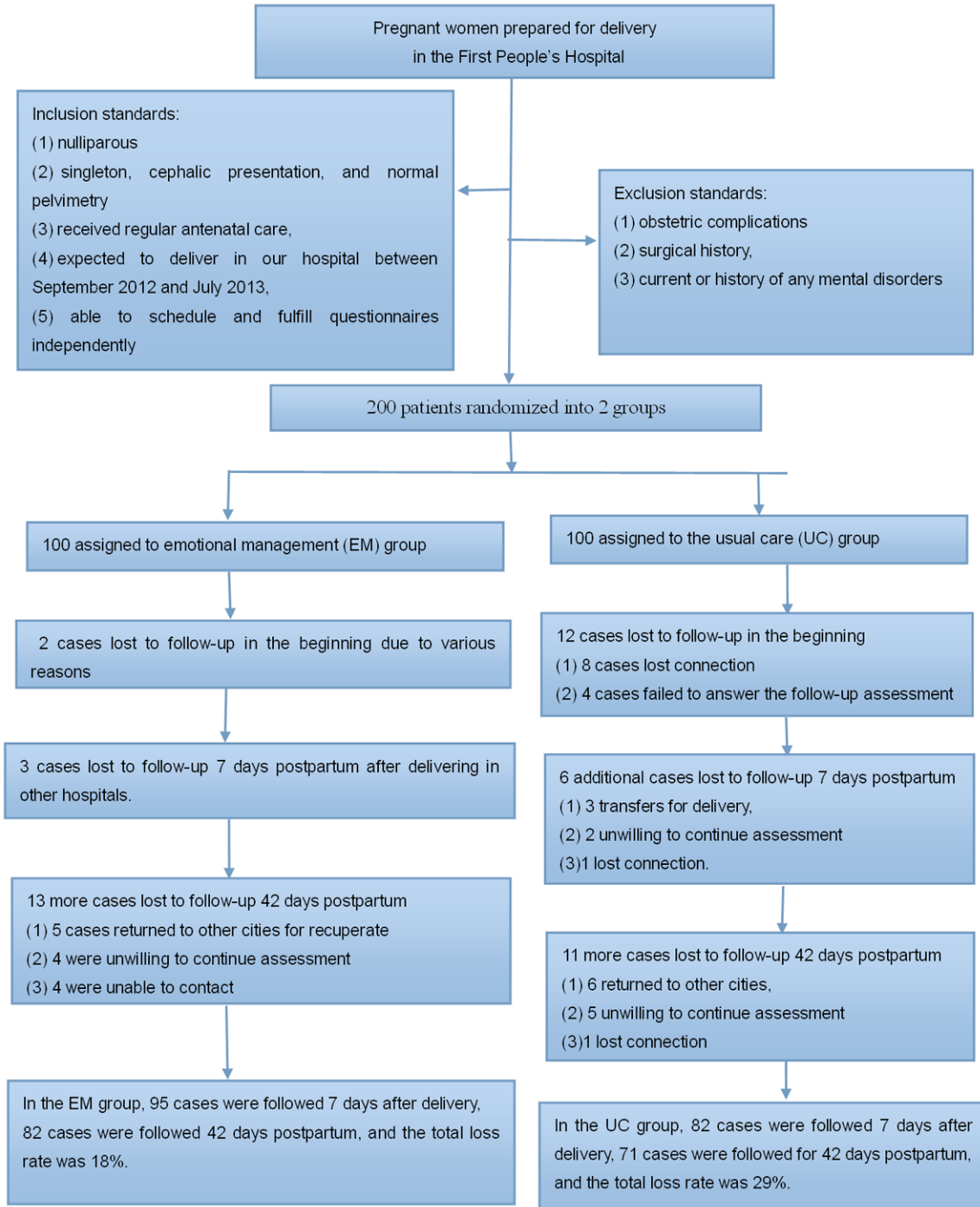
### The effectiveness of the EM intervention

The data indicated the EM intervention was very helpful for the decrease of patients' depressive symptoms (see **Table 2**). A significant difference was shown at 3 time points after the EM intervention: 36 weeks gestation (*t* = 3.34, *P* < 0.01), 7 days postpartum (*t* = 3.33, *P* < 0.01), and 42 days postpartum (*t* = 3.20, *P* < 0.01). The EM intervention could also reduce the postpartum depressive symptoms, the EPDS score of participants in the EM group at 42 days postpartum was significant lower than those in the UC group even their had the same baseline PHQ-9 score (EM 6.45 vs. UC 9.23, *t* = 1.95, *P* < 0.05).

### The effectiveness of the EM intervention on the cesarean section rate and labor styles

Of the 95 subjects in the EM group, 21 had cesarean deliveries and 1 had an operative vaginal delivery. The dystocia rate was 23.2%, and the cesarean section rate was 22.1%. Five women (5.3%) underwent cesarean section without a medical indication. Of 82 women in the UC group, 35 had cesarean deliveries and 2

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**Figure 1.** Flow diagram of prenatal emotional management.

had operative vaginal deliveries. The dystocia rate was 45.1%. The cesarean section rate was 42.7%. Twenty women (24.4%) in the UC group underwent cesarean sections without a medical indication. It shows the lower cesarean section rate of the EM group than the UC group ( $\chi^2 = 8.62, P < 0.01$ ), and the lower cesarean sec-

tion rate without medical indication compared with the UC group ( $\chi^2 = 13.28, P < 0.01$ ).

### Labor

Seventy-three patients in the EM group delivered naturally (natural birth rate = 76.8%). In



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**Table 2.** Changes in the PHQ-9 ( $x \pm s$ )

	EM		UC		t
	N	PHQ-9	N	PHQ-9	
32 weeks pregnant	98	8.20 $\pm$ 2.84	88	8.35 $\pm$ 2.96	0.31
36 weeks pregnant	98	5.45 $\pm$ 2.42	88	7.23 $\pm$ 3.52	3.34**
7 days postpartum	95	5.61 $\pm$ 2.64	82	7.10 $\pm$ 3.48	3.33**
42 days postpartum	82	4.61 $\pm$ 2.79	71	6.17 $\pm$ 3.27	3.20**

\*\* $P < 0.01$ . EM compare to UC.

**Table 3.** Duration (min) of Each Stage of Labor in the Two Groups ( $x \pm s$ )

	Total	First stage	Second stage	Third stage	Total process
EM	73	391 $\pm$ 43.3	51.9 $\pm$ 7.85**	8.34 $\pm$ 1.38	452 $\pm$ 47.2
UC	45	394 $\pm$ 47.6	61.6 $\pm$ 12.1	7.84 $\pm$ 1.48	464 $\pm$ 54.3

\*\* $P < 0.01$  EM compare to UC.

the UC group, 45 patients had natural childbirth (natural birth rate = 54.9%).

**Table 3** indicates the progress of labor in both groups, The duration of the first stage, third stage, and total intrapartum course was not significantly different in the two groups (first stage of labor [ $t = 1.004, P > 0.05$ ], third stage of labor [ $t = 1.325, P > 0.05$ ], and total intrapartum course [ $t = 0.283, P > 0.05$ ]). However, the duration of the second stage of labor in the EM group was significantly shorter than the UC group ( $t = 4.905, P < 0.01$ ).

### Discussion

#### *The EM intervention on the impact of maternal mood*

Our study indicated that the PHQ-9 score did not differ at baseline (31 weeks gestation) between the EM intervention group and usual care group. After 6 weeks EM intervention, the PHQ-9 score in the intervention group was significantly decreased at 36 weeks gestation, and 7 and 42 days postpartum compared with the UC group. As the date of confinement approached, a significant portion of nulliparas have anxiety, depression, and fear of childbirth. Our study showed that emotional management care in the third trimester of pregnancy will help to prevent depressive emotions and to reduce the occurrence of postpartum depression.

Usually, anxiety and fear of childbirth during pregnancy is an independent predictor of postpartum depressive symptoms [12]. The risk factors for antenatal depression include "low

self-esteem, antenatal anxiety, low social support, negative cognitive style, major life events, low income and history of abuse" [13]. According to the characteristic risk factors, we designed the EM intervention package based on the principle of cognitive behavioral therapy. Designed to meet the mental and reproductive health needs, the EM intervention package integrated health education, stress treatment, and coping skills. Using this type of group intervention is good for the pregnant woman and their spouse. In each cognitive counseling group, all the group members (including the pregnant women and their spouses)

had common goals, and often had common problems. They had good communication, with mutual trust, encouragement, and supervision. The intervention program was held in an easy, free, and tolerant atmosphere. The method that allowed the couple to jointly participate in the intervention, and facilitated completion of the planning effectively. In this way, the group members strengthen self-management skills, and achieve a better sense of self-control.

Perinatal depression will not only affect a woman's health, marriage, and family relationships, but also have an adverse impact on the relationship between mother and child. The risk for suicide is significantly increased among depressed women during pregnancy [14]. Therefore, it has become a challenge for obstetricians and psychiatrists to decrease the risk of depression gravidas and parturients, and thus reduce prenatal morbidity. Because there are concerns regarding the use of medications in pregnant women, psychological interventions are preferred. Our study supports the view that timely effective EM is the best current approach to reducing perinatal depression [15], which is in agreement with the meta-analysis of 17 studies [16]. That reported psychological interventions during pregnancy reduces anxiety and depression, and partially prevents the occurrence of postpartum depression.

#### *The EM intervention for reducing the cesarean section rate*

The main objective of our study was to establish a maternal emotional self-management

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program which would reduce the cesarean section rate, especially without a medical indication. It is our perspective that psychological interventions can relieve unhealthy emotions in gravidas and increase the confidence of natural childbirth. Antepartum, intrapartum, and postpartum education are the essential part of this behavior therapy. In group intervention, the obstetric staff helps pregnant women understand the advantages and disadvantages of cesarean and vaginal deliveries, so that objective and rational decisions regarding the mode of delivery can be made. In the current study, the cesarean section rate was only 22.1% after emotional management intervention, and the cesarean section rate without indication was 5.3%, which was lower than the control group (cesarean section rate [42.7%]; cesarean section rate without medical indication [20%]).

Women with severe anxiety over childbirth need special support [17]. It has been reported that 80% of women who request an elective caesarean delivery had previously experienced anxiety and/or depression [18]. In some cases, fear of childbirth is the only psychological variable associated with the choice for cesarean delivery [19]. These women often had a larger burden of psychosocial and psychiatric problems than others. Thus, maximal effort is necessary to alleviate the psychosocial burden, avoid traumatic deliveries, and negative experiences, especially for nulliparas [20]. If the obstetric staff seriously consider the concerns of gravidas and build up trust and give support, those who initially had requested a cesarean delivery may eventually undergo a vaginal delivery. It was reported that well-designed psycho-education intervention could relieve women's childbirth fear, reduce decisional conflict and depressive symptom, support normal birth, diminish the possibility of a negative birth experience, and improved health and obstetric outcomes [21]. Our data also suggest that effective psychological intervention plays a vital role in reducing the cesarean section and obstetric intervention rates.

### *The EM intervention for shortening the natural childbirth birth process*

The duration of the second stage of labor in the EM group was significantly shorter than the UC group. The second stage is the period of time from complete cervical dilation until the fetus is

delivered. The second stage of labor is also a critical time to assess the capacity for emotional self-control. Whether or not the second stage could proceed smoothly depends largely on the emotions of the gravida, such as maternal self-positioning, psychological suggestion of pain relief, and effective pushing [22]. Maternal anxiety and depression may relegate the cerebral cortex to an inhibitory state, reduce the secretion of norepinephrine and other endocrine hormones which lead to uterine atony, affect the pain threshold, and disrupt the balance of uterine contractions and cervical dilation. All such factors may cause dysfunctional labor and increase the dystocia rate. Maternal cognitive behavioral intervention enhances mood regulation, relieve psychological tension [23], which will help pregnant women change the misconception of delivery, correct excessive assessment of pain, being more cooperative with the obstetric staff, making the delivery uneventful. Our study has shown that trained mothers know how to maintain equanimity and optimism during delivery and better cooperate with the obstetric staff. Perhaps the intervention was the main reason that those women had a higher rate of natural childbirth, and a shorter labor in the second stage.

Limitation of this study, because a limited number of samples and the short time of follow-up, a longer period of follow-up observation with larger samples and multi-center studies is needed to confirm the results. The effectiveness of the emotional management program also needs to be improved in large sample and multi sites.

### **Conclusion**

Prenatal EM intervention could control anxiety and depressive feelings in nulliparas, and improve obstetric outcomes. It may serve as an innovative approach to reduce the cesarean section rate in China.

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None.

**Address correspondence to:** Dr. Shu-Lin Chen, Department of Psychology, Xixi Campus of Zhejiang University, Zhejiang University, No. 148 Tianmushan Road, Hangzhou 310028, Zhejiang, China; E-mail: shulinchendoc@yeah.net; Dr. He-Jiang Li, Department of Obstetrics and Gynecology, The First People's Hospital of Hangzhou, No. 265 Huan sha Road, Hangzhou 310006, Zhejiang, China. Tel: +86-571-88273337; +86-571-56005600; E-mail: hj\_006@hotmail.com

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