Research Article   **Open Access**

Modeling structural equations of the effect of stress and perceived social support on the postpartum depression considering the mediator role of vulnerable personality in the mothers

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Abstract

Objectives: Therefore, the present study has been conducted to predict Postpartum depression (PPD) in the mothers according to stress and perceived social support taking the mediator role of vulnerable personality into account.

Methods: This research was correlational and basic. The research sample included 300 mothers in Isfahan who gave birth to a child in recent 6 months and were selected through a convenient sampling method. Afterward, they answered the research instruments including the Edinburgh Depression Questionnaire (1978), Harry Stress Questionnaire (2005), Multidimensional Scale of Perceived Social Support, Zimet *et al.* (1988), and Vulnerable Personality Questionnaire, Bois *et al.* (2004).

Results: The data were analyzed using structural equation modeling through the covariance method through AMOS24 software. The findings showed that the results of direct relationships of research variables were significant in all coefficients in the mothers' model ($P < 0.05$).

Conclusion: The results showed that vulnerable personality has a mediation role in the relationship between stress and perceived social support with PPD in the mothers. In fact, a vulnerable personality can improve the relationship between stress and perceived social support with PPD.

Keywords: Perceived Social Support, Postpartum Depression, Stress, Vulnerable Personality.

Introduction

Postpartum depression (PPD) is a serious psychiatric disorder that is less studied and diagnosed; this disorder is one of the most common birth complications that leave negative effects on the mother, and statistics have shown that it causes approximately 20% of postpartum deaths.[1,2] Furthermore, studies have shown that maternal depression has adverse effects on various dimensions of the baby's development, such as behavioral, emotional, and cognitive dimensions.[3,4] One out of every seven women might develop PPD; While women who experience postpartum grief recover quickly, PPD severely affects a woman's ability to return to normal functioning, as well as the mother and her relationship with the infant.[5]

One out of every seven women might develop PPD. According to Beck, about half of PPD in the mothers is not diagnosed due to the privacy conflict and disinclination to information disclosure for close family members. Moreover, there is a stigma about the new mothers that its disclosure might lead to being left and fear of not being supported.[5]

In relation to the underlying causes of PPD, we can mention perinatal depression, personal or family history of depression, stressful life, insufficient social support, and health problems of hospitalized infants.[6,7] The strongest risk factor for PPD is a history of mood or anxiety disorder, especially having active symptoms during pregnancy.[8] Biological factors such as sex hormones and stress, thyroid hormones, and psychosocial factors play a

role in causing PPD. The main risk factors for developing PPD are a history of psychiatric illness, low social support, and domestic violence during pregnancy or after delivery. Active screening and follow-up treatment based on cooperation between obstetrics and gynecology and psychiatry is the main method of preventing PPD.[9]

Perceived social support is defined as the person's general perception or his/her belief in the people in his/her social network who will help him/her in the time of necessity. On the other hand, it entails measuring the degree of the provided support (i.e., frequency of support measures and the number of network members) and the quality of received support.[10] Zhang and Jin reported that the received support influences general self-efficacy and PPD and general self-efficacy mediates the relationship between social support and PPD.[11]

The human response to the perception of stressful events in life is an inevitable mental state. Stress or experienced perceived stress can bring about dramatic problems in the absence of the intentional addition of stressful factors.[12]

It has been widely known that some personality traits are related to vulnerability to depression in nonpostpartum samples. The role of personality traits, too, has been attended to as a risk factor in PPD in recent years.[13]

Maryami *et al.* indicated in their study that personality traits and social support are two important factors in PPD.[14] PourKhaleghi *et al.* conducted another study, the results of which showed that the probability of depression incidence in the firstborn women was 40.18%, 10.1%, and 5.55%, respectively, after delivery. Moreover, the probability of depression incidence after delivery in the firstborn women was 27% according to the type of delivery and the women who had cesarean were significantly more depressed than those with natural delivery.[15]

The results of Erbaba and Pinar's research in relation to PPD and perceived support showed breastfeeding problems, inadequate knowledge, information about postpartum, history of mental illnesses, low birth weight, prematurity, and long-term hospitalization predictors of PPD and poor maternal adjustment. PPD symptoms also increased as perceived social support and maternal adjustment decreased.[16]

Objectives

Considering what has been pointed out above, the present study has been conducted to model the structural equations of the effect of stress and perceived social support on the PPD taking the mediator role of vulnerable personality in the mothers. Taking the research study, the following model was raised to be tested.

Methods

The present study is basic and correlational. The following instruments were used to assess the variables: Harry Stress Questionnaire was made by Les Harry Chandran in 2005 with 66 questions and assesses the fathers' and mothers' stress in the form of self-report sentences. This questionnaire was made to assess mental pressure in different life situations.

The scoring was on a five-point scale. If all the scores are above 150, the individual suffers from tension and if the total score of the individual is above 250, he/she should receive specialized care. The internal consistency was calculated and confirmed through halving according to the answers of 50 universities.[17]

The content validity of the questionnaire was approved by five psychology professors who were experienced specialists in mental disease.[18] Cronbach's alpha coefficient was 87% for this instrument for the current study and at a desirable level.

The perceived social support questionnaire is a self-report instrument including 12 questions which was designed by Zimet *et al.*[19] The scoring of the questionnaire is on a five-point Likert scale. The minimum possible score is 12 and the maximum is 60. The score between 12 and 20 shows that perceived social support is at a low level, the score between 20 and 40 shows that perceived social support is at an average level and the score above 40 shows that the degree of perceived social support is at a high level.

The other questionnaire is vulnerable personality; Dennis and Boyce[20] which is a questionnaire for identifying the people at risk of PPD due to personality vulnerability. The logistic regression analysis has shown that a vulnerable personality style questionnaire (VPSQ) is the predictor of the signs of developing depression. The researcher took the measure of providing the VPSQ in Persian according to the stages of evaluating the degree of test language conformity.

The reliability of the mentioned questionnaire was determined at 0.66 through Cronbach's alpha method and the validity is 0.53. Cronbach's alpha coefficient was 0.83 for this instrument in the present study and at the desired level.

The statistical population in this study included all the mothers in the city of Isfahan. Determining the sample size is done through the clustered random method. Therefore, the files taken from the families of the up to 6-

month infants were randomly selected from pediatrician offices in the city of Isfahan, and then, the questionnaires were distributed among the mothers. The questionnaires were given to the mothers by the researcher or the secretary. The data were analyzed after collecting the questionnaires and removing corrupted and incomplete questionnaires and those who were accommodated into exclusion criteria. The sample size was 300 mothers as a whole.

The inclusion criteria in this study included high-risk pregnancy in case of risky problems during pregnancy, history of sterility, history of abortion, preterm delivery, record of having a stillbirth, suffering from mental diseases and drug use, using narcotics such as smoking, etc., and unwanted pregnancy and exclusion criteria were: the exclusion criteria included incomplete questionnaires and unwillingness to continue the research process.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki. The ethics license (IR.IAU.KHSH.REC.1400.056) was approved by the Research Ethics Committees of the Islamic Azad University-Khomeinishahr Branch.

Results

According to the demographic information in this study, the frequency of the mothers in case of pregnancy order was: one hundred and ninety-three (64.3%) mothers were first pregnant, 100 (33.3%) mothers were second pregnant, and 7 (2.3%) mothers were the third pregnant. Eighty-one (27%) women have given birth to a girl and 219 (73%) women have given birth to a boy. The women with a history of sterility, abortion, abnormal fetus, preterm delivery, stillborn, medical diseases, mental diseases, and pregnancy problems were excluded from the study and no one had a history of smoking and drug. All the participants in the study had intended pregnancy. Moreover, most of the mothers had bachelor's degrees, the number of whom equaled 164 (54.7%). One hundred ninety-four (64.7%) mothers had a natural delivery, and 106 (35.3%) had cesarean.

The mothers' age average was 26.37 years. Furthermore, the mothers had a delivery in week 38.38. The independent variables including perceived stress and social support, respectively, have a mean and standard deviation of 148.35 (21.61) and 45.06 (10.35). The mean of the mediator variable of vulnerable personality is 26.25 and the standard deviation is 6.59; moreover, the mean of

the variable of PPD is 22.03 and the standard deviation is 6.45 [See the descriptive indexes of study variables in Table 1].

Table 1. Descriptive indexes of study variables

Variable	Mean	SD
Stress	148.356	21.610
Stress as a context	13.273	2.961
Stress with the familial source	14.550	4.560
Stress with vocational source	20.063	4.696
Mental evaluations of situations	25.873	7.815
Physical outcomes of stress	14.183	3.343
Psychological outcomes of stress	26.153	4.075
Specific models of responding to stress	20.366	1.340
Participation in stress decreased activities	16.146	2.246
Perceived social support	45.063	10.353
Family's support	16.440	3.869
Friend's support	12.240	3.095
Important people's support	16.383	3.693
Vulnerable personality	26.256	6.592
PPD	22.003	6.451

SD: Standard deviation, PPD: Postpartum depression

The data relating to Pearson correlation revealed that the relationship between all the study variables has been significant at 0.01 level. The highest correlation coefficient was in the positive relationship of vulnerable personality with perceived stress ($r = 0.75$) and the lowest was in the positive relationship between PPD and perceived stress [See the correlation matrix between the exogenous, mediator, and endogenous variables in Table 2].

Structural equation modeling has been used to answer the proposed hypotheses through the covariance method through AMOS24 software and the model parameters were estimated through the Maximum-likelihood method. The structural equation modeling method was used to test the proposed model. In the first step, d2 Mahalanobis index was investigated to examine not having multivariate outliers and the significance levels below 0.05 imply those outliers. The outlier was not identified according to this index and was not excluded from the study. In the second step, in investigating the univariate normality, the distribution of existing observed variables in this model (i.e., main variables of the study) was investigated through the indexes of skewness and kurtosis. The absolute value of skewness is not more than

3 for any of the variables. Moreover, the absolute variable of kurtosis is not more than 10 for any of the variables. Therefore, according to Cline's view, it can be stated that carrying out this analysis has no problem in the case of univariate normality. In the third step, Mardia's standardized kurtosis coefficient and critical proportion were used to investigate the multivariate normality. Mardia coefficient also equaled 3.31 in the general model and it was 8.47 in the critical proportion. Moreover, the Mardia coefficient has been 3.89 in the mothers' model and it was 8.11 for the critical proportion and the critical proportion equaled 8.77 which is below 5. Therefore, the supposition of multivariate normality is true [See the model fit indices of the research model in mothers and fathers in Table 3].

Standard coefficients of the proposed model of predicting PPD according to stress and perceived social support can be seen in Figure 1 considering the mediator role of vulnerable personality in the mothers. Standard path coefficients in the samples (mothers) are given in Table 4. The results of Table 4 show that in the mother's model, all the coefficients have been achieved at a significant level (P<0.05) [See the standard path coefficients in the mother's model in Table 4].

Table 2. Correlation matrix between the exogenous, mediator, and endogenous variables in the final model

Mother	Stress	Social support	Vulnerable personality	PPD
Stress	1			
Social support	-0.655**	1		
Vulnerable personality	0.75**	−0.626**	1	
PPD	0.426**	-0.596**	0.509**	1

PPD: Postpartum depression, **P<0.001

Table 3. Model fit indices of the research model in mothers and fathers

Model fit indices	χ2	df	P	CMIN/DF	RMSEA	PNFI	CFI	PCFI	IFI	GFI
Mothers	47.96	108	0.001	4.37	0.078	0.633	0.929	0.643	0.929	0.927
Fathers	516.24	108	0.001	4.78	0.08	0.625	0.929	0.627	0.916	0.905

RMSEA: Root mean square error of approximation, PNFI: Parsimony normed fit index, CFI: Comparative fit index, IFI: Incremental fit index, GFI: Goodness-of-fit index, PCFI: Parsimony CFI, CMIN: Chi-square, DF: Degree of freedom

Table 4. Standard paths coefficients in the mother's model

Sample	Path	Standard coefficients	SE	Critical proportion	Significance level (P)
Mothers	Stress → vulnerable personality	0.648	0.203	9.66	0.001
	Social support→ vulnerable personality	−0.152	0.111	−2.3	0.008
	Vulnerable personality→PPD	0.288	0.064	4.07	0.001
	Stress→ PPD	0.166	0.228	1.98	0.048
	Social support → PPD	−0.548	0.123	−7.73	0.001

SE: Standard error, PPD: Postpartum depression

Discussion

According to the results of the researcher, no study has addressed studying simultaneous relationships between stress and perceived social support and PPD taking the mediator role of vulnerable personality in the mothers. Nevertheless, research has been done in relation to research variables, which in this regard, in relation to social support and depression, is in line with the results of the research of Maryami *et al.* who showed that personality traits and social support are two important factors in relation to are PPD.[14] Furthermore, PourKhaleghi *et al.* also showed that the possibility of depression in women with their first child after parturition was due to a decrease in the components of informational-emotional support, kindness support, and positive social interaction support.
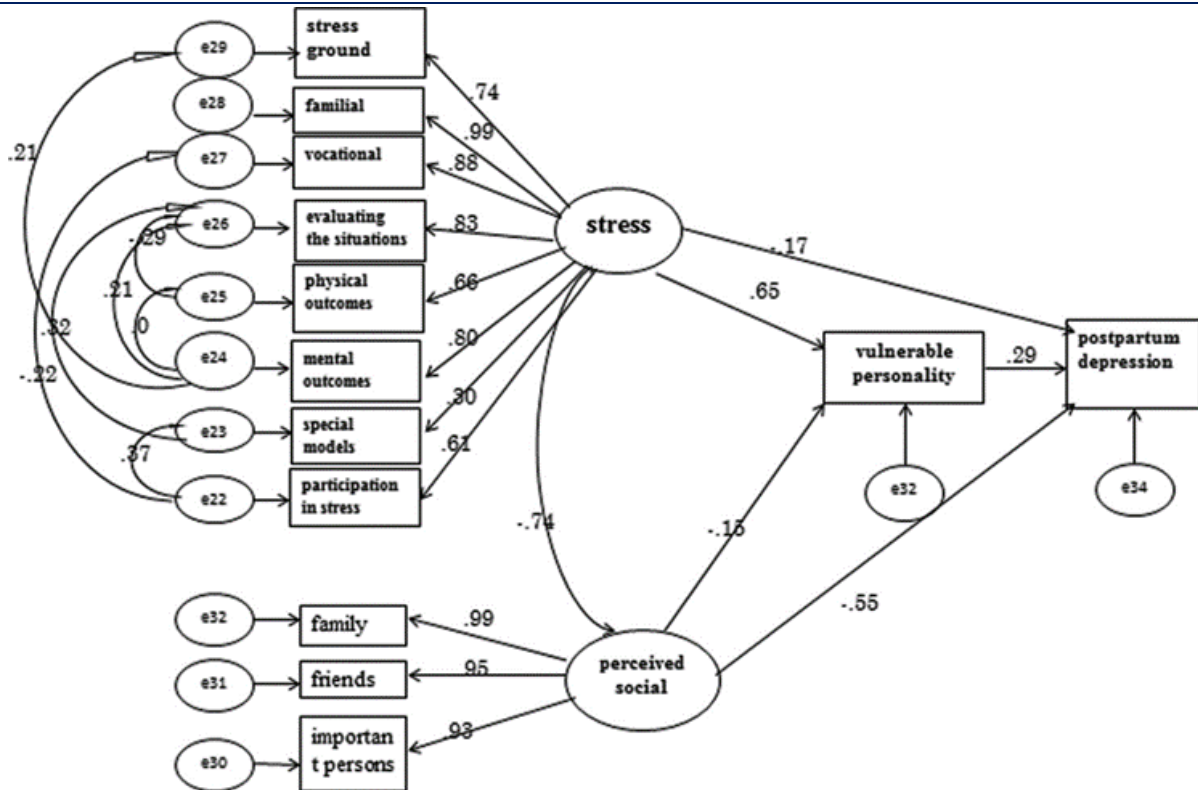
Figure 1. Final confirmed model. e22-e30 (Measurement errors), e32, e34 (Structural errors), dimensions of stress (stress ground, familial, vocational, evaluating the situation, physical outcomes, mental outcomes, special models and participation in stress), dimensions of Perceived social (family, friends and important persons)

Furthermore, the probability of depression in women with their first delivery after parturition due to the type of delivery was 27%, and women who had cesarean parturition were significantly more depressed than women who had a normal parturition.[15] In addition, the two variables of stress and perceived social support of the vulnerable personality were also effective in PPD, which was in line with the findings of Ghasemi and Hadianfard and the results indicated that 0.49 of the variance of PPD is explained by three variables: personality vulnerability, wife abuse, and coping style. Personality vulnerability and spousal abuse predict this disorder positively and coping style negatively. According to the results of this research, it seems that one of the important factors that make a person susceptible to PPD disorder is the vulnerability of personality style.[21]

In explaining the acquired results, it can be expected that a vulnerable personality would pave the way to increase the effect of each of the variables including high stress and low social support on the mothers' PPD. It is probable to increase the mothers' vulnerable personality and their PPD as a result of the stress increase and social support decrease.

In addition, in this process, the variables which are related to their communication with their spouse have

decreased; hence, the spouses experience PPD under the effect of this condition. Duan *et al.* have shown in their study that the couples' marital satisfaction is an important mediator factor in the relationship between stress and PPD. Moreover, these researchers point out that the shortage of studies in this field makes explaining these causal relationships difficult; however, any variable which disturbs the couples' relationships would increase the risk of PPD.[22]

According to the results of the present study, one of the main factors which make the mothers prone to PPD is the vulnerable personality. The results of the current study are consistent with the study conducted by Maryami *et al.*[14] which showed that personality features are an important factor in PPD.

Moreover, another consistency was observed in the research by Ghasemi and Hadianfard[21] who proved that vulnerability in personality, domestic violence, and coping style explains 49% of PPD variance. According to the results of the study, the other significant factor which causes PPD in the mothers is the social perceived stress. This very result is consistent with the studies conducted by PourKhaleghi *et al.*,[15] Tambag *et al.*,[23] and Hudson *et al.*[24]

Conclusions

Overall, the findings of this research showed that the general model for predicting PPD based on perceived stress and social support had a good fit, considering the mediating role of vulnerable personality in fathers and also in mothers. Furthermore, there was a significant difference between fathers and mothers in terms of the effect of each stress factor and social support on PPD. Other results showed that in mothers, stress and social support were effective on PPD, and vulnerable personality had an effect on PPD, and vulnerable personality was the mediator of the effect of stress and social support on PPD in this group have been. In fathers, however, the effect of stress and social support on PPD was not significant, but vulnerable personality had an effect on PPD, and also vulnerable personality was the mediator of the effect of stress and social support on PPD in the group it has been fathers. In the comparison of mothers and fathers, the results showed that there is a difference between the two groups only in the effect of social support on PPD, and the effect of stress on the victim's personality. Based on the results, mothers significantly suffered from personality vulnerability under the influence of stress, and also with a decrease in support Socially, PPD increases in them.

According to the results of the study, it is suggested that mothers be screened in case of PPD after delivery. Regarding social support, holding meetings for the mothers' families in the hospitals to explain the importance of social support for them can be a good solution. Regarding stress, teaching stress-coping techniques to the mothers before and after delivery is the other solution.

Competing interests
The authors declare that they have no competing interests.

Abbreviations
Postpartum depression: PPD;
vulnerable personality style questionnaire: VPSQ;
SD: Standard deviation; SE: Standard error.
RMSEA: Root mean square error of approximation;
PNFI: Parsimony normed fit index;
CFI: Comparative fit index;
IFI: Incremental fit index;
GFI: Goodness-of-fit index;
PCFI: Parsimony CFI;
CMIN: Chi-square;
DF: Degree of freedom;

Authors' contributions
All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

Availability of data and materials
The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate
The study was conducted in accordance with the Declaration of Helsinki. Institutional Review Board approval was obtained.

Consent for publication
By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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