博士論文

Associations between intimate partner violence (IPV) during pregnancy, mother-to-infant bonding failure, and postnatal depressive symptoms

(妊娠期のパートナーからの暴力(IPV)と新生児へのボンディング不全及び産後うつ症状との関係)

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Abbreviations

Abbreviations	
IPV	Intimate Partner Violence
WHO	World Health Organization
MFICU	Maternal-Fetal Intensive Care Unit
NICU	Neonatal Intensive Care Unit
ISA	Index of Spouse Abuse
ISA_P	Index of Spouse Abuse Physical violence
ISA_NP	Index of Spouse Abuse Nonphysical violence
GCS	Generalized Contentment Scale
ISE	Index of Self-Esteem
IMS	Index of Marital Satisfaction
GHQ	General Health Questionnaire
HADS	Hospital Anxiety and Depression Scale
HADS_A	Hospital Anxiety and Depression Scale Anxiety
HADS_D	Hospital Anxiety and Depression Scale Depression
STAI	State-Trait Anxiety Inventory
SDS	Zung Self-rating Depression Scale
MIBS	Mother–Infant Bonding Scale
MIBQ	Mother–Infant Bonding Questionnaire
EPDS	Edinburgh Postnatal Depression Scale
MIBS_J	Japanese version of Mother–Infant Bonding Scale
MIBS_LA	Mother–Infant Bonding Scale Lack of Affection
MIBS_AR	Mother–Infant Bonding Scale Anger and Rejection
SEM	Structural Equation Modelling
CMIN	Chi-Squared
CFI	Comparative Fit Index
GFI	Goodness-of-Fit Index
AGFI	Adjusted Goodness-of-Fit Index
RMSEA	Root Mean Square Error of Approximation
IUFD	Intrauterine Fetal Death

ABSTRACT

Aims: The aims of this study were to examine the associations between intimate partner violence (IPV) during pregnancy, mother-to-infant bonding failure, and postnatal depressive symptoms at one month postnatal. This study also aimed to examine if these relationships would be mediated by antenatal depressive symptoms.

Methods: This study was a prospective cohort study that investigated effects between the third trimester of pregnancy and one month after childbirth. The Japanese version of the Index of Spouse Abuse (ISA), the Japanese version of the Mother-Infant Bonding Scale (MIBS), and the Japanese version of the Hospital Anxiety and Depression Scale (HADS) were used to measure IPV during pregnancy, bonding failure with infants, and depressive symptoms during pregnancy and the postnatal period respectively. Structural equation modeling (SEM) was used to find the associations between those four variables.

Results: The final path model of the SEM showed good fit with the data. IPV during pregnancy was associated with mother-to-infant bonding failure at one month postnatal, whereas IPV during pregnancy was not significantly associated with postnatal depressive symptoms at one month postnatal. In addition, this study demonstrated that the

associations between IPV during pregnancy, mother-to-infant bonding failure, and postnatal depressive symptoms at one month postnatal were mediated by antenatal depressive symptoms.

Discussion: This study indicated the need for interventions for IPV and psychological health care for abused pregnant women to prevent antenatal depressive symptoms in prenatal health settings in order to prevent bonding failure with infants and postnatal depressive symptoms after childbirth.

INTRODUCTION

1. Intimate partner violence (IPV)

Intimate partner violence (IPV) is a serious social and health concern. IPV is described as behaviors that exert power and control over an intimate partner through the use of violence, including physical, psychological, and sexual violence (Stewart, MacMillan, & Wathen, 2013; World Health Organization, 2013; Osaki & Takada, 2003). Physical violence includes hitting, kicking, beating, and threatened use of a weapon (Stewart et al., 2013). Psychological violence involves constant intimidation, belittling, humiliation and threats, isolating a person from family or friends, and monitoring their movement (Stewart et al., 2013). Finally, sexual violence includes forced sexual actions, unwanted sexual comments, and not cooperating with contraception (Stewart et al., 2013).

IPV against women occurs frequently. A survey conducted in 15 areas across 10 countries using structured interviews with original IPV questions (Garcia-Moreno, Jansen, Ellsberg, Heise, & Watts, 2006)—Bangladesh, Brazil, Ethiopia, Japan, Namibia, Peru, Samoa, Serbia and Montenegro, Thailand, and the United Republic of Tanzania—reported that 15–70% of women have experienced physical violence, sexual violence, or both from a male partner in their lifetime (Garcia-Moreno et al., 2006). The rates of IPV vary considerably between industrialized countries, such as Japan and Serbia (15.4% and

23.7%, respectively), and industrializing countries, such as the United Republic of Tanzania and Ethiopia (55.9% and 70.9%, respectively) (Garcia-Moreno et al., 2006). In Japan, a 2011 governmental survey of 1,751 women using self-report questionnaires with original IPV questions (Gender Equality Bureau, 2011) showed that 32.9% of women have experienced either physical, psychological, or sexual assault at least once or twice in their lifetime.

2. IPV during pregnancy

IPV during pregnancy is an important perinatal health issue that should be considered by health care professionals in perinatal health settings (Horiuchi, Yaju, Kataoka, Eto, & Matsumoto, 2009; World Health Organization, 2013). The severity of violence from a partner during pregnancy may be greater than violence before pregnancy (McFarlane, Parker, & Soeken, 1995; McFarlane, Parker, Soeken, Silva, & Reed, 1999). An American study (McFarlane et al., 1995) comparing the severity of physical and non-physical violence before pregnancy and during pregnancy using the Index of Spouse Abuse (ISA) demonstrated that both physical and non-physical violence during pregnancy were significantly more severe than they were before pregnancy (physical violence (ISA_P): 19.83 versus 10.56; non-physical violence (ISA_NP): 28.08 versus

19.05). In addition, the Bureau of Citizens and Cultural Affairs of the Tokyo Metropolitan Government interviewed victims of IPV and reported escalated violence during pregnancy (Bureau of Citizens and Cultural Affairs, 1998).

Changes in a couple's relationship and lifestyle due to pregnancy may be one of the main reasons for the aggravation of IPV during pregnancy. Bancroft and Silverman (2004) indicated that an IPV perpetrator is likely to strongly believe that he must be the center of the family's interests and his desires should always be satisfied by his partner. However, women's interests tend to shift to unborn babies during pregnancy; in addition, it would be difficult for pregnant women to care for their partners (i.e., housework) as perfectly as before due to the physical burdens accompanying pregnancy (Bancroft, & Silverman, 2004; Mercer, 1995). Bancroft and Silverman (2004) mentioned that IPV perpetrators are likely to be jealous of the attention their partners pay to the babies, to refuse increased burdens of housework, and to feel frustrated their partners do not care for them during pregnancy as sufficiently as before (Bancroft, & Silverman, 2004). These changes in the couples' relationships and lifestyles due to pregnancy may increase frustration and anger among abusive partners, which would then result in escalating violence during pregnancy.

IPV during pregnancy may have an adverse impact on mothers' parenting

behaviors after childbirth. Pregnancy is a preliminary period to adapt to becoming a new family and a new role as a mother for parenting after childbirth (Mercer, 1995; Tomey, & Alligood, 2004; Shindo, 2013; Sugiyama, Yamada, & Nagasaka, 2009; Atogami, 2011). Mercer (1995) and Sugiyama et al. (2009) indicated that intimate relationships between couples greatly encourage accommodation during pregnancy and lead to successful parenting after childbirth. Violence by an intimate partner during pregnancy may lead to adverse effects on the mother's parenting behaviors towards the babies after childbirth. Indeed, a longitudinal study in China (Chan et al., 2012) demonstrated that women who reported IPV during pregnancy reported significantly more abusive parenting behaviors, such as physical abuse and neglect, three years after childbirth (adjusted odds ratio [AOR] = 1.78 and AOR = 1.51, respectively).

The pregnancy period is an ideal opportunity for health care professionals to detect and assist victims of IPV (World Health Organization, 2013; Horiuchi et al., 2009). Pregnant women attend health clinics more regularly and contact many professionals throughout pregnancy, such as midwives, nurses, and doctors, via regular maternity check-ups, maternal consultations, and mother's classes (Tinkler & Quinney, 1998; Horiuchi et al., 2009). In addition, health care providers were the professionals most frequently contacted by victims of IPV due to physical and psychological discomforts

accompanying IPV (Hamilton & Coates, 1993; World Health Organization, 2013). Therefore, perinatal health care professionals should have an important role in detecting IPV during pregnancy and providing health care for abused pregnant women in order to address their problems.

3. IPV during pregnancy and mother-to-infant bonding failure

In recent years, research attention has focused on mother-to-infant bonding failure due to its impact on adverse parenting behaviors (Kitamura, Ohashi, Kita, Haruna, & Kubo, 2013; Choi et al., 2010). Bonding refers to maternal emotional involvement with the baby (Yoshida, Yamashida, Conroy, Marks, & Kumar, 2012). Bonding failure is defined as the impairment of emotional communion between the mother and child (Yoshida, 2006; Kumar, 1997). Kumar (1997) indicated that maternal negative feelings with their infants, such as indifference, reduced affection, rejection, hostility, anger, and impulses to harm, commonly appear in mothers with bonding failure. Bonding failure is believed to be different from attachment, which is defined as the affective response and instinctive behaviors for the child's feeling of security with caregivers (Bowlby, 1969).

Bonding failure in the postnatal period may be an important contributing factor in the mother's abusive parenting behaviors toward the baby. A recent study that

investigated mothers' feelings and parenting behaviors at three months after childbirth (Kitamura et al., 2013) found that bonding failure was significantly associated with abusive parenting behaviors, such as insulting or sulking at the baby. Likewise, another study conducted on mothers with babies in the first year after childbirth in Japan (Choi et al., 2010) demonstrated that bonding failure with infants significantly affected mothers' abusive behaviors, including emotional explosions, physical abuse, and neglect.

Factors associated with bonding failure after childbirth have been reported by previous studies. These include antenatal and postnatal anxiety and depressed mood (Kokubu, Okano, & Sugiyama, 2012; Edhborg, Nasreen, & Kabir, 2011; Ohoka et al., 2014), negative attitude towards pregnancy by women and husbands (Kokubu et al., 2012), having a girl (Edhborg et al., 2011), low maternal-fetal bonding during pregnancy (Dubber, Reck, Muller, & Gawlik, 2014; Edhborg et al., 2011), and strong memory of severe pain with childbirth (Kumar, 1997).

IPV during pregnancy and mother-to-infant bonding failure may be strongly associated. Pregnancy is the emotional and social accommodation phase for a mother's new maternal role. The successful adaptation of the new maternal role during pregnancy leads to the mother's affection and emotional involvement with the newborn after childbirth (Mercer, 1995; Tomey & Alligood, 2004). Mercer (1995) indicated that the

mother's intimate partner has the greatest impact on the mother's accommodation during pregnancy for her new role as mother in comparison with other individuals. It is possible that it is difficult for pregnant women experiencing IPV to emotionally and socially accept their new role as mother during pregnancy, and as a result, they experience negative feelings towards their babies after childbirth (e.g., absence of affection and rejection after childbirth). However, the association between IPV during pregnancy and bonding failure with infants has not yet been reported.

4. IPV during pregnancy and postnatal depressive symptoms

Postnatal depressive symptoms have also been recognized as a strong contributor to mothers' parenting behaviors. Postnatal depressive symptoms is a general term for all depressive symptoms with an onset in the four weeks after childbirth (American Psychiatric Association, 2013). Postnatal depressive symptoms include depressed mood, anxiety, loss of interest, irritability, insomnia, interpersonal withdrawal, and preoccupation with death (American Psychiatric Association, 2013; Tomb, 2005). Tomb (2005) indicated that depressed mood and anxiety, in particular, are frequently reported to health care professionals as initial symptoms by depressed patients. Postnatal depressive symptoms have been recognized as distinct from the "maternity blues," which

refers to a transient depressed mood that onsets in the first to fifth days following childbirth and usually resolves within 10 days (Sakumoto, Masamoto, & Kanezawa, 2002).

Postnatal depressive symptoms greatly affect mothers' parenting difficulties (Choi et al., 2010; Buist, 1998; Thomason et al., 2014). A study conducted in Japan (Choi et al., 2010) demonstrated that postnatal depressive symptoms were significantly associated with mothers' "worry about parenting" and "burden of nursing time." Consistent results have not been obtained on the relation between postnatal depressive symptoms and mothers' abusive behaviors (Buist, 1998; Mishina, Arimoto, Taniguchi, & Ito, 2013; Sagami, Kayama, & Senoo, 2004; Kitamura et al., 2013; Choi et al., 2010). However, recent studies (Kitamura et al., 2013; Choi et al., 2010) have suggested that mothers' abusive parenting behaviors might be affected more strongly by bonding failure with infants than by postnatal depressive symptoms.

Several reviews (O'Hara, & McCabe, 2013; O'Hara, & Wisner, 2014; O'Hara, Neunaber, & Zekoski, 1984; Villegas, McKay, Dennis, & Ross, 2011) have reported the factors associated with postnatal depressive symptoms: low socioeconomic status (SES), unwanted pregnancy, multipara, single status, antenatal anxiety and depressed mood, low self-esteem, postnatal blues, poor social supports, poor adjustment, and stressful life

events. In addition, childbirth-related factors such as the mode of delivery (e.g., emergency cesarean section), fetal distress, medical interventions during delivery, infant admission to Neonatal Intensive Care Unit (NICU), and low infant health have been demonstrated to be associated with postnatal depressive symptoms (Blom et al., 2010; O'Hara, & Wisner, 2014; Staehelin, Kurth, Schindler, Schmid, & Zemp Stutz, 2013).

IPV during pregnancy may have a strong relationship with postnatal depressive symptoms. Several studies have suggested that poor partner relationships have a considerable impact on postnatal depressive symptoms (Ikeda, 2011; O'Hara, & Wisner, 2014; Banker, & Lacoursiere; 2014). A qualitative study on depressed mothers in the postnatal period (Ikeda, 2011) reported that depressed mothers are likely to express their feelings to their husbands less during pregnancy and receive non-empathic reactions, such as negative or critical responses, from husbands. A study conducted with 1,568 postnatal mothers in the United State (Banker, & Lacoursiere, 2014) demonstrated that couple stress was significantly related to postnatal depressive symptoms, a stronger relationship than both financial and emotional stress. Bancroft and Silverman (2004) indicated that perpetrators of IPV tend to not be empathic and to ignore, disrespect, and deny women's feelings and wills in daily life. Women experiencing IPV during pregnancy may express their feelings about their pregnancy less to their partners or receive less empathic

reactions and attitudes from their partners when they express their own feelings. As a result, these women are more likely to have depressive symptoms after childbirth.

Previous studies have already reported the association between IPV and postnatal depressive symptoms (Beydoun, Beydoun, Kaufman, Lo, & Zonderman, 2012; Gao, Paterson, Abbott, Carter, & Iustini, 2010). A meta-analysis of 37 studies (Beydoun et al., 2012) demonstrated that women exposed to IPV in their lifetime were more likely to report postnatal depressive symptoms than women not exposed to IPV (relative risk [RR] = 1.5–2.0). However, these studies asked participants about their past experience with IPV in their lifetime, including that experienced prior to pregnancy, during pregnancy, and in the postnatal period. Escalating violence during pregnancy has been indicated by previous studies (Bureau of Citizens and Cultural Affairs, 1998; McFarlane et al., 1995; McFarlane et al., 1999). The impact of IPV during pregnancy on postnatal depressive symptoms may be stronger in comparison to IPV in the other periods. Therefore, it is necessary to clarify the association between IPV during pregnancy and postnatal depressive symptoms.

At present, seven studies have investigated the association between IPV during pregnancy and postnatal depressive symptoms (Budhathoki et al., 2012; Faisal-Cury, Menezes, d'Oliveira, Schraiber, & Lopes, 2013; Gomez-Beloz, Williams, Sanchez, &

Lam, 2009; Hayes, Ta, Hurwitz, Mitchell-Box, & Fuddy, 2010; Ludermir, Lewis, Valongueiro, de Araujo, & Araya, 2010; Ogbonnaya, Macy, Kupper, Martin, & Bledsoe-Mansori, 2013; Zhang, Zou, Cao, & Zhang, 2012). Of these, five articles (Ogbonnaya et al., 2013; Zhang et al., 2012; Ludermier et al., 2010; Hayes et al., 2010; Gomez-Beloz et al., 2009) reported that IPV during pregnancy was associated with postnatal depressive symptoms; however, the other two (Budhathoki et al., 2012; Faisal-Cury et al., 2013) found no significant relationship between IPV during pregnancy and postnatal depressive symptoms. These inconsistent results are likely due to differences in study setting, participants, observation points, and how IPV during pregnancy was evaluated between the studies. Thus, we cannot yet conclude that there is an association between IPV during pregnancy and postnatal depressive symptoms, and it remains premature to generalize the results of previous studies to the female population of Japan. Therefore, further studies that longitudinally examine the association between IPV during pregnancy and postnatal depressive symptoms among Japanese women are essential.

5. Impact of antenatal depressive symptoms on the relationships between IPV during pregnancy, bonding failure and depressive symptoms in the postnatal period

Antenatal depressive symptoms may have a strong impact on the relationship

between IPV during pregnancy, mother-to-infant bonding failure, and postnatal depressive symptoms. The increased risk of bonding failure with infants as a function of maternal emotional distress during pregnancy has been previously demonstrated (Mercer, May, Ferketich, & DeJoseph, 1986; Kokubu, Okano, & Sugiyama, 2012; Edhborg, Nasreen, & Kabir, 2011). A theoretical model describing the effect of antenatal stress on family functioning (Mercer et al., 1986) suggests that maternal depressed mood and anxiety during pregnancy negatively influence maternal affection toward infants. A longitudinal study conducted on Japanese women in late pregnancy and one month postnatal (Kokubu et al., 2012) also demonstrated that anxiety during pregnancy significantly affects bonding failure at one month postnatal.

In addition, several reviews have provided evidence on the strong impact of antenatal depressive symptoms on postnatal depressive symptoms (Beck, 2001; O'Hara & McCabe, 2013; O'Hara & Wisner, 2014; Robertson, Grace, Wallington, & Stewart, 2004). A meta-analysis of 84 studies demonstrated that antenatal depressed mood (mean r = .44–.46) and anxiety (mean r = .41–.45) are strongly associated with postnatal depressive symptoms. These previous findings suggest that antenatal depressive symptoms are a significant psychological factor that strongly affects bonding failure and depressive symptoms in the postnatal period.

Antenatal depressive symptoms may have a mediating effect on the relationships between IPV during pregnancy, mother-to-infant bonding failure, and postnatal depressive symptoms. IPV during pregnancy has been reported to be associated with antenatal depressive symptoms (Kataoka, Yaju, Eto, & Horiuchi, 2005; Martin et al., 2006). Therefore, pregnant women experiencing IPV may be more likely to experience antenatal depressive symptoms, and this may result in bonding failure and depressive symptoms after childbirth. However, whether the relationships between IPV during pregnancy, bonding failure and depressive symptoms in the postnatal period are mediated by antenatal depressive symptoms has not yet been examined. Addressing this hypothesis would help to develop effective health interventions for pregnant women who suffer IPV in order to prevent postnatal bonding failure and depressive symptoms.

6. Study hypotheses

This study examined three hypotheses: (1) IPV during pregnancy would be associated with mother-to-infant bonding failure at one month postnatal; (2) IPV during pregnancy would be associated with postnatal depressive symptoms at one month postnatal; and (3) the relationships between IPV during pregnancy, mother-to-infant bonding failure, and postnatal depressive symptoms at one month postnatal would be

mediated by antenatal depressive symptoms (Figure 1).

Participant's demographics, partner's demographics, and childbirth-related variables, such as the mode of delivery and infant admission to NICU, which were potential risk factors for mother-to-infant bonding failure and postnatal depressive symptoms reported by previous studies (O'Hara & Wisner, 2014; O'Hara, Neunaber, & Zekoski, 1984; O' Hara, & McCabe, 2013; Suzuki, Tatsuoka, Sugiura, & Yamagake, 2006; Kumar, 1997; Blom et al., 2010; Staehelin et al., 2013), should be considered as control variables to test the hypotheses. Thus, the paths of these control variables would be set to bonding failure with infants and postnatal depressive symptoms.

In addition, previous findings (Kokubu et al., 2012; Choi et al., 2010; Edhborg et al., 2011) have indicated that both mother-to-infant bonding failure and postnatal depressive symptoms are important psychological factors in the postnatal period that influence mother's parenting behaviors and mutually interact. Thus, these two variables should be investigated as the main outcomes of this study and the covariance path should be set between the error variables of mother-to-infant bonding failure and postnatal depressive symptoms in the analyses (i.e., covariance structure analyses).

7. Study aims

This study aimed to examine the three hypotheses presented above.

8. Operational definitions

This study defined “IPV during pregnancy” as IPV in the third trimester of pregnancy. The Bureau of Citizens and Cultural Affairs of the Tokyo Metropolitan Government indicated that violence began or escalated during pregnancy (Bureau of Citizens and Cultural Affairs, 1998). Therefore, examining IPV in the third trimester of pregnancy could reveal the situation of violence during pregnancy more accurately than either the first or the second trimester of pregnancy.

Moreover, this study defined “postnatal depressive symptoms” as depressed mood and anxiety at one month postnatal. According to Tomb (2005), both depressed mood and anxiety are important clinical symptoms that frequently occurred in depressed patients. Regarding the postnatal time-frame, it remains debatable; however, investigators often use four weeks after childbirth to define the postnatal period. The American Psychological Association (2013) described postnatal depressive symptoms as having a typical onset of four weeks after childbirth. Therefore, investigating depressed mood and anxiety at one month postnatal could precisely reflect postnatal depressive symptoms.

METHODS

1. Study design

A prospective cohort study during the third trimester of pregnancy and one month postnatal was conducted.

2. Study setting and period

This study was conducted in an antenatal outpatient clinic in a hospital in a suburb of Tokyo, Japan from July 2013 to July 2014. The facility has 36 beds and approximately 1,300 childbirths annually. The facility usually provides secondary medical care targeting low-risk pregnant women, and does not have a Maternal-Fetal Intensive Care Unit (MFICU), a Neonatal Intensive Care Unit (NICU), or a psychiatric clinic. Moreover, the area where the facility is located is a major base for small to medium-sized factories, such as printing and machine factories, and has a higher rate of single or nuclear households (Itabashi Public Office, 2014). The facility was selected for this study because of the lower potential for extreme bias among possible participants due to the features of the facility and the area.

3. Participants

Pregnant women who were over 28 weeks pregnant and attended maternity check-ups at the facility were potential participants for this study. Eligible participants were recruited according to the following inclusion criteria: (a) not diagnosed with major mental illness, (b) be able to understand and complete a questionnaire in Japanese, (c) will give birth at the facility, and (d) agree to complete a questionnaire in a private area without a partner.

4. Procedure

Patients' medical records were examined under the supervision of a medical director for obstetrics and a head nurse in the maternity clinic, and used to select eligible participants for this study according to the inclusion criteria. Eligible participants were recruited in the waiting room for the antenatal clinic and were taken to a private room or area to ensure their safety and privacy. In the private area or room, the study was explained to eligible participants according to an informed consent document, and they were invited to participate in the study. After the women agreed to participate in the study, participants were asked for their signature and address on the consent document for follow-up at one month postnatal. After this procedure was completed, the participants were asked to complete a questionnaire (during pregnancy). At this time, an incentive (500-yen gift

card) was provided to the participants. It took approximately 30–40 minutes to complete the whole questionnaire; therefore, the questionnaire during pregnancy could be divided into two parts to reduce the physical and mental burden on participants and prevent any disruption of their maternity check-ups. The first part of the questionnaire asked participants about their demographics, partner's demographics, and IPV during pregnancy. Participants were asked to complete at least the first part of the questionnaire and put it into a sealed envelope in the private room or area to ensure their privacy and safety. The second part of the questionnaire included items on maternal mental health, such as antenatal depressive symptoms. Participants were allowed to complete the second part of the questionnaire outside the private room or area (e.g., in the waiting room or at home). After they completed the questionnaires and put them into a sealed envelope, they were asked to submit them to the researcher directly, or to one of two collection boxes located in the waiting room and the private room in the antenatal clinic.

Patients' medical records were used to determine the delivery date of the participants and collect their obstetric data. At one month postnatal, the postnatal questionnaire was sent to the participants' addresses, and they were asked to complete the questionnaire and send it back to the University of Tokyo within two weeks. Reminders were sent to the participants who did not respond in the 2–4 weeks that followed distribution of the postnatal questionnaire.

5. Data collection

All variables used in this study, except for abortion experience, previous miscarriage and childbirth-related variables, were collected using the questionnaires in the third trimester of pregnancy and at one month postnatal. Previous abortion and miscarriage, and childbirth-related variables (obstetric information) were obtained from patient medical records.

6. Measures

The questionnaires in the third trimester of pregnancy and at one month postnatal were constructed in accordance with previous studies and preliminary interviews with abused women who visited IPV counseling offices and professional IPV counselors.

1) Variables in the third trimester of pregnancy

(1) Demographics

Age, nationality, marital status, parity, employment status, annual income, educational attainment, current alcohol and cigarette use, abortion experience, and previous miscarriage were used as the participants' demographic variables. Partner's age, nationality, employment status, educational attainment, and current alcohol and cigarette use were included as demographic variables for the participants' partners. In addition, the mode of delivery (e.g., instrumental delivery and emergency cesarean section), induction

of labor, fetal distress during labor, infant admission to NICU, and baby's sex were obtained as childbirth-related variables.

These variables were selected as potential risk factors for mother-to-infant bonding failure and postnatal depressive symptoms in accordance with previous findings (O'Hara & Wisner, 2014; O'Hara, Neunaber, & Zekoski, 1984; O' Hara, & McCabe, 2013; Suzuki et al., 2006; Kumar, 1997; Blom et al., 2010; Staehelin et al., 2013). These variables were used as control variables to examine the relationships between IPV during pregnancy, antenatal depressive symptoms, bonding failure and depressive symptoms in the postnatal period.

(2) IPV during pregnancy

The severity of IPV during pregnancy was measured using the Index of Spouse Abuse (ISA) (Hudson & McIntosh, 1981; Kataoka, Yaju, Eto, & Horiuchi, 2005). The ISA is a 30-item self-report scale that measures the severity of physical and non-physical violence toward female respondents by an intimate partner (Hudson & McIntosh, 1981). The original ISA has two dimensions: physical abuse (ISA_P) and non-physical abuse (ISA_NP). The ISA_P has eleven items, including "performs sex acts," "punches me," "threatens me with a weapon," "beats me," "slaps me around," and "is abusive when drinking" (Hudson & McIntosh, 1981). On the other hand, the ISA_NP has 19 items, including "belittles me," "is jealous and suspicious," "tells me I am ugly," "is an unkind

person," "does not like me socializing with friends," "orders me around," "does not respect my feelings," and "treats me like a dunce" (Hudson & McIntosh, 1981). For each item, the women respond on a scale from 1 (never) to 5 (very frequently) (Hudson & McIntosh, 1981). Each item is weighted differently and the scores of the ISA_P and ISA_NP are calculated combining the weighted items, respectively (Hudson & McIntosh, 1981). Scores of the ISA_P and ISA_NP range from 0 to 100, and "the low scores indicate the relative absence of abuse and the higher scores indicate the presence of a greater degree or amount of abuse" (Hudson & McIntosh, 1981). The ISA subscale scores have demonstrated good construct validity with the Generalized Contentment Scale (GCS), the Index of Self-Esteem (ISE), the Index of Marital Satisfaction (IMS), and clinical abuse status among women in protective shelters (Hudson & McIntosh, 1981). The reliabilities of the ISA subscales are also excellent (ISA_P: .90; ISA_NP: .91) (Hudson & McIntosh, 1981).

The cut-off points of the ISA subscale were established for clinical use by investigating abused women in protective shelters (ISA_P: 10; ISA_NP: 25) (Hudson & McIntosh, 1981). The ISA is widely used as a gold standard to validate IPV screening tools (Feder et al., 2009), such as the Violence Against Women Screen (VAWS) (Kataoka 2005), the Hurts, Insults, Threatens, and Screams at Her (HITS) scale (Chen, Rovi, Vega, Jacobs, & Johnson, 2005), and the Ongoing Abuse Screen (OAS) (Weiss, Ernst, Cham,

& Nick, 2003). Hudson & McIntosh (1981) warned the cut-off points of the ISA should be cautiously applied in a general female population due to its feature of identifying severe violence.

The ISA was translated into Japanese by Kataoka et al. (2005). The content validity of the Japanese version of the ISA was confirmed by 10 female faculty members (Katatoka et al., 2005). The same two dimensions and almost identical factor structures were confirmed by an exploratory factor analysis (Kataoka et al., 2005). The cutoff points of the subscales of the Japanese ISA were confirmed as the same cut-off points of the original ISA (ISA_P: 10; ISA_NP: 25) using a cluster analysis (Kataoka et al., 2005). Construct validity was examined using the subscales of the Japanese version of the General Health Questionnaire (GHQ). The three subscales of the Japanese GHQ: depressive symptoms, anxiety, and sleeping impairment were significantly related to the women identified as IPV victims by the Japanese version of the ISA (Kataoka et al., 2005; Kataoka, 2005). In addition, the reliabilities of the subscales of the Japanese version of ISA were excellent (ISA_P: $\alpha = .80$; ISA_NP: $\alpha = .90$) (Kataoka et al., 2005).

The internal consistencies of the subscales of the Japanese ISA in this study were also good (ISA_P: $\alpha = .70$; ISA_NP: $\alpha = .85$).

(3) Antenatal depressive symptoms

Antenatal depressive symptoms during pregnancy were evaluated using the

Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). The HADS was developed to measure the severity of anxiety and depression among patients with physical illness in a medical outpatient clinic in a hospital (Zigmond & Snaith, 1983). The HADS is a 14-item self-reported scale and has two subscales: anxiety (HADS_A), and depression (HADS_D) (Zigmond & Snaith, 1983). Each subscale includes seven items. Scores of the HADS range from 0 to 21 (Zigmond & Snaith, 1983). Higher scores indicate more severe adverse symptoms. The HADS subscales are highly correlated with psychiatric assessments of anxiety and depression from interviews by clinicians (Zigmond & Snaith, 1983).

The HADS was translated into Japanese by Kitamura (Zigmond, Snaith, & Kitamura, 1993). The Japanese version of the HADS has the same two factors: anxiety (HADS_A) and depression (HADS_D) (Zigmond et al., 1993). Two previous studies examined the validity and reliability of the Japanese HADS for patients in a gastrointestinal clinic, female university students, and female workers in a hospital (Higashi et al., 1996; Hatta et al., 1998). As a result, the criterion validities of the subscales of the Japanese HADS were verified by comparisons with the State-Trait Anxiety Inventory (STAI) and the Zung's Self rating Depression Scale (SDS) (HADS_A: .58–.68; HADS_D: .46–.57) (Higashi et al., 1996; Hatta et al., 1998). The reliabilities of the subscales of the Japanese version of the HADS were also fairly good

(HADS_A: α = .80–87; HADS_D: α = .50–76) (Higashi et al., 1996; Hatta et al., 1998).

The reliability of the subscales of the Japanese version of the HADS during the third trimester of pregnancy in this study was acceptable (HADS_A: α = .66; HADS_D: α = .69).

2) Variables at one month postnatal

(1) Postnatal depressive symptoms

Postnatal depressive symptoms were measured using the Japanese version of the HADS (Zigmond et al., 1993; Higashi et al., 1996; Hatta et al., 1998). The internal consistencies of its subscales at one month postnatal in this study were good (HADS_A: α = .71; HADS_D: α =.73).

(2) Mother-to-infant bonding failure

Mother-to-infant bonding failure was evaluated by the Mother-Infant Bonding Scale (MIBS) (Kumar, 1997). Kumar (1997) conducted a narrative study with mothers and developed a self-report screening scale: the Mother-Infant Bonding Questionnaire (MIBQ) (Kumar, 1997). A new measurement that revised the MIBQ was developed and named the MIBS (Taylor, Atkins, Kumar, Adams, & Glover, 2005). The construct validity of the MIBS with the Edinburgh Postnatal Depression Scale (EPDS) was good in the postnatal period (MIBS at day three postnatal: r = .24; MIBS at 12 weeks postnatal: r = .31) (Taylor et al., 2005). The test-retest reliabilities of the MIBS on day three, the first

few weeks, and 12 weeks postnatal were all excellent (r = .57, .54, and .61, respectively) (Taylor et al., 2005). The MIBS comprises an eight-item self-measured scale with the following items: “loving,” “resentful,” “neutral or feel nothing,” “joyful,” “dislike,” “protective,” “disappointed,” and “aggressive” (Taylor et al., 2005). Kumar’s colleague, Marks, later modified the wording and added new items, resulting in a total of 10 items (Yoshida et al., 2012).

A Japanese version of the MIBS (the MIBS-J) was developed by Yoshida et al. (2012). The MIBS-J has two subscales: lack of affection (MIBS_LA) and anger and rejection (MIBS_AR) (Yoshida et al., 2012). Of the 10 items of the MIBS-J, two items (items 4 and 9) are removed when calculating the score of the subscales because the factor loadings of those items were quite low for both factors (Yoshida et al., 2012). The scores of the MIBS-J subscales range from 0 to 12 (Yoshida et al., 2012). Higher scores indicate a greater severity of bonding failure (Yoshida et al., 2012). The reliabilities of the subscales were reasonable (MIBS_LA: $\alpha = .71$; MIBS_AR: $\alpha = .51$) (Yoshida et al., 2012). In addition, the good test-retest reliabilities of the subscales were confirmed on day five, one month, and four months postnatal (Yoshida et al., 2012). The MIBS-J subscales were strongly correlated with the Japanese version of the EPDS (Yoshida et al., 2012).

The Cronbach’s alphas for the subscales of the MIBS-J (MIBS_LA and MIBS_AR) in this study were .70 and .55, respectively. The internal consistency of the

MIBS_AR in this study was relatively low; however, it was almost the same as that obtained in the study that developed the MIBS-J (MIBS_AR = .51) (Yoshida et al., 2012).

7. Statistical analyses

First, descriptive statistics were used for participants' demographic characteristics. Data are shown in Table 1 (n [%], and mean [SD]). In addition, in order to determine the characteristics of IPV among the participants, the frequency distribution (n [%]) of the 30 items of the Japanese version of the ISA and the participants identified as IPV victims according to the cut-off points of the Japanese version of the ISA were calculated.

Next, the mean, SD, and skewness were calculated for all the variables used in this study. Variables with a skewness greater than two were logarithmically transformed to fix the violation of normality (Kitamura, 2013). After that, the correlations between all variables were examined.

Finally, structural equation modeling (SEM) was conducted using the variables that were significantly correlated with the subscales of the MIBS and the HADS at one month postnatal. The model was tested using SEM. The model fit with the data was examined using the terms of chi-squared (CMIN), df, comparative fit index (CFI), adjusted goodness-of-fit index (AGFI), goodness-of-fit index (GFI), and root mean

square error of approximation (RMSEA). According to conventional criteria, a good fit would be indicated by CMIN/df < 2, CFI > 0.97, AGFI > 0.90, GFI > 0.95, RMSEA < 0.05, while an acceptable fit would be indicated by CMIN/df < 3, CFI > 0.95, AGFI > 0.85, GFI > 0.90, and RMSEA < 0.08 (Schermelleh-Engel & Moosbrugger, 2003).

Moreover, the covariance paths between "depression" (the subscale of the HADS) during the third trimester of pregnancy and "depression" (the subscale of the HADS) at one month postnatal, and between "anxiety" (the other subscale of the HADS) during the third trimester of pregnancy and "anxiety" (the other subscale of the HADS) at one month postnatal were added after evaluating the modification indexes (22.23 and 54.25, respectively) to improve the model fit with the data.

All statistical analyses were conducted using the Statistical Package for Social Science (SPSS) version 20.0 and Amos 20.0.

8. Ethical considerations

The study protocol was approved by the Ethical Committee of the Graduate School of Medicine, the University of Tokyo (No. 10137).

Disclosure of experience of IPV in the questionnaire during pregnancy might violate safety and privacy. In addition, follow-up care for participants who disclosed IPV and sought help was necessary. Therefore, the following additional ethical policies were

implemented: (a) the aim of this study was carefully explained and participants were then asked to sign a consent document, and complete at least the first part of the questionnaire during pregnancy (including the questions about IPV) in the private room or an area without the presence of their partners; (b) IPV resource cards and brochures were placed in a women's bathroom and a private room for the participants to obtain information about IPV and relevant social resources at any time; (c) participants who disclosed experience of IPV and sought assistance were provided information about IPV social resources, such as the Tokyo women's plaza and the Tokyo female counseling office; (d) participants were instructed that they did not have to answer sensitive or uncomfortable questions, such as those concerning IPV, whenever they did not want to answer or did not feel good answering; (e) participants were told that appropriate medical and nursing care could be provided immediately if they experienced any physical and psychological discomfort, such as post-traumatic stress disorder (PTSD), which may be caused by answering IPV-related questions; (f) the research assistants were trained regarding additional ethical policies and a basic knowledge of IPV, including the fundamentals of IPV, IPV social resources, and a proper attitude toward women who experience IPV. This training was provided by the researcher (SK), who completed an IPV facilitator training program, in order to ensure participants' safety and prevent women who experienced IPV from secondary victimization, that is, "victim-blaming attitudes, behaviors, and practices,

which result in additional trauma" (Campbell & Raja, 1999).

This study implemented these considerations based on respecting women's self-determination according to the policies of the Japanese law regarding IPV (the Act on the Prevention of Spousal Violence and the Protection of Victims) (Gender Equality Bureau, 2014) and the clinical IPV guideline for perinatal health care professionals (Horiuchi et al., 2009). This law and guideline mention that health care professionals have to respect women's wills when they detect IPV in health care settings, because forced assistance for IPV victims may lead to worsening violence, additional trauma, and detachment from proper assistance. Therefore, this study provided additional IPV care, such as providing information about IPV social resources, as recommended by the IPV guideline (Horiuchi et al., 2009), only for the participants who sought assistance.

RESULTS

A total of 955 eligible women were invited to participate in this study. Of these, 123 women did not agree to participate in this study for the following reasons: too busy (n = 46), planning to give birth at a different hospital (n = 55), could not read Japanese (n = 21), and prohibited by husband (n = 1). A total of 832 women agreed to participate and completed the questionnaire during pregnancy. The one-month postnatal questionnaire was sent to 824 participants. Two women cancelled their participation, three were sent to a different hospital for postnatal atonic bleeding, obstetrical anesthesia, and preterm birth, and three babies died from intrauterine fetal death (IUFD) (n = 2) and aortic coarctation (n = 1). Responses were completed and returned by 610 participants. The response rate was 74.0%. Finally, the data for 562 participants were used for the analyses after eliminating responses that were late by over two months (n = 41), and responses with excessive blanks (n = 7) (Figure 2).

1. Participant demographics

The average age of the participants was 32.2 (SD = 5.0, range: 19–46). Almost all of the participants were married (97.3%) and Japanese (97.3%). Approximately half of the participants (48.3%) were multiparas. Among the multipara participants, the

majority of births were paras (76.1%). Participants were divided almost equally among three educational backgrounds: junior/senior high school (23.7%), junior college/technical school (37.0%), and university and graduate school (39.3%). Three million to less than five million yen was the most common annual household income (35.1%), followed by five million to less than seven million yen (26.7%), seven million to less than nine million yen (19.9%), over nine million yen (11.2%), and less than three million yen (7.1%). Half of the participants (50.7%) did not work. In addition, 72 (12.8%) participants reported previous experience of abortion, and 99 (17.6%) reported previous miscarriage experience. Most of the participants did not drink alcohol or smoke (3.6%, and 2.3%, respectively) (Table 1).

Regarding the childbirth-related variables among participants, natural delivery was the most common mode of delivery (72.6%). Forty-six (8.4%) participants experienced vacuum extraction, two (0.2%) had a forceps delivery, 45 (8.0%) had an emergency cesarean section, and 61 participants (10.9%) delivered by a scheduled cesarean section. Labor was induced for 16.5% of the participants. Subsequently, 11.5% of the participants were diagnosed with fetal distress during labor and six (1.1%) infants were sent to NICU in another hospital after childbirth. The rates for the sex of the babies were almost the same; however, the rate for girls was slightly higher than that of boys

(boys = 46.4%, girls = 53.6%) (Table 1).

The average partner age was 33.9 (SD = 5.89, range: 19–59). Most of the participants' partners were Japanese (95.7%) and full-time workers (92.9%), and over half of partners (59.3%) graduated from a university or graduate school. Moreover, 37.9% of the partners drank alcohol, and 70.1% smoked cigarettes (Table 1).

The average scores of the HADS subscales during the third trimester of pregnancy were HADS_A = 4.55 ± 3.01 and HADS_D = 4.35 ± 3.00. On the other hand, the average scores of the subscales of the HADS and MIBS at one month postnatal were HADS_A = 5.20 ± 3.18, HADS_D = 5.04 ± 3.40, MIBS_LA = 1.11 ± 1.53, and MIBS_AR = 1.13 ± 1.39 (Table 2).

2. IPV among the participants

1) Frequencies of the items of the Japanese version of the ISA (Table 3)

Of the entire sample, 198 (35.2%) answered all the items of the ISA_NP negatively, and 364 (64.8%) responded more than "rarely" to at least one item on the ISA_NP. On the other hand, 349 (62.1%) participants gave negative responses to all the items of the ISA_P, and 213 (37.9%) answered more than "rarely" to at least one item on the ISA_P.

The most frequent items of the ISA_NP to which participants gave positive responses (more than “rarely”) were “My partner belittles me” (37.7%), “My partner demands obedience to his whims” (35.0%), and “My partner becomes very angry if I disagree with his point of view” (27.4%). On the other hand, the most frequent items of the ISA_P that were answered positively (more than “rarely”) were “My partner becomes surly and angry if I tell him he is drinking too much” (18.5%), “My partner makes me perform sex acts that I do not enjoy or like” (18.0%), and “My partner screams and yells at me” (14.9%). Eleven women (2.0%) answered positively (more than “rarely”) on the items indicating severe physical violence, such as “My partner punches me with his fists” and “My partner slaps me around my face and head.” Eight women (1.5%) responded positively to “My partner acts like he would like to kill me,” and four women (0.8%) answered, “My partner beats me so badly that I must seek medical help.”

2) Total scores for the subscales of the Japanese version of the ISA

The average total scores of the ISA_NP and ISA_P were 5.17 ± 7.78 and 1.37 ± 3.16, respectively. The range of scores on the ISA_NP was 0 to 63.31 and 0 to 32.29 on the ISA_P.

3) Prevalence of IPV

The prevalence of IPV, defined as score of ≥25 on the ISA_NP and ≥10 on the ISA_P was 20 (3.6%) and 14 (2.5%), respectively. Eight women (1.4%) were identified as IPV victims of both of non-physical (ISA_NP) and physical violence (ISA_P). Twenty-six participants (4.6%) were identified as victims of either non-physical (ISA_NP) or physical violence (ISA_P).

3. Correlations among study variables

Means, SDs, and skewness for all the variables used in this study and their correlations are shown in Table 4. The ISA_NP, ISA_P subscale scores, and the abortion and miscarriage items had a skewness greater than two (ISA_NP = 4.67, ISA_P = 2.40, abortion= 3.40, and miscarriage= 2.63); therefore, these four variables were logarithmically transformed and used for the analyses.

Postnatal HADS_A was significantly correlated with ISA_NP (r = .18), ISA_P (r = .14), parity (r = -.11), marital status (r = -.09), antenatal HADS_A (r = .47), and antenatal HADS_D (r = .37). Postnatal HADS_D was significantly correlated with ISA_NP (r = .18), age (r = .10), parity (r = -.10), antenatal HADS_A (r = .34), and antenatal HADS_D (r = .51). On the other hand, MIBS_LA was significantly correlated

with ISA_NP (r = .13), age (r = .11), parity (r = -.13), antenatal HADS_A (r = .15), and antenatal HADS_D (r = .27). MIBS_AR was significantly correlated with ISA_NP (r = .14), parity (r = -.25), partner's employment status (r = .09), antenatal HADS_A (r = .21), and antenatal HADS_D (r = .23).

4. Path model

The final path model (Figure 3) showed a good fit with the data: CMIN/df = 1.42, CFI = .99, AGFI = .97, GFI = .99, RMSEA = .03. This model demonstrated that (a) IPV during pregnancy was associated with mother-to-infant bonding failure (β = *.16*); (b) IPV during pregnancy was associated with antenatal depressive symptoms (β = *.32*); (c) antenatal depressive symptoms were associated with mother-to-infant bonding failure and postnatal depressive symptoms (β = *.44*, and β = *.57*); (d) the error variables between bonding failure with infants and postnatal depressive symptoms were correlated with each other (β = *.56*); (e) primipara was associated with "anger and rejection", and "lack of affection" (β = *-.28*, and β = *-.20*); (f) older age was associated with "lack of affection" (β = *.17*); (g) primipara and older age were associated with postnatal "depression" and "anxiety" respectively (primipara: β = *-.18*, and β = *-.17*, older age: β = *.18*, and β = *.12*); (h) IPV during pregnancy were correlated with single status, and multipara (β = *-25*, and β = *.14*); and (i) parity and age were positively correlated (β = *.21*).

DISCUSSION

The main finding of this study was that IPV during pregnancy was associated with mother-to-infant bonding failure at one month postnatal. In addition, the relationships between IPV during pregnancy, mother-to-infant bonding failure, and postnatal depressive symptoms at one month postnatal were mediated by antenatal depressive symptoms.

1. Features of the participants in this study

Participants may have been likely to be socially and economically disadvantaged. The rates of the participants who had a job (including maternity leave) (49.8%) and who graduated from university or college (39.3%) were lower compared to those among women aged 25–34 years old reported by national surveys in Japan (67.0% and 63.0%, respectively) (Ministry of Health, Labour and Welfare, 2014; Ministry of Education, Culture, Sports, Science and Technology, 2011). In addition, the most frequent response for household income in this study was three million to less than five million yen (35.1%). The average household income of adults aged 30–35 years old in Japan is 5,450,000 yen (Ministry of Health, Labour and Welfare, 2014), indicating that the participants in this study had lower household incomes in comparison to individuals in the general Japanese

population.

Moreover, the rate of multipara women in this study (48.4%) was relatively high in comparison to that of the Comprehensive Survey of Living Conditions in Japan (25.3%) (Ministry of Health, Labour and Welfare, 2013).

Regarding age, marital status, nationality, abortion experience, previous miscarriage, smoking, and alcohol consumption, rates in this study were not considerably different from previous findings on pregnant women in Japan (Inami, Kataoka, Eto, & Horiuchi, 2010; Kita, Kataoka, & Porter, 2013; Kataoka et al., 2005).

All the rates of medical intervention during delivery among the participants, such as instrumental deliveries, caesarean section, and induction of labor were comparatively lower than those reported by the governmental survey (8.6%, 18.9%, 16.5%, and 10.6%, 23.3%, 18.7-26.1%, respectively) (Ministry of Health, Labors, and Welfare, 2010) and previous findings (Kasai et al., 2012; Osada, Tsunoda, Toida, Yamada, & Tsubone, 2014). In addition, the rate of fetal distress during labor in this study was lower than that of a previous study, which investigated 1,722 women, aged 30–34 in Tokyo (11.5% compared to 18.7%) (Ksasai et al., 2012). The lower incidence of high-risk deliveries in this study may be due to the fact that the facility was a secondary medical hospital focusing on low-risk pregnant women.

The most remarkable feature of the partners of the study participants was the high percentage of those who worked full-time (92.9%). Compared to the rate of full-time workers among men who had children (85.0%) in a nationwide survey for 2,218 households in Japan (Zhou et al., 2012), the percentage in this study was higher. Partner's educational attainment (rate of tertiary education: 59.3%) was also higher than that (35.6%) reported by the same survey (Zhou et al., 2012). In addition, the partners of the participants may have been more likely to smoke (70.1%) and not drink alcohol (37.9%) in comparison to the general male population aged 30–39 years old (43.4% and 57.4%, respectively) (Ministry of Health, Labour and Welfare, 2014).

The mean scores of the subscale of the HADS in the third trimester of pregnancy in this study (HADS_A = 4.45; HADS_D = 4.35) were slightly higher than those showed in a previous study using the HADS at late pregnancy in Japan (33–35 gestational weeks) (HADS_A = 3.6; HADS_D = 3.8) (Kokubu et al., 2012). The mean scores of the MIBS at one month postnatal (MIBS_LA = 1.11; MIBS_AR = 1.13) were almost the same as those of a previous study of Japanese women at three months postnatal (MIBS_LA = 1.2; MIBS_AR = 1.1) (Kitamura et al., 2013). Regarding the HADS at one month postnatal, none of the studies that investigated the postnatal period among Japanese women reported mean HADS scores in the postnatal period, and thus, the features of postnatal depressive

symptoms among these participants could not be easily interpreted.

The descriptive results of the Japanese version of the ISA in this study were very similar to those of a study conducted among general pregnant women in Japan using the ISA (Kataoka et al., 2005). The mean scores of both subscales of the Japanese version of the ISA in this study (ISA_NP = 5.13; ISA_P = 1.37) were similar with those reported by a previous study (ISA_NP = 4.9; ISA_P = 1.47) (Kataoka et al., 2005). In addition, the most frequent responses of the ISA_NP and ISA_P were all identical to those of this previous study (ISA_NP: items 1, 2, 12; ISA_P: items 3, 4, 28) (Kataoka et al., 2005). The prevalence of IPV during pregnancy (4.6%) also was similar to that of the previous study (5.4%) (Kataoka et al., 2005).

The prevalence of IPV during pregnancy in this study was much lower than that reported by previous studies using different IPV scales (e.g., VAWS) for Japanese pregnant women in antenatal health settings (15.9–31.4%) (Inami et al., 2010; Kita et al., 2013). This difference is thought to perhaps relate to the difference in features between the ISA and other IPV screening tools. The cut-off point of the ISA was developed through comparisons to the experience of violence among abused women who escaped into female shelters (Hudson & McIntosh, 1981), which is why the ISA has been widely used as a gold standard for developing IPV screening tools in several studies (Feder et al.,

2009; Kataoka, 2005; Chen et al., 2005; Wiess et al., 2003). Thus, the 26 pregnant women identified as victims of IPV by the ISA in this study experienced very severe violence similar to the violence experienced by abused women in female shelters.

2. Association between IPV during pregnancy and mother-to-infant bonding failure

Notably, this study found that IPV during pregnancy was associated with mother-to-infant bonding failure, which may then lead to abusive parenting behaviors by mothers. The profound effect of IPV victimization on child abuse has been reported by previous studies (Chan et al., 2012; Tajima, 2000; Rumm, Cummings, Krauss, Bell, & Rivara, 2000). However, it remained unclear why women who experienced IPV were likely to be abusive towards their children. In recent years, bonding failure after childbirth has been considered a strong contributor to mothers' abusive behaviors (e.g., physical and emotional abuse, neglect) towards children (Kitamura et al., 2013; Choi et al., 2010). These studies suggest that mothers who experience IPV during pregnancy tend to have a greater incidence of bonding failure with infants after childbirth, which would then contribute to the mother's abusive parenting behaviors. However, abusive parenting behaviors after childbirth were not investigated in this study; therefore, it remains unclear whether bonding failure with infants becomes a psychological factor influencing abusive

parenting behaviors among mothers who experienced IPV during pregnancy. Therefore, an additional study investigating mothers' abusive parenting is essential in the future.

Controlling behaviors by abusive partners after childbirth may be one of the direct reasons for the relationship between IPV during pregnancy and mother-to-infant bonding failure. IPV perpetrators are likely to exhibit behaviors to directly control maternal-newborn bonding and the mother's parenting behaviors after childbirth (Bancroft, & Silverman, 2004). Bancroft and Silverman (2004) have reported IPV perpetrators often complain and forbid women to take close care of their babies, such as holding crying babies and breastfeeding them, due to jealousy towards the infants, regardless of the presence of violence after childbirth. These controlling behaviors after childbirth by partners who are abusive during pregnancy may directly contribute to bonding failure with infants and improper parenting behaviors, such as neglect, in the postnatal period.

In addition, direct interference in maternal-fetal relationships by abusive partners during pregnancy may also affect the relationship between IPV during pregnancy and bonding failure after childbirth. Bancroft and Silverman (2004) mentioned IPV perpetrators are likely to feel discomfort and jealousy when women express their affection, interest, and care for their babies from the beginning of the pregnancy (Bancroft, &

Silverman, 2004). Several studies (Parker, McFarlane, Soeken, Torres, & Campbell, 1993; Bancroft, & Silverman, 2004; Heise, Ellsbirt, & Gottemoeller, 1999) have reported that abusive partners frequently prohibit pregnant women from understanding fetal development and health (to visit maternity check-ups), and from doing beneficial things for the fetus, such as weight control. These behaviors to disturb the development of close relationships between mother and baby during pregnancy may lead to bonding failure after childbirth. However, this study did not investigate behaviors controlling maternal-baby relationships and parenting; therefore, a further study which includes these variables would be necessary in the future.

Psychological difficulty with adapting to one's new role as a mother during pregnancy is another possible reason for the association between IPV during pregnancy and mother-to-infant bonding failure. Mercer (1995) and Tomey and Alligood (2004) described intimate partner relationships and emotional support from partners are essential to accepting one's new role as a mother during pregnancy, ultimately resulting in the mother's affective feelings toward the baby. It would be difficult for pregnant women who experience IPV to build intimate and supportive relationships with their partner during pregnancy. This may then lead to maladaptation to maternal roles during pregnancy, resulting in the mother's failure to bond with her baby after childbirth.

However, this study did not investigate adaptation to new maternal roles during pregnancy. Therefore, a further investigation examining this new hypothesis is necessary.

Another possible reason for the relationship between IPV during pregnancy and bonding failure with infants could be bonding failure with the fetus during pregnancy. A cross-sectional study exploring factors associated with bonding failure after childbirth in Sweden (Edhborg, Nasreen, & Kabir, 2011) demonstrated that maternal bonding failure with the fetus was significantly related to bonding failure at three months postnatal. Mercer (1995) and Tomey and Alligood (2004) indicated that pregnant women with intimate partner relationships were likely to express more interests and affection towards the fetus beginning in early pregnancy. It is possible that pregnant women who experience IPV already begin to have negative feelings toward the baby early in pregnancy, which then continues after the baby is born. However, bonding failure with the fetus was not examined in this study. Therefore, further studies should investigate the effect of bonding failure with the fetus.

Moreover, IPV after childbirth may also be a potential reason for the relationship between IPV during pregnancy and bonding failure with infants. IPV during pregnancy may be strongly associated with IPV after childbirth. Previous studies that tracked abused women from pregnancy to after childbirth (Harrykissoon, Rickert, & Wiemann, 2002;

McFarlane & Soeken, 1999) have showed 44.6–75.0% of women abused during pregnancy reported being victimized by IPV at three or six months after childbirth. It is highly possible that women who experience IPV during pregnancy continue to be victimized by IPV after childbirth, which might have a consequent effect on bonding failure after childbirth. However, the effect of IPV after childbirth on bonding failure with infants could not be investigated in this study because of the limited research procedure (i.e., mail-based survey) at one month postnatal. No previous studies have investigated continuous IPV, beginning in pregnancy to the postnatal period, and its association with mother-to-infant bonding failure. Therefore, additional studies investigating IPV after childbirth are necessary.

3. Association between IPV during pregnancy and postnatal depressive symptoms

No significant relationship between IPV during pregnancy and postnatal depressive symptoms was found after adjusting for demographic variables (marital status, parity, and age) and antenatal depressive symptoms. The result did not correspond with previous findings reporting an association between IPV during pregnancy and postnatal depressive symptoms (Hayes et al., 2010; Zhang et al., 2012; Gomez-Beloz et al., 2009; Ogbonnaya et al., 2013; Ludermier et al., 2010). However, these studies failed to consider

antenatal depressive symptoms as a confounding factor in examining the association between IPV during pregnancy and postnatal depressive symptoms. Thus, antenatal depressive symptoms should be considered as a confounding factor that strongly affects postnatal depressive symptoms.

It is possible that IPV after childbirth affects postnatal depressive symptoms more than IPV during pregnancy. Dramatic biological and environmental changes occur among women after the baby is born. Steroid hormones that support pregnancy, such as estradiol, progesterone, and cortisol are dramatically reduced after childbirth (O'Hara & McCabe, 2013; O'Hara, Schlechte, Lewis, & Wright, 1991; Workman, Barha, & Galea, 2012). Withdrawal of steroid hormones after childbirth is a proximate cause of postnatal depressive symptoms (O'Hara, 2013; O'Hara et al., 1991; Workman et al., 2012). In addition, physical damage due to obstetric stress, and poor accommodation to the new environment with the baby and childrearing after childbirth have a profound influence on postnatal depressive symptoms (Kitamura et al., 2006; O'Hara et al., 1984). Thus, the postnatal period may be a time of greater vulnerability to postnatal depressive symptoms in comparison to the pregnancy period. Therefore, it may be easier to develop postnatal depressive symptoms as a function of IPV after childbirth as opposed to IPV during pregnancy. However, this study did not investigate the effect of IPV after childbirth, and

therefore, further studies should be conducted.

4. Impact of antenatal depressive symptoms on the relationships between IPV during pregnancy, bonding failure and depressive symptoms in the postnatal period

This study suggested that antenatal depressive symptoms may play an important factor as a mediator of the relationship between IPV during pregnancy and mother-to-infant bonding failure. Mercer et al. (1986) proposed that maternal depressed mood and anxiety during pregnancy adversely affect the mother's affection toward her baby. A longitudinal study conducted during late pregnancy and at one month postnatal in Japan (Kokubu et al., 2012) reported that anxiety during pregnancy significantly affects bonding failure at one month postnatal. Women who experience IPV during pregnancy may be more likely to experience depressive symptoms during pregnancy, such as depressed mood and anxiety, thus manifesting into a psychological reason for bonding failure after childbirth. This result provides evidence for the necessity of psychological health interventions for abused women to prevent antenatal depressive symptoms in antenatal health settings in order to prevent bonding failure after childbirth.

Moreover, as a mediator, antenatal depressive symptoms may also significantly influence the relationship between IPV during pregnancy and postnatal depressive

symptoms. In this study, the strong association between antenatal depressive symptoms during the third trimester of pregnancy and postnatal depressive symptoms at one month postnatal was confirmed (β = .57). This was consistent with previous findings (O'Hara et al., 1984; O'Hara & Wisner, 2014). In addition, a significant correlation between postnatal depressive symptoms and bonding failure at one month postnatal was observed. These findings suggest that antenatal depressive symptoms caused by IPV during pregnancy transfer to postnatal depressive symptoms after childbirth, and then the postnatal depressive symptoms may be associated with bonding failure with infants. This is indicative of the importance of antenatal psychological care by health care professionals for abused women to prevent antenatal depressive symptoms during pregnancy in order to prevent both bonding failure and depressive symptoms at one month postnatal.

5. Interactions between other variables

Single status and multipara were treated as control variables in this study were correlated with IPV during pregnancy and each other. These results were consistent with those of previous findings examining factors associated with IPV during pregnancy (Espinosa & Osborne, 2002; Kita et al., 2013; Kataoka et al., 2005; Inami et al., 2010).

Next, significant relationships were found between older age and primipara with the subscale scores of bonding failure (MIBS) and depressive symptoms (HADS) after childbirth (older age: lack of affection, depressed mood, and anxiety; primipara: lack of affection, anger and rejection, depressed mood, and anxiety). A recent study investigating risk factors for bonding failure and depressive symptoms at three months after childbirth in Japan (Kitamura et al., 2013) reported that young women and multiparous women were more likely to experience bonding failure and depressive symptoms after childbirth. This result differs from that of this study. However, a recent study that focused on older primiparous women in the postnatal period (Fujioka et al., 2014) demonstrated that older primiparous women were more likely to experience depressive symptoms and express negative feelings toward the baby after childbirth, such as "I do not know why my baby is crying," in comparison with other primiparous women. It is possible that there are greater physical and emotional burdens associated with childbirth and childrearing among older primiparous women. However, the causes of increased bonding failure and depressive symptoms among older primiparous women after childbirth remain unclear. Therefore, further studies exploring influential factors for older primiparous women on bonding failure and depressive symptoms after childbirth should be conducted.

In addition, this study found a mutual association between mother-to-infant

bonding failure and postnatal depressive symptoms. This result is similar to that of a previous investigation at one month postnatal in Japan (Kokubu et al., 2012). A causal relationship between bonding failure and depressive symptoms after childbirth is still being discussed (Dubber et al., 2014; Edhborg et al., 2011; Ohoka et al., 2014; Choi et al., 2010; Kokubu et al., 2012; Tharner et al., 2012); however, several studies (Dubber et al., 2014; Edhborg et al., 2011; Ohoka, et al., 2014) have reported that postnatal depressive symptoms were a significant predictor of bonding failure with infants. Loss of interest and interpersonal withdrawal are the most representative of postnatal depressive symptoms (American Psychiatric Association, 2013). Those postnatal depressive symptoms may cause negative feelings with infants, especially less affection and indifference. Conversely, a study conducted with 413 Japanese postnatal mothers (Choi et al., 2010) has demonstrated that bonding failure with newborns significantly impacted postnatal depressive symptoms. This study could not determine a clear causal association between these two variables due to its cross-sectional method at one month postnatal. Thus, a longitudinal study with several observation points in the postnatal period is essential to clarify the causal relationship between bonding failure and depressive symptoms in the postnatal period.

6. Implications for clinical practice

This study suggests that antenatal interventions for IPV might be effective in preventing bonding failure and depressive symptoms after childbirth. Early detection of IPV and advocacy interventions to encourage abused women to seek assistance by providing them with useful information and support to facilitate access to community resources, such as female counseling offices and protective shelters, have been recommended as interventions for IPV in health care settings (Horiuchi et al., 2009; McFarlane, Soeken, & Wiist, 2000; Ramsay et al., 2009; World Health Organization, 2013). The interventions have been effective in reducing or terminating IPV 12–24 months later (Ramsay et al., 2009; McFarlane et al., 2000). This study indicated that those antenatal interventions for IPV by perinatal health care providers may be effective in preventing bonding failure and depressive symptoms at one month postnatal.

Moreover, this study suggests that antenatal psychological care to prevent antenatal depressive symptoms should be provided for abused pregnant women in order to prevent mother-to-infant bonding failure and postnatal depressive symptoms. Previous intervention studies have reported that antenatal psychological interventions, such as individual psychological care by midwives to reduce depressed mood and anxiety during pregnancy, were effective in preventing bonding failure and depressive symptoms in the

postnatal period (Dennis & Dowswell, 2013; Fontein-Kuipers et al., 2014; Kitamura et al., 2006). However, whether those antenatal psychological interventions are also effective for abused women to prevent bonding failure and depressive symptoms after childbirth has not yet to be investigated. This study demonstrates the need for antenatal psychological interventions for abused pregnant women in order to prevent bonding failure and depressive symptoms after childbirth.

Eliminating the barriers to IPV among health care professionals is essential to provide proper health intervention for IPV victims in perinatal health care settings. A review article (Ronnberg, & Hammarstrom, 2000) has reported multiple barriers experienced by care professionals in providing interventions for abused women, such as lack of knowledge, improper recognition, including the stereotype of a "typical abused woman," and a feeling of non-responsibility for IPV interventions. These barriers to IPV among healthcare professionals would lead to unilateral interventions that disrespect women's needs and situations, victim-blaming attitudes, and under-identification of IPV victims, which would then result in additional trauma, escalating violence, and the aggravation of health status among abused women (St Luke's College of Nursing, 2004; Ronnberg, & Hammarstrom, 2000). Thus, reducing these barriers among health care professionals is a necessary first step to provide safe and effective health interventions

(e.g., advocacy intervention and psychological care) for abused pregnant women in perinatal health settings.

Several studies (Harwell et al., 1998; Moore, Zaccaro, & Parsons, 1998; Roberts, Raphael, Lawrence, O'Toole, & O'Brien, 1997) have reported that IPV training was effective in reducing the barriers for IPV among health care professionals. A study with nurses and doctors in an emergency department in Australia (Robert et al., 1997) has reported that a training program (one hour workshop including IPV case reports and sharing research about IPV) significantly increased IPV knowledge, such as the characteristics and registration of IPV, and improved attitudes toward IPV victims. Similarly, an interventional study conducted in a health care center in the U.S. (Harwell et al., 1998) found a three to six hour IPV training program was effective in increasing proper IPV knowledge and health behaviors to identify and assess IPV victims by health care professionals. These findings indicate that IPV training to improve knowledge and intervention skills is essential for perinatal health care professionals, such as midwives and doctors, in order to provide effective interventions for IPV and psychological care for abused pregnant women, thus preventing bonding failure and depressive symptom after childbirth.

7. Study limitations

First, the participant sample may have been biased. Compared to national surveys (Ministry of Health, Labour and Welfare, 2014; Ministry of Education, Culture, Sports, Science and Technology, 2011), the participants in this study may have been more socially and economically disadvantaged due to their tendency to be less educated, have lower household income, and reduced employment status. These characteristics of the participants might be mainly reflected in the features of the area where the maternity clinic was located (i.e., higher rates of small to medium sized factories and single households) (Itabashi Public Office, 2014). In addition, the rates of medical interventions during delivery, including instrumental delivery and caesarean section, as well as fetal distress during labor among the participants were relatively lower than those of a national survey and previous findings (Ministry of Health, Labour and Welfare, 2010, Kasai et al., 2012; Osada et al., 2014). These lower rates may be characteristic of the facility, a secondary medical hospital focusing on low-risk pregnant women. Previous findings (O'Hara & Wisner, 2014; O' Hara, & McCabe, 2013; Suzuki et al., 2006; Kumar, 1997; Blom et al., 2010; Staehelin et al., 2013) have indicated the negative impact of low socioeconomic status (SES); in contrast, low-risk delivery and good fetal health have a positive impact on bonding failure and depressive symptoms after childbirth. Thus, it is

still premature to generalize these results to the entire pregnant population due to the possible biases among the participants in this study. Further studies conducted in multiple centers, representing a greater variety of socioeconomic backgrounds and health status, are necessary to improve the generalizability of the results in this study.

Second, this study did not investigate if participants had lived in their parents' homes without their partners after childbirth. A previous study of 2,478 Japanese postnatal women (Nagayama, 2000) has reported that approximately half of Japanese women have lived temporarily in their parents' homes without their partners after childbirth. Living in their parents' homes after childbirth may be beneficial for postnatal mothers to prevent bonding failure and depressive symptoms after childbirth. A study conducted with 700 postnatal women in the U.S. (Gjerdingen, McGovern, Attanasio, Johnson, & Kozhimannil, 2014) has demonstrated that high social support from non-partner individuals, such as mothers, was more significantly associated with lower postnatal depressive symptoms than social support from partners. A longitudinal study investigating the postnatal period of 56 Japanese women (Takahashi, & Tamakoshi, 2011) has indicated that a temporary stay in the parents' home after childbirth prevented bonding failure with infants. Moreover, living without partners during the postnatal period may be particularly effective for abused women to prevent bonding failure and postnatal

depressive symptoms by reducing the stress caused by their partners. Therefore, a temporary stay without partners in the parents' home after childbirth may have had a strong influence on the results of this study. Thus, further investigation considering this variable is necessary in the future.

Third, IPV victimization might have been underrepresented in this study in comparison to actual pregnant women. There was a woman whose partner was very defensive and denied her permission to participate in this study. Bancroft and Silverman (2004) indicated that IPV perpetrators are likely to impair women's sociality and autonomy due to the fear of the disclosure of IPV. Therefore, it is possible that the partner rejected this study due to the fear of her disclosing IPV. In addition, 21 women from an ethnic minority who could not understand Japanese sufficiently were excluded. A study investigating the ethnic differences in IPV in the United States (Field & Caetano, 2004) demonstrated that women from an ethnic minority reported higher rates of IPV than did women in the general population. This suggests that women from minority groups who did not participate due to their insufficient skill in Japanese might be at a greater risk for IPV. Furthermore, women who suffer IPV might reject participation due to the fear of stigma. Therefore, there might have been IPV victims among the 123 women who did not agree to participate.

Fourth, women who were severely abused by their partners may have been overrepresented in this study. Health care providers were the professionals most frequently contacted by abused women due to their physical and mental symptoms accompanying IPV (Hamilton, & Coates, 1993; World Health Organization, 2013). However, a previous study of 394 women who obtained health care in the U.S. (Hamberger, Saunders, & Hovey, 1992) has reported that only six women (1.5%) have been asked about IPV by health care professionals. The maternity clinic in this study also did not routinely ask the pregnant women about IPV. Thus, there is a possibility that some participants who were severely abused by their partners agreed to participate in this study to disclose the victimization of IPV and seek help. Although 26 women participants were identified as IPV victims by the ISA and none of them sought assistance directly from the researchers or health care professionals during the fieldwork of this study, continued violence might undermine their autonomy, confidence, and social value (Ronnberg, & Hammarstrom, 2000), which would then create barriers to prevent their seeking help from health care professionals. Therefore, the possibility of including severely abused women who potentially sought help through participation in this study should be noted and additional considerations to encourage them to seek help may be necessary.

Fifth, the prevalence of IPV during pregnancy as identified by the ISA should be

cautiously interpreted. This study showed a much lower prevalence of IPV during pregnancy (4.6%), compared to other studies using different IPV screening tools (e.g., the VAWS) (15.9–31.4%) (Inami et al., 2010; Kita et al., 2013). This is likely because the ISA was developed to identify the victims of severe violence that is almost at the same level of violence experienced by abused women in female shelters (Hudson & McIntosh, 1981). Therefore, the prevalence of IPV in this study should be cautiously interpreted and compared to the prevalence of IPV identified by other IPV scales, especially IPV screening tools aimed to identify women at risk for IPV.

Sixth, this study was still insufficient to identify antenatal factors that influence the relationships between IPV during pregnancy and bonding failure and depressive symptoms after childbirth. The coefficients of determination (R^2) of b mother-to-infant bonding failure and postnatal depressive symptoms were 39% and 33%, respectively. This indicates that 61–67% of the variance in bonding failure and depressive symptoms could be explained by other variables not investigated in this study. The results of this study indicated that behaviors by partners to control maternal-baby relationships, maladaptation to maternal role, and bonding failure toward the fetus could be potential antenatal factors influencing the relationships between IPV during pregnancy and bonding failure and depressive symptoms after childbirth. Moreover, other potential antenatal influencing

factors were indicated by previous studies, such as low self-esteem (Nakatani & Nakatani, 2006; Aida & Okawara, 2014), and poor social support (O'Hara & Wisner, 2014). Determining the antenatal influencing factors on the relationships between IPV during pregnancy and bonding failure and depressive symptoms in the postnatal period would help to suggest more effective health interventions for abused pregnant women in antenatal health settings.

Lastly, IPV after childbirth was not investigated in this study. The use of a mail-based survey at one month postnatal due to the non-appointment system of postnatal check-ups in the maternal clinic precluded the investigation of IPV after childbirth. Previous findings have reported that IPV during pregnancy often continues in the postnatal period (Harrykissoon, Rickert, & Wiemann, 2002; Stewart, 1994). Therefore, continuous violence since pregnancy into the postnatal period may be strongly associated with bonding failure and depressive symptoms in the postnatal period. Additional studies investigating IPV after childbirth at postnatal check-ups should be conducted.

CONCLUSION

This study was a prospective cohort study during the third trimester of pregnancy and one month after childbirth. This study aimed to examine the associations between IPV during pregnancy and mother-to-infant bonding failure and postnatal depressive symptoms at one month postnatal. This study also aimed to examine whether the relationships between IPV during pregnancy, mother-to-infant bonding failure, and postnatal depressive symptoms at one month postnatal would be mediated by antenatal depressive symptoms.

The main finding of this study was that IPV during pregnancy was significantly associated with mother-to-infant bonding failure at one month postnatal. In addition, the associations between IPV during pregnancy, mother-to-infant bonding failure, and postnatal depressive symptoms at one month postnatal were mediated by antenatal depressive symptoms.

The results of this study suggest the need for antenatal interventions for IPV and psychological health care for abused pregnant women to prevent antenatal depressive symptoms in health care settings in order to prevent bonding failure and depressive symptoms after childbirth.

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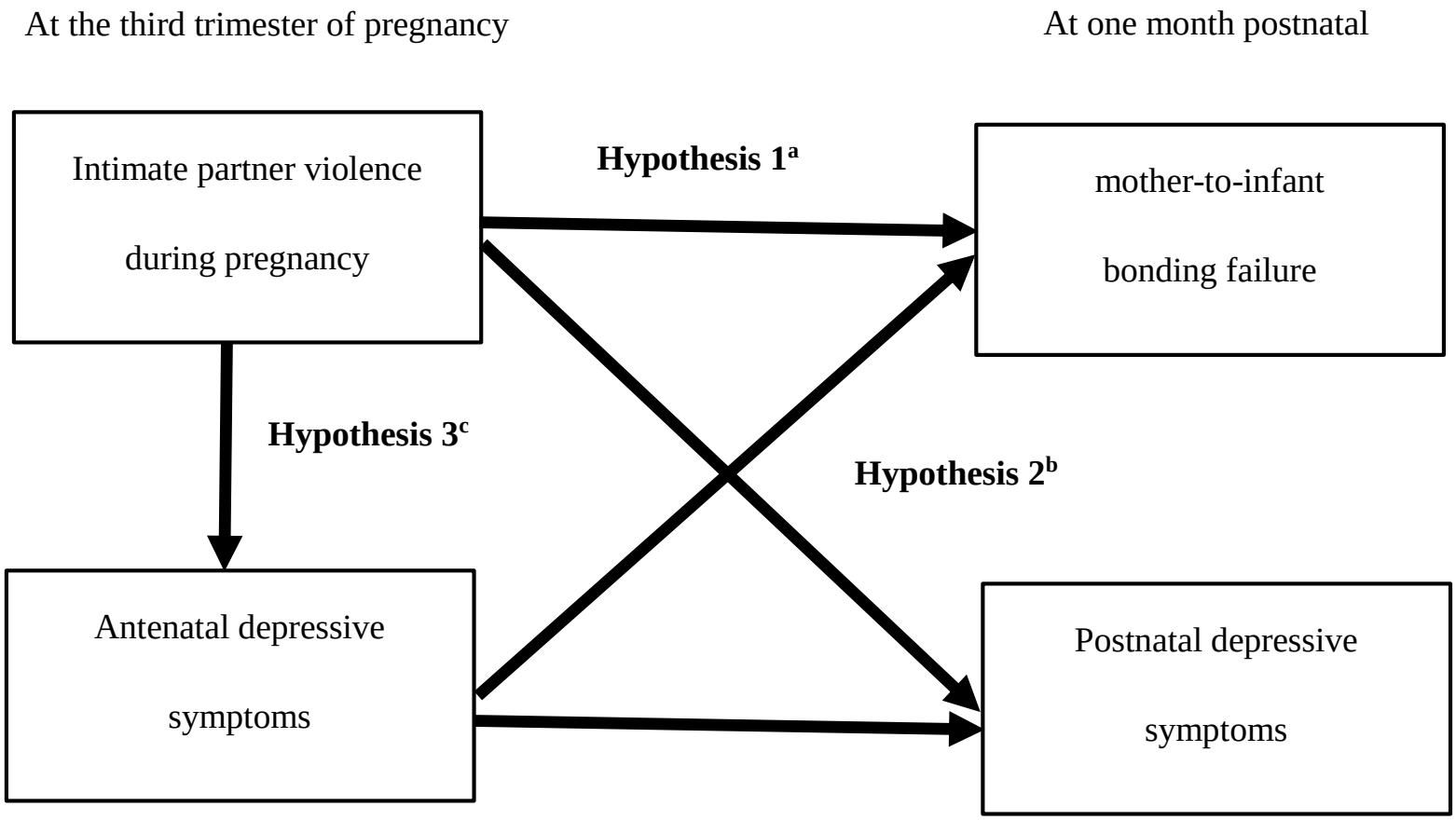
Figure 1. Model for hypotheses



[a] Hypothesis 1: IPV during pregnancy would be associated with mother-to-infant bonding failure at one month postnatal; [b] Hypothesis 2: IPV during pregnancy would be associated with postnatal depressive symptoms at one month postnatal; [c] Hypothesis 3: the relationships between IPV during pregnancy, mother-to-infant bonding failure and postnatal depressive symptoms at one month postnatal would be mediated by antenatal depressive symptoms.

Figure 2. Flow chart of the participants

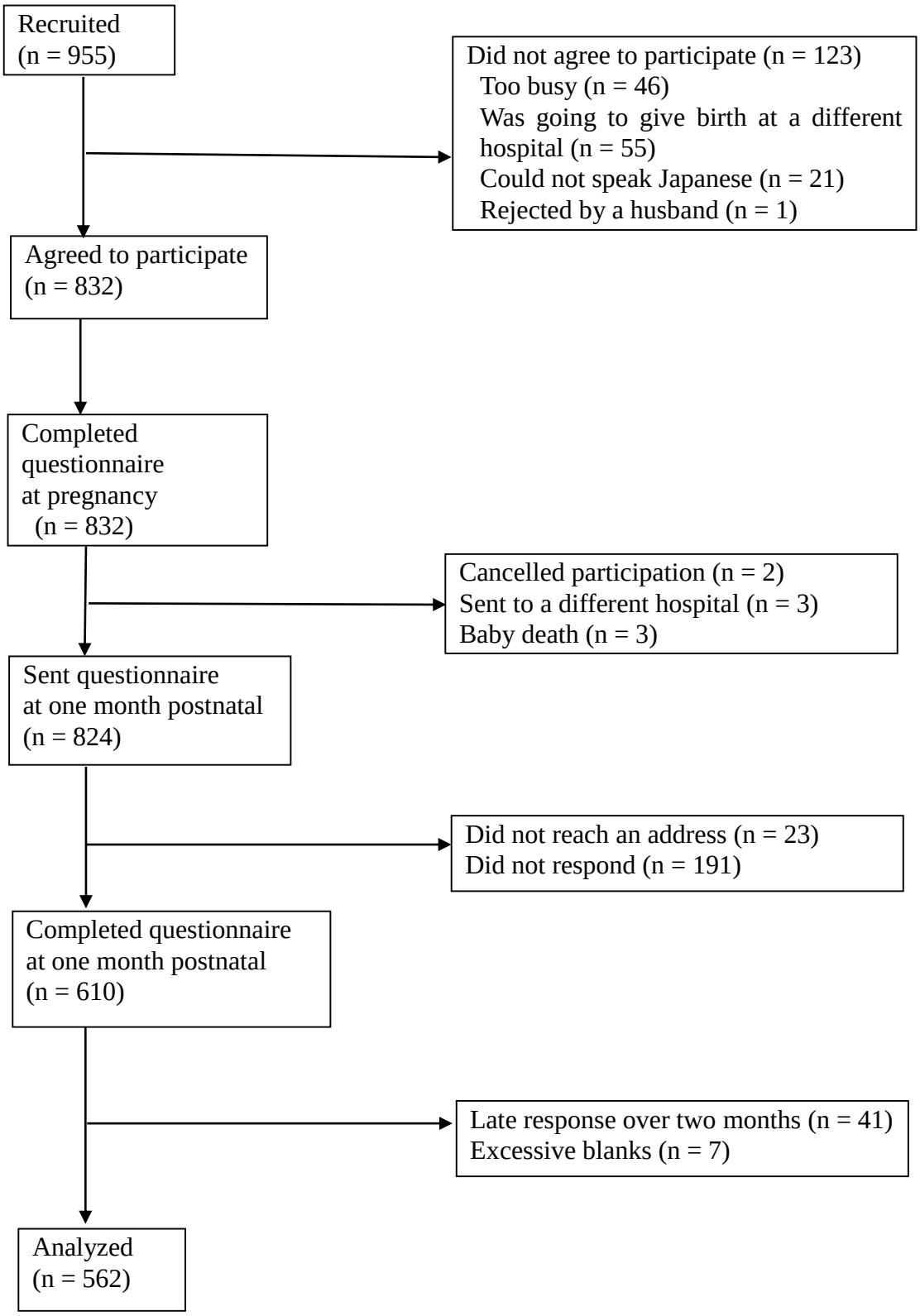


Table 1. Demographic characteristics of the participants (n = 562)

Characteristic	n (%)	Mean (SD)
Age		32.19 (4.94)
Marital status		
Married	547 (97.3)	
Single	15 (2.7)	
Number of children		
None	290 (51.7)	
1	207 (36.8)	
2	57 (10.1)	
3	5 (0.9)	
4	3 (0.5)	
Nationality		
Japanese	547 (97.3)	
Non-Japanese	15 (2.7)	
Household income per year		
Less than three million yen	40 (7.1)	
Three million to less than five million yen	197 (35.1)	
Five million to less than seven million yen	150 (26.7)	
Seven million to less than nine million yen	112 (19.9)	
More than nine million yen	63 (11.2)	
Educational attainment		
Junior/senior high school	133 (23.7)	
Junior college/technical school	208 (37.0)	
University/graduate school	221 (39.3)	
Current working status		
Not working	282 (50.2)	
Maternity leave	132 (23.5)	
Working	142 (25.3)	
Student	6 (1.0)	
Abortion experience		
None	490 (87.2)	
1	59 (10.5)	
2	9 (1.6)	
3	4 (0.7)	
Miscarriage experience		
None	463 (82.4)	
1	80 (14.2)	
2	17 (3.0)	
3	2 (0.4)	
Currently drinking alcohol		
No	542 (96.4)	
Yes	20 (3.6)	

Table 1. Continued

Characteristic	n (%)	Mean (SD)
Currently smoking		
No	549 (97.7)	
Yes	13 (2.3)	
Mode of delivery		
Natural delivery	408 (72.6)	
Vacuum extraction	46 (8.4)	
Forceps delivery	2 (0.2)	
Emergency cesarean section	45 (8.0)	
Scheduled cesarean section	61 (10.9)	
Induction of labor		
No	469 (83.5)	
Yes	93 (16.5)	
Fetal distress during delivery		
No	497 (88.5)	
Yes	65 (11.5)	
Infant admission to NICU[a]		
No	556 (98.9)	
Yes	6 (1.1)	
Baby sex		
Boy	261 (46.4)	
Girl	301 (53.6)	
Partner's age		33.97 (5.89)
Partner's nationality		
Japanese	538 (95.7)	
Non-Japanese	24 (4.3)	
Partner's educational attainment		
Junior/senior high school	135 (24.0)	
Junior college/technical school	94 (16.7)	
University/graduate school	333 (59.3)	
Partner's current working status		
Not working	4 (0.7)	
Full-time worker	522 (92.9)	
Contract worker	24 (4.3)	
Temporary/part-time worker	10 (1.8)	
Student	2 (0.3)	
Partner currently drinking alcohol		
No	349 (62.1)	
Yes	213 (37.9)	
Partner currently smoking		
No	168 (29.9)	
Yes	394 (70.1)	

a NICU=Neonatal Intensive Care Unit

Table 2. Scores of the scales used in this study

Scales	Mean (SD)
ISA antenatal [a]	
Non-physical violence	5.17 (7.78)
Physical violence	1.37 (3.16)
HADS antenatal [b]	
Anxiety	4.55 (3.01)
Depression	4.35 (3.00)
HADS postnatal [c]	
Anxiety	5.20 (3.18)
Depression	5.04 (3.40)
MIBS postnatal [d]	
Lack of affection	1.11 (1.53)
Anger and rejection	1.13 (1.39)

Note: [a] ISA antenatal = Index of Spouse Abuse at third trimester of pregnancy. The scores of the subscales range from 0 to 100, with higher scores indicating the presence of a greater degree of violence; [b] HADS antenatal = Hospital Anxiety and Depression Scale at third trimester of pregnancy. The scores of the subscales ranged from 0 to 21, with higher scores indicating more severe symptoms of anxiety or depressed mood; [c] HADS postnatal = Hospital Anxiety and Depression Scale at one month postnatal. The scores of the subscales ranged from 0 to 21, with higher scores indicating more severe symptoms of anxiety or depressed mood; [d] MIBS postnatal = Mother–Infant Bonding Scale at one month postnatal The scores of the subscales range from 0 to 12, with higher scores indicating the presence of more severe bonding failure.

Table 3. Frequencies of the items of the Japanese version of the Index of Spouse Abuse (ISA) (n [%]) (n = 562)

No	items	Never	Rarely	Sometimes	Frequently	Very frequently
Non-physical violence (ISA_NP[a])						
Number (%) of participants who answered "Never" for all the items		198 (35.2)				
1	My partner belittles me.	350 (62.3)	137 (24.4)	70 (12.5)	4 (0.7)	1 (0.2)
2	My partner demands obedience to his whims.	365 (65.0)	132 (23.5)	58 (10.3)	5 (0.9)	2 (0.4)
5	My partner becomes very upset if dinner, housework, or laundry is not done when he thinks it should be.	463 (82.4)	76 (13.5)	21 (3.7)	1 (0.2)	1 (0.2)
6	My partner is jealous and suspicious of my friends.	470 (83.6)	71 (12.6)	15 (2.7)	4 (0.7)	2 (0.4)
8	My partner tells me I am ugly and unattractive.	502 (89.3)	45 (8.0)	14 (2.5)	1 (0.2)	0 (0.0)
9	My partner tells me I really couldn't manage or take care of myself without him.	484 (86.1)	56 (10.0)	17 (3.0)	4 (0.7)	1 (0.2)
10	My partner acts like I am his personal servant.	461 (82.0)	73 (13.0)	23 (4.1)	5 (0.9)	0 (0.0)
11	My partner insults or shames me in front of others.	489 (87.0)	56 (10.0)	16 (2.8)	1 (0.2)	0 (0.0)
12	My partner becomes very angry if I disagree with his point of view.	408 (72.6)	113 (20.1)	34 (6.0)	6 (1.1)	1 (0.2)
14	My partner is stingy in giving me enough money to run our home.	478 (85.1)	58 (10.3)	21 (3.7)	4 (0.7)	1 (0.2)
15	My partner belittles me intellectually.	453 (80.6)	79 (14.1)	23 (4.1)	6 (1.1)	1 (0.2)
16	My partner demands that I stay home to take care of the children.	470 (83.6)	79 (14.1)	9 (1.6)	3 (0.5)	1 (0.2)
18	My partner feels that I should not work or go to school.	465 (82.8)	74 (13.2)	16 (2.8)	6 (1.1)	1 (0.2)
19	My partner is not a kind person.	480 (85.4)	58 (10.3)	21 (3.7)	3 (0.5)	0 (0.0)
20	My partner does not want me to socialize with my female friends.	537 (95.6)	18 (3.2)	6 (1.1)	0 (0.0)	1 (0.2)
21	My partner demands sex whether I want it or not.	496 (88.3)	55 (9.8)	9 (1.6)	2 (0.4)	0 (0.0)
25	My partner orders me around.	514 (91.5)	38 (6.8)	9 (1.6)	1 (0.2)	0 (0.0)
26	My partner has no respect for my feelings.	449 (79.9)	81 (14.4)	29 (5.2)	2 (0.4)	1 (0.2)
29	My partner treats me like a dunce.	470 (83.6)	55 (9.8)	28 (5.0)	7 (1.2)	2 (0.4)

Note. [a] ISA_NP = Index of Spouse Abuse, Non-physical violence.

Table 3. Continued

No	items	Never	Rarely	Sometimes	Frequently	Very frequently
Physical violence (ISA_P [b])						
Number (%) of participants who answered "Never" for all the items		349 (62.1)				
3	My partner becomes surly and angry if I tell him he is drinking too much.	458 (81.5)	72 (12.8)	23 (4.1)	8 (1.4)	1 (0.2)
4	My partner makes me perform sex acts that I do not enjoy or like.	461 (82.0)	83 (14.8)	15 (2.7)	3 (0.5)	0 (0.0)
7	My partner punches me with his fists.	551 (98.0)	11 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
13	My partner threatens me with a weapon.	562(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
17	My partner beats me so badly that I must seek medical help.	558 (99.2)	2 (0.4)	2 (0.4)	0 (0.0)	0 (0.0)
22	My partner screams and yells at me.	478 (85.1)	60 (10.7)	23 (4.1)	1 (0.2)	0 (0.0)
23	My partner slaps me around my face and head.	551 (98.0)	10 (1.8)	1 (0.2)	0 (0.0)	0 (0.0)
24	My partner becomes abusive when he drinks.	542 (96.4)	14 (2.5)	3 (0.5)	1 (0.2)	2 (0.4)
27	My partner acts like a bully towards to me.	539 (95.9)	17 (3.0)	6 (1.1)	0 (0.0)	0 (0.0)
28	My partner frightens me.	535 (95.2)	18 (3.2)	8 (1.4)	0 (0.0)	1 (0.2)
30	My partner acts like he would like to kill me.	554 (98.6)	6 (1.1)	1 (0.2)	1 (0.2)	0 (0.0)

Note. [b] ISA_P = Index of Spouse Abuse, Physical violence.

Table 4. Means, SDs, skewnesses, and correlations of all the variables used in this study (n = 562)

	1	2	3	4	5[b]	6[c]	7	8	9[d]	10[e]	11[f]	12	13[g]	14	15[h]
1. ISA_NP	---														
2. ISA_P	.59***	---													
3. Age	-.05	-.08	---												
4. Parity[a]	.12**	.10*	.21***	---											
5. Marriage[b]	-.20***	-.21***	.03	.04	---										
6. Nationality[c]	-.02	-.03	-.05	-.03	.03	---									
7. Education	.08	-.09*	.10*	-.17***	.11*	.04	---								
8. Income	-.09*	-.07	.25***	-.05	.04	-.11*	.35***	---							
9. Working[d]	-.01	-.03	-.22***	-.16***	-.01	.00	-.06	-.14***	---						
10. Alcohol use[e]	.07	.05	.03	.09*	-.09*	-.03	-.09*	-.07	-.03	---					
11. Smoking[f]	.08	.04	.00	.16	-.05	-.03	-.14**	-.08	-.03	-.03	---				
12. P's age	.05	-.02	.65***	.15***	.00	.03	.00	.23***	-.20***	-.01	-.03	---			
13. P' nationality[g]	.04	.02	.01	-.02	-.02	.40***	-.01	-.09**	.02	-.04	-.03	.00	---		
14. P's education	-.07	-.12**	.05	-.15***	.07	.00	.41***	.29***	-.07	-.16***	-.15**	.09	.03	---	
15. P's working[h]	.10*	.09*	-.06	-.06	-.11**	.17***	-.12**	-.12**	-.02	-.02	.06	-.09*	.28***	-.03	---
16. P's alcohol use[i]	-.04	.01	.07	.02	.01	-.11*	.00	.10*	.04	.08*	-.03	-.04	-.06	.00	-.10*
Mean	5.17	1.37	32.19	---	---	---	2.16	2.93	---	---	---	33.97	---	2.35	---
SD	7.78	3.16	4.94	---	---	---	0.8	1.14	---	---	---	5.99	---	0.84	---
Skewness	.44[q]	1.42[q]	-.05	---	---	---	-.29	0.33	---	---	---	.47	---	-0.75	---

Note. ISA_NP = Index of Spouse Abuse Non-physical violence; ISA_P = Index of Spouse Abuse Physical violence; P's age = Partner's age; P's nationality = Partner's nationality; P's education = Partner's education status; P's working = Partner's working status, P's alcohol use = Partner's alcohol use

[a] 1 = Primipara, 2 = Multipara; [b] 1 = Single, 2 = Married; [c] 1 = Japanese 2 = Non-Japanese; [d] 1 = Working, 2 = Non-working; [e] 1 = No, 2 = Yes; [f] 1 = No, 2 = Yes; [g] 1 = Japanese, 2 = Non-Japanese; [h] 1 =Working, 2 = Non-working; [I] 1 = No, 2 = Yes; [q] Logarithmically transformed because the skewness was over two.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4. Continued

	1	2	3	4	5[b]	6[c]	7	8	9[d]	10[e]	11[f]	12	13[g]	14	15[h]
17. P's smoking[j]	.09*	.12**	-.12**	.04	-.05	-.06	-.21***	-.18***	.02	.13***	.10*	-.12**	.02	-.30***	-.01
18. Abortion	-.04	-.04	-.01	-.03	-.04	.11**	-.12**	-.09*	.01	.00	.10*	-.02	.08	-.10*	.06
19. Miscarriage	-.01	.06	.14**	.09*	.02	.00	-.03	.02	-.05	-.02	-.04	.12**	-.01	-.02	.01
20. Instrumental labor[k]	-.05	-.04	.09*	-.18***	.02	-.01	.09*	.11*	-.02	-.03	-.02	.09*	.09*	-.02	-.07
21. Emergency CS[l]	-.06	-.06	.08	-.09*	-.11**	.07	-.05	-.02	-.06	-.02	.04	.06	-.03	.01	.02
22. Fetal distress[m]	-.10*	-.66	.04	-.18***	-.04	-.03	.02	.07	-.04	-.01	-.06	.03	-.02	.03	-.02
23. Admission to NICU[n]	-.02	-.02	-.03	-.06	.02	-.02	.11**	.07	-.05	-.02	-.02	-.00	-.02	-.04	-.02
24. Induction of labor[o]	-.02	-.00	-.08	-.22***	-.00	.02	.02	.03	.03	-.04	-.02	-.04	-.05	-.02	.06
25. Baby's sex[p]	-.01	-.04	.01	-.03	.02	-.06	-.04	-.01	-.05	-.03	.03	-.00	-.02	.00	.01
26. HADS_A pre	.22***	.12**	-.09*	.03	-.07	.03	-.07	-.07	.02	-.04	.08	-.04	.07	.04	.07
27. HADS_D pre	.24***	.13**	-.06*	.06	.08	.03	-.09*	-.12**	.03	.04	.10*	-.05	.05	-.03	.08
28. HADS_A post	.18***	.14**	.04	-.11**	-.09*	.01	.00	.00	-.01	.02	-.02	-.02	.00	.03	.06
29. HADS_D post	.18***	.07	.10*	-.10*	-.06	-.01	.03	.01	.01	.02	-.02	.02	.00	.05	.04
30. MIBS_LA	.13**	.07	.11*	-.13**	.03	-.01	.01	.01	.04	-.01	.00	.07	-.04	.05	.02
31. MIBS_AR	.14**	.06	-.05	-.25***	-.02	.03	.03	-.02	.08	.03	-.08	-.03	.03	.06	.09*

Note. P's smoking = Partner's smoking; Instrumental labor= Instrumental labor including vacuum extraction and forceps delivery; Emergency CS =Emergency cesarean section; Admisstion to NICU=Infant's admission to neonatal intensive care unit; HADS_A_pre = Hospital Anxiety and Depression Scale_Anxiety prenatal; HADS_D_pre =Hospital Anxiety and Depression Scale_Depression prenatal; HADS_A_post = Hospital Anxiety and Depression Scale_Anxiety postnatal; HADS_D_post = Hospital Anxiety and Depression Scale_Depression postnatal; MIBS_LA = Mother–Infant Bonding Scale_Lack of Affection; MIBS_AR = Mother–Infant Bonding Scale_Anger and Rejection.

[i] 1 = No, 2 = Yes; [j] 1 = No, 2 = Yes; [k] 1 = No, 2 = Yes; [l] 1 = No, 2 = Yes; [m] 1 = No, 2 = Yes; [n] 1 = No, 2 = Yes; [o] 1 = No, 2 = Yes; [p] 1 = Boy, 2 = Girl ; [q] Logarithmically transformed because the skewness was over two.

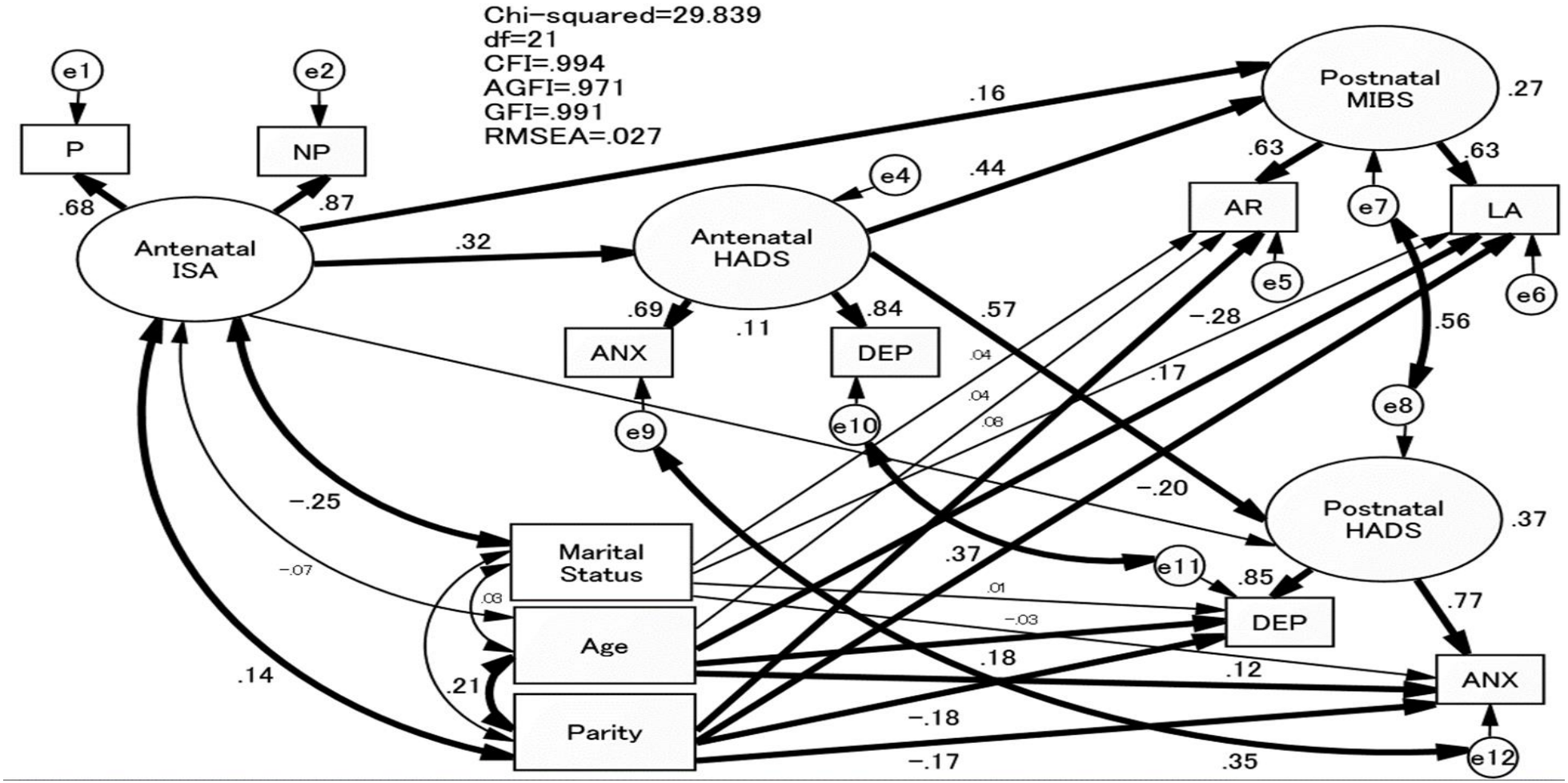
* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4. Continued

	16[i]	17[j]	18	19	20[k]	21[l]	22[m]	23[n]	24[o]	25[p]	26	27	28	29	30	31
16. P's alcohol use [i]	---															
17. P's smoking[j]	.10*	---														
18. Abortion	-.05	.10*	---													
19. Miscarriage	.02	-.08	-.03	---												
20. Instrumental labor[k]	.06	-.06	-.02	.00	---											
21. Emergency CS[l]	-.01	-.03	.06	.02	-.09*	---										
22. Fetal distress[m]	.01	-.07	.02	.02	.34***	.34***	---									
23. Admission to NICU[n]	.03	-.05	-.04	-.04	.09*	.03	.02	---								
24. Induction of labor[o]	-.04	.01	-.04	.00	.16***	.13**	. 22***	.07	---							
25. Baby's sex[p]	.01	-.02	.03	.02	-.05	-.07	-.09*	-.00	-.05	---						
26. HADS_A_pre	-.01	.02	.09*	-.03	-.08	-.03	.01	-.04	-.01	.02	---					
27. HADS_D_pre	-.02	.01	.10*	.02	-.09*	-.05	-.05	-.03	-.02	.03	.59***	---				
28. HADS_A_post	.01	.02	.02	.02	-.02	.01	-.02	.05	.04	.05	.47***	.37***	---			
29. HADS_D_post	-.05	-.02	.04	.02	.02	-.05	-.01	.00	-.01	.06	.34***	.51***	.68***	---		
30. MIBS_LA	-.07	-.02	.05	.03	.01	.04	-.06	.02	-.01	.01	.15***	.27***	.32***	.42***	---	
31. MIBS_AR	.02	-.02	.06	.02	.06	.03	-.01	.02	-.06	.03	.21***	.23***	.39***	.38***	.43***	---
Means	---	---	.16	.19	---	---	---	---	---	---	4.55	4.35	5.2	5.04	1.11	1.13
SD	---	---	.45	.46	---	---	---	---	---	---	3.01	3.00	3.18	3.40	1.53	1.39
Skewness	---	---	2.61[q]	2.06[q]	---	---	---	---	---	---	.78	.92	.93	.95	1.30	1.66

Note. P's alcohol use = Partner's alcohol use; P's smoking = Partner's smoking; Instrumental labor= Instrumental labor including vacuum extraction and forceps delivery; Emergency CS =Emergency cesarean section; Admission to NICU=Infant's admission to neonatal intensive care unit; HADS_A_pre = Hospital Anxiety and Depression Scale_Anxiety prenatal; HADS_D_pre =Hospital Anxiety and Depression Scale_Depression prenatal; HADS_A_post = Hospital Anxiety and Depression Scale_Anxiety postnatal; HADS_D_post = Hospital Anxiety and Depression Scale_Depression postnatal; MIBS_LA = Mother–Infant Bonding Scale_Lack of Affection; MIBS_AR = Mother–Infant Bonding Scale_Anger and Rejection.
[i] 1 = No, 2 = Yes; [j] 1 = No, 2 = Yes; [k] 1 = No, 2 = Yes; [l] 1 = No, 2 = Yes; [m] 1 = No, 2 = Yes; [n] 1 = No, 2 = Yes; [o] 1 = No, 2 = Yes; [p] 1 = Boy, 2 = Girl ; [q] Logarithmically transformed because the skewness was over two.
* $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 3. Path model of IPV during pregnancy, antenatal depressive symptoms, mother-to-infant bonding failure, and postnatal depressive symptoms



Note. Antenatal ISA = Antenatal Index of Spouse Abuse; P = Physical violence; NP = Non-physical violence; Antenatal HADS = Antenatal Hospital Anxiety and Depression Scale; ANX = Anxiety (Hospital Anxiety and Depression Scale); DEP = Depression (Hospital Anxiety and Depression Scale); Postnatal MIBS = Postnatal Mother–Infant Bonding Scale; AR = Anger and Rejection (Mother–Infant Bonding Scale); LA = Lack of Affection (Mother–Infant Bonding Scale); Marriage: 1 = Single, 2 = Married; Parity: 1 = Primipara, 2 = Multipara; CFI = Comparative Fit Index; AGFI = Adjusted Goodness-of-Fit Index; GFI = Goodness-of-Fit Index; RMSEA = Root Mean Square Error of Approximation; Significant paths are in **bold**.