PERCEIVED SOCIAL SUPPORT, BASIC PSYCHOLOGICAL NEEDS AND PSYCHOLOGICAL ADAPTABILITY OF CHINESE POSTPARTUM WOMEN WITH DEPRESSION: THE MEDIATING ROLE OF HOPE

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Abstract

Postpartum depression (PPD) is one of the most common health problems among postpartum women in the world and is generally defined as an episode of depression that occurs within 12 months after delivery. This study investigated the relationship between hope in perceived social support, basic psychological needs, and psychological adaptability. Participants were 501 postpartum-depressed women from four maternal and child health centers in China. The study collected demographic data from women with postpatrum depression and used Psychological Adaptability Scale (PAS), Perceived Social Support Scale (PSSS), Basic Psychological Needs Scale (BPNS), and Herth Hope Index (HHI) to obtain the values of the variables.The results of the structural equation model showed that hope partially mediated the effect of perceived social support on psychological adaptability, and it also partially mediated the effect of basic psychological needs on psychological adaptability. In addition, the bootstrapping procedure revealed a significant link between perceived social support and basic psychological needs on psychological adaptability through hope. Examination of the competing models reveals that Model 3 is the optimal structural equation model. These results help to investigate the complexity of the relationship between factors and psychological adaptability to inform clinical work and mental health counselling. The study concludes with a discussion of possible explanations and limitations.

Keywords: Postpartum depression, Perceived social support, Basic psychological needs, Psychological adaptability, Hope, Mediating effects

1. Introduction

Pregnancy and childbirth are important events in a woman's life. Frequently, it may be assumed that the risks are over when a woman gives birth; however, the change in female identity, the stress of childcare, the lack of social support, postnatal complications, and the downturn in the family's finances can all signal the onset of a crisis: Postpartum Depression(PPD)[1-5] .The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) considers PPD not to be a stand-alone diagnosis and defines it as depressive symptoms present during pregnancy and up to 4 weeks after birth [6]. However, this definition differs from the usual criteria in clinical studies.Because, the highest incidence of postpartum depression occurs during the puerperium(around 6 weeks) [7], but some studies have shown that the onset of PPD may be within a year or possibly even longer [8,9]. We believe that there are some differences in the judgement of the onset of the disease, that need to be further clarified.The study used the general criteria of the ACOG Committee, which states that PPD is an episode of depression within one year [10]. It is also important to note that PPD can be defined as symptomatic at one end of the disease spectrum [11].For example, if the Edinburgh Postnatal Depression Scale (EPDS) exceeds a given threshold (10 or 13 points), the patient can be referred to a clinical unit for further assessment or treatment [12]. So these scales can be used as an important instrument to screen for postpartum depressive symptoms. A meta-analysis by Slomian, Honvo, Emonts, Reginster and Bruyère also found that the different depression scales were all highly predictive of major depressive episodes[13]. However, due to diagnostic heterogeneity, different scales have different scoring criteria, which makes it difficult to accurately determine whether it is bad mood or depressive disorder . Therefore, given the differences in the onset and measurement of postpartum depression [14,15], We use the broad concept that postpartum depression includes postpartum depression and postpartum depressive episodes that do not fulfill the full diagnostic criteria. This interpretation helps to reduce academic controversy and provides conceptual clarity for subsequent studies.

Postpartum depression is a depressive episode or depressive disorder closely related to the individual's physiological, psychological, and social factors, and its main symptoms are low mood, irritability, low energy, decreased appetite, lack of interest in life, and insomnia [16,17]. Postpartum depression affects 10 to 20 percent of women within the first year and 25 percent thereafter and is still not fully diagnosed and understood [18]. So there are still many women with postpartum depression who appear to be underdiagnosed. There are several sets of data that can visually represent the prevalence and scope of postpartum depression, such as a report showing that 7% of postpartum mothers had suicidal ideation in the first 8 months, and 62% to 70% of them experienced a depressive episode [19]; the prevalence of postpartum depression ranges from 8.7% to 12.7% in China, with a higher prevalence in economically backward areas [20,21]; the results of another Meta-analysis also showed that the detection rate of postpartum depression in China was 14.8% between 2015 and 2019 [22]. These data raise concerns about this vulnerable

group,in particular, we are focusing on the China sample. One study found that in addition to the 15 percent of diagnosed cases of mental illness that are screened for, many postpartum depressed women are overlooked [13], and it is conceivable that the number of potentially depressed postpartum women in China may be staggering. Furthermore, women with postpartum depression may have concomitant weight gain, substance abuse, and may also have adverse effects on infant and child rearing [23]. This can be a threat to oneself and the entire family. In conclusion, postnatal depression is an important public health issue. Improving women's mental health contributes to people's well-being and family happiness.

1.1. Psychological adaptability

Life is always full of uncertainty and endless possibilities. The uncertainty of life can be seen in schooling, leaving home, changing jobs, marital relationships, raising children, and retirement [24]. These changes can disrupt the rhythm of life and daily emotions. People can only live with the new environment to which they have adapted [25]. What is certain is that postpartum women are going through a huge turning point in their lives. They need to shoulder the responsibilities of motherhood, learn to take care of their children, adapt to a new life, and re-plan for the future. Therefore, learning how to cope with the changes in daily life is of great value to postpartum women. We propose the concept of adaptability. The American Psychological Association (APA) defines adaptability as "the ability to respond appropriately to change or changing situations; the ability to change or adjust one's behaviour in the face of different circumstances or different people" [26]. In other words, psychological adaptation is the dynamic process of adjusting to and accepting external stimuli or threats when they are received" [27].So is there a relationship between psychological adaptability and mental health? A study of psychological adaptability in young and older people showed that adaptability moderated the relationship between age and mental health.

The adverse effects of low adaptability were stronger in young people than in older people. Moreover, adaptability is recognized as a key psychological resource. When individuals are constrained by social and physical conditions, adaptability contributes to positive outcomes [28]. This suggests that there may be some positive association between psychological adaptability and mental health.By teaching coping strategies, providing psychoeducation, and providing social support, people can help distressed people withstand future risks and improve their psychological adaptability [29]. Therefore, psychological adaptability or adaptive capacity can be seen as a function of psychological quality and is one of the measures of mental health. Improving psychological adaptability is an important way to promote mental health.

1.2. Perceived social support

With the rise of positive psychology and humanism, counsellors have come to focus on the potential, resources and optimistic qualities of their clients. Some studies have found a strong link between social support as an important resource and mental health [30,31]. For example, low social support is associated with mental health problems, addiction problems, or worsening of

psychological problems [32], while high social support reduces many risks. This strong association was also confirmed in women, children and the elderly. The results show that social support is better at improving their emotional and behavioural problems and reducing their distress [33,34].Does that mean that all components of social support are closely related to mental health? Researchers have attempted to make a finer division of social support into perceived social support and received social support [35]. Perceived social support refers to the perceived availability of social support, which is the emotional experience of feeling respected, understood and supported, and can be regarded as a subjective emotional feeling [36], whereas received social support focuses on the quantity and quality of support, which is the support received directly in reality. This distinction is important because perceived social support is only moderately correlated with received social support [37,38]. This suggests that perceived support by an individual is not equivalent to support received in reality, and that perceived social support is more capable of explaining or influencing an individual's behaviour. Therefore, compared with received social support, perceived social support better reflects participants' internal emotional responses and support utilization, which is conducive to accurately measuring social support for women with postpartum depression. In recent years, although there have been no studies directly examining the relationship between perceived social support and psychological adaptability, the relationship between perceived social support and mental health has been mentioned in a number of publications. For example, Riahi, Aliverdinia, and Pourhossein found a direct and significant relationship between perceived social support and mental health, and that high levels of perceived social support were a source of mental health [39]. Applebaum, Stein, Lord-Bessen, Pessin Rosenfeld and Breitbart's study also showed that higher levels of perceived social support were associated with better quality of life for cancer patients, and that it was positively correlated with mental health [40]. However, this was limited to perceived social support, and the impact of received social support on mental health was not significant [41]. In conjunction with the above analyses, perceived social support, and psychological adaptability are both potentially associated with mental health, and the present study attempts to investigate the relationship between perceived social support and psychological adaptability in postpartum depressed women. Therefore, this study proposes the research hypothesis H_1: Perceived social support will have a significant positive predictive effect on psychological adaptability.

1.3. Basic psychological needs

Needs are viewed as an innate psychological stimulant, necessary for self-determination, sustained development, and happiness throughout an individual's life. High self-esteem and good ego functioning are all conducive to need satisfaction. According to the Basic Psychological Needs Theory (BPNS), Ryan and Deci believe that human beings have three basic psychological needs: the autonomous need (being in control of one's own behaviour and choosing one's own behaviour), the competence/ability need(being able to do one's own optimal or challenging activities and achieving the desired outcomes) and the belonging/relationship need(feeling one's own sense of belonging and having mutual respect with others) [42]. Currently, there is no literature on the

relationship between basic psychological needs and psychological adaptability. However, there is a link between basic psychological needs and mental health [43]. Low satisfaction with basic psychological needs is characterized by need deficiency and need frustration [44].Individuals with unmet needs, especially when frustrated can lead to deterioration in mental health, with a decline in their ability to perform tasks and psychosocial functioning [45]. This shows the importance of basic psychological needs for mental health. Similar studies have found that need frustration, lack of psychological needs and their dimensions predict the degree of mental health in adults, and are especially closely related to the amount of depressive symptoms [46–48]. People who experience more need frustration show higher levels of depressive symptoms [49]. In conclusion, the absence/frustration of basic psychological needs is significantly associated with depressive symptoms and mental health, so we can venture to speculate that basic psychological needs are related to psychological adaptability in women with postpartum depression and propose the research hypothesis H2: Basic psychological needs produce a significant positive predictive effect on psychological adaptability.

1.4. Hope as a mediator

Snyder believes that hope is a very common psychological phenomenon that explains much of human behaviour. Hope is a cognitive set characterised by a cognitive orientation and a positive motivational state. This state is based on the interaction of paths to success (goal-oriented plans) and motivation (goal-oriented vigor) [50]. Hope consists of three primary components: goals, path thinking, and motivational thinking. Path thinking, which is a specific method and plan to reach a goal, is a cognitive component of hope. Path thinking is manifested by the fact that people with high levels of hope are more adept at forming feasible plans and alternative routes than those with low levels of hope [51]. Motivational thinking refers to the motivation to execute a route, that is, an individual's ability to reach a desired goal according to an existing route. It plays an important role in people's pursuit of goals. Individuals with high levels of hope usually have enough perseverance to overcome setbacks and difficulties, and see such setbacks as opportunities for growth, whereas those with low levels of hope are likely to be wishy-washy in the face of difficulties.Thus, the concept of hope reveals deep connotations of motivation, future orientation, and positive cognition. Several studies have shown that hope has a positive impact on both general and hospital clinical populations. In a general population, Marques conducted a 2-year follow-up study of children and adolescents during which hope, life satisfaction, and mental health were measured three times. Results showed that life satisfaction scores significantly predicted mental health on all three measures, and that hope significantly enhanced this effect of life satisfaction [52]. During the closure of the New Crown outbreak in Greece and Cyprus, Demetriou, Drakontaides, and Hadjicharalambous used the Psychological Resilience Scale, the Hope Scale for Adults, and the COVID-19-Adaptation Scale to assess the impact of hope on mental health and people's life adaptations affected by isolation. The results showed that high hope scores predicted higher levels of psychological resilience and adaptability in the face of adversity [53]. This confirms that hope can be used as a psychoprotective factor or a predictor of mental health.

And, in a clinical sample from a hospital, hope promotes recovery and can have a positive impact on patients [54]. Does hope predict psychological adaptability? Much of the existing research has focused on the dimension of occupational adaptability. A study from a large national university in Turkey found that students who were more resilient, hopeful and optimistic were more likely to perceive themselves as more adaptable in their careers. Meanwhile, multiple regression analyses showed that hope, resilience and optimism significantly predicted career adaptability [55]. This proves that hope has a positive effect on career adaptability. In the group of people with intellectual disabilities, occupational adaptability and hope are important variables in coping with the current work environment, as well as affecting their life satisfaction. The results support the relationship between occupational adaptability and life satisfaction [56]. In conclusion, existing studies have not directly examined the psychological adaptability of women with postpartum depression. They have only confirmed hope and mental health, occupational adaptability or life adaptability during COVID-19. Therefore, it is reasonable for this study to continue to investigate the effect of hope on psychological adaptability in postpartum depressed women. We propose the research hypothesis H_3: Hope has a significant positive predictive effect on psychological adaptability.

Is there a link between perceived social support, basic psychological needs and hope? Xiang, Teng, Li, Chen, and Guo used a latent variable growth model to assess the effect of perceived social support on hope. The results showed that perceived social support significantly predicted the level of hope and strongly influenced the change in hope [57]. This idea was also confirmed laterally by Nouzari, Najafi, and Momennasab's study. They found that positive growth after trauma was related to social support and hope. Regular counselling of caregivers by outsiders and encouraging patients and caregivers to participate in community activities can promote their psychological growth [58]. Therefore, broad concepts of mental health, such as psychological growth and psychological adaptability, may be linked to perceived social support and hope. We propose the research hypothesis H_4: Hope partially mediates perceived social support and psychological adaptability. Currently, research on basic psychological needs and hope focuses on student populations. Su, Huebner, & Tian investigated longitudinal associations between hope, basic psychological needs at school, and depressive symptoms among primary school students. The results showed that hope, basic psychological needs at school, and depressive symptoms were directly interrelated [59]. Of course, the results of this study cannot be directly given to our reference,because basic psychological needs at school cannot be equated with basic psychological needs. However, it indirectly reflects that the needs may be linked to hope and depressive symptoms. In addition, some scholars have focused on the autonomy of basic psychological needs and found that increased self-regulation positively affects the level of hope and leads to greater academic achievement [60]. This suggests that changes in one dimension of psychological needs (autonomy needs) affect hope levels and that there may be some association between the two. Are these associations different in the group of postpartum depressed women? Therefore, we propose the research hypothesis H_5: hope plays a partial mediating role in basic psychological needs and psychological adaptability.

In summary, the purpose of this thesis is to investigate the possible mediating role of hope in structural equation modeling and to hypothesize that hope will moderate the relationship between perceived social support, basic psychological needs and psychological adaptability on cross-sectional data. In other words, we argue that perceived social support affects a person's level of hope, which in turn affects a person's adaptability to the external environment. whereas basic psychological needs also affect a person's level of hope, which in turn also affects psychological adaptability. The present study has some unique strengths: a) It models basic psychological needs, perceived social support, hope and psychological adaptability and then directly tests their connections, which helps to seek strategies to enhance psychological adaptability in postpartum depressed women. b) Compared to most studies that focus on students, this study focuses on a hospital clinical sample, which can further broaden the scope and study population. c) Psychological adaptability, perceived social support and basic psychological needs have been studied relatively little. In particular, empirical studies on the psychological adaptability of Chinese women with postpartum depression are scarce.

2.   Measures
2.1. Participants and Sampling
Between June 2023 and September 2023, the researchers conducted a non-random sampling of postpartum depressed women in Guizhou Province, China, after obtaining permission from the Ethics Committee of Guiyang Maternal and Child Health Hospital. The entire study complied with the principles of human scientific ethics and the Declaration of Helsinki; therefore, participants' personal information was anonymised. The study's data collection was divided into two main processes: screening and formal testing. Specifically, the researcher assigned Guiyang Maternal and Child Health Hospital to send the electronic scale to other partner organisations, which in turn distributed it to the postpatrum women who came to the hospital. These postpartum depressed women first completed the Patient Health Questionnaire (PHQ-9), and participants with positive depression results went on to complete the Psychological Adjustment Scale (PAS), the Perceived Social Support Scale (PSSS), the Basic Psychological Needs Scale (BPNS), and the Herth Hope Index (HHI). The surveyed scopes were Guiyang Maternal and Child Health Hospital (GCH), Bijie Maternal and Child Health Hospital (BCH) and Qingzhen Maternal and Child Health Hospital (QCH). The data collection software was Questionnaire Star designed by Changsha Ranxing Ltd.

During the study period, the researcher screened a total of 570 postpartum depressed women by PHQ-9 and obtained the results of 570 formal tests (including PAS, PSSS, BPNS and HHI). The study could use a sample size of 501 with a recall rate of 87.89% by removing scales with missing data or haphazard responses (e.g., scales with all one option selected). Among the female participants, the ages ranged from 18 to 34 years, with a mean age of 25.64 ± 3.31, and detailed demographic data and socioeconomic variables are shown in Table 1. The screening criteria for postpartum depressed women were:a) The number of pregnancies was one. this was intended to exclude the effect of multiple births on the psychological adaptability of the mothers, after this

was intended to exclude the effect of multiple births on the psychological adaptability of the mothers, after all, after multiple births, women will have more understanding and adaptation to motherhood;

b) a score of greater than five in the Patient Health Questionnaire (PHQ-9) [61]; c) the patient was aware of the study and volunteered to participate without ethical issues; d) Participants were at least 18 years old and had high school education or above. e) The postpatrum time was defined as within 6-8 weeks after delivery (puerperium). Because the puerperium is a stage with a high prevalence of depression [62], and this is a period when many postpatrum women need to come to the hospital for medical check-ups and rehabilitation. Therefore data collection will be more accurate and easier. It will also prevent a large loss of participants and be easier to administer. Each participant will be informed that it will take approximately 30 minutes to complete an assessment, during which time they may voluntarily withdraw from the survey. After the survey, the researcher, in conjunction with the healthcare staff, will provide a free online postpatrum healthcare seminar at a time to guarantee the rights of the participants.

Table 1 Basic information of the participants

Factor	Frequency (n)	Percentage (%)	Cumulative percentage (%)
Literacy level(Educational background)			
Middle School	129	25.75	25.75
High School	157	31.34	57.09

Undergraduate	165	32.93	90.02
Postgraduate	50	9.98	100.00
Ethnicity			
Han	386	77.05	77.05
Ethnic Minority	115	22.95	100.00
Number of babies (first birth)			
0 (miscarriage or infant death within 28 weeks)	25	4.99	4.99
1	362	72.26	77.25
2	114	22.36	99.60
3 or more	2	0.40	100.00
mode of delivery			
normal birth	288	57.47	57.47
Caesarean birth	213	42.53	100.00
Family living style			
Self, partner and children	315	62.87	62.87
Owners and children/only living on their own	31	6.19	69.06
Self, partner, children and parents (biological or partner's)	155	30.94	100.00
Economic condition(based on personal real-life feelings in the province)			
well off	151	30.14	30.14
Moderate	286	57.09	87.23
Difficult	64	12.77	100.00
Past medical history			
No	300	59.88	59.88
Yes	201	40.12	100.00
Postpartum complications			
No	443	88.42	88.42
Yes	58	11.58	100.00

3. Instruments

3.1. Psychological adaptability

American scholar Biesecker developed the Psychological Adaptation Scale (PAS) [63]. The scale is used to measure the level of psychological adjustment of chronically ill patients and their caregivers and has been translated and used by scholars in several countries [64,65]. PAS consists of 4 dimensions, including Coping Ability (CA), Self-Empowerment (SE), Social Skills (SS), and Psychological Growth (PG), for a total of 20 items, which are exactly the same as the dimensions of the original scale.The scale measures the participants' performance and degree of these dimensions.Each item was rated on a 5-point Likert scale from "never" to "almost always", with a total score of 20 to 100. Higher scores indicate better positive psychological adaptability of the caregiver (e.g., I accept the way things are going.I choose "almost always" for five points.). The PAS has a Cronbach's alpha coefficient of 0.90, half reliability of 0.702 to 0.760 for each dimension, and retest reliability of 0.876 for the total scale [66].

3.2. Perceived social support

Perceived social support was measured by Perceived Social Support Scale (PSSS). PSSS is based on the Multidimensional Scale of Perceived Social Support (MPSS) developed by Zimet et al. and

culturally tested and translated by Chinese scholars[67]. The two scales are identical in content, only the names of the scales are different.The PSSS consists of 12 items measuring three dimensions of family support (items: 3,4,8,11), friend support (items: 6,7,9,12), and other support (items: 1,2,5,10), reflecting the participant's perceived level of support from these dimensions.The PSSS uses a 7-point scale, i.e., it is classified as: strongly disagree, quite agree, slightly disagree, neutral, slightly agree, quite agree, and strongly agree. For example, if a participant scores 5 on the item "I am able to get emotional help and support from my family when I need it," this means that she slightly agrees with the statement. The total score is the sum of the scores from all the questions to reflect the total level of social support felt by the individual. The higher the total score, the more social support the subject feels and receives. Scores between 12 and 36 are considered low levels of support, scores between 37 and 60 are moderate levels of support, and scores between 61 and 84 are high levels of support. The generalization coefficients and reliability indices for the overall scale were above 0.9, while the factors were also above 0.77 [68, 69].

3.3. Basic psychological needs

To measure basic psychological needs, Ryan and Deci developed the Basic Psychological Needs Scale (BPNS) [70]. It is currently used in countries such as Pakistan, Turkey and China.The scale consists of 21 items assessing the level of satisfaction of autonomy needs (AN), competence needs (CN), and belonging/relationship needs (BN), reflecting participant satisfaction with these dimensions. The scale uses a 7-point Likert scale (1 = not at all, 7 = completely) to reflect the level of participants' perceptions and feelings (e.g., I don't have many opportunities to demonstrate my competence in my life). Higher scores on each topic indicate higher levels of satisfaction of participants' basic psychological needs. The Cronbach's alpha coefficient for the autonomy need was 0.82, the competence need was 0.80, and the belongingness need was 0.81 [71]. The sub-dimensions and total scores of the BPNS also had good reliability after retesting, with 0.71, 0.60, and 0.74 for the subscales and 0.83 for the total scale, respectively [72].

3.4. Hope

There are many scales that measure levels of hope. Typically, researchers in the health field view hope as a confident, future-oriented, yet uncertain multidimensional experience. Therefore, the Herth Hope Index (HHI) is more commonly used in the field [73]. The HHI is an adaptation of the Herth Hope Scale (HHS) and is used as an important tool for assessing hope in patients [74]. The HHI covers three dimensions of positive attitudes (AH), positive behaviours (BH), and relationships of closeness (RH), which measure, respectively, positive readiness and expectancy, behavioural and emotional components, and interconnectedness between self and others. The scale consists of 12 questions and is rated on a four-point scale (1= strongly disagree, 4= strongly agree), with higher total scores indicating higher levels of hopefulness (e.g., "I have an inner positive energy", "I am afraid of my future"). Cronbach's α is 0.97, with a reliability of 0.91 when retested two weeks later [75].

3.5. Data analysis

This study initially investigated the relationship between psychological adaptability, basic psychological needs, hope, and perceived social support. Descriptive statistics (sample size, mean, standard deviation, percentage,cumulative percentage) were tested via IBM SPSS 23.

We constructed models using AMOS 23 and tested the mediating effect of hope in two steps. First, measurement models were computed for each variable to test whether each latent variable could be described by the available indicators. Second, if the results of the measurement model are satisfactory, then the study will test the structural equation model using maximum likelihood (ML).

To assess the fit of the model, the study refers to Hu & Bentler, Jackson,Gillaspy, Purc-Stephenson, and Boomsma's indicators [76]. We used χ^2/DF, CFI, GFI, TLI, SRMR, RMSE as judgemental indices and reported AIC and ECVI. Typically, in non-nested structures, smaller AIC and ECVI indicate a better fit. This study used 5000 bias-corrected bootstrap 95% confidence intervals (CIs). The bootstrap procedure involves repeated sampling from a sample over and over again to simulate the original sampling process, which in turn creates a representation of the total sample. The effect was significant if the bootstrap confidence interval did not contain zero.

4. Result

4.1. descriptive statistics of variables

The demographic data on women with postpartum depression (Table 1)showed that the participants' education was generally at the undergraduate level or below (90.02%; their ethnicity was predominantly Han (77.05%); and the vast majority of them had given birth for the first time to a single child (72.26%), with a small proportion having two children or other conditions. In terms of mode of delivery, the number of normal births and caesarean sections was basically close (57.47%, 42.53%); most of the 501 postpartum women had no previous medical history and no postpartum complications. They had moderate economic conditions and lived with their partners and children. These results are favorable for other researchers to compare different studies and samples.The study's descriptive statistics and correlations are presented in Table 2.Perceived Social Support, Basic Psychological Needs, Hope, and Psychological Adaptability were two-by-two positively correlated with each other at moderate strength(correlation coefficients range from 0.406 to 0.518.). The results of the AVE are explained in the following paragraph of measurement model.In terms of kurtosis and skewness, all variables were somewhat skewed (skewness ranged from -0.658 to -1.24 and kurtosis ranged from 0.192 to 1.97). Typically a skewness greater than 2 and a kurtosis greater than 4 (more appropriate than 7) is significantly skewed [77]. So the data conforms to an approximately normal distribution. We can assume that the data are all normal. This lays the foundation for subsequent structural equation modelling analysis.

Table 2 Correlations, discriminant validity and descriptive statistics

| variables	Correlations/discriminant validity				descriptive statistics				
	PSS	BPN	Hope	PA	Sample size	Mean	Deviation	Skewness	Kurtosis
PSS	**0.789**	-	-	-	501	5.3	0.897	-0.658	0.198
BPN	.429**	**0.778**	-	-	501	4.746	0.99	-1.24	1.97
Hope	.518**	.445**	**0.754**	-	501	3.11	0.476	-0.478	0.618
PA	.469**	.406**	.475**	**0.746**	501	3.379	0.733	-0.46	0.192

**p＜0.01

Interpretation:Bolded values in black are AVE open square roots, the rest are correlation coefficients.

Abbreviations:Perceived social support(PSS);Basic psychological needs(BPN);Psychological Adaptability(PA)

4.2. Measurement model

The study involved four latent variables (Psychological Adaptability, Perceived Social Support, Hope, and Basic Psychological Needs) and thirteen observational variables.The study tests the measurement model for each variable to determine whether each latent variable can be described by the existing observed variables. a) Psychological Adaptability encompasses four dimensions, and after performing a validated factor analysis, $\chi^2/DF = 2.344$; SRMR = 0.039; GFI = 0.925; NFI = 0.922; IFI = 0.954; TLI = 0.947; CFI = 0.954; RMSA = 0.052. Fit indices indicate that psychological adaptation possesses a sufficient degree of fit. Compositional reliability (CR) was 0.7 and average variance extracted (AVE) was 0.556, indicating good convergent validity for CA,SE,SS and PG.This suggests that these indicators are a good representation of psychological adaptability. b) Hope contains three dimensions, and after performing a validated factor analysis, $\chi^2/DF = 1.641$; SRMR = 0.029; GFI = 0.973; NFI = 0.968; IFI = 0.987; TLI = 0.984; CFI = 0.987; RMSA = 0.036. The fit indices indicate that the fit is hopefully good enough. Compositional reliability (CR) is 0.794 and average variance extracted (AVE) is 0.568, indicating that AH, RH, and BH all have good convergent validity. This suggests that these indicators are a good representation of hope.c) The basic psychological need contains three dimensions: $\chi^2/DF = 2.853$; SRMR = 0.043; GFI = 0.903; NFI = 0.916; IFI = 0.943; TLI = 0.936; CFI = 0.943; RMSA = 0.061. The fit indices indicate that the basic psychological needs have good fit. Compositional reliability (CR) is 0.821 and average variance extracted (AVE) is 0.605, indicating that BN, CN, and AN also converge well.This suggests that these indicators are a good representation of basic psychological needs.d) Finally, a validated factor analysis of perceived social support was conducted. The perceived social support contains three dimensions: $\chi^2/DF = 2.282$; SRMR = 0.033; GFI = 0.963; NFI = 0.958; IFI = 0.976; TLI = 0.969; CFI = 0.976; and RMSA = 0.051. The fit indices indicate a good perceived social support fit. Compositional reliability (CR) was 0.831 and average variance extracted (AVE) was 0.622, indicating good OS, FS, and PS convergent validity. This suggests that these indicators are a good representation of perceived social

support.The study also used the more rigorous AVE method to assess the differential validity, requiring that the open root sign of the AVE for each factor be greater than the correlation coefficient [78], and the data are detailed in Table 2. In summary, these good results indicate that the latent variables are fully operationalized by the observed variables, and that there is a close association between each latent variable and its own observational variable (the question item). Moreover, there is good differentiation between each latent variable. 4.3. Structural model

Firstly, hope was used as a mediator between perceived social support and psychological adaptability (Model 1). The data showed an acceptable level of fit: $\chi^2/DF = 1.736$; CFI = 0.985; GFI = 0.978; TLI = 0.979; SRMR = 0.030; RMSA = 0.038; ACI = 101.56; and ECVI = 0.203. This suggests that model 1 is acceptable.Next, hope as a mediator of basic psychological needs and psychological adaptability (Model 2). The data showed an acceptable level of fit: $\chi^2/DF = 1.700$; CFI = 0.986; GFI = 0.979; TLI = 0.980; SRMR = 0.031; RMSA = 0.037; ACI = 100.394; and ECVI = 0.201.This suggests that model 2 is acceptable. Lastly, the two models were integrated to form a new model (Model 3), i.e., hope as a mediator of perceived social support, basic psychological needs and psychological adaptability. Model 3 still showed a good fit: $\chi^2/DF = 1.487$; CFI = 0.987; GFI = 0.974; TLI = 0.983; SRMR = 0.031; RMSA = 0.031; ACI = 151.706; and ECVI = 0.303. This suggests that model 3 is acceptable.Model 3 shows that perceived social support and basic psychological needs can be mediated partly through hope to influence psychological adaptability, or they can each directly influence psychological adaptability. The path coefficients estimated by the maximum likelihood method are shown in Fig 1 and **Table 3**.
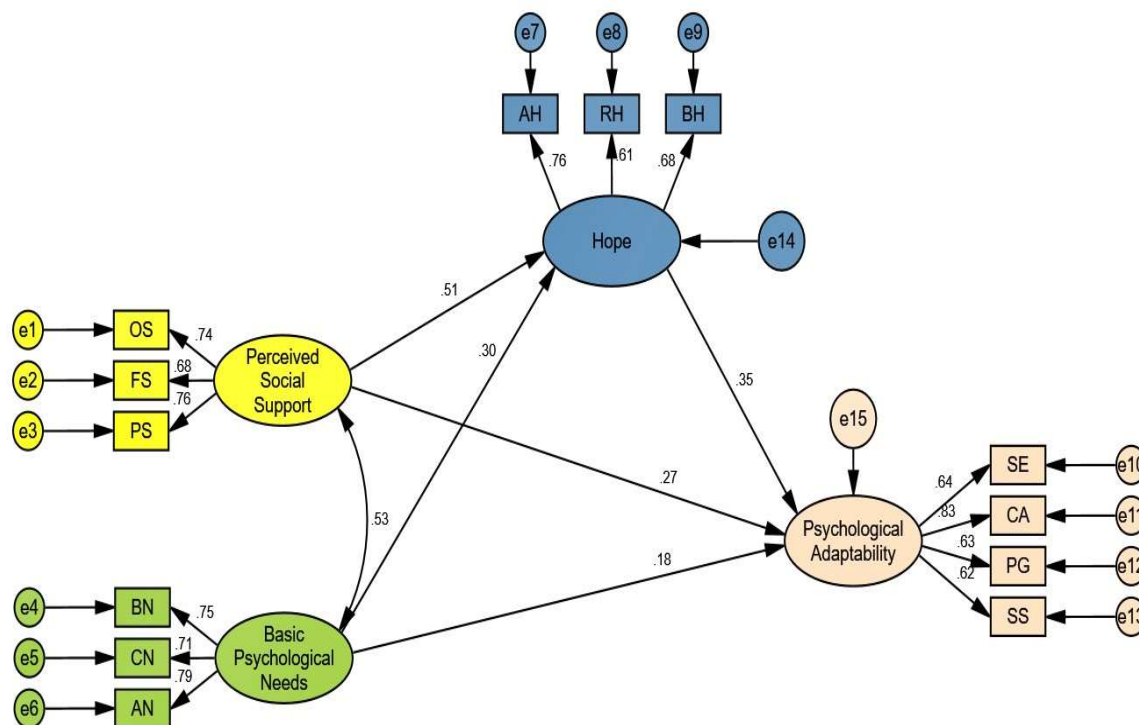
Fig.1. Standardized coefficients for the final structural model;N=501;BN belonging need ; CN competence need ; AN autonomy need: OS other support; FS family support; PS friend support; AH positive attitudes; RH intimacy; BH positive behaviours; SE self-improvement; CA coping skills; PG psychological growth; SS social skill

Table 3 Path coefficients

Model pathways	Standardised	Non-standardised	S.E.	C.R.	P
Perceived social support → Hope	0.511	0.3	0.041	7.298	***
Basic psychological needs → Hope	0.297	0.151	0.033	4.596	***
Perceived social support → PA	0.269	0.196	0.057	3.413	***
Basic psychological needs → PA	0.184	0.116	0.041	2.852	0.004
Hope → PA	0.346	0.428	0.107	4.012	***

***$p < 0.001$

Psychological Adaptability is abbreviated as PA

4.4. Bootstrapping

The bootstrap procedure tested the mediating role of hope between perceived social support, basic psychological needs, and psychological adaptability. **Table 4** shows the direct and indirect effects between the latent variables and the Bias-Corrected level values at the 95% confidence level.First, the total and direct effects are significant between perceived social support and psychological adaptability (both excluding 0),The indirect effect of perceived social support on psychological adaptability through hope was 0.177. The bias-corrected (95% CI = 0.052, 0.387) and percentile (95% CI = 0.049, 0381) intervals did not contain 0, suggesting that hope plays a significant mediating role between perceived social support and psychological adaptability;Second,the total and direct effects between Basic Psychological Needs and Psychological Adaptability were significant(both excluding 0). The indirect effect of basic psychological needs on psychological adaptability through hope was 0.103, and the Bias-Corrected (95% CI = 0.037, 0.264) and Percentile (95% CI = 0.028, 0235) intervals did not contain 0. This suggests that hope also plays an important mediating role between basic psychological needs and psychological adaptability.

Table 4 Parameters and 95% CIs for model 3

Model pathways/effects		Estimated (standardised)	Bias-Corrected（95%CI）		Percentile（95%CI）	
			Lower	Upper	Lower	Upper
PSS→PA	Total effect	0.446	0.315	0.581	0.319	0.584
	Indirect effect	0.177	0.052	0.387	0.049	0.381
	Direct effect	0.269	0.064	0.459	0.057	0.456
BPN→PA	Total effect	0.287	0.145	0.432	0.141	0.427
	Indirect effect	0.103	0.037	0.264	0.028	0.235
	Direct effect	0.184	0.037	0.33	0.025	0.323

Perceived social support is abbreviated as PSS,Basic psychological needs is abbreviated as BPN
Psychological Adaptability is abbreviated as PA

4.5. Alternative Models

As it was cross-sectional data, we examined possible alternative models. These models were composed of different connections and orders between the study variables. If these models show lower-fitting data, it will more fully confirm that model 3 is the best final model. This result also favours us to confirm that hope is the best mediator among these variables. The first alternative model (Model 4) assumes hope as an exogenous variable, psychological adaptability as an outcome variable, and perceived social support and basic psychological needs as mediating variables. The results were as follows: $\chi^2/DF=1.640$; CFI = 0.982; GFI = 0.971; TLI = 0.977; SRMR = 0.0361; RMSA=0.036; ACI=160.409; ECVI=0.321. Compared to model 3, ACI and ECVI were larger, and therefore model 4 was a poor fit. The second alternative model (Model 5) assumed hope as an exogenous variable, psychological adaptability as a mediator variable, and perceived social support and basic psychological needs as outcome variables. The results showed that the fit indices of
Model 5 were worse than both Model 3 and Model 4 (Table 5). The specific data were: χ^2/DF = 2.503; CFI = 0.957; GFI = 0.952; TLI = 0.946; SRMR = 0.059; RMSA = 0.055; ACI = 213.194; and ECVI = 0.426. In summary, Model 3 was a better fit and served as the preferred model. Model

3 suggests that hope partially mediates perceived social support on psychological adaptability and also partially mediates basic psychological needs on psychological adaptability.

Table 5 Fit indices among competing model

Models	χ^2/DF	CFI	GFI	TLI	SRMR	RMSEA	AIC	ECVI
3	1.487	0.987	0.974	0.983	0.031	0.031	151.706[a]	0.303[b]
4	1.64	0.982	0.971	0.977	0.0361	0.036	160.409	0.321
5	2.503	0.957	0.952	0.946	0.059	0.055	213.194	0.426

[a] value is as small as possible
[b] value is as small as possible

5. Discussion

5.1. The relationship of variables

The study used the HHI, PAS, PSSS and BPNS to measure hope, psychological adaptability, perceived social support and basic psychological needs among Chinese women with postpartum depression. The four latent variables showed moderately strong positive relationships ($p < 0.01$) with correlation coefficients ranging from 0.406 to 0.518, suggesting that higher perceived social support predicted higher psychological adaptability. Under the pressure of heavy family and parenting, women after giving birth are very eager to be cared for and loved by others. The strangeness and fear of the unfamiliar associated with being a first-time mother also exacerbate their emotional responses. If women with postpartum depression feel cared for and encouraged by others, they are better able to feel and accept the new role of motherhood and have better psychological adaptability. There are studies that support this finding. Low, Bono, and Azmi argue that emotional support is important. Adequate emotional support reduces postpartum depression in Asian women [79]. Of course, there is another way we can interpret this. Adaptation is a process, or it can be the result of an organism achieving a state of equilibrium with its environment in the midst of constant change. If the organism is out of balance with the environment, it is necessary to change its behaviour to re-establish the balance. The fundamental aim of psychological adaptability is to achieve or restore a balanced relationship between subject and object [80]. Perceived social support, as a positive psychological element, facilitates the assimilation and compliance of postpartum depressed women to external stimuli and promotes the shift from psychological imbalance to balance. Therefore, perceived social support positively predicts psychological adaptability, which confirms research hypothesis H_1.

Satisfaction of basic psychological needs also predicts better psychological adaptability. A possible explanation for this result is Maslow's view of mental health, which suggests that mental illness can be seen as the patient's inability to recognise and satisfy his or her own needs. They do not have the ability to achieve a state of mental health, and therefore mental illness is a deprivation disorder [81]. If the patient meets their basic needs and develops themselves further, the disorder can be well alleviated or treated. Women with postpartum depression need to adapt to new roles and environments, as well as develop autonomy and good relationships. Failure to fulfill these

needs may hinder their psychological development and reduce their adaptability to the outside world. This confirms research hypothesis H_2.

We also found that hope positively predicts psychological adaptability. Adaptability is presented as a positive and growth-promoting force such as change, growth, and development. Its connotations are associated with hope to some extent [82]. For example, they both focus on future orientation and are closely linked to mental health. Thus, hope can be positively linked to psychological adaptability, and the link is supported by Griggs' conclusions from his review of the literature on hope from 2011 to 2016. He concluded that hope is associated with improved coping, with improved well-being, as a moderator between depression and negative life events, as a protective factor against suicide, and as a factor in health behaviour engagement [83]. Thus, this confirms research hypothesis H_3.

5.2. Mediating role of hope

5.2.1. Perceived Social Support and Psychological Adaptability

The significant path coefficients of model 3 indicate that perceived social support can directly influence the level of psychological adaptability (60.314 percent of the total effect), while it can indirectly influence psychogical adaptability through hope (39.686 percent of the total effect). Hope mediates the relationship between perceived social support and psychological adaptability in postpartum depressed women. In other words, the level of psychological adaptability of postpartum depressed women was influenced by both the level of hope and the level of perceived social support. This may be due to the fact that those with higher levels of perceived social support have a positive attitude towards their surroundings and believe that they are understood and cared for. They believe that their efforts can change things. And the sense of hope, as a cognitive structure, is a working model within the individual. This working model promotes psychological capacity and psychological adaptability and has a positive effect on the mind in negative environments. This, in turn, leads to psychological homeostasis. It is also possible to explain that perceived social support is the feeling inherent in receiving support and can be viewed as an emotional experience. Snyder's model of hope contains an emotional-affective component, and the emotional experience feeds back to regulate motivational and pathway thinking about hope[50,51]. In brief, it means that postpartum depressed women feel supported and understood, even loved and cared for, they may have a natural tendency to anticipate some kind of good outcome (high level of hope), and this optimistic attributional approach may be able to improve their stress tolerance and adaptability in the future. Yadav found that when individuals perceive support from significant others (e.g., parents, peers, and teachers), they tend to be happier and more likely to become optimistic and confident [84]. And hope also acts as a buffer and protection against negative personal influences [85,86], which implies that there is a link with psychological adaptability. It confirms research hypothesis H_4.

5.2.2. Basic Psychological Needs and Psychological Adaptability

The significant path coefficients of model 3 indicate that basic psychological needs can directly influence the level of psychological adaptability (64.111 percent of the total effect), while they

can indirectly influence psychological adaptability through hope (35.889 percent of the total effect). Hope mediates the relationship between basic psychological needs and psychological adaptability in women with postpartum depression. Hope is an important component of psychological capital [87], and when an individual's basic needs are met, the individual may realise that he or she possesses some ability to reach the desired goal (the motivational dimension of hope), which in turn naturally increases the level of hope. This statement can be explained by a number of studies.For example,Deci and Ryan found that basic psychological needs are critical for both mental health and well-being. Lower autonomous need and belonging need/relationship need(both are subdimensions of basic psychological need are strongly associated with poorer motivation and behavioural performance [88]. This suggests that poorer basic psychological needs lead to poorer levels of motivation. Hope itself is a positive motivational state, a cognitive set that includes a rich set of positive attitudes, positive expectations and behaviours [50,51]. This suggests that poorer levels of motivation will arrive at a lower sense of hope. Therefore, deficiencies in basic psychological needs can be reflected in poorer levels of motivation or motivated thinking, which in turn is reflected in a poorer sense of hope. Imagine a person who struggles to satisfy even her basic needs in life, what is the probability that she holds positive expectations for the future?In addition, we believe that psychological adaptability is a subordinate concept or subconcept of mental health [89], and therefore the relationship between hope and mental health can also try to explain its relationship with psychological adaptability.

Combined with the above explanation, The study ultimately found that perceived social support and basic psychological needs have an impact on psychological adaptability through hope.Moreover, it is important to focus on the fact that the indirect effect of hope between perceived social support/basic psychological needs and psychological adaptability is almost close to each other. This may indicate that hope has a similar mechanism of action on both and requires further research.

5.3. Limitations

This study has several limitations. First, the women with postpartum depression were mainly from several maternal and child health centers in Guizhou Province, China. Therefore, the results of the current study can only be generalised to a limited extent. If other researchers want to replicate similar studies, they would need to find at least similar demographic information and clinical characteristics as this study. Second, this study used a cross-sectional design, which makes causal interpretation difficult. And there could be reversal between variables. Fortunately, we conducted tests with alternative models to reduce the likelihood of this situation. This confirmed that model 3 had the best fit and covered the widest range of variables. However, future studies could use a longitudinal design to draw firm conclusions about the causal direction of the variables. A final limitation is that the study tested the mediating effect of hope. However, other mediating effects could also be considered, such as psychological capital.

5.4. Implications

Despite these limitations, this study enriches the literature on postpartum women's mental health and positive psychology by exploring the potential variables of perceived social support, basic psychological needs, hope, and psychological adaptability. Counsellors, obstetricians and gynaecologists, and family members should be aware of the importance of perceived social support, basic psychological needs and hope. Family and friends should provide appropriate care to women with postpartum depression, develop their sense of competence and autonomy, and help them build a good network of interpersonal relationships that will ultimately create a favourable family atmosphere and living environment. Health professionals can also provide some positive psychology courses and knowledge propagation to women with postpartum depression and cultivate a sense of hope. It is believed that the psychological adaptability of women with postpartum depression can be improved to some extent and even the worsening of their depression can be reduced.

6 . Conclusions

The study demonstrated the mediating role of hope between perceived social support/basic psychological needs and psychological adaptability in a sample of Chinese women with postpartum depression. The four latent variables were positively correlated with each other. Hope explained 39.686% and 35.889% of the variance in perceived social support, basic psychological needs on psychological adaptability, respectively. The results suggest that hope moderates the relationship between perceived social support/basic psychological needs and psychological adaptability to some extent. Better perceived social support and basic psychological needs may show good psychological adaptability at high levels of hope. This provides therapeutic and health strategies for psychologists, medical professionals and families.

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Ethics approval and consent to participate
The study protocol was reviewed and approved by the Research Ethics Committee of Guiyang Maternal and Child Health Hospital. The patient ticked the box on the informed consent form

(questionnaire star) to be able to take the survey. And participants can refuse the survey at any time.

Conflicts of Interest

The authors declare no conflict of interest.

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