

RESEARCH ARTICLE

Predictor Role of Intimate Domestic Violence During Pregnancy and Mental Health in Maternal Competency with Moderating Role of Mother-infant Attachment: A Structural Equation Model

Faeze Ansarifard¹, Mitra Rahimzadeh², Maryam Keshavarz³, Touran Bahrami Babaheidari⁴ and Sara Esmaelzadeh Saeieh^{5,*}

¹Department of Medical Sciences, Alborz University of Medical Sciences, Karaj, Iran; ²Social Determinants of Health Research Center, School of Public Health, Alborz University of Medical Sciences, Karaj, Iran; ³Reproductive Health Department, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran; ⁴Department of Nursing, School of Nursing, Alborz University of Medical Sciences Karaj, Iran; ⁵Social Determinants of Health Research Center, Alborz University of Medical Sciences, Karaj, Iran

Abstract: Introduction: Intimate domestic violence causes psychological consequences in pregnancy and maternal competency. We aimed to assess the effect of domestic violence on mental health and maternal competency with the moderating role of mother-infant attachment behavior.

Methods: This prospective longitudinal study was conducted on 254 primiparous mothers in the third trimester of pregnancy referring to selected health centers in Qazvin province, Iran. Data collection tools were questionnaires. Data were analyzed by SPSS and Smart Partial Least Square3 software.

Results: The results of the structural equations model showed that domestic violence has a positive and significant effect on mental health disorders ($\beta = 0.87$). Mental health disorder has a negative and significant effect on parental acceptance ($\beta = -0.55$). Domestic violence has a negative and significant effect on mother-infant attachment behavior ($\beta = -0.83$), also mother-infant attachment behavior is a moderator of the relationship between pregnancy violence and maternal competency (T -value = 3.17).

Conclusion: The results revealed that domestic violence during pregnancy affects the mental health of pregnant mothers and maternal competency and mother-infant attachment behavior moderates this relationship. Therefore, it is recommended that mothers facing domestic violence be identified and receive psychological support and counseling, and also improve maternal competency and mother-infant attachment behavior in mothers exposed to violence.

Keywords: Domestic violence, attachment, mental health, competence, maternal competency, psychological consequences.

1. INTRODUCTION

Becoming a mother is one of the most important events for women, which is accompanied by changes, imbalances, and reorganization of life events and maternal competency is a process in which the mother acquires sufficient competence and correct behaviors to accept the role of mother [1]. This process is influenced by many factors such as personal characteristics, beliefs, economic and social conditions, relationship with the partner, and mental and psychological health [2]. Success in accepting the role of the mother occurs when the mother has sufficient competence to maintain and feel commitment and interest in the child and make a

balance between the current and previous tasks [3]. Women who perceived themselves as capable mothers during pregnancy were better adapted to the role of mothers in the postpartum period [4]. Maternal competency is a process in which the mother achieves competence in the role and integrates the mothering behaviors into her established role so that she feels comfortable with her identity as a mother [5]. Transition to motherhood is an important stage in women's lives and adds many responsibilities and roles to their lives [6]. Developing a way to be good and achieve maternal competency is essential in adapting to the maternal role [7]. The formation of maternal competency is a progressive process that begins at the beginning of pregnancy and continues until the postpartum period [1]. Some studies showed that severe anxiety during pregnancy disrupts the maternal-infant relationship and reduces the mother's ability to play a maternal role [8]. Intimate violence during pregnancy directly af-

* Address correspondence to this author at the Social Determinants of Health Research Center, Alborz University of Medical Sciences, Karaj, Iran; Tel:02634336007(360); E-mail: Esmaelzadeh1360@gmail.com

fects mental health disorders. The experience of Intimate violence causes a stress response and frequent exposure to violence has a psychological consequence, which increases neuroendocrine responses, and the cumulative effect of these responses causes mental health disorders during pregnancy [9].

Intimate domestic violence among couples includes different forms of emotional, psychological, economic, and physical violence, abuse, and threatening and coercive behaviors [10]. Domestic violence is a risk factor for suicide in women after common mental health disorders and increases the risk of depression, anxiety, and post-traumatic stress disorder [11]. According to a report released by the World Health Organization, the prevalence of physical and sexual violence among all women was 30% in the world [12]. The results of a systematic review study of 15610 pregnant women in Iran reported a 52% prevalence of domestic violence during pregnancy [12]. Many studies have shown an association between violence during pregnancy and its complications such as low birth weight, preterm delivery, and intrauterine growth restriction [13]. Numerous studies have shown that domestic violence exposes children at risk of behavioral, emotional and cognitive problems with short-term and long-term consequences.

1.1. Violence During Pregnancy, Mental Health and Maternal Competency

Mental disorders, stress, and anxiety typically affect women's health during pregnancy and after childbirth [14]. Pregnancy is a unique experience of the mother that has psychological, physiological, and biochemical effects on the mother, and pregnant mothers are more sensitive to mental disorders due to these changes [15]. Violence affects directly or indirectly the attachment behavior of the mother and infant. Many studies have suggested that mental disorders during pregnancy and maternal-infant attachment behavior decrease, maternal ability by reduction of oxytocin levels [16].

Anxiety and stress disorders during pregnancy affect the risk of postpartum depression; and disrupt maternal and infant attachment behavior, maternal competency, and infant growth and development [17]. Transition to parenting is one of the biggest life events that bring about long-term changes in parental relationships [18].

Mental health disorders during pregnancy and postpartum seem to conflict with the socially accepted feeling of being a good mother. Mothers with mental disorders feel guilty about their maternal abilities, and many mothers are less likely to seek treatment for mental disorders due to the transition to parenthood, which is more likely to interfere with motherhood acceptance [19].

1.2. Domestic Violence and Mother-infant Attachment Behavior

Violence by the partner against his wife can lead to a decline in marital quality and reduce the attachment between the spouses and the subsequent attachment of the mother to the infant [20]. A study has shown the effect of domestic violence

on the mother's mental health and disrupting the security of mother-infant attachment behavior [11]. Maternal-infant attachment behavior in the early hours of birth is associated with the development of maternal competence and emotional-social performance of the infant [21]. Inadequate maternal attachment behavior is due to increased risk factors in the infant care environment. Early attachment behavior has the ultimate effect on the formation of brain structure and self-regulatory capacity in positive development with the infant's emotional and social performance [22]. Numerous longitudinal studies have shown an association between risk exposure such as pregnancy stress and violence with unorganized maternal and infant attachment behavior [23]. Violence during pregnancy is associated with an increased risk of depression, malnutrition, substance abuse, neonatal complications, and maternal and neonatal mortality [24, 25]. Domestic violence has a negative effect on maternal behavior and is associated with decreased family support and increased levels of aggressive behaviors [26].

Considering the effect of maternal mental health on maternal behavior, the present study aimed to investigate the effect of intimate partner domestic violence during pregnancy and mental health disorder with the moderating role of mother-infant attachment behavior on maternal competency based on the following hypotheses:

- (1) Violence during pregnancy affects mental health disorders.
- (2) Mental health disorder affects maternal competence.
- (3) Violence during pregnancy affects maternal competence.
- (4) Violence during pregnancy affects maternal-infant attachment behavior.
- (5) The maternal-infant attachment behavior affects maternal competence.
- (6) Mother-infant attachment behavior moderates the relationship between pregnancy violence and maternal acceptance.

2. METHODS

This study was a prospective longitudinal study that was approved by the Ethics Committee of Alborz University of Medical Sciences with code (IR.ABZUMS.REC.1399.259). Participants were 254 pregnant mothers who referred to selected health centers in Qazvin province, which had the most patients. Participants received written and oral information about the study, informed consent was obtained from the participants *via* e-mail or social media. They were free to decline participation or to withdraw at any time during the study. All methods were performed in accordance with the relevant guidelines and regulations. Firstly, the list of pregnant mothers was prepared, and then, based on their eligibility, the mothers were selected.

Inclusion criteria were as follows: Primiparous, pregnant mothers in the third trimester of pregnancy (28 to 40 weeks

of pregnancy), singleton pregnancy, absence of stressful events over the past six months, no history of a specific disease. The exclusion criteria were the following: History of depression and mental illnesses, mothers with high-risk pregnancies (placental disorders, diabetes, hypertension, uterine disorders, and fetal abnormalities before entering the study), hospitalization of the mother or infant in the ICU after delivery, mothers having infants with anomalies, mothers with COVID-19.

To determine the sample size in this study, software estimation in the structural equations model was used. Regarding the four latent variables in the study, the number of 102 questions of total questionnaires, an effect size of 0.22, 80% power, and 0.95 confidence level, the sample size was estimated at 254.

This study used multi-stage sampling. In the first stage, the selected centers of Qazvin province that had the most clients and were middle class in terms of economic status were selected. In the second stage, samples were selected after identifying eligible pregnant mothers through the convenience sampling method.

First, a list of pregnant mothers was prepared, and then mothers were contacted based on their eligibility. The objectives of the study were explained to them, and an informed consent form was completed. The questionnaires of demographic information, violence during pregnancy, and mental health were completed in their third trimester of pregnancy. The researcher then followed up the pregnant mothers until delivery to fully evaluate the complications of pregnancy and delivery outcome, and then the Müller's questionnaire of mother-infant attachment was completed within 48 hours, and the maternal competency questionnaire was completed in 6 weeks after postpartum.

The data collection tool was a five-part questionnaire that was completed as a self-report. The questionnaires were completed as Google forms using social networks; in case the mother did not have access to social networks, the questionnaires were completed through a telephone call.

3. CONFLICT TACTICS SCALE (CTS-2)

The revised conflict tactics scale (CTS-2) is a 39-item questionnaire that was developed in 1996 by Strauss *et al.* [27], it has five subscales and measures the violence committed by the spouse. Cornbrash's alpha coefficient showed good internal consistency for each subscale negotiation (0.86), psychological aggression (0.79), physical assault (0.86), sexual coercion (0.87) and injury (0.95). The scoring method of the Likert scale is 0 to 7 (0 = did not happen at all, 6=more than 20 times in the past year, 7 = did not happen last year, but has happened before). Panaghi *et al.* showed that CTS2 and its subscales had good internal consistency (Chronbach's α =.66 to .86) and it has appropriate validity and reliability for the Iranian sample and is an efficient tool for research and couple counseling [28].

4. PARENTING SENSE OF COMPETENCE SCALE (P-SOC)

Gibaud-Wallston's Parenting Sense of Competence scale is a 17-item scale that measures two subscales of satisfaction and self-efficacy of parental competence [29]. Each item is ranked by 6 points Likert's scale. The total score range of the scale is 17 to 102 and the higher score indicates more competency in maternal competency. The validity and reliability of the PSOC scale in the study of Abdollahpour *et al.* [30] were respectively, α =0.71 and α =75.0. In this study, we used the total score of the parenting sense of competence scale.

5. MÜLLER'S MATERNAL ATTACHMENT INVENTORY (MAI)

Müller's Maternal Attachment Inventory (MAI) was developed in 1994 [31]. The conceptual basis of this questionnaire is based on the theory of attachment, which contains 26 items scored from rarely (1), to almost always (4). The range of scores is 26-104; high scores indicate a high degree of attachment of the mother to the baby. The validity of this tool was confirmed by the content validity method, and its reliability has been confirmed with Cronbach's alpha coefficient of 0.89. Omani Samani *et al.* in 2016 showed that a single-factor model provided a good fit to the data, which confirmed the original model by its developer. The Cronbach's alpha coefficient for PAI was 0.856 and the test-retest reliability with ICC was 0.784 [32]. In this study, we used the total score of parenting sense of Müller's Maternal Attachment.

6. DEPRESSION, ANXIETY AND STRESS SCALE (DASS-21)

To measure stress, anxiety, and depression, a 21-item questionnaire (DASS21) designed by Fernando Gomez was used. Lovibond (1995) [33] reported Cronbach's alpha of the total scale and the three scales of depression, anxiety, and stress 0.88, 0.93, 0.82, and 0.9, respectively. Asghari Moghadam *et al.* [34] obtained the internal consistency coefficients of three subscales of depression, anxiety, and stress, respectively, 0.92, 0.93, and 0.90, and the test re-test coefficients (three weeks intervals) of depression, anxiety, and stress scales 0.84, 0.89, and 0.90, respectively. In this study, we used the total score of parenting sense of DASS-21 for screening mental health disorder.

7. STATISTICAL ANALYSIS

After data collection, the data were entered into SPSS-16, and then the normality of the data was determined by skewness and kurtosis. Skewness and kurtosis were lower than 1.8 which showed normal distribution of variables. The missing data were indicated and replaced with the median. Socio-demographic and obstetrics characteristics' relationship with the frequency of domestic violence was examined using independent t-tests and ANOVA and Smart PLS3 was used to perform confirmatory factor analysis, determine the validity and reliability, fit the quality of the mod-

el, and the relationship between variables in the model. The dependent variable in this study was maternal competency and the independent variables were domestic violence, mental health disorders and maternal-infant attachment.

8. RESULTS

Questionnaires were distributed between 270 eligible mothers and 5 people did not complete questionnaires 48 hours after delivery and 9 people did not complete questionnaires in 6 weeks after postpartum. The findings represented that 48% of pregnant mothers were 30 to 40 years old, and their mean age was 30.05 ± 5.7 ; 84.4% of pregnant mothers were housewives, and 40.1% of pregnant mothers had academic degrees. About 39.5% of pregnant mothers were married for more than 6 years. About 36.6% of pregnant mothers had unwanted pregnancies, and 44.5% of mothers considered their family and their spouse as supportive.

The results showed that the negative outcomes and complications of childbirth are higher in mothers who experience violence during pregnancy (Table 1).

9. MEASUREMENT MODEL

In the measurement model, 10 tests were examined. The first test is the confirmatory factor analysis by (PLS) to determine the homogeneity of the questions of variables and con-

struct validity. Fourteen questions that were not significant and had a factor load of less than 0.7 (7 questions from CTS and 7 questions from PSOC), were removed from the model [35].

For model reliability, Cronbach's alpha, composite reliability (CR), and Spearman RHO-A correlation coefficient tests were used. In all cases, values greater than 0.7 were acceptable [36] (Table 2).

To determine the convergent validity of the model, two tests were used. In this test, the average variance extracted (AVE) of each variable should be greater than 0.5. In the second convergent validity test, the CR values of each variable should be greater than the AVE values of the same variable [37] (Table 2).

The results showed that the model had good convergent validity. Two cross-loading and Fornell and Larcker tests were used to determine the divergent validity. In the table of cross-loading, each question had the highest factor load for the determining variable. The results showed that the questions of each variable are divergent or different from the questions of the other variable [38].

The Fornell and Larcker table shows that the square root of the AVE of all variables is greater than the correlation of that variable with other variables. Therefore, the divergent validity of the variables is also confirmed (Table 3).

Table 1. Mean and standard deviation of total score of domestic violence in pregnant women based on demographic and pregnancy outcomes.

Variables	-	F (%)	Mean $\pm$ SD	P-value	Variables	-	F (%)	Mean $\pm$ SD	P-value
Breast feeding				0.001*	History of violence before pregnancy				0.001*
Total score of violence	Yes	232(91.3)	18.2 $\pm$ 24.6		Total score of violence	Yes	117(46.1)	34.1 $\pm$ 31.08	
	No	22(8.7)	62.2 $\pm$ 32.2			No	137(53.9)	11.8 $\pm$ 20.6	
Baby weight(gr)					Pregnancy complication				0.001*
Total score of violence	<2000	40(15.7)	50.8 $\pm$ 35.04	0.001**	Total score of violence	Yes	56(22)	43.8 $\pm$ 21.8	
	-2000 2500	57(22.4)	20.6 $\pm$ 30.3			No	198(78)	67.4 $\pm$ 15.4	
	2500 3000	110(43.3)	15.4 $\pm$ 19.7		Intention pregnancy				0.001*
	>3000	47(18.5)	14.8 $\pm$ 20.1		Total score of violence	Yes	93(36.6)	37.1 $\pm$ 35.1	
NICU				0.001*		No	161(63.4)	13.3 $\pm$ 18.4	
	Yes	45(17)	50.4 $\pm$ 37.3		ICU				0.001*
	No	209(83)	15.9 $\pm$ 21.5		Total score of violence	Yes	7(2.7)	70.8 $\pm$ 37.9	
Maternal competency score				0.001*		No	247(97.3)	20.6 $\pm$ 26.7	
Total score of violence	Yes	106(41.7)	47.6 $\pm$ 19.1		Mental health score				0.001*
	No	148(58.3)	72.7 $\pm$ 11.7		Total score of violence	Yes	106(41.7)	41.8 $\pm$ 16.8	
Total score of muller maternal-fetal attachment questionnaire				0.001*		No	148(58.3)	29.3 $\pm$ 9.6	
Total score of violence	Yes	106(41.7)	83.7 $\pm$ 20.4						
	No	148(58.3)	98.1 $\pm$ 12.3						

*Independent T-test **ANOVA

Table 2. Criterion of reliability of the model.

Variables	Cronbach's Alpha	Composite Reliability	Average Variance Extraction	RHO_A
Domestic violence	0.96	0.96	0.50	0.96
Mental health disorder	0.97	0.97	0.67	0.98
Attachment	0.98	0.98	0.77	0.98
Parental competence	0.94	0.95	0.60	0.95

Table 3. Fornell and larcher, quality and goodness of model.

-	Domestic Violence	Mental Health Disorder	Attachment	Parental Competence	CV-COM	SRMR
Domestic violence	0.651	-	-	-	0.36	0.077
Mental health disorder	0.78	0.87	-	-	0.60	
Attachment	0.83	0.84	0.88	-	0.70	
Parental competence	-0.76	0.78	0.802	0.834	0.51	

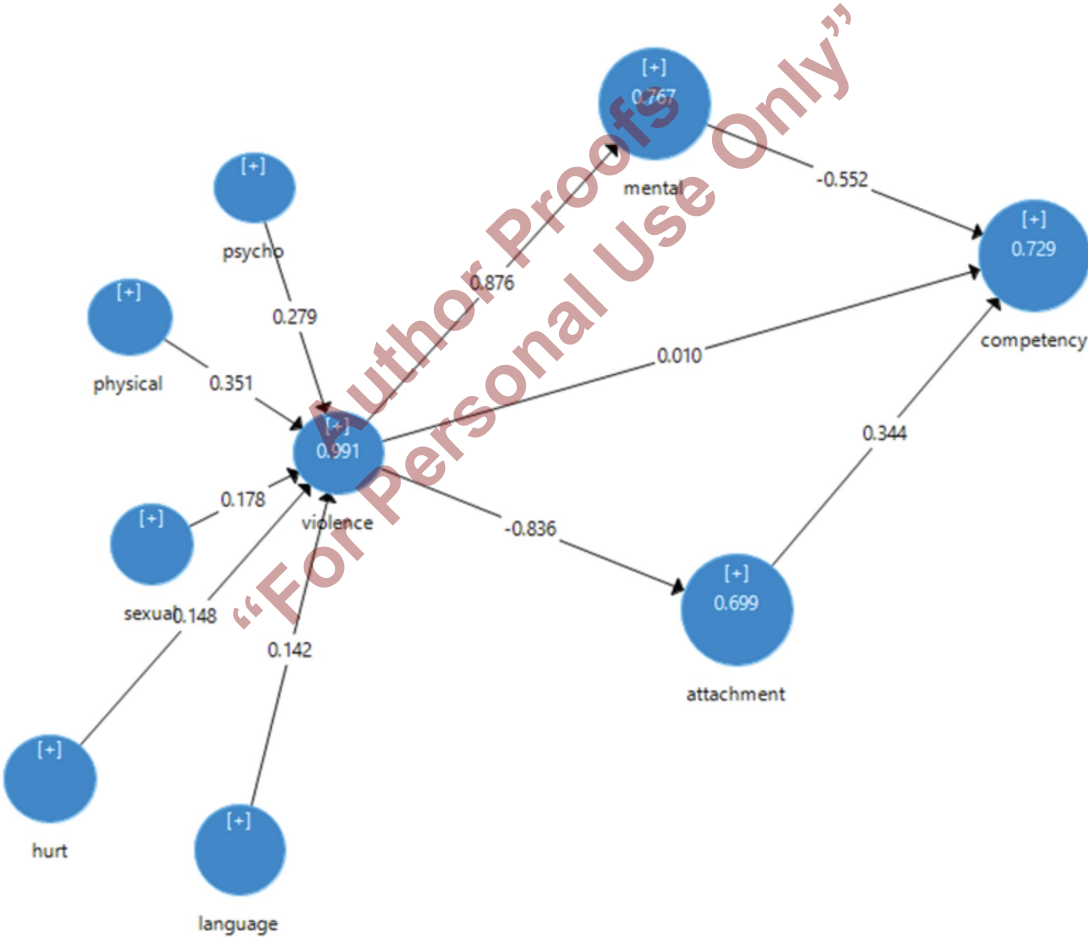


Fig. (1). Path coefficients of research variables. (A higher resolution / colour version of this figure is available in the electronic copy of the article).

To determine the quality of the model in terms of predictive power, the CV COM index was used, which is compared with three numbers of 0.02, 0.15, and 0.35, respective-

ly, weak, medium, and strong quality [39]. CV COM values of all variables were more than 0.35 (Table 3), so the measurement model has a very strong predictive quality.

Table 4. Path coefficient and factor load of structural equation model.

Hypothesis	-	P-value	T-value
Violence → Mental disorder	0.87	0	49.6
Mental disorder → Maternal competency	-0.55	0	5.46
Violence → Maternal competency	0.01	0.9	0.124
Violence → Attachment	-0.83	0	22.5
Attachment → Maternal competency	0.34	0.009	2.61
-	R adjusted	R square	-
Mental health	0.809	0.808	-
Parental competence	0.72	0.77	-
Attachment	0.5	0.51	-

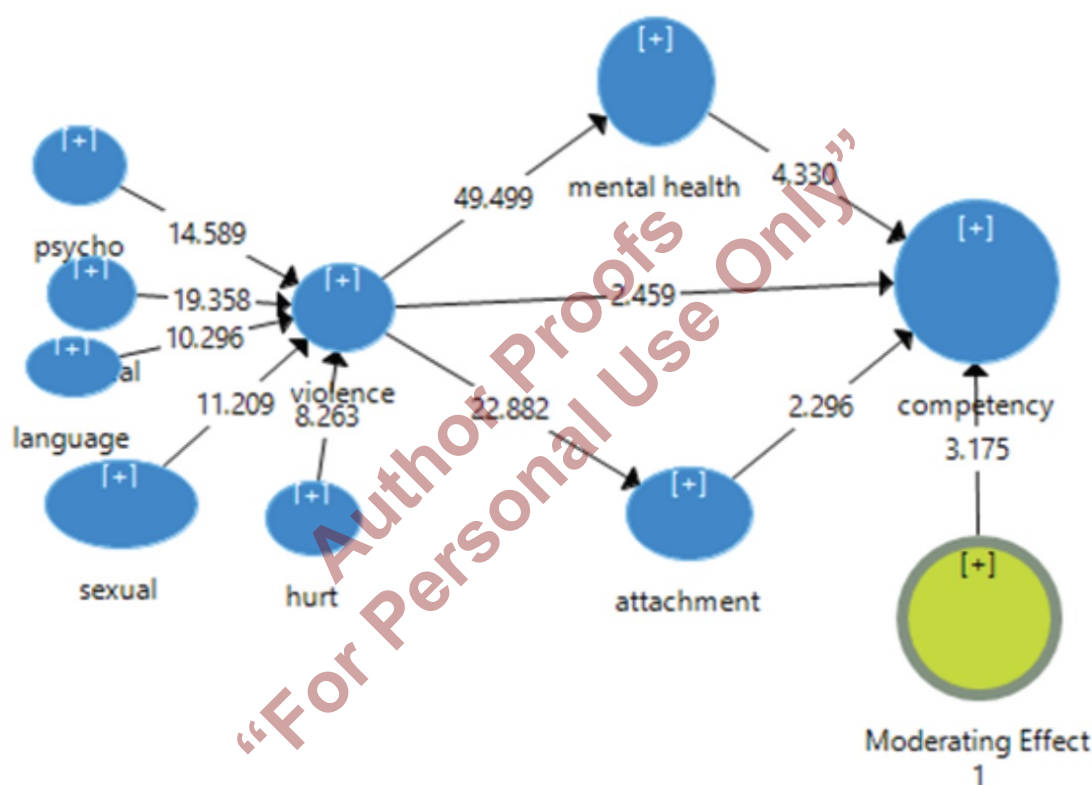


Fig. (2). The moderating role of mother-infant attachment behavior. (A higher resolution / colour version of this figure is available in the electronic copy of the article).

10. STRUCTURAL MODEL

The structural model was used to determine the relationship between the variables of domestic violence during pregnancy, mental health disorder, mother-infant attachment behavior, and maternal competency. Fig. (1) and Table 4 show the significant coefficients and path coefficients of the research variables.

To determine the moderating role of maternal-infant attachment in the relationship between domestic violence and maternal competency, PLS software was used. Interaction analysis in PLS software showed that the role of mother-in-

fant attachment behavior was significant as a moderator (T -value = 3.17), which indicates the reinforcement role of attachment behavior on the relationship between violence and maternal competency. This showed that greater attachment strengthens maternal competency and weakens the effects of domestic violence on maternal competency (R adjusted=0.5) (Fig. 2 and Table 4).

11. DISCUSSION

The results revealed that 41.7% of mothers experienced violence during pregnancy, and 46.1% of mothers experienced violence before pregnancy. Karimi *et al.* [40] showed

that the prevalence of physical violence during pregnancy in the world was 18% and was 23% in Iran; also, the prevalence of psychological violence in the world was 38% and it was 44% in Iran, which is consistent with the results of the present study.

The findings show that breastfeeding rate, low birth weight, neonatal hospitalization in NICU, and pregnancy complications such as gestational hypertension, postpartum hemorrhage, preterm labor, and maternal ICU admission were more in mothers experiencing domestic violence in pregnancy than in other mothers. The results of a study in Sweden showed that mothers with a history of violence during pregnancy had a higher rate of cesarean section, and mothers with a history of more violence had preterm delivery. However, the weight of infants was not significantly different between mothers with a history of violence and without a history of violence [41]. The results of a study in Quebec, Canada, showed that complications such as placental abruption, stillbirth, preterm labor, and low birth weight were higher in mothers with a history of violence, and the risk of pregnancy complications, regardless of the time and frequency of violence, was a risk factor for pregnancy outcomes [42].

The present study results showed that domestic violence has a positive and significant impact on mental health disorders, if the variable of domestic violence during pregnancy changes by one unit, mental disorders change by 0.87 in the same direction. A study conducted in 2017 showed that the prevalence of mental disorders among mothers who reported domestic violence in the past 12 months was 44.6%, and the relative risk of mental disorders in mothers with psychological violence, even without experiencing physical and sexual violence, in last 12 months was three times more than mothers without experience of violence [43]. A systematic review study showed that violence during pregnancy has a main, direct, and one-way relationship with mental disorders during pregnancy and postpartum [17]. Studies have also shown that mental health disorders among mothers who experience violence during pregnancy were two to three times more compared to other mothers [44], which is consistent with the results of the present study.

The present study showed that domestic violence has a negative and significant effect on mother-infant attachment behavior. If the variable of domestic violence changes by one unit, the mother-infant attachment behavior will change in the same direction by 0.83. A systematic review study showed an indirect relationship between the experience of violence during pregnancy and the security of mother-infant attachment behavior, and the quality of the marital relationship, maternal depression disorders, and maternal stress affect the security of mother-infant attachment behavior, compared to mothers who did not experience violence [45]. A study showed that mother-infant attachment behavior also affects maternal competency and behavior and that maternal behaviors are directly affected by the experience of domestic violence by the spouse, and the mother's negative experiences of violence, trauma and affect the emotional aspects

of childcare. Moreover, maternal violence during pregnancy affects the correct interpretation of the mother's understanding of her baby's behaviors and causes a lack of development and the formation of maternal acceptance [11].

The results of the study showed that domestic violence does not directly affect maternal competency, and mother-infant attachment behavior moderates the relationship between domestic violence and maternal acceptance. One study showed the indirect effect of psychological and physical domestic violence on mother-infant attachment behavior and the moderating role of postpartum depression. It was shown that physical and psychological domestic violence is associated with postpartum depression, and postpartum depression affects poor mother-infant attachment behavior. Psychological violence is associated with diminished maternal acceptance, anger, rejection of the baby, and symptoms of postpartum depression [46].

The results of the study demonstrated that mental health disorder has a negative and significant effect on maternal competency, *i.e.* if we change the mental health variable by one unit, it will change by 0.55 of maternal acceptance in the opposite direction. Other studies have shown that women with postpartum depression have less self-efficacy in parenting activities and do fewer childcare activities, which delays child development at 6 to 18 months of age. Mental health plays an important role in maternal competence and child development [47]. Chang *et al.* showed that mental health during pregnancy (depression and anxiety) is inversely related to child development in the first six months after birth [48]. It was also shown in a study that maternal mental health has a moderating effect on the relationship between mother-infant attachment behavior and infant behavior [49].

The results showed that mother-infant attachment behavior has a positive and significant effect on maternal competency. That is if we change the mother-infant attachment behavior variable by one unit, maternal competency changes in the same direction by 0.34. Becoming a mother is the first step in the process of adulthood socialization, and the transition to a maternal role is one of the most distressful adjustments for new parents and engages them as well as the whole family with a range of positive and negative emotions, which is influenced by the mother-infant attachment behavior [50-53]. Studies have shown that one of the factors related to mother-infant attachment behavior is domestic violence. Domestic violence is considered an attack on the mother-child relationship. Fathers who engage in violence, directly (through attacks during pregnancy or preventing mothers from being with their children) and indirectly (by inflicting physical or mental harm on mothers and disabling them in their parenting role), weaken the emotional relationship between mothers and children [44, 45].

The results showed that mental health disorders and domestic violence together explain 77% of maternal competency with the moderating role of mother-infant attachment behavior. Therefore, further studies to examine other variables explaining the maternal role are required. Due to the high role of mental disorders and domestic violence in maternal

competency, screening mental health disorders in mothers with pregnancy violence is essential.

One of the strengths of the study was that a prospective study was conducted. The limitations include conducting the study during pregnancy and COVID-19 pandemic. Due to quarantine and economic problems, estimating the increase in violence only during pregnancy was not possible. Further studies are recommended post-COVID-19 pandemic on pregnant mothers.

This study used a convenience sample of middle-income Iranian women referred to the public health center of one province of Iran. The findings are less likely to be generalizable to women of higher socioeconomic status or women of other ethnicities.

Considering the moderating role of mother-infant attachment behaviors in the relationship between maternal competency and domestic violence and the important role of mother-infant attachment behavior in maternal competency, recognizing reinforcing factors and barriers related to mother-infant attachment behaviors is crucial.

CONCLUSION

The results revealed that domestic violence during pregnancy affects the mental health of pregnant mothers and maternal competency and mother-infant attachment behavior moderates this relationship. Therefore, it is recommended that mothers facing domestic violence be identified and receive psychological support and counseling, and also improve maternal competence and mother-infant attachment behavior in mothers exposed to violence.

AUTHORS' CONTRIBUTIONS

S.E.S and F.A conceived and designed the study. F.A and M.Y performed the study. M.R analyzed the data. S.E.S, F.A, T.B.B and M.K wrote the primary draft of the paper. All authors read and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

AVE	= Average Variance Extracted
CR	= Composite Reliability
CTS	= Conflict Tactics Scale
CV COM	= Crossed Validated Communalities
DASS	= Depression, Anxiety and Stress Scale
MAI	= Müller's Maternal Attachment Inventory
PSOC	= Parenting Sense of Competence Scale
SRMR	= Standardized Root Mean Square Residual

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The present study with the code of IR.ABZUM-S.REC.1398.259 was approved by the Ethics Committee of Alborz University of Medical Sciences.

HUMAN AND ANIMAL RIGHTS

The study was conducted in accordance with the Helsinki Declaration.

CONSENT FOR PUBLICATION

Informed consent was obtained from all the participants.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data file is available based on the request to the corresponding author.

FUNDING

The study is extracted from the first author's master's thesis with Number 3986 in midwifery, which was financially supported by Alborz University of Medical Sciences in Iran.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

The researcher hereby thank the Development and Research Unit of Kamali Hospital for its spiritual support of the present study.

REFERENCES

- [1] Shrestha S. Maternal role: A concept analysis. *J Midwifery Reproductive Health* 2019; 7(3)
- [2] Liu CC, Chen YC, Yeh YP, Hsieh YS. Effects of maternal confidence and competence on maternal parenting stress in newborn care. *J Adv Nurs* 2012; 68(4): 908-18.
<http://dx.doi.org/10.1111/j.1365-2648.2011.05796.x> PMID: 21790741
- [3] Ramiro-Cortijo D, de la Calle M, Gila-Díaz A, *et al.* Maternal resources, pregnancy concerns, and biological factors associated to birth weight and psychological health. *J Clin Med* 2021; 10(4): 695.
<http://dx.doi.org/10.3390/jcm10040695> PMID: 33578963
- [4] Zdolska-Wawrzekiewicz A, Bidzan M, Chrzan-Dętkoś M. The dynamics of becoming a mother during pregnancy and after childbirth. *Int J Environ Res Public Health* 2020; 17(1): 57.
- [5] Mercer RT. Becoming a mother *versus* maternal role attainment. *J Nurs Scholarsh* 2004; 36(3): 226-32.
<http://dx.doi.org/10.1111/j.1547-5069.2004.04042.x> PMID: 15495491
- [6] Don BP, Chong A, Biehle SN, Gordon A, Mickelson KD. Anxiety across the transition to parenthood: Change trajectories among low-risk parents. *Anxiety Stress Coping* 2014; 27(6): 633-49.
<http://dx.doi.org/10.1080/10615806.2014.903473> PMID: 24628469
- [7] Nijssens L, Bleys D, Casalin S, Vliegen N, Luyten P. Parental attachment dimensions and parenting stress: The mediating role of parental reflective functioning. *J Child Fam Stud* 2018; 27(6): 2025-36.
<http://dx.doi.org/10.1007/s10826-018-1029-0>
- [8] Nath S, Pearson RM, Moran P, *et al.* The association between prenatal maternal anxiety disorders and postpartum perceived and observed mother-infant relationship quality. *J Anxiety Disord* 2019; 68: 102148.

- [9] <http://dx.doi.org/10.1016/j.janxdis.2019.102148> PMID: 31604204
Osório C, Probert T, Jones E, Young AH, Robbins I. Adapting to stress: Understanding the neurobiology of resilience. *Behav Med* 2017; 43(4): 307-22.
<http://dx.doi.org/10.1080/08964289.2016.1170661> PMID: 27100966
- [10] Ayre J, On ML, Webster K, Gourley M, Moon L. Examination of the burden of disease of intimate partner violence against women in 2011: Australia's National Research Organisation for Women's Safety. Australia's National Research Organisation for Women's Safety (ANROWS). 2011.
- [11] McIntosh JE, Tan ES, Levendosky AA, Holtzworth-Munroe A. Mothers' experience of intimate partner violence and subsequent offspring attachment security ages 1–5 years: A meta-analysis. *Trauma Violence Abuse* 2021; 22(4): 885-99.
<http://dx.doi.org/10.1177/1524838019888560> PMID: 31750785
- [12] Razaghi N. Domestic violence against women, Mashhad, Islamic Republic of Iran: A grounded theory study. *East Mediterr Health J* 2021; 28: 4.
- [13] Soleimani A, Delpisheh A, Ahmadi A, Khademi N, Jafarinia B, Sayehmiri K. Prevalence of violence against women during pregnancy in Iran: A systematic review and meta-analysis. *Nurs Midwifery Res J* 2016; 13(11): 973-86.
- [14] Hill A, Pallitto C, McCleary-Sills J, Garcia-Moreno C. A systematic review and meta-analysis of intimate partner violence during pregnancy and selected birth outcomes. *Int J Gynaecol Obstet* 2016; 133(3): 269-76.
<http://dx.doi.org/10.1016/j.ijgo.2015.10.023> PMID: 27039053
- [15] Gureje O, Abdulmalik J, Kola L, Musa E, Yasamy MT, Adebayo K. Integrating mental health into primary care in Nigeria: Report of a demonstration project using the mental health gap action programme intervention guide. *BMC Health Serv Res* 2015; 15(1): 242.
<http://dx.doi.org/10.1186/s12913-015-0911-3> PMID: 26094025
- [16] Alipour Z, Kheirabadi GR, Kazemi A, Fooladi M. The most important risk factors affecting mental health during pregnancy: A systematic review. *East Mediterr Health J* 2018; 24(6): 549-59.
<http://dx.doi.org/10.26719/2018.24.6.549> PMID: 30079950
- [17] Samuel S, Hayton B, Gold I, Feeley N, Carter CS, Zerkowicz P. Attachment security and recent stressful life events predict oxytocin levels: A pilot study of pregnant women with high levels of cumulative psychosocial adversity. *Attach Hum Dev* 2015; 17(3): 272-87.
<http://dx.doi.org/10.1080/14616734.2015.1029951> PMID: 25862151
- [18] Halim N, Beard J, Mesic A, Patel A, Henderson D, Hibberd P. Intimate partner violence during pregnancy and perinatal mental disorders in low and lower middle income countries: A systematic review of literature, 1990–2017. *Clin Psychol Rev* 2018; 66: 117-35.
<http://dx.doi.org/10.1016/j.cpr.2017.11.004> PMID: 29198412
- [19] Aktar E, Qu J, Lawrence PJ, Tollenaar MS, Elzinga BM, Bögels SM. Fetal and infant outcomes in the offspring of parents with perinatal mental disorders: Earliest influences. *Front Psychiatry* 2019; 10: 391.
<http://dx.doi.org/10.3389/fpsy.2019.00391> PMID: 31316398
- [20] Malka T, Hasson-Ohayon I, Goldzweig G, Roe D. Coping style is associated with parental distress beyond having a mental illness: A study among mothers with and without mental illness. *Psychiatr Rehabil J* 2020; 43(2): 170-3.
<http://dx.doi.org/10.1037/prj0000381> PMID: 31259580
- [21] Gharacheh M, Mazari Z, Hasanpoor AS, Haghani S. Relationship between domestic violence and mother-infant attachment in mothers referring to comprehensive health centers affiliated to Iran university of medical sciences. *Iran J Nurs* 2020; 33(127): 72-88.
- [22] Joas J, Möhler E. Maternal bonding in early infancy predicts children's social competences in preschool age. *Front Psychiatry* 2021; 12: 687535.
<http://dx.doi.org/10.3389/fpsy.2021.687535> PMID: 34489753
- [23] Feldman R. The neurobiology of human attachments. *Trends Cogn Sci* 2017; 21(2): 80-99.
<http://dx.doi.org/10.1016/j.tics.2016.11.007> PMID: 28041836
- [24] Groh AM, Fearon RMP, van IJzendoorn MH, Bakermans-Kranenburg MJ, Roisman GI. Attachment in the early life course: Meta-analytic evidence for its role in socioemotional development. *Child Dev Perspect* 2017; 11(1): 70-6.
<http://dx.doi.org/10.1111/cdep.12213>
- [25] Rogathi JJ, Manongi R, Mushi D, et al. Postpartum depression among women who have experienced intimate partner violence: A prospective cohort study at Moshi, Tanzania. *J Affect Disord* 2017; 218: 238-45.
<http://dx.doi.org/10.1016/j.jad.2017.04.063> PMID: 28477502
- [26] Ononokpono DN, Azfredrick EC. Intimate partner violence and the utilization of maternal health care services in Nigeria. *Health Care Women Int* 2014; 35(7-9): 973-89.
<http://dx.doi.org/10.1080/07399332.2014.924939> PMID: 24902004
- [27] Louise M. Maternal experiences of domestic abuse and their effect on the mother's approach to parenting. *Nurs Child Young People* 2021; 33(3)
- [28] Straus MA, Hamby SL, BONEY-McCOY SUE, Sugarman DB. The revised conflict tactics scales (CTS2) development and preliminary psychometric data. *J Fam Issues* 1996; 17(3): 283-316.
<http://dx.doi.org/10.1177/019251396017003001>
- [29] Panaghi L. Investigating reliability, validity and factor structure of the revised conflict tactics scale. *ZfF Z Famforsch* 2011; 7(1): 103-7.
- [30] Gibaud-Wallston J, Wandersmann LP. Development and utility of the Parenting Sense of Competence Scale. Kennedy Center for Research on Education and Human Development 1978.
- [31] Abdollahpour N, Seyedfatemi N, HakimShoostari M, Mehran A. The effect of education on sense of competence of mothers of children with hyperactivity disorder. *Iran J Psychiatry Behav* 2017; 5(4): 19-26.
<http://dx.doi.org/10.21859/ijpn-05043>
- [32] Muller ME, Mercer RT. Development of the prenatal attachment inventory. *West J Nurs Res* 1993; 15(2): 199-215.
<http://dx.doi.org/10.1177/019394599301500205> PMID: 8470375
- [33] Omani Samani R, Maroufizadeh S, Ezabadi Z, Alizadeh L, Vesali S. Psychometric properties of the Persian version of the prenatal attachment inventory in pregnant Iranian women. *Int J Fertil Steril* 2016; 10(2): 184-9.
PMID: 27441051
- [34] Lovibond SH, Lovibond PF. Manual for the depression anxiety stress scales: Sydney psychology foundation. Sydney, N.S.W.: Psychology Foundation of Australia 1995.
- [35] Asghari A, Saed F. Psychometric properties of the Depression Anxiety Stress Scales-21 (DASS-21) in a non-clinical Iranian sample. *Int J Psychol* 2008; 2(2): 82-102.
- [36] Hair JF Jr, Sarstedt M, Hopkins L. Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *Eur Bus Rev* 2014; 26(2): 106-21.
<http://dx.doi.org/10.1108/EBR-10-2013-0128>
- [37] Hair JF Jr, Ringle CM, Sarstedt M. Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long Range Plann* 2013; 46(1-2): 1-12.
<http://dx.doi.org/10.1016/j.lrp.2013.01.001>
- [38] Sarstedt M, Ringle CM. Partial least squares structural equation modeling. *Handbook of market research*. Cham: Springer International Publishing 2021; pp. 587-632.
- [39] Henseler J, Ringle CM, Sarstedt M. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J Acad Mark Sci* 2015; 43(1): 115-35.
<http://dx.doi.org/10.1007/s11747-014-0403-8>
- [40] Henseler J, Ringle CM, Sinkovics RR. The use of partial least squares path modeling in international marketing. *New challenges to international marketing*. Emerald Group Publishing Limited 2009; 20: pp. 277-319.
[http://dx.doi.org/10.1108/S1474-7979\(2009\)0000020014](http://dx.doi.org/10.1108/S1474-7979(2009)0000020014)
- [41] Karimi A, Daliri S. The prevalence of physical and psychological violence during pregnancy in Iran and the world: A systematic review and meta-analysis. *J Clin Nurs* 2016; 5(3)
- [42] Finnbogadóttir H, Baird K, Thies-Lagergren L. Birth outcomes in a Swedish population of women reporting a history of violence including domestic violence during pregnancy: A longitudinal co-

- hort study. *BMC Pregnancy Childbirth* 2020; 20(1): 183.
<http://dx.doi.org/10.1186/s12884-020-02864-5> PMID: 32216780
- [43] Auger N, Low N, Lee GE, Ayoub A, Luu TM. Pregnancy outcomes of women hospitalized for physical assault, sexual assault, and intimate partner violence. *J Interpers Violence* 2022; 37(13-14): NP11135.
<http://dx.doi.org/10.1177/0886260520985496> PMID: 33535860
- [44] de Mendonça MFS, Ana BL. Intimate partner violence and incidence of common mental disorder. *Rev Saude Publica* 2017; 51: 32.
- [45] Mahenge B, Likindikoki S, Stöckl H. Intimate partner violence during pregnancy and associated mental health symptoms among pregnant women in Tanzania: A cross-sectional study. *BJOG* 2013; 120(8): 940-7.
<http://dx.doi.org/10.1111/1471-0528.12185> PMID: 23464524
- [46] Tan ES, McIntosh JE, Kothe EJ, Opie JE, Olsson CA, Development H. Couple relationship quality and offspring attachment security: A systematic review with meta-analysis. *Attach Hum Dev* 2018; 20(4): 349-77.
<http://dx.doi.org/10.1080/14616734.2017.1401651> PMID: 29143567
- [47] Park S, Greene MC, Melby MK, Fujiwara T, Surkan PJ. Postpartum depressive symptoms as a mediator between intimate partner violence during pregnancy and maternal-infant bonding in Japan. *J Interpers Violence* 2021; 36(19-20): NP10545-71.
<http://dx.doi.org/10.1177/0886260519875561> PMID: 31530064
- [48] Vameghi R, Amir Aliakbari S, Sajjad H, Sajedi F, Alavimajd H. Correlation between mothers' depression and developmental delay in infants aged 6-18 months. *Glob J Health Sci* 2015; 8(5): 11-8.
<http://dx.doi.org/10.5539/gjhs.v8n5p11> PMID: 26652078
- [49] Chang YT, Feng JY, Chang HY, Chang YC, Lee CK. The impacts of maternal childhood adversity, stress, and mental health on child development at 6 months in Taiwan: A follow-up study. *Dev Psychopathol* 2021; 33(3): 970-9.
<http://dx.doi.org/10.1017/S0954579420000267> PMID: 32684201
- [50] Davies SM, Silverio SA, Christiansen P, Fallon V. Maternal-infant bonding and perceptions of infant temperament: The mediating role of maternal mental health. *J Affect Disord* 2021; 282: 1323-9.
<http://dx.doi.org/10.1016/j.jad.2021.01.023> PMID: 33601711
- [51] Lau Y, Fang L, Kwong HKD. Cross-lagged models of marital relationships and intergenerational conflicts during transition to parenthood: Effect of patrilineal coresidence. *Fam Process* 2020; 59(4): 1569-87.
<http://dx.doi.org/10.1111/famp.12524> PMID: 32023353
- [52] Maher J, Fitz-Gibbon K, Meyer S, Roberts S, Pfitzner N. Mothering through and in Violence: Discourses of the 'Good Mother'. *Sociology* 2021; 55(4): 659-76.
<http://dx.doi.org/10.1177/0038038520967262>
- [53] Alipour SM, Rahimzadeh M, Tourzani ZM, Mahmoodi Z, Esmaelzadeh SS. Predictor role of marital conflict on maternal competency with mediating role of perceived stress and concerns during pregnancy: A structural equation model. *Neuropsychopharmacol Rep* 2023; 43(1): 95-102.
<http://dx.doi.org/10.1002/npr2.12309> PMID: 36692423

DISCLAIMER: The above article has been published, as is, ahead-of-print, to provide early visibility but is not the final version. Major publication processes like copyediting, proofing, typesetting and further review are still to be done and may lead to changes in the final published version, if it is eventually published. All legal disclaimers that apply to the final published article also apply to this ahead-of-print version.