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Antenatal Depressive Symptomatology, Family Conflict and Social Support Among Chengdu Chinese Women

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Abstract To investigate the association between demo-socio-economic status, obstetric variables, family conflict, social support and antenatal depressive symptoms among 1,609 Chinese women from four regional public hospitals during their second trimester of pregnancy in Chengdu. The vulnerable factors of depressive symptoms were explored in terms of their demo-socio-economic, obstetric, and Chinese family relational aspects, as well as in terms of social support. The women were identified as having depressive symptoms using the Edinburgh Postnatal Depression Scale. Marital conflict and parent-in-law conflict were assessed using the Dyadic Adjustment Scale and the Stryker Adjustment Checklist, respectively. The Interpersonal Support Evaluation List was used to measure the functional aspects of the perceived availability of social support. The prevalence rates of antenatal mild to severe and severe depressive symptoms were 35.9 and 7.3%, respectively. The logistic regression analysis revealed that participants who had been married for a shorter time, had a single source of financial support, a poor marital and mother-in-law relationship, and who lacked social support were more likely to have mild to severe depressive symptoms ($P < 0.05$). Participants who were younger, who had lived in Chengdu for a shorter period of time, had a shorter duration of marriage, solo financial support, poor marital relationship, and poor social support were more likely to have severe depressive symptoms ($P < 0.05$). The findings provide important information for prenatal screening, public health and social policies to help in the reduction of antenatal depressive symptoms among the Chengdu population.

Keywords Antenatal depressive symptoms · Marital conflict · Parent-in-law conflict · Social support · Chengdu

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Introduction

Antenatal depression is very significant because research indicates that there is a risk of potentially devastating adverse consequences for mothers and their families [1]. Inadequate treatment and inappropriate intervention in depression during pregnancy may be fatal because the risk of suicide is all too real [2]. There is a growing global literature on antenatal depression, but most research focuses on the western, developed countries, primarily in Europe and North America. Prevalence rates show considerable variation between countries, ranging between 10 and 52% [3]. One reason for these disparate figures might be the inherent difficulties of conducting cross-cultural research [4]. The identification of antenatal depressive symptoms is therefore significant in making possible early detection and intervention. However, none of the existing studies has explicitly explored the correlates associated with antenatal depressive symptoms among the mainland Chinese population. It is therefore difficult to interpret antenatal depressive symptomatology in this group, or to investigate the factors associated with depressive symptoms so as to determine what we need to know to offer appropriate treatment.

Factors recently found to be associated with depressive symptoms during pregnancy include youth [5], low levels of education [6], being a newly-arrived immigrant [7], being single [8], suffering financial hardship [9], living in poor accommodation [10], and maternal employment [11]. Furthermore, an unwanted [11] or a first [12] pregnancy, a first baby [13], late antenatal booking [14], and negative attitudes to breastfeeding [3] all increase the risk of suffering antenatal depressive symptoms. Although evidence for these risk factors has been found in many reviews of western literature, the applicability of these findings to mainland Chinese populations is still a matter of debate.

In traditional Chinese families, husbands are considered as the "heaven" (*tian*) and wives as the "earth" (*di*), an arrangement that has been heavily influenced by Confucian philosophy [15]. The inferior role of women is succinctly reflected by rigid gender norms such as "three obediences and four virtues" (*san cong sd de*) and being "virtuous wives and good mothers" (*xian qi liang mu*) [16]. Men, as the heads of household, preside over major decisions about family matters. It is common knowledge among the Chinese population that the marital roles of men and women are greatly influenced by a domestic inequality originating in the gendered division of labor and the male-oriented patriarchal element of Chinese culture [17]. However, the economic policies in place since the 1980s have transformed China into a market-based socialist economy, resulting in increased education and employment opportunities for women [15]. Women can bring additional financial resources to their families as a result of their greater access to education and employment [18]. As a result, they have begun to demand greater decision power in the family, a view that may challenge men's status as head of the household [17]. Indeed, marital conflict is far more common today in China [16].

Based on the Confucian paradigm, the most important relationships in Chinese culture involve the rule of hierarchy [19]. The subordination of the daughter-in-law to the parents-in-law is reinforced by a Confucian ideology that prescribes a hierarchy in its doctrine of the separated spheres [15]. The daughter-in-law is perceived as "an outsider" (*wai ren*) from another family and therefore must take the initiative to adjust to her "new" family. She is expected to show respect for, and obedience to, the older generation [20]. The birth of a baby is not only a matter for the couple, but concerns the whole family; the grandparents are still the first choice as childcare providers [21]. Indeed, the parents-in-laws see themselves as key providers of, and therefore decision-makers in, perinatal care practices [22]. Previous studies show that all pregnant women claim to have heard about traditional practices from their parents-in-law [23]. However, traditional practice is an active concept that changes gradually as it is transmitted from generation to generation [24]. Tension and conflict between traditions and modernity may result because of incompatible value systems [25].

Although pregnancy is a joyful event for most women, the perinatal period is often a stressful one, both biologically [26] and psychologically [27]. China is a developing Asian country whose culture is dominated by traditional Confucian values and which is home to a population with a collectivist orientation and preference for social harmony [28]. The nature and quality of social support seems to vary across cultures [29]. Therefore, social support during pregnancy is a particularly promising area of investigation [30]. The perinatal literature has found a lack of social support to be an important and consistent risk factor for depressive symptoms during pregnancy [30, 31]. The bulk of the evidence about the association between depression and social support is based on the Chinese elderly [32]. Fewer studies have been conducted focusing on pregnant women, where the patterns of association may differ.

Given the limited information on the demo-socio-economic status, obstetric variables, marital status, parent-in-law conflict, and social support associated with antenatal depressive symptoms in the Chinese population, this study aims to fill the gap. To our knowledge, this is the first large-scale study conducted in mainland China to focus on these issues. The findings will be beneficial for planning services and designing further interventions. More research is needed to increase our understanding before culturally sensitive therapy can be implemented. Thus, the following research questions may be asked. Among pregnant women living in Chengdu;

1. What is the prevalence of antenatal depressive symptoms?
2. What demo-socio-economic and obstetric factors are associated with antenatal depressive symptoms?
3. Is the presence of familial conflict (marital and parent-in-law) a correlate of antenatal depressive symptoms?
4. Is a lack of social support a risk factor for antenatal depressive symptoms?

Method

The research is exploratory, cross-sectional, and quantitative in nature. The study was approved in August 2007, and a pilot test carried out a month before the main study with 100 similar subjects in similar settings. The pilot aimed to examine the reliability, validity, and usability of the measurement methods in the target population. Based on the comments received, some of the demo-socio-economic items and obstetric items were revised to make them more accessible, without changing their meaning.

The research setting was Chengdu, a subprovincial city located in southwestern China and the capital of Sichuan province. Chengdu is one of the most important economic centers and transportation and communication hubs in this region, and has a population of over 11 million. The study was approved by the institutional review boards of four regional public hospitals in Chengdu—one university-affiliated and three regional hospitals—serving a combined population of over 2.75 million people and delivering about 30,000 babies per year. Women being served by these hospitals under governmental support were identified as a representative group covering different demo-socio-economic classes of the Chengdu population. Nonprobabilistic convenience sampling was adopted because of resource constraints.

Measurement

A validated Edinburgh Postnatal Depression Scale (EPDS) [33] was used to screen for antenatal depressive symptoms. Although the EPDS was originally designed for and validated among postnatal women, the scale has subsequently been found to be effective in the detection of depression among antenatal women [34] and has been used in several antenatal studies [35, 36]. The EPDS is a 10-item self-rating instrument, with each item scored using a 4-point scale. The minimum and maximum total scores are 0 and 30. This scale focuses on the cognitive and affective features of depression. A Chinese version was used that has been tested in a Chinese population and demonstrated good reliability and validity [37]. The EPDS scores are divided into three levels: 0–9, insignificant; >9, mild to severe depressive symptoms; and >14, severe depressive symptoms [38]. Therefore, cutoff scores of 9/10 and 14/15 were used in this study. The Cronbach's alpha for the EPDS was 0.762, suggesting good internal consistency.

The Dyadic Adjustment Scale (DAS) [39] is a 32-item marital inventory with four subscales on "affectional expression," "dyadic consensus," "dyadic cohesion," and "dyadic satisfaction" that adequately demonstrate the level of adjustment in pair relationships [39]. The range of scores on the DAS is 0–151. A lower score means more conflict in the marital relationship. Reliability and validity tests by Spanier and his associates on a purposive sample of married and divorced respondents in 1976 showed coefficient alphas of overall adjustment at 0.96, for subscales from 0.73 to 0.94 [40]. A confirmatory analysis of the DAS has demonstrated that subscale factors account for 94% of the co-variance among the items [41]. Tests with other populations in Australia [42], Canada [43], Hong Kong [44] and among Mexican Americans [45] confirm the validity and reliability of the DAS when applied across cultures. The Chinese version of the DAS was adopted in this study [46]. Cronbach's alpha showed that the Chinese version was reliable ($\alpha = 0.96$) [46]. The convergent validity of the DAS was tested, and the data showed that the Chinese version correlated significantly and substantially with the Chinese Kansas Marital Satisfaction Scale and the Chinese Marital Comparison Level Index [46]. The mean score is 101 among Chinese women [47]. Thus, 101 was used as the cutoff point in this study: <101 was defined as a poor relationship and ≥101 as a better one. Our Cronbach's alpha coefficient for the DAS subscales was 0.881, suggesting good internal consistency.

The Stryker Adjustment Checklist (SAC) [48] was used to measure the relationships between women and their parents-in-law. The correlation coefficient of the SAC was 0.90 [49] and the satisfactory reliability and validity of the measurement has been confirmed [48]. The checklist consists of 40 true–false items measuring adjustment in terms of four categories; affection, intimacy, sympathy, and tension. Only two categories (intimacy and tension), comprising 20 items in total, were used in this study as they were more relevant to the purpose of the investigation. The items were added up to give a score for each subscale. A higher score indicates poor adjustment and more conflict. A higher degree of parent-in-law conflict was present when the woman's perception of her experiences with them contained less intimacy and more tension. The Chinese version of the SAC was adopted [50] and achieved satisfactory reliability and validity. The mean score in this study is 8, so a score of 8/9 was used as the cutoff point because there is no relevant cutoff found elsewhere in the empirical evidence. A score of ≥9 was defined as a poor relationship and <9 as a better one.

To measure the perceived availability of social support, the Interpersonal Support Evaluation List (ISEL) [51] was used. The ISEL is a multi-dimensional inventory with four subscales measuring the perceived availability of four aspects of social support; emotional, belonging, tangible, and self-esteem. Each subscale has 10 items, giving a total of 40. A three-point Likert-type scale is used to score the items, ranging from "definitely true" to "definitely false." The subscale scores are simply the sum of the item scores, and are summed to give the total score. The higher the perceived availability of social support, the higher the score. The ISEL measures functional aspects of the perceived availability of social support and has been shown to be an accurate measure for the general population [52]. It also shows strong validity and reliability [53]. The Chinese version adopted in this study has undergone satisfactory psychometric testing previously [54]. The mean score in this study is 145, so 145/146 was used as the cutoff point: ≥146 was defined as better and <146 as poorer social support.

Information on demo-socio-economic status and obstetric data was also collected. Demographic data included age, educational level, and socio-economic status (employment, total family income, and type and size of residence). The obstetric aspect included number of pregnancies, number of children, intention to be pregnant, and intention of breastfeeding.

Data Collection

The target population was Chinese pregnant women living in Chengdu. The exclusion criteria included: (1) the woman did not supply written informed consent; (2) baby had an abnormality; and (3) the woman was not Chinese. The inclusion criteria included; (1) primiparas or multiparas; (2) the woman was having either a vaginal or instrumental delivery in one of the four participating hospitals. All women who attended antenatal clinics within the data collection period of August 2007 to March 2009 were eligible for entry into the study on the basis of their obstetric record according to the eligibility criteria. These women were screened, and the investigator then approached them individually to confirm that those who were eligible had satisfied the selection criteria before they were invited to participate. The data were collected at approximately 12–24 weeks' gestation. All of the women who were approached were given a full explanation of the study and informed of their right to refuse to participate. They completed the self-report instruments in approximately 20–25 min while waiting for their routine antenatal check-up at the hospital.

Data Analysis

The SPSS for PC 17.0 software package was used for statistical analysis. Proportions of the groups were compared using a Chi-square (χ^2) test. All potential variables were chosen based on the preceding literature review using the dichotomized items. The main advantage of dichotomization is that it greatly simplifies the presentation of the results and produces meaningful findings that are easily understandable without causing a decrease in the measured strength of associations [55]. The reliability of the subscales was measured using internal consistency (Cronbach's alpha). This study adopted the EPDS cutoff thresholds to identify mild to severe, and severe depression with depressive symptoms, by scores of >9 and >14, respectively. Significant variables were used as input variables in multivariate stepwise logistic regression models to identify, separately, the factors predicting mild to severe and severe depressive symptoms. Statistical significance was set at $P < 0.05$. The strength of association between the independent variables used in the regression model was moderate for some pairs ($|r| \leqq 0.4$). Hence, the tolerance values of predictive variables were obtained in the logistic regression models. All of the tolerance values were about 0.9 or higher, which is greater than the common cutoff threshold of 0.1 [56]. The multicollinearity between predictor variables was at an acceptable level. Hostmer and Lemshow's goodness-of-fit (HL-GOF) test was used to fit the model [57].

Results

Two thousand Chengdu women attending four regional hospitals were invited to join the study. Three hundred and ninety-one women (19.5%) declined. The main reasons for refusal were busyness, tiredness, and reluctance to disclose information. The remaining 1,609 women (giving an overall response rate of 80.5%) completed the questionnaires. The demographic characteristics of the women who had declined and the participants were not significantly different. The percentages of women with an EPDS score >9 and >14 were 35.9% ($n = 578$) and 7.3% ($n = 118$), respectively.

Table 1 shows the demo-socio-economic status, obstetric characteristics, family conflict score, and social support scores of the participants sorted into different groups. The majority of participants were aged over 25 (80.7%), had attained at least a secondary level education (80.6%), and were married (99.2%). Significant differences in age, educational level, period of time living in Chengdu, length of marriage, employment, monthly income, source of financial support, type of residence, intention to breastfeed, marital conflict, parent-in-law conflict, and social support were found among the groups ($P < 0.05$).

Significant Variables Related to Antenatal Depressive Symptoms

Table 2 shows that women with a shorter marital duration (aOR = 1.338; 1.014–1.765), having a single source of financial support (aOR = 1.407; 1.099–1.800), a poor marital relationship (aOR = 2.347; 1.769–3.114), a poor mother-in-law relationship (aOR = 1.399; 1.056–1.854), and poor social support (aOR = 1.997; 1.582–2.520) were more likely to have mild to severe depressive symptoms ($P < 0.05$). Women who were younger (aOR = 1.661; 1.041–2.651), had lived for less than a year in Chengdu (aOR = 2.296; 1.170–4.504), had been married for a shorter time (aOR = 1.596; 1.007–2.531), had a single source of financial support (aOR = 1.846; 1.193–2.855), had a poor marital relationship (aOR = 2.572; 1.664–3.997), and had poor social support (2.463; 1.515–4.005) were more likely to have severe depressive symptoms ($P < 0.05$) as also shown in Table 2.

Table 1 Demographic, obstetric characteristics, family conflicts and social support of participants in Chengdu ($n = 1,609$)

	Entire sample ($n = 1,609$) *N* (%)	Non depressed [EPDS ≤ 9] ($n = 1,031$) 64.1% *N* (%)	Mild to severe depressed [EPDS > 9] ($n = 578$) 35.9% *N* (%)	*P*-value[a]	Non severe depressed [EPDS ≤ 14] ($n = 1,491$) 92.7% *N* (%)	Severe Depressed [EPDS > 14] ($n = 118$) 7.3% *N* (%)	*P*-value[a]
Demographic characteristics							
Age							
>25	1,298 (80.7)	851 (82.5)	447 (77.3)	**.011**	1,220 (81.8)	78 (66.1)	**<.000**
≤25	311 (19.3)	180 (17.5)	131 (22.7)		271 (18.2)	40 (33.9)	
Educational level							
≥Secondary	1,297 (80.6)	858 (83.2)	439 (76.0)	**<.000**	1,218 (81.7)	79 (66.9)	**<.000**
<Secondary	312 (19.4)	173 (16.8)	139 (24.0)		273 (18.3)	39 (33.1)	
Places of birth							
Chengdu	824 (51.2)	531 (51.5)	293 (50.7)	.755	766 (51.4)	58 (49.2)	.642
Others	785 (48.8)	500 (48.2)	285 (49.3)		725 (48.6)	60 (50.8)	
Period of time in Chengdu							
≥1 year	1,527 (94.9)	991 (96.1)	536 (92.7)	**.003**	1,425 (95.6)	102 (86.4)	**.000**
<1 year	82 (5.1)	40 (3.9)	42 (7.3)		66 (4.4)	16 (13.6)	
Marital status							
Married	1,569 (99.2)	1,024 (63.6)	572 (99.0)	.440	1,480 (99.3)	116 (98.3)	.264
Cohabited/unmarried/separated/divorced	13 (0.8)	7 (0.7)	6 (1.0)		11 (0.7)	2 (1.7)	
Length of marriage							
≥1 year	1,265 (78.6	842 (81.7)	423 (73.2)	**<.000**	1,193 (80.0)	72 (61.0)	**<.000**
<1 year	344 (21.4)	189 (18.3)	155 (26.8)		298 (20.0)	46 (39.0)	
Employment status							
Full-time/self-employment	1,223 (76.0)	807 (78.3)	416 (72.0)	**.005**	1,146 (76.9)	77 (65.3)	**.004**
Part-time/unemployment/housewife	386 (24.0)	224 (21.7)	162 (28.0)		345 (23.1)	41 (34.7)	
Partner's employment status							
Full-time/self-employment	1,549 (96.3)	1,001 (97.1)	548 (94.8)	**.021**	1,441 (96.6)	108 (91.5)	**.005**
Part-time/unemployment	60 (3.7)	30 (2.9)	30 (5.2)		50 (3.4)	10 (8.5)	
Monthly individual total income							
>RMB $2,000	1,207 (75.0)	809 (78.5)	398 (68.9)	**<.000**	1,134 (76.1)	73 (61.9)	**.001**
≤RMB $2,000	402 (25.0)	222 (21.5)	180 (31.1)		357 (23.9)	45 (38.1)	
Main financial supporter of family							
Couple sharing	1,021 (63.5)	689 (67.7)	323 (55.9)	**<.000**	970 (65.1)	51 (43.2)	**<.000**
One partner only	588 (36.5)	333 (32.3)	255 (44.1)		521 (34.9)	67 (56.8)	

Table 1 continued

	Entire sample (n = 1,609) N (%)	Non depressed [EPDS ≤ 9] (n = 1,031) 64.1% N (%)	Mild to severe depressed [EPDS > 9] (n = 578) 35.9% N (%)	P-value[a]	Non severe depressed [EPDS ≤ 14] (n = 1,491) 92.7% N (%)	Severe Depressed [EPDS > 14] (n = 118) 7.3% N (%)	P-value[a]
Types of residence							
Private house	479 (29.8)	272 (26.4)	207 (35.8)	**<.000**	432 (29.0)	47 (39.8)	**<.013**
Others	1,130 (70.2)	759 (73.6)	371 (64.2)		1,059 (71.0)	71 (60.2)	
Size of residence							
≥50 meter square	1,097 (68.2)	712 (69.1)	385 (66.6)	.311	1,022 (68.5)	75 (63.6)	.263
<50 meter square	512 (31.8)	319 (30.9)	193 (33.4)		469 (31.5)	43 (36.4)	
Obstetric characteristics							
Number of pregnancy							
>First pregnancy	936 (58.2)	596 (57.8)	340 (58.8)	.692	878 (58.9)	58 (49.2)	**.039**
First pregnancy	673 (41.8)	435 (42.2)	238 (41.2)		613 (41.1)	60 (50.8)	
Number of baby							
>First baby	320 (19.9)	197 (19.1)	123 (21.3)	.295	293 (19.7)	27 (22.9)	.397
First baby	1,289 (80.1)	834 (80.9)	455 (78.7)		1,198 (80.3)	91(77.1)	
Antenatal booking							
Before 12 weeks gestation	1,029 (64.0)	669 (64.9)	360 (62.3)	.296	951 (63.8)	78 (66.1)	.614
Between 12 and 28 weeks gestation	580 (36.0)	362 (35.1)	218 (37.7)		540 (36.2)	40 (33.9)	
Planning of pregnancy							
Planned/neutral	1,283 (79.7)	837 (81.2)	446 (77.2)	.054	1,193 (80.0)	90 (76.3)	.330
Unplanned/IVF/others	326 (20.3)	194 (18.8)	132 (22.8)		298 (20.0)	28 (23.7)	
Yes	23 (1.4)	14 (1.4)	9 (1.6)		21 (1.4)	2 (1.7)	
Feeding intention of breastfeeding							
Yes	1,403 (87.2)	918 (89.0)	485 (83.9)	**.003**	1,309 (87.8)	94 (79.7)	**.011**
No or not sure	206 (12.8)	113 (11.0)	93 (16.1)		182 (12.2)	24 (20.3)	
Family conflict							
Marital conflict [The Dyadic Adjustment Scale Total Score (DAS)]							
Better couple's relationship (DAS ≥ 101)	1,319 (82)	909 (88.2)	410 (70.9)	**<.000**	1,250 (83.8)	69 (58.5)	**<.000**
Poor couple's relationship (DAS < 101)	290 (18.0)	122 (11.8)	168 (29.1)		241 (16.2)	49 (41.5)	
Father-in-law conflict [The Stryker Adjustment Checklist (SAC)]							
Better father-in-law's relationship (SAC < 9)	847 (54.6)	593 (59.9)	254 (45.2)	**<.000**	779 (55.6)	48 (42.1)	**.005**
Poor father-in-law's relationship (SAC ≥ 9)	705 (45.4)	397 (40.1)	308 (54.8)		639 (44.4)	66 (57.9)	
Mother-in-law conflict [The Stryker Adjustment Checklist (SAC)]							
Better mother-in-law's relationship (SAC < 9)	849 (54.0)	600 (59.7)	249 (43.9)	**<.000**	801 (54.9)	48 (42.1)	**.008**
Poor mother-in-law's relationship (SAC ≥ 9)	723 (46.0)	405 (40.3)	318 (56.1)		657 (45.1)	66 (57.9)	

Table 1 continued

	Entire sample (n = 1,609) N (%)	Non depressed [EPDS ≤ 9] (n = 1,031) 64.1% N (%)	Mild to severe depressed [EPDS > 9] (n = 578) 35.9% N (%)	P-value[a]	Non severe depressed [EPDS ≤ 14] (n = 1,491) 92.7% N (%)	Severe Depressed [EPDS > 14] (n = 118) 7.3% N (%)	P-value[a]
Social support							
The Interpersonal Support Evaluation List (ISEL)							
Better social support (ISEL ≥ 146)	820 (51.0)	614 (59.6)	206 (35.6)	**<.000**	793 (53.2)	27 (22.9)	**<.000**
Poor social support (ISEL < 146)	789 (49.0)	417 (40.4)	372 (64.4)		698 (46.8)	91 (77.1)	

EPDS Edinburgh Postnatal Depression Scale

[a] Chi-square test

Values in boldface indicated P value < .05

Discussion

As shown above, the prevalence of mild to severe and severe antenatal depressive symptoms were 35.9 and 7.3%, respectively. These results are similar to those found in previous studies in other countries [3]. Empirical evidence shows that western women express their depressive symptoms overtly but Chinese women tend to manifest them through somatic complaints [58]. Therefore, the actual prevalence of depressive symptomatology among Chengdu women may be much higher. Women suffering severe antenatal depressive symptoms tended to be younger, which is consistent with previous literature [5]. The majority of younger women in this study are only children, as a result of the "one-child policy" (*du sheng zi nv*), which was officially codified in 1979 as a set of rules and regulations governing the approved size of Chinese families [59]. Under this regime, each child was often described as the "little emperor" or "little sun" (*xiao huang di*) [60]. As a result, women tend to be spoiled by their parents [61] such that their independence and autonomy are threatened. Furthermore, feelings of depression may further reflect the vulnerability and dependency of younger women. This study also shows, for the first time, that pregnant women living in Chengdu who had been married for less than a year were more likely to experience mild to severe depressive symptoms. In the same vein, another study has showed that the transition to parenthood hastens the typical linear decline in marital satisfaction over the early years of marriage [62] and additional psychological distress results from women's role adjustment with the advent of a baby shortly after marriage [63].

Women who had lived in Chengdu for a year or less (new internal migrants) were also more likely to experience antenatal depressive symptoms, which is consistent with previous studies [7]. The possible explanations of this finding might lie in migrant-related factors [64] such as language ability, social isolation, experiences of discrimination, life adaptation, unfair working opportunities, financial difficulties, and a lack of familiarity with healthcare practices. Chinese studies of internal migration have highlighted the importance of the *hukou* (household registration system) in determining life chances [65]. Because of the *hukou*, new migrants and members of their families who were not born in the cities cannot register as official residents and therefore are not entitled to subsidized housing, education, social security, or medical benefits [65]. As a result, the presence of antenatal depressive symptoms among pregnant women in this group is not surprising. Women in solo-earner couples will have comparatively poor financial resources compared with dual-earner families. As a result, women in this position showed antenatal depressive symptoms, consistent with the findings of western studies

Table 2 Adjusted odds ratios (95% CI) of logistic regression models of significant variables associated with antenatal depressive symptoms

	Mild to severe depressed [EPDS > 9] ($n = 578$)				Severe depressed [EPDS > 14] ($n = 118$)			
	aOR	95% CI		*P*-value	aOR	95% CI		*P*-value
		Lower	Upper			Lower	Upper	
Demographic characteristics								
Age								
≤25	1.162	.870	1.552	.310	1.661	1.041	2.651	**.033**
Educational level								
≤Secondary	.884	.647	1.207	.437	1.031	.618	1.720	.908
Period of time in Chengdu								
<1 year	1.639	1.001	2.684	.050	2.296	1.170	4.504	**.016**
Length of marriage								
<1 year	1.338	1.014	1.765	**.040**	1.596	1.007	2.531	**.047**
Employment status								
Part-time/unemployment/housewife	.939	.708	1.246	.633	.958	.593	1.548	.862
Partner's employment status								
Part-time/unemployment	.994	.554	1.783	.984	1.206	0.514	2.829	.667
Monthly individual total income								
≤RMB $2,000	1.201	0.912	1.581	.191	1.139	.702	1.849	.597
Main financial supporter of family								
One partner only	1.407	1.099	1.800	**.007**	1.846	1.193	2.855	**.006**
Types of residence								
Rented house	.814	.628	1.054	.119	1.013	.640	1.603	.957
Obstetric characteristics of participants								
Number of pregnancy								
First pregnancy	–	–	–	–	1.280	.847	1.935	.241
Feeding intention of breastfeeding								
No or not sure	1.310	.949	1.808	.101	1.363	.807	2.301	.247
Family conflict								
Marital conflict [The Dyadic Adjustment Scale total score (DAS)]								
Poor couple's relationship (DAS < 101)	2.347	1.769	3.114	**<.000**	2.572	1.664	3.997	**<.000**
Father-in-law conflict [The Stryker Adjustment Checklist (SAC)]								
Poor father-in-law's relationship (SAC ≥ 9)	1.206	.910	1.599	.192	1.222	.729	2.048	.447
Mother-in-law conflict [The Stryker Adjustment Checklist (SAC)]								
Poor mother-in-law's relationship (SAC ≥ 9)	1.399	1.056	1.854	**.019**	1.137	.676	1.910	.629
Social support								
The interpersonal support evaluation list (ISEL)								
Poor social support (ISEL < 146)	1.997	1.582	2.520	**<.000**	2.463	1.515	4.005	**<.000**

aOR Adjusted odd ratio

EPDS Edinburgh Postnatal Depression Scale

Values in boldface indicated *P* value < .05

[9]. Women whose finances are constrained generally suffer from hardship and financial stress that potentially spills over into other areas of emotional wellbeing. This is consistent with a Chinese saying, "destitute couples are sad over a hundred things" (*pin jian fu qi bai shi ai)* [66].

Consistent with previous western studies [67, 68] as well as a study conducted in Hong Kong [69], our results also show that marital conflict is a significant factor associated with antenatal depressive symptoms. In the traditional Chinese family, patriarchal and Confucian cultures strictly define circumscribed gender roles in which wives are responsible for caretaking and household chores and men tend to place greater emphasis on their work role [16]. China's "open-door" policy and its increasing interactions

with foreign cultures make cultural learning and change a reality for today's society [70]. However, it is also widely recognized that Chinese society is in a transition phase between urbanization and industrialization and is struggling to keep traditional values intact. In a context of rising women's aspirations and economic power, women would have an incentive to, or may be compelled to, devote more effort to their work and less to their families [71]. However, the patriarchal ideology persists in Chinese families, especially in men [16] and this discrepancy may precipitate marital conflict. Moreover, Chinese women experience role overload related to work, childcare, and housework even when they are gainfully employed in the workforce, as their husbands' participation in childcare and household chores is limited [72]. As a result, depressive symptoms during pregnancy are not surprising.

Our findings show that women who experienced more conflict with their mother-in-law were more likely to have antenatal depressive symptoms, which is consistent with previous research [69]. Chinese only children have grown up within the 4-2-1 (four grandparents, two parents, and one child) family structure that has emerged as the new dominant form in mainland society [60]. Therefore, each child will have increasingly become the center of attention in the household and become more precious than ever to her parents. Rapid social changes in China, such as the dramatic increase in women's participation in the labor market, mean that Chinese grandmothers are actively engaged in child care [21, 73]. An older generation mother-in-law will tend to hold traditional beliefs about antenatal care (*an tai* or *tai jiao*) or observe certain restrictions on diet, environment, and activities [25, 69] that may be different from the views held by her daughter-in-law. The excessive attention paid by adults to the only baby in the family will engage this intergenerational conflict, which may be experienced as tension and depressive mood by modern women [74].

The results of this study confirm that the lack of perceived availability of social support is significantly associated with antenatal depressive symptoms, echoing previous studies [30, 31] which show that social support plays an important role in alleviating or escalating antenatal depression. Women with low perceived social support lack effective psychosocial resources, particularly social stability and social participation, and therefore receive insufficient social support. During pregnancy, a time of significant life changes requiring major psychological adjustments, the perception and expectation of insufficient support clearly has a detrimental impact on maternal psychological wellbeing [30, 31]. Women may feel emotionally isolated because of this lack of social support during their pregnancy, feelings which will cause distress and depressive symptoms [75].

To the best of our knowledge, the present study is the first to provide evidence of the correlates of antenatal depressive symptoms among women living in Chengdu. This study could alert health care professionals to those who need special attention during antenatal visits. The development of a checklist or structured questions for antenatal screening is necessary to detect high risk groups, with items measuring age, period of time in Chengdu, marital duration, financial support of family, marital conflict, mother-in-law conflict, social support and antenatal depressive symptoms. Health professionals can refer women for couple therapy or extended family therapy if they are experiencing family conflicts. Moreover, initiation of a prenatal outreach program is important to identify the antenatal depressive women actively in community and household settings. The early detection of depressive symptoms during the antenatal period is important to prevent women from developing postnatal depression. Health care providers should design antenatal education programs to be promoted in the media to increase awareness of antenatal depression and of the importance of social support during pregnancy. Preventive and early intervention for marital and mother-in-law conflicts during pregnancy should be emphasized. In addition, the findings may alert policymakers to ensure adequate healthcare resources are available to address antenatal depression. This study provides an introductory analysis of antenatal depression in the hopes of inspiring further study in the field.

Despite the contribution that it makes to the literature, this study has several limitations. Firstly, although it examines the correlates of antenatal depressive symptoms, it may have overlooked a number of other variables, such as psychological factors of personality and social networks. Hence, further studies are warranted. Secondly, the use of a cross-sectional survey means that causal factors are undetermined and should be further investigated in a longitudinal study. Thirdly, the generalization of our findings is limited by the use of a nonprobabilistic convenience sample. Fourthly, depressive symptoms were self-reported and not verified with a clinical interview. Finally, family conflict between partners or a parent-in-law is always co-constructed, but this study only considers the woman's contribution. It does not address information about partners and other family members. Hence, the dynamics and dimensions of partners and parents-in-law in familial relationships are undetermined and further study is needed to explore these.

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