ORIGINAL RESEARCH

Health Science Reports _Open Access_ WILEY

The relationship between perceived stress and pregnancy distress with self-care of pregnant women: The mediating role of social support—A cross-sectional study

Sanaz Bahrami-Samani[1] | Shabnam Omidvar[2] | Farideh Mohsenzadeh-Ledari[2] | Alireza Azizi[2] | Mohadeseh Ashrafpour[3] | Mohammadreza Kordbagheri[4]

[1]Student Research Committee, Babol University of Medical Sciences, Babol, I.R. Iran

[2]Social Determinants of Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, I.R. Iran

[3]Imamreza Hospital, Amol, Iran

[4]Department of Statistics, Faculty of Mathematical Sciences, Shahid Beheshti University, Tehran, Iran

Correspondence
Shabnam Omidvar, Social Determinants of Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran.
Email: shomidvar@yahoo.com

Abstract

Background and Aims: Pregnancy is a stressful experience, which can affect different aspects of a woman's life. Yet, women with a supportive network of friends and family may experience lower stress and improved self-care behavior. The study aimed to investigate the relationship between perceived stress and pregnancy distress with the self-care of pregnant women, as well as the mediating role of social support.

Methods: This cross-sectional study was conducted from February to May 2022 in Babol, Iran. A total of 157 pregnant women participated in the study. The participants completed five questionnaires, including a demographic and obstetric questionnaire, a Self-care questionnaire, Perceived Social support (PSS), Perceived Stress Inventory (PSI), and Pregnancy Specific Distress. Structural equation modeling was used to test the hypothesis relationships among the variables.

Results: We found that Perceived stress ($\beta = -0.221$, $p = 0.012\beta$) and pregnancy distress ($\beta = -0.203$, $p = 0.002\beta$) had a negative and significant effect on the self-care of pregnant women. Also, perceived stress ($\beta = -0.429$, $p < 0.001\beta$) and pregnancy distress ($\beta = -0.381$, $p < 0.001\beta$) had a negative and significant effect on the social support of pregnant women. The results exhibited a significant specific indirect effect between pregnancy distress, perceived stress, and pregnancy self-care, with social support as the mediator: standardized indirect effect = −0.068, −0.076, respectively.

Conclusion: According to the findings, social support plays a direct and mediating role in improving self-care behaviors among pregnant women. Therefore, providing strategies and measures to improve perceived social support by maternal health professionals may be expected to reduce the impact of stress on pregnant women's self-care. The implementation of policies and social interventions to improve the social support of pregnant women can be one of the applications of the findings.

1 | BACKGROUND

Pregnancy is an important period of a woman's life that overshadows almost all aspects of a woman's life.[1] In fact, it is a stressful experience, accompanied by many emotional, physical, and social changes.[2] The changes lead to new physical and mental characteristics, which cause changes in women's health behaviors and lifestyle.[3]

Self-care during pregnancy refers to the decisions and activities that a pregnant person makes to be able to recover from problems and issues related to one's health, arising during this period, or improve the health.[4,5] Proper self-care behaviors prevent women's health problems during pregnancy and childbirth. The self-care can be applied before and during pregnancy through interventions. It can be performed as promotional, preventive, or curative care.[6] These behaviors include avoiding exposure to cigarettes or secondhand smoke and alcohol consumption,[7,8] maintaining proper personal hygiene,[9,10] taking iron tablets during pregnancy,[11] diagnosis and management of birth complications by referring to the Antenatal Care Center (ANC),[12] appropriate weight gain regarding body mass index status,[13] exercise,[14] increasing calories and nutrient intake,[15] and adequate sleep.[16]

Several pregnancy outcomes, including birth weight, are dependent on self-care during pregnancy.[17] Therefore, proper health behaviors have a positive effect on the health status of pregnant women as well as the growth of the offspring,[18] while unhealthy behaviors can lead to several physical and psychological consequences for pregnant women and increase the risk of birth defects, miscarriage, or premature birth.[19–22] However, unhygienic behaviors are relatively common. Previous systematic review and meta-analyses studies estimated that approximately 10% of pregnant women used alcohol,[23] 0.8% to 8.1% used tobacco,[24] and 60% consumed energy-restricted diets.[25] Low education, low socio-economic status, lack of employment, weak social support, and unwanted pregnancy were associated with a higher probability of unhealthy behaviors.[26–29] According to the findings of a new study, about 17% of pregnant women were adherent to the recommended physical activity[30] and 3% followed the recommended diets that included the four main food groups.[31] The statistics show that self-care behaviors in many countries of the world are moderate to weak.[32,33]

Psychological stress and depression during pregnancy in pregnant women in the short and long term cause an imbalance in homeostasis weaken the body's immune responses, and increase the risk of pre-eclampsia, premature birth or miscarriage,[34,35] and various adverse outcomes in the newborns.[36] Women who lead an unhealthy lifestyle simultaneously experience mental health problems such as depression and/or anxiety.[37] Therefore, in addition to engaging in healthy physical behaviors, having good mental health is an important part of pregnancy as it relates to pregnancy outcomes. Further research on such a relationship could potentially provide insights into improving the mental health of pregnant women and, consequently, the health status of mothers and their children.

Social support plays an important role in changing lifestyles and improving physical and mental health outcomes in mothers.[38] Previous studies have shown the effect of social support on pregnancy success, and postpartum health conditions of mothers by helping them maintain better mental health,[39,40] feel less anxious,[41–44] or reduce stress.[45,46] Pregnant women with lower social support had infants with lower birth weight,[47] poor delivery outcomes, and infants with lower Apgar scores than women with higher social support.[48] Studies have reported the role of social support in the relationship between depression and birth outcomes. Depressed women receiving less social support gave birth to infants with lower Apgar scores than those with higher social support.[49] Low social support has been shown to have a similar effect to stress on birth weight in infants.[49]

However, the role of social support in the relationship between psychological factors such as perceived stress, pregnancy distress, and self-care behaviors of pregnant women has not been sufficiently investigated. Understanding this mediating effect is essential for designing interventions to improve prenatal care. This study was conducted with the aim of investigating the relationship between pregnancy distress and perceived stress with the state of self-care behaviors of pregnant women and the mediating effect of social support in this relationship.

2 | MATERIALS AND METHODS

The cross-sectional study was conducted among pregnant women referring to the health centers in 2022, Babol, Iran.

After the approval of the proposal by the research board of BUMS, the sampling was started. First, the health-care centers were selected randomly, from the list presented by the authorities. Then all the pregnant women referring to the health-care centers for their routine medical visits, filled out the questionnaires. The participants read and completed the consent form and were then given the questionnaires to be filled.

2.1 | Participants and setting

Participants were pregnant women who met the study inclusion criteria such as: singleton pregnancy, reading and writing literacy, absence of infertility history, pregnancy complications such as: asthma, thyroid, and kidney disorders, diabetes, pre-eclampsia, fetus-growth retardations, and rupture of the membranes.

Psychological disorders, soporific drug use Historyno addiction to drugs and alcohol, absence of known psychological disorders or under psychiatric treatment. Exclusion criteria were refusal to participate and incomplete questionnaires. Informed consent was received from all the participants in the research, and they were fully assured about the confidentiality of their information.

The sample size was calculated by G-POWER software. Considering the effect size of $r = 0.27$ (according to the pilot study of the multiple correlation value between research variables), $\alpha = 0.05$ and 80% power calculated to be 144 pregnant women. According to the loss of the sample, final sample size, is considered to be 157 pregnant women.

2.2 | Ethics approval and consent to participate

The study design was approved by Ethics Committee (IR.MUBA-BOL.REC.1400.233). Written informed consent was taken from all the participants. All methods were carried out in accordance with relevant guidelines and regulations

2.3 | Data collection tools and techniques

The participants completed five questionnaires, including a demographic and obstetric questionnaire, Self-care questionnaire, Perceived Social support (PSS), Perceived Stress Inventory (PSI), and pregnancy-specific distress.

2.4 | Demographic and obstetric questionnaire

The questionnaire included demographic information such as age, place of residence, occupation, education, spouse's education, and occupation, family income sufficiency, pregnancy history, type of previous birth, and the number of children.

2.5 | Self-care questionnaire in pregnancy

The questionnaire, containing 13 questions, was created by Dolatian et al.,[50] which are scored based on the Likert scale. The scores range from 1 to 4. The reliability of the questionnaire was obtained using Cronbach's alpha coefficient of 0.85, and in the retest method, Spearman's correlation coefficient was obtained as 0.91.[50]

2.6 | Perceived social support questionnaire

The questionnaire was designed by Sarason et al. (1983). This instrument consists of 12 questions and three subscales which include family, friends, and acquaintances. Its scoring is based on a 7-point Likert scale ranging from "I completely disagree" with a score of

"1" to "I completely agree" with a score of "7."[51] The alpha-Cronbach of 97% was reported by Nasseh et al.[52] in the Persian version.

2.7 | Perceived stress questionnaire

This questionnaire was created by Cohen et al.[53] and indicates the general stress of a person during the last month. It measures thoughts, feelings and thoughts and feelings about stressful events, control, overcoming, coping with psychological pressure, and experiencing stress. The questionnaire has 14 questions. The negative criterion indicates the inability to cope with stress and the 7 positive criteria indicate a person's good adaptation to stressful factors. The responses are on a five-point Likert scale that starts with "never" (with a score of 0) and ends with "a lot of times" with a score of 4. The total score ranges from zero to 56. A higher score indicates higher perceived stress. The reliability of this questionnaire was calculated using the internal consistency method with Cronbach's alpha coefficient of 0.81.[54]

2.8 | Pregnancy specific distress questionnaire

The questionnaire consists of 12 questions and 3 subscales of worry about birth and baby worry about weight and body image, concern about emotions and relationships, which is used to measure specific concerns during pregnancy. The questionnaire psychometric properties were assessed, and the alpha-Cronbach of 78% was reported.[55]

2.9 | Data analytic procedures

The structural equation modeling method with a path analysis approach was used to test the proposed model of the relationship between perceived stress and pregnancy distress with self-care of pregnant women with the mediating role of social support. Following the exploratory study of the study variables, some of the basic descriptive statistics were obtained, and Pearson's bivariate correlations were investigated. These analyses were conducted using SPSS version 26. The structural equation modeling was performed using AMOS24.[56] The maximum likelihood method was used to estimate the parameters. To investigate the indirect effect, the bootstrap technique was used in the MACRO program of Preacher and Hayes,[57] and the number of bootstrap samplings was 5000. SPSS26 software was used to assess descriptive statistics and correlation. Data on 157 participants were initially examined for outliers and normality. Univariate outliers (z scores greater than 3.29 and less than −3.29) were not removed from analyses. Multivariate outliers were non-problematic (D2 values were not distinctively apart; Byrne, 2010), which resulted in a sample of 157 participants. Multivariate normality was confirmed (i.e., the multivariate kurtosis critical ratio was less than 5.00.[58]

To evaluate the model fit, we used the comparative fit index (CFI) > 0.9, Incremental Fit Index (IFI) > 0.9, Goodness of Fit Index (GFI) > 0.9, Parsimonious Comparative Fit Index (PCFI) > 0.5, Parsimonious Normed Fit Index (PNFI) > 0.5, the standardized root mean square residual (SRMR) < 0.08, and the root mean square error of approximation (RMSEA) < 0.08. Furthermore, we calculated the coefficient of determination (R^2) to estimate the proportion of the variance in the dependent variables that is explained by the independent variables.[59]

3 | RESULTS

3.1 | Sample characteristics

Among 157 pregnant women who participated in the study 69.5% (109 persons) were in the diploma and lower education level. 63.7% (100 participants) were housewives, 56.7% (89 participants) lived in the village, 63.7%(100 participants) of women had a history of pregnancy, 43.9%(69 participants) had one child and 44% (44

TABLE 1 Demographic characteristics and its relationship with self-care of pregnant women (n = 157).

Variable		n	%	Self-care Mean ± SD	p
Level of education*	High school	15	9.6	44.06 ± 5.24	0.14
	Diploma	94	59.9	42.96 ± 5.21	
	University	48	30.5	44.62 ± 3.80	
Husband's education*	Elementary	36	22.9	42.44 ± 4.29	0.21
	High school/diploma	80	51	43.68 ± 5.28	
	University	41	26.1	44.36 ± 4.34	
Occupation**	Housewife	100	63.7	43.31 ± 4.96	0.35
	Employed	57	36.3	44.05 ± 4.67	
Husband's occupation*	Freelancer	77	49	42.35 ± 5.09	0.007
	Employee	53	33.8	44.90 ± 4.64	
	Expert	27	17.2	44.48 ± 3.71	
Residency environment**	Urban	68	43.3	44.02 ± 3.92	0.31
	Rural	89	56.7	43.23 ± 5.46	
Pregnancy history**	Yes	100	63.7	43.43 ± 5.29	0.61
	No	57	36.3	43.84 ± 4.01	
Type of delivery in case of pregnancy**	Normal delivery	44	44	44.02 ± 5.48	0.32
	Cesarean section	56	56	42.96 ± 5.14	
Number of children**	None	66	42	43.83 ± 3.98	0.68
	1	69	44	43.20 ± 5.33	
	2	22	14	44.00 ± 5.76	
Chronic disease**	Yes	17	10.8	42.05 ± 4.43	0.17
	No	140	89.2	43.76 ± 4.89	
Income sufficiency*	Yes	56	35.7	43.67 ± 5.05	0.96
	To some extent	91	58	43.49 ± 4.76	
	No	10	6.4	43.80 ± 5.07	
Age (years)***; mean (SD); range		29.05 (6.48); (20–40)			0.71
Spouse age (years)***; mean (SD); range		33.23 (5.16); (25–46)			0.08
Marriage age (years)***; mean (SD); range		20.50 (5.47); (10–30)			0.46
Gestational age (week)***; mean (SD); range		30.87 (5.60); (22–40)			0.77

Abbreviation: SD, standard deviation.

*Analysis of variance (ANOVA).

**independent samples t-test.

***Pearson correlation.

TABLE 2 Descriptive indices, internal consistency, and Pearson correlation of research variables ($n = 157$).

	Pregnancy self-care	Social support	Perceived stress	Pregnancy distress
1. Pregnancy self-care	1			
2. Social support	0.267**	1		
3. Perceived stress	−0.297**	−0.402**	1	
4. Pregnancy distress	−0.235**	−0.333**	0.447**	1
Mean	43.57	66.42	18.32	11.62
SD	4.85	12.10	8.20	7.26
Range	25–52	13–84	0–40	0–3
Kurtosis	−0.693	−1.068	0.037	0.696
Skewness	0.870	1.906	−0.251	0.163
Cronbach's alpha	0.790	0.892	0.794	0.772

Abbreviation: SD, standard deviation.

**$p < 0.001$.

participants) had a history of normal delivery and 56%(56 participants) had a history of cesarean delivery.

Table 1 exhibits the demographic characteristics of the studied samples as well as the relationship between the demographic variables and the self-care of pregnant women. The results showed that there is a significant difference between a spouse's occupation and women's self-care ($p = 0.007$). Thus, the self-care of pregnant women whose husbands had freelance jobs was lower than other women. However, no significant relationship was observed between other demographic variables and the self-care of pregnant women.

3.2 | Correlations

The results of the Pearson correlation exhibited a positive and significant relationship between social support and pregnancy self-care in women, and there was a negative and significant relationship between perceived stress and pregnancy distress with pregnancy self-care. Also, there was a negative and significant relationship between perceived stress and pregnancy distress with social support ($p < 0.001$) (Table 2). Cronbach's alpha values of research variables were higher than 0.7, which indicates acceptable reliability of research variables.[60]

According to the analysis of variance, a significant difference between the husband's job and the self-care of pregnant women was found. This variable was considered as a controller in the proposed model. In the hypothesized proposed model, social support mediates the relationship between perceived stress and pregnancy distress with pregnant women's self-care (Figure 1).

The hypothesized model was also an acceptable fit for the data χ^2 (1, $N = 157$) = 0.004, $p = 0.950$; CFI = 1; SRMR = 0.001; RMSEA = 0.001, 90% CI [0.000–0.011]; PNFI = 0.600; PCFI = 0.601; IFI = 1; GFI = 0.988 and $R^2 = 0.17$.
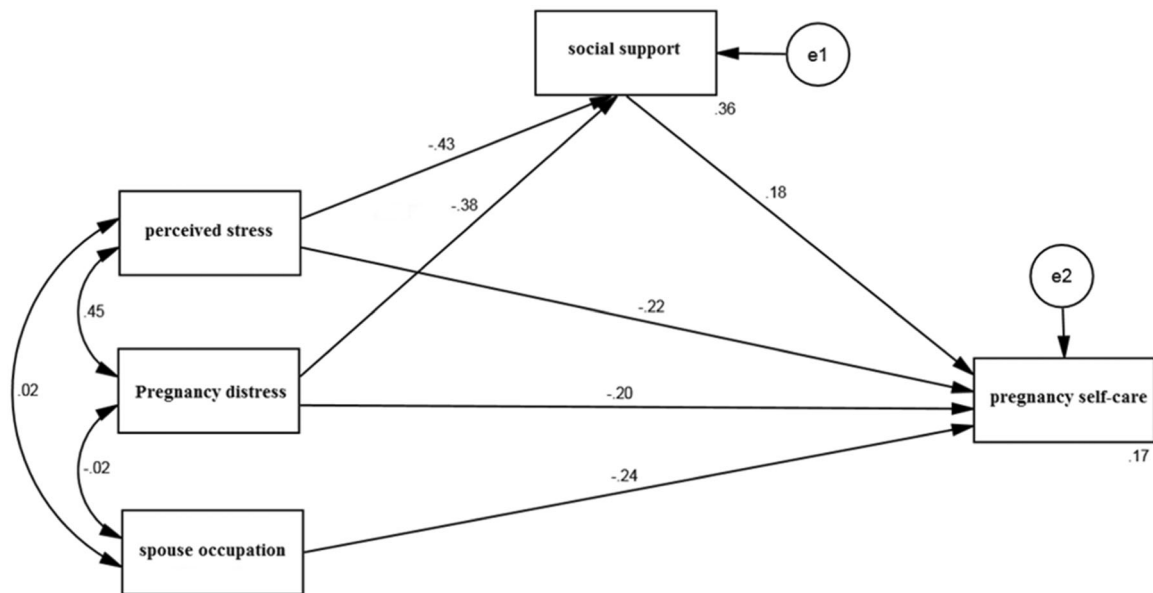
3.3 | Direct paths

All paths in the proposed research model were significant (Table 3). Perceived stress ($\beta = -0.221$, $p < 0.01$) and pregnancy distress ($\beta = -0.203$, $p = 0.002$) had a negative and significant effect on the self-care of pregnant women. Also, perceived stress ($\beta = -0.429$, $p < 0.001$) and pregnancy distress ($\beta = -0.381$, $p < 0.001$) had a negative and significant effect on the social support of pregnant women. So with the increase of perceived stress and pregnancy distress, the level of self-care and social support in pregnant women decreases. In addition, social support has a positive and significant effect on self-care in pregnant women ($\beta = 0.177$, $p < 0.02$).

Therefore, with the increase in social support, the level of self-care in pregnant women increases. Also, spouse's occupation has a negative and significant effect on pregnant women's self-care ($\beta = -0.242$, $p < 0.001$). So that the self-care of pregnant women with a husband with a freelance job is 0.242 units lower than other women.

3.4 | Indirect paths

The determination of mediation in the model was based on examining the significance of the indirect effects of the bootstrap procedure.[57] Two indirect relationships were significant.

First, the bootstrap analysis revealed a significant specific indirect effect between perceived stress and pregnancy self-care, with social support as the mediator: standardized indirect effect = −0.076, SE = 0.001, 95% CI (−0.099, −0.007). Second, the bootstrap analysis revealed a significant specific indirect effect between prenatal distress and pregnancy self-care, with social support as the mediator: standardized indirect effect = −0.068, SE = 0.002, 95% CI (−0.087, −0.005).

FIGURE 1 The model with standardized estimates.

TABLE 3 Standard coefficients of direct and indirect path.

Path estimate	Path coefficient	S.E.	C.R.	p
Direct effect				
Perceived stress ---> pregnancy self-care	−0.221	0.052	−2.500	0.01
Perceived stress ---> social support	−0.429	0.121	−5.238	<0.001
Pregnancy distress ---> pregnancy self-care	−0.203	0.742	−3.004	0.002
Pregnancy distress ---> social support	−0.381	0.192	−4.731	<0.001
Social support ---> pregnancy self-care	0.177	0.032	2.220	0.02
Spouse occupation ---> pregnancy self-care	−0.242	0.706	−3.327	<0.001
Indirect Effect	**Path Indirect**	**S.E.**	**Lower**	**Upper**
Perceived stress ---> social support ---> pregnancy self-care	−0.076	0.001	−0.099	−0.007
Pregnancy distress ---> social support ---> pregnancy self-care	−0.068	0.002	−0.087	−0.005

4 | DISCUSSION

The present study aimed to investigate the relationship between perceived stress and pregnancy distress with self-care of pregnant women, as well as the mediating role of social support. The results of this study showed that perceived stress, pregnancy distress, and impaired social support have a negative and significant effect on pregnant women's self-care, while social support played a mediating role.

There are factors that affect the health practices of pregnant women, such as perceived stress, perceived social support, and psychological resilience.[61] A recent study revealed a significant negative relationship between the perceived stress by the pregnant women and their level of healthcare practice.[62] It would seem as if these findings are in line with our study.

In the present study, there was a significant relationship between perceived stress and pregnancy distress with social support. Social support has a positive effect on pregnancy outcome in different ways. Dietzen et al.[63] observed that higher social support leads to decreased blood cortisol levels which modify anxiety. In addition to that, social support is considered as a strong defense against stressful life events, and is one of the necessary coping skills when facing life stressors. These findings are in line with Folkman's and Lazarus' theory of adaptation and psychological stress, which believes that the perception of stressful stimuli accelerates the occurrence of coping strategies.[64] In other words, the stress and coping approach of the

individual leads to the search for social support from the surrounding environment, and the social support from the environment protects the individual from the negative effects of stress. Studies have shown that people who receive social support experience a better quality of life. Lack of social support has negative effects on mothers' health and pregnancy outcomes. A study in Iran showed that 50 percent of pregnant women do not receive adequate social support.[65] Webster et al.[66] also found that women who receive less social support during pregnancy experience lower levels of health, compared to women receiving high social support. In the present study, social support played a mediating role between pregnancy distress and perceived stress with self-care during pregnancy. These results are consistent with Auszniewski's mid-range theory of resourcefulness and quality of life. According to this theory, a person's productivity and quality of life and the absence of depression symptoms are affected by perceived stress and social support.[67] Social support has a positive effect on psychological and physical well-being, as well as provides access to necessary resources during stressful events of life such as pregnancy.[68]

The themes and facilitators of self-care could be classified as helplessness, perceived problems, acceptance of illness, and support from others.[69] It can be said that one of the explanatory factors of self-care would be getting social support from others. The perceived stress and distress of pregnancy can be moderated to a great extent with the help of social support. Reduction of the stress and pregnancy distress results in the improvement of self-care behaviors. On the other hand, helplessness, perceived problems, and acceptance of one's illness can be considered as mediators between pregnancy distress and stress and self-care behaviors. Therefore, social support plays the role of a partial mediator in this relationship.

A similar study concluded that social support plays a mediating role between prenatal distress and mothers' resourcefulness.[70] Resourcefulness can be described as a treasury of cognitive-behavioral skills to deal with unpredictable or stressful situations, and achieve ideal mental health. Therefore, resourcefulness can be considered similar in nature to the self-care of a pregnant woman, but there has been no study accurately evaluating self-care as a dependent variable. The findings are in line with the previous studies concluding that social support mediates between prenatal concerns and psychological well-being,[71] as well as between prenatal stress and postpartum depression.[72] Good pregnancy care behavior can be encouraged through the reception of adequate social support.[73] On the other hand, low social support can predict behavior such as sedentary lifestyle, and increased alcohol consumption which can give rise to health-related complications,[74] and increased BMI.[75]

Several studies have investigated the relationship between perceived stress, social support, and prenatal mental health.[76–78] These studies mainly focused on the general perceived stress, with no emphasis on pregnancy-specific stress scales. It seems to be one of the strengths of the current research. On the other hand, there is an abundance of investigations focusing on the effects of perceived stress and pregnancy distress on the occurrence of depression and anxiety symptoms,[79–81] while less attention has been paid to self-

care behaviors. In the current research, pregnancy specific stress has been taken into consideration and the mediating role of social support in the context of the stress experiences has been discussed.

4.1 | Limitation of the present study

The present study was a cross-sectional study, and therefore, the stress and distress of pregnant mothers and their self-care were measured only once, and these variables were not evaluated over time. In addition to that, the variables of this research were evaluated by self-assessment questionnaires, which usually involve people's biases. Moreover, convenience sampling of pregnant women located in one geographic area could be another limitation of this study. Despite these limitations, the current research certainly provides a new perspective in the field of the relationship between social support, perceived stress, and pregnancy distress, as well as self-care behaviors in pregnant women.

5 | CONCLUSION

According to the findings of the current research, social support can be considered as a counter-measure against the negative effects of perceived stress as well as pregnancy-specific stress; a stress that certainly has a negative effect on birth outcomes at high levels. Therefore, interventions that target and improve social support will significantly reduce stress and distress related to pregnancy and improve mental health. It is suggested that the social support provided to pregnant women in different trimesters and stages of pregnancy should be investigated to determine whether the received social support is considered more important in certain stages. It can also shed light on the effects of social support reception of the mother on the newborn.

AUTHOR CONTRIBUTIONS

Sanaz Bahrami-samani: Conceptualization; investigation; writing—review & editing. **Shabnam Omidvar**: Conceptualization; supervision; writing—original draft; writing—review & editing. **Farideh Mohsenzadeh-Ledari**: Conceptualization; writing—review & editing. **Alireza Azizi**: Methodology; writing—review & editing. **Mohadeseh Ashrafpour**: Data curation; writing—review & editing. **Mohammadreza Kordbagheri**: Formal analysis; methodology; writing—review & editing.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

TRANSPARENCY STATEMENT

The lead author Shabnam Omidvar affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

ORCID

Shabnam Omidvar http://orcid.org/0000-0001-5026-9399

REFERENCES

1. Fahey JO, Shenassa E. Understanding and meeting the needs of women in the postpartum period: the perinatal maternal health promotion model. *J Midwifery Womens Health*. 2013;58(6):613-621.
2. Karaçam Z, Ançel G. Depression, anxiety and influencing factors in pregancy: a study in a Turkish population. *Midwifery*. 2009;25(4):344-356.
3. Naghizadeh S, Fathnezhad-Kazemi A, Gavidel T. Relationship between self-care in pregnancy with perceived social support and stress among pregnant women in 29 Bahman Hospital in Tabriz. *Community Health (Bristol)*. 2019;6(1):99-107.
4. Solhi M, Abbasi K, Ebadi Fard Azar F, Hosseini A. Effect of health literacy education on self-care in pregnant women: a randomized controlled clinical trial. *Int J Community Based Nurs Midwifery*. 2019;7(1):2-12.
5. Ekhtiari YS, Majlessi F, Foroushani AR, Shakibazadeh E. Effect of a self-care educational program based on the health belief model on reducing low birth weight among pregnant Iranian women. *Int J Prev Med*. 2014;5(1):76-82.
6. WHO. Self-care in the context of primary health care. WHO Regional Office for South-East Asia; 2009.
7. Khader YS, Al-Akour N, AlZubi IM, Lataifeh I. The association between second hand smoke and low birth weight and preterm delivery. *Matern Child Health J*. 2011;15:453-459.
8. Miyake Y, Tanaka K, Okubo H, Sasaki S, Arakawa M. Alcohol consumption during pregnancy and birth outcomes: the Kyushu Okinawa Maternal and child health study. *BMC Pregn Childbirth*. 2014;14:79.
9. Puspita T, Jerayingmongkol P, Sanguanprasit B. Factors related to self-care behavior among pregnant women in Garut district, Indonesia. *J Health Res*. 2015;29(1):1-6.
10. Chayathab S. Self-care behavior and selected factors affecting outcomes of pregnancy in adolescent mothers: Mahidol University; 2006.
11. https://www.who.int/data/nutrition/nlis/info/antenatal-iron-supplementation.
12. Lincetto O, Mothebesoane-Anoh S, Gomez P, et al. Antenatal care. Opportunities for Africa's newborns: Practical data, policy and programmatic support for newborn care in Africa. 2006:55-62.
13. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-weight-gain.htm.
14. Artal R, O'Toole M, Obstetricians ACo, et al. Exercise during pregnancy and the postpartum period. *Clin Obstet Gynecol*. 2003;46(2):496-499.
15. https://medlineplus.gov/ency/patientinstructions/000584.htm#:~:text=Pregnant%20women%20need%20about%20300.
16. Mindell JA, Cook RA, Nikolovski J. Sleep patterns and sleep disturbances across pregnancy. *Sleep Med*. 2015;16(4):483-488.
17. Gaíva MAM, Palmeira EWM, Mufato LF. Women's perception of prenatal and delivery care in cases of neonatal death. *Escola Anna Nery*. 2017;21(4):e20170018.
18. Górniaczyk A, Czech-Szczapa B, Sobkowski M, Chmaj-Wierzchowska K. Maternal health-related behaviours during pregnancy: a critical public health issue. *Eur J Contracep Reprod Health Care*. 2017;22(4):321-325.
19. Brand JS, Hiyoshi A, Cao Y, et al. Maternal smoking during pregnancy and fractures in offspring: national register based sibling comparison study. *BMJ*. 2020:368.
20. Mojibyan M, Karimi M, Bidaki R, Rafiee P, Zare A. Exposure to second-hand smoke during pregnancy and preterm delivery. *Int J High Risk Behav Addict*. 2013;1(4):149-153.
21. Dejong K, Olyaei A, Lo JO. Alcohol use in pregnancy. *Clin Obstet Gynecol*. 2019;62(1):142-155.
22. Riley EP, Infante MA, Warren KR. Fetal alcohol spectrum disorders: an overview. *Neuropsychol Rev*. 2011;21:73-80.
23. Popova S, Lange S, Probst C, Gmel G, Rehm J. Estimation of national, regional, and global prevalence of alcohol use during pregnancy and fetal alcohol syndrome: a systematic review and meta-analysis. *The Lancet Global Health*. 2017;5(3):e290-e299.
24. Lange S, Probst C, Rehm J, Popova S. National, regional, and global prevalence of smoking during pregnancy in the general population: a systematic review and meta-analysis. *Lancet Global Health*. 2018;6(7):e769-e776.
25. Poudevigne S, O'Connor PJ. A review of physical activity patterns in pregnant women and their relationship to psychological health. *Sports Med*. 2006;36:19-38.
26. Tesfaye G, Demlew D, Habte F, et al. The prevalence and associated factors of alcohol use among pregnant women attending antenatal care at public hospitals Addis Ababa, Ethiopia, 2019. *BMC Psychiatry*. 2020;20(1):1-10.
27. Addila AE, Bisetegn TA, Gete YK, et al. Alcohol consumption and its associated factors among pregnant women in Sub-Saharan Africa: a systematic review and meta-analysis' as given in the submission system. *Subst Abuse Treat Prev Policy*. 2020;15(1):1-14.
28. De Wolff MG, Backhausen MG, Iversen ML, Bendix JM, Rom AL, Hegaard HK. Prevalence and predictors of maternal smoking prior to and during pregnancy in a regional Danish population: a cross-sectional study. *Reprod Health*. 2019;16(1):82.
29. Azene AG, Aragaw AM, Wubetie HT, et al. Dietary diversity among pregnant women and associated factors in Ethiopia: systematic review and meta-analysis. *PLoS One*. 2021;16(6):e0251906.
30. Habibnejad F, Maleki F, Behmanesh F, et al. Physical activity among healthy pregnant women and its association with socio-demographic, obstetric characteristics and quality of sleep: a cross-sectional study. *Curr Res Med Sci*. 2023;6(2):64-73.
31. Morton SM, Grant CC, Wall CR, et al. Adherence to nutritional guidelines in pregnancy: evidence from the growing up in New Zealand birth cohort study. *Public Health Nutr*. 2014;17(9):1919-1929.
32. Harrison AL, Taylor NF, Shields N, Frawley HC. Attitudes, barriers and enablers to physical activity in pregnant women: a systematic review. *J Physiother*. 2018;64(1):24-32.
33. Yasuoka J, Nanishi K, Kikuchi K, et al. Barriers for pregnant women living in rural, agricultural villages to accessing antenatal care in Cambodia: a community-based cross-sectional study combined with a geographic information system. *PLoS One*. 2018;13(3):e0194103.
34. Traylor CS, Johnson JD, Kimmel MC, Manuck TA. Effects of psychological stress on adverse pregnancy outcomes and nonpharmacologic approaches for reduction: an expert review. *Am J Obstet Gynecol*. 2020;2(4):100229.

35. Accortt EE, Cheadle ACD, Dunkel Schetter C. Prenatal depression and adverse birth outcomes: an updated systematic review. *Matern Child Health J*. 2015;19:1306-1337.

36. Vehmeijer FOL, Guxens M, Duijts L, El Marroun H. Maternal psychological distress during pregnancy and childhood health outcomes: a narrative review. *J Dev Origins Health Dis*. 2019;10(3): 274-285.

37. Baskin R, Hill B, Jacka FN, O'Neil A, Skouteris H. The association between diet quality and mental health during the perinatal period. A systematic review. *Appetite*. 2015;91:41-47.

38. Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychol Bull*. 1985;98(2):310-357.

39. Rashid A, Mohd R. Poor social support as a risk factor for antenatal depressive symptoms among women attending public antennal clinics in Penang, Malaysia. *Reprod Health*. 2017;14:144.

40. Lancaster CA, Gold KJ, Flynn HA, Yoo H, Marcus SM, Davis MM. Risk factors for depressive symptoms during pregnancy: a systematic review. *Am J Obstet Gynecol*. 2010;202(1):5-14.

41. Akiki S, Avison WR, Speechley KN, Campbell MK. Determinants of maternal antenatal state-anxiety in mid-pregnancy: role of maternal feelings about the pregnancy. *J Affect Disord*. 2016;196:260-267.

42. Azimi M, Fahami F, Mohamadirizi S. The relationship between perceived social support in the first pregnancy and fear of childbirth. *Iran J Nurs Midwifery Res*. 2018;23(3):235.

43. Gümüşsoy S, Keskin G, Çiçek Ö, Yiğitoğlu S, Kirazlı G, Yıldırım GÖ. Psychological problem areas of pregnant women diagnosed with abortus imminens as a result of assisted reproductive techniques: a comparative study. *Perspect Psychiatr Care*. 2021;57(1):73-81.

44. Nath A, Venkatesh S, Balan S, et al. The prevalence and determinants of pregnancy-related anxiety amongst pregnant women at less than 24 weeks of pregnancy in Bangalore, Southern India. *Int J Women's Health*. 2019;11:241-248.

45. Chadwick KA, Collins PA. Examining the relationship between social support availability, urban center size, and self-perceived mental health of recent immigrants to Canada: a mixed-methods analysis. *Soc Sci Med*. 2015;128:220-230.

46. Faramarzi M, Pasha H. The role of social support in prediction of stress during pregnancy. *J Babol Univ Med Sci*. 2015;17(11):52-60.

47. Feldman PJ, Dunkel-Schetter C, Sandman CA, Wadhwa PD. Maternal social support predicts birth weight and fetal growth in human pregnancy. *Psychosom Med*. 2000;62(5):715-725.

48. Collins NL, Dunkel-Schetter C, Lobel M, et al. Social support in pregnancy: psychosocial correlates of birth outcomes and postpartum depression. *J Pers Soc Psychol*. 2004;65(6):1243-1258.

49. Nylen KJ, O'Hara MW, Engeldinger J. Perceived social support interacts with prenatal depression to predict birth outcomes. *J Behav Med*. 2013;36:427-440.

50. Dolatian M, Alavi Majd H. Comparison of pregnancy self-care, perceived social support and perceived stress of women with gestational diabetes and healthy pregnant women. *Iran J Endocrinol Metab*. 2014;16(3):156-164.

51. Sarason IG, Levine HM, Basham RB, Sarason BR. Assessing social support: the social support questionnaire. *J Pers Soc Psychol*. 1983;44(1):127-139.

52. Nasseh M, Ghazinour M, Joghataei M, et al. A Persian version of the social support questionnaire (SSQ). *Soc Welfare Quartly*. 2011;11(41): 251-266.

53. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983;24:385-396.

54. Mazlom SR, Darban F, Vaghei S, et al. The effect of stress inoculation program (SIP) on nurses' perceived stress in psychiatric wards. *Evid Based Care*. 2012;2(1):35-44.

55. Yousefi R. Psychometric properties of Persian version of renatal distress questionnaire (PDQ). *Nursing Midwifery J*. 2015;13(3):215-225.

56. Kline RB *Principles and practice of structural equation modeling*: Guilford publications; 2023.

57. Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Methods*. 2008;40(3):879-891.

58. Byrne BM. *Structural equation modeling with Mplus: Basic concepts, applications, and programming*: Routledge; 2013.

59. Marsh HW, Scalas LF. Individually weighted-average models: testing a taxonomic SEM approach across different multidimensional/global constructs because the weights "Don't make no nevermind. *Struct Equat Model: Multidisciplinary J*. 2018;25(1):137-159.

60. Coster W, Bedell G, Law M, et al. Psychometric evaluation of the participation and environment measure for children and youth. *Dev Med Child Neurol*. 2011;53(11):1030-1037.

61. Cannella BL, Yarcheski A, Mahon NE. Meta-analyses of predictors of health practices in pregnant women. *West J Nurs Res*. 2018;40(3): 425-446.

62. Ekrem EC, Ozturk A, Buyuktarakci MK. The relationship between perceived stress, social support, psychological resilience and health care practices in pregnant women. *International Journal of Caring Sciences*. 2023;16(1):255-263.

63. Ditzen B, Schmidt S, Strauss B, Nater UM, Ehlert U, Heinrichs M. Adult attachment and social support interact to reduce psychological but not cortisol responses to stress. *J Psychosom Res*. 2008;64(5): 479-486.

64. Biggs A, Brough P, Drummond S. Lazarus and folkman's psychological stress and coping theory. In: Cooper CL, Quick JC, eds. *The Handbook of Stress and Health: A Guide to Research and Practice*. Wiley & Sons; 2017:349-364.

65. Iranzad I, Bani S, Hasanpour S, Mohammadalizadeh S, Mirghafourvand M. Perceived social support and stress among pregnant women at health centers of Iran-Tabriz. *J Caring Sci*. 2014;3(4):287-295.

66. Webster J, Linnane JWJ, Dibley LM, Hinson JK, Starrenburg SE, Roberts JA. Measuring social support in pregnancy: can it be simple and meaningful? *Birth*. 2000;27(2):97-101.

67. Zauszniewski JA. *Resourcefulness*. SAGE Publications Sage CA; 2016:p. 1551-1553.

68. Tani F, Castagna V. Maternal social support, quality of birth experience, and post-partum depression in primiparous women. *J Maternal-Fetal Neonatal Med*. 2017;30(6):689-692.

69. Emamgholi Khooshehchin T, Keshavarz Z, Afrakhteh M, et al. Explanation the experiences of mothers with gestational diabetes about the factors affecting self-care: A qualitative study. *J Clin Nursing Midwifery*. 2017;5(4):76-89.

70. Herbell K, Zauszniewski JA. Stress experiences and mental health of pregnant women: the mediating role of social support. *Issues Ment Health Nurs*. 2019;40(7):613-620.

71. Ilska M, Przybyła-Basista H. Partner support as a mediator of the relationship between prenatal concerns and psychological well-being in pregnant women. *Health Psychol Rep*. 2017;5(4): 285-295.

72. Coburn SS, Gonzales NA, Luecken LJ, Crnic KA. Multiple domains of stress predict postpartum depressive symptoms in low-income Mexican American women: the moderating effect of social support. *Arch Women's Mental Health*. 2016;19:1009-1018.

73. Mabetha K, Soepnel L, Klingberg S, et al. Social Supportsupport during pregnancy: a phenomenological exploration of young women's experiences of support networks on pregnancy care and wellbeing in Soweto, South Africa. *medRxiv*. Published online April 4, 2022.

74. Croezen S, Picavet HSJ, Haveman-Nies A, Verschuren WM, de Groot LC, van't Veer P. Do positive or negative experiences of social support relate to current and future health? Results

from the Doetinchem cohort study. *BMC Public Health*. 2012; 12(1):65.

75. Moak ZB, Agrawal A. The association between perceived interpersonal social support and physical and mental health: results from The National epidemiological survey on alcohol and related conditions. *J Public Health*. 2010;32(2):191-201.

76. Bilszta JL, Tang M, Meyer D, Milgrom J, Ericksen J, Buist AE. Single motherhood versus poor partner relationship: outcomes for antenatal mental health. *Aust N Z J Psychiatry*. 2008;42(1): 56-65.

77. Maxson PJ, Edwards SE, Valentiner EM, Miranda ML. A multidimensional approach to characterizing psychosocial health during pregnancy. *Matern Child Health J*. 2016;20:1103-1113.

78. Reid H, Power M, Cheshire K. Factors influencing antenatal depression, anxiety and stress. *Br J Midwifery*. 2009;17(8):501-508.

79. Katz J, Crean HF, Cerulli C, Poleshuck EL. Material hardship and mental health symptoms among a predominantly low income sample of pregnant women seeking prenatal care. *Matern Child Health J*. 2018;22:1360-1367.

80. Pampaka D, Papatheodorou SI, AlSeaidan M, et al. Depressive symptoms and comorbid problems in pregnancy-results from a population based study. *J Psychosom Res*. 2018;112:53-58.

81. Koutra K, Vassilaki M, Georgiou V, et al. Antenatal maternal mental health as determinant of postpartum depression in a population based mother–child cohort (Rhea Study) in Crete, Greece. *Soc Psychiatry Psychiatr Epidemiol*. 2014;49:711-721.