

博士論文

**Psychosocial factors on traumatic stress symptoms due to
childbirth among Japanese primiparas and multiparas:
a longitudinal study**

(出産経験別にみた日本人女性における
産後のトラウマ症状とその関連要因の検証：
縦断的観察研究)

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ABSTRACT

Background: Traumatic stress symptoms due to childbirth (postnatal traumatic symptoms) negatively impact not only the mother's well-being, but also affect mother-infant relationships. Although several factors on the postnatal traumatic symptoms have been identified, their aetiology has not yet been fully clarified.

Objective: To identify aetiological relationships of psychosocial factors with regard to postnatal traumatic symptoms among Japanese primiparas and multiparas.

Methods: A longitudinal prospective observational study was conducted at three obstetric institutions in Tokyo (Japan) between April 2013 and May 2014. Questionnaires were distributed to 464 Japanese women at late pregnancy (> 32 gestational weeks, Time 1), the third day (Time 2), and one month (Time 3) after childbirth.

Results: Questionnaires from the three observation times were returned by 248 women. 238 completions (96% of the data) were analysed. Structural equation modelling conducted separately for primiparas and multiparas exhibited good fits (chi-squared /df = 1.19 - 1.56, comparative fit index = 0.91- 0.95, and root mean square error of approximation = 0.04 - 0.06). In both of these groups, Time 1 antenatal fear of childbirth predicted Time 2 postnatal traumatic symptoms ($\beta = 0.30 - 0.53$, $p = 0.004 - 0.009$). Time 1 expected family support during childbirth was negatively associated with Time 3 postnatal traumatic symptoms ($\beta = -0.25$, $p = 0.005$). Among multiparas, lower satisfaction of previous delivery was associated with Time 1 antenatal fear of childbirth ($\beta = -0.24$, $p < 0.001$).

Conclusion: Association between antenatal fear of childbirth and postnatal traumatic symptoms would suggest antenatal care for future study. Antenatal fear of childbirth was predicted by past history of mental illness and lower annual income for primiparous women, whereas previous birth experiences were central to multiparous women.

INTRODUCTION

1. Postnatal mental health issues

Postnatal periods are characterised by physical, social and emotional changes. During the phases of recovery from childbirth, and transitioning to motherhood, a variety of mental disorders are often witnessed among pregnant and child rearing women (Brockington, 2004; Brockington, Macdonald, & Wainscott, 2006). Hence, mental health is a crucial clinical and research topic for practitioners such as midwives, psychiatrists, and obstetricians.

To the best of my knowledge, for decades, postpartum psychosis and postpartum depression have been investigated more than other disorders among researchers. First, postpartum psychosis displays symptoms of manic and severe depression in the form of delusions, confusion or stupor. This psychosis is viewed in one birth out of a thousand (Kendell, Chalmes, & Platz, 1987; Terp, & Morensen, 1998) – It is a type of acute transient psychotic disorders, often referred to as cycloid psychosis, and not related to schizophrenia (Brockington, 2004). Since the concerned patients can be easily detected, and effective pharmacological treatment has already been established, its prognosis is usually good. Mothers with postpartum psychosis usually recover within several weeks, and resume parenting.

Second, postpartum depression comprises continuous depressive moods, a marked diminished interest or pleasure, decreased appetite, psychomotor agitation or retardation, fatigue, feeling of guilt, insomnia, and suicidal ideation (American Psychiatric Association, 1994) – It occurs in around 10 % of women (O'Hara & Swain, 1996). Postpartum depression, and puerperal psychosis have been socially recognised as critical issues, widely among not only clinical practitioners, but also mothers and family members. Since the report of Pitt (1968), a huge amount of research and clinical interventions have already been conducted. As for pharmacological treatments, antipsychotic drugs are administered for both these disorders, and are very effective. In addition, several psychological interventions and preventions have been conducted in developed countries (Austin, Frilingos, Lumley, Hadzi-Pavlovic,

Roncolato, Acland, Saint, Sagal, & Parker, 2008; Cuijpers, Bränmark, & Van Straten, 2008; Zlotnick, Miller, Pearlstein, Howard, & Sweeney, 2006). Since major contributing factors to postnatal depression are antenatal distress, negative life events, disturbed relationships with others, and social isolation, psychological interventions based on cognitive behavioural therapy or interpersonal psychotherapy are reported to be effective (Beck, 2002). Recent research emphasis of postpartum depression has been shifted to its adverse effects on child development (Beck, 1995).

On the other hand, less attention has been paid to anxiety disorders. Anxiety disorder is a generic term, covering a wide range of diagnostic categories that share symptoms of anxiety, fear, and physical symptoms such as a racing heart and shakiness (American Psychiatric Association, 2013). These disorders may be more seen than depression, which is around 10 – 30 % of postpartum women (Brockington, 2004). Anxiety disorders include panic disorder, phobic disorders, obsessive compulsive disorder, and post-traumatic stress disorder. Obsessive compulsive disorder refers to an anxiety disorder characterized by intrusive thoughts that produce uneasiness, apprehension, fear or worry (obsessions), and repetitive behaviours aimed at reducing the associated anxiety (compulsion). The impacts of pregnancy and delivery on panic disorder and obsessive compulsory disorder are minimal (Herzberg & Wahlbeck, 1999). Both these disorders have a low prevalence rate (4%) (Speisman, Storch, & Abramowitz, 2011).

2. Postnatal traumatic symptoms

Postnatal traumatic symptoms are triggered by the experience of childbirth (traumatic event). According to DSM-5, traumatic symptoms consist of four domains: (a) re-experiencing of traumatic events, (b) avoidance of situations that remind one of the traumatic events, (c) negative cognitions and moods related to the traumatic experiences, and (d) alterations in arousal and reactivity. Re-experiencing of traumatic events refers to “spontaneous memories of the traumatic event, recurrent related dreams, flashbacks or other

intense psychological distress”. Avoidance refers to avoiding behaviours of “distressing memories, thoughts, feelings, or external reminders of the event”. Negative cognitions and moods represent “ a variety of feelings - from a persistent and distorted sense of blame of self or others to estrangement from others, or markedly diminished interest in activities to an inability to remember key aspects of the event”. Finally, alterations in arousal and reactivity include “aggressive, reckless or self-destructive behaviour, sleep disturbances, hyper vigilance or related problems”. Postnatal traumatic symptoms have drawn more attention to clinical researchers and clinical care providers for the last decade.

It has been often controversial that childbirth can be a traumatic event (Horowitz, 1974). Generally, traumatic symptoms are triggered by experiencing or witnessing a life-threatening event (American Psychiatric Association, 2013). Traumatic events include not only unusual experiences such as war, murder, accident, natural disaster (Zhang, Ran, Li, Ou, Gong, Li, Fan, Jian, & Fang, 2012), injury and abuse, but also unexpected experiences that occur in a human’s daily life such as being diagnosed with cancer, and surgical operation (American Psychiatric Association, 2013). Childbirth is a significant life event for women. Women may experience ultimate happiness at this point of time - This is, however, not always the case. Childbirth itself is accompanied with uncertainty that adverse outcomes may occur for the mother and her baby, regardless of the presence of adverse processes such as emergency Caesarean section and instrumental delivery (Söderquist, Wijma, Thorbert, & Wijma, 2009). Ballard, Stanley, and Brokington (1995) reported four cases. In this report, “one woman experienced childbirth, where epidural anesthesia was not fully effective. She was shouting, screaming, and struggling to get off the bed during delivery.” After returning home, she had recurrent experience of her delivery (Criteria A: re-experiencing of traumatic events), felt protracted terror, as well as sweating and trembling (Criteria D: alterations in arousal and reactivity). She had nightmares about the delivery, suffering from persistent emotions of anger (Criteria D: alterations in arousal and reactivity). Therefore, obviously there are some women who exhibit traumatic symptoms triggered by childbirth experience.

Postnatal traumatic symptoms may be more prevalent than the other mental disorders (Beck, 2004; Grekin & O'Hara, 2014; Olde, van der Hart, Kleber, & van Son., 2006). In Western countries, 24 - 33% of postpartum women may have one or more traumatic stress symptoms following childbirth (Grekin & O'Hara, 2014; Olde et al., 2006). Between three and 11 months of postpartum, 0.9- 14.9 % of women fulfil the criteria (Zars, Waschke, & Ehlert., 2008; Söderquist, Wijma, & Wijma, 2006). Postnatal traumatic symptoms causes impairment of mother's bonding with her infant, and her overall adjustment to motherhood, as well as, her relationship with her partner, and for multiparas, other children. These women suffering from postnatal traumatic symptoms are emotionally detached to infants, and afraid of caring for the baby (Nicholls & Ayers, 2007). In addition, they tend to become less patient with other children, facing difficulties to deal with others' problems, and reluctant to have any more children because of their childbirth experience(s) (Allen, 1998; Beck, 2004). Furthermore, they are distressed in having sexual activity with their partner, who, in turn, show irritation with them (Allen, 1998). Health care providers, including obstetricians and midwives, generally take postnatal traumatic symptoms for temporal fatigue and emotional liability, in event of physical injury, due to childbirth. However, a high prevalence of postnatal traumatic symptoms and its severe impact on the mother and her family warn that more attention should be paid to psychological aspects of birth and clinical interventions in order to deal with the psychological disorders. Midwifery care promotes the normal healthy process of pregnancy, childbirth, and breastfeeding and supports women's confidence in their abilities (Canadian Association of Midwives, 2009). The potential of midwifery to enhance the well-being of women, families and the society should be valued and promoted (Canadian Association of Midwives, 2009). On considering postnatal traumatic symptoms that negatively impact not only childrearing, but also family relationships, and having additional children, it is a fundamental duty for midwives to give ultimate support for women to have a positive acceptance of delivery.

Clinical approaches to postpartum stress symptoms are two-fold: (a) treatment (Lapp, Agbokou, Peretti, & Ferreri, 2010), and (b) prevention (Ayers, Joseph,

McKenzie-McHarg, Slade, & Wijma, 2008). Several modes of treatment have been proposed: debriefing (Priest, Henderson, Evans, & Hagan, 2003; Sorenson, 2003), cognitive behavioural therapy (Harvey, Bryant, & Tarrier, 2003), and group counselling (Kershaw, Jolly, Bhabra, & Ford, 2005; Ryding, Wijma, & Wijma, 1998). Debriefing is a more general, unstructured intervention, where women are given the opportunity to discuss their traumatic experience, which has been often used as a treatment for postnatal traumatic symptoms arriving from other traumatic events (Gamble, Creedy, Webster, & Moyle, 2002). However, the effects of these interventions for birth trauma remain unclear because these findings are inconsistent and the number of studies is small (Lapp et al., 2010). In addition, because debriefing may increase trauma symptoms after other traumatic experiences, more caution is necessary for implication. Furthermore, there are women who cannot be 'detected' because they avoid recalling the event and are reluctant to disclose their negative birth experiences (Allen, 1998). Therefore, what remains is to explore the psychological mechanism that mediates the impact of birth trauma on negative psychological adjustment so that primary prevention can be more effective.

Primary prevention to reduce the risk of postnatal traumatic symptoms may be feasible because healthcare professionals, including midwives, have good opportunities to provide women with psychological support in routine care. Although preventive intervention should be developed based on the identified psychosocial mechanism of the development of traumatic stress symptoms (Ayers et al., 2008; Garthus-Niegel, vonSoest, Vollrath, & Eberhard-Gran, 2013), such intervention has not yet been developed. Among a variety of factors, which have been reported as associated with postnatal traumatic symptoms, childbirth-related factors have been considered as major contributors (Czarnocka & Slade, 2000; Ryding et al., 1998). They include objective and subjective aspects. The objective aspect includes unexpected obstetric interventions such as emergency Caesarean section, and instrumental and induced deliveries. The subjective aspect includes negative birth experience(s) brought by fear, dissatisfaction with the care provider, and pain during labour (Creedy, Shochet, & Horsfall, 2000; Furuta, Sandall, Cooper, & Bick, 2014; Söderquist,

Wijma, & Wijma, 2002). When the delivery course turns complicated such as emergency Caesarean section and prolonged delivery, the subjective experience towards the delivery becomes stressful and life threatening for mothers and their babies. Therefore, it has been proposed that mothers who experienced complicated delivery should receive attention and be supported (Czarnocka & Slade, 2000). In contrast, recent studies have shown that some women develop postnatal traumatic symptoms even if the delivery has gone without any complications (Söderquist, Wijma, & Wijma, 2006). Hence, factors which exist prior to childbirth may be also predictive of postnatal traumatic symptoms. The factors include younger age, new motherhood, low socioeconomic status, prior psychiatric problems and previous traumatic experience(s) such as history of sexual abuse and poor attachment with partner (Czarnocka & Slade, 2000; Olde et al., 2006; Söderquist et al., 2009; Söderquist et al., 2002). In addition, psychological factors during pregnancy, including psychological distress such as antenatal fear of childbirth, and perceived lower social support with family and health care providers (Fairbrother & Woody, 2007; Söderquist et al., 2009; Wijma, Söderquist, & Wijma, 1998), may also contribute to the development of postnatal trauma symptoms. Although these pre-existing and pregnancy-related factors, as well as birth-related factors may contribute to the development of postnatal traumatic symptoms, it is still questionable which factor is the most predictable and how these factors contribute to postnatal traumatic symptoms.

3. Antenatal fear of childbirth

Pregnant women desire to give birth to their babies, but simultaneously they feel fear the upcoming birth. Antenatal fear of childbirth is defined as a negative expectancy brought by fear towards upcoming childbirth (Wijma, Wijma, & Zar, 1998). It concerns the child's health, pain, surgical interventions, a difficult course of labour, loss of control and isolation (Eriksson, Jansson, & Hamberg, 2006; Geissbuehler & Eberhard, 2002; Nilsson & Lundgren, 2009). Women are afraid of risks to her own health such as bleeding, Caesarean section and

forceps/vacuum delivery, as well as those to the child such as being injured and distressed, which are due to the unpredictability of childbirth (Nilsson & Lundgren, 2009). In addition, pregnant women are worried about losing control and being isolated during labour, which may lower their confidence and lead to a sense of failure (Nilsson & Lundgren, 2009). In the UK and Nordic countries, intense antenatal fear of childbirth has been found in 11–15% of pregnant women (Nieminen, Stephansson, & Ryding, 2009; Zar, Wijma, & Wijma, 2002), some of whom report strong anxiety, fatigue, and sleep problems (Hall, Hauck, Carty, Hutton, Fenwick, & Stoll., 2009).

Pregnant women who had severe fear of childbirth are more likely to perceive severe pain, and consider their childbirth experiences frightening (Fenwick, Gamble, Nathan, Bayes, & Hauck., 2009; Zar et al., 2001). Intense fear of childbirth during pregnancy is also related to subsequent emotional maladjustment such as irritation and anxiety, and postnatal traumatic symptoms (Söderquist et al., 2006; Waldenstrom, Hildingsson, & Ryding, 2006). The present study focuses on antenatal fear of childbirth because intense fear of childbirth itself has severe impact on a mother's daily life, which should be addressed by midwives. In addition, focusing on the antenatal fear of childbirth rather than the woman's vulnerability - reported to be also associated with postnatal traumatic symptoms - would be more helpful for possible midwifery care. Woman's vulnerability to stress can refer to a history of abuse (Olde et al., 2006), personality traits such as low self-esteem, anxiety, and previous traumatic experiences (Olde et al., 2006). Antenatal fear of childbirth can be a manifestation of a woman's vulnerability towards the stress. I hypothesize antenatal fear of childbirth might be more predictable, linking the vulnerability caused by stress, and the outcome variable.

4. Methodological consideration: Aetiology studies on postnatal traumatic symptoms

There have been some methodological limitations in earlier studies about mechanisms of postnatal traumatic symptoms. First, most previous studies were cross-sectional (Creedy et al., 2000; Czarnocka & Slade, 2000; Söderquist et al., 2002; Wijma, Söderquist, et al., 1998). Therefore these findings are co-relational, but hardly indicate causal relationships. For example, Czarnocka and Slade (2000) and Söderquist et al. (2002) have revealed that lack of social support, perceived low control and fear in labour are associated with traumatic stress symptoms at six to eight weeks postpartum. However, there is a possibility that women with traumatic stress symptoms are more likely to recall their childbirth as more frightening and receiving less care. Hence, the longitudinal follow-up research design is essential when researchers are interested in causality. This is because researchers are able to presume that variables measured at a later time point cannot affect the variables measured earlier in the time course.

Second, interaction of independent factors has rarely been taken into account in most previous studies (Slade, 2006). They used multivariate regressions: conceptually similar and temporally discrete variables were entered into a single regression analysis. Entered independent variables included demographic and psychiatric data such as parity, history of mental illness, prior traumatic experiences, and current psychological variables such as negative expectation towards the upcoming childbirth, and perceived negative birth experience after delivery (Fairbrother & Woody, 2007; Verreault et al., 2012). Regression analysis usually considers demographic variables such as age and parity, followed by variables occurring immediately before the symptoms, and finally those variables that are of the researchers' main interest. However, the results of regression analysis only prove whether the variables of the researchers' main interest directly impact the variance of the dependent variable. Indirect effects of independent variables on dependent variables cannot be examined.

For example, women with a history of mental illness may show higher fear of childbirth, and recognize the birthing experience as less positive. Slade (2006) claimed that some factors can be potential predictors of other influences. Thus, the history of mental illness can be a potential predictor of the antenatal fear of childbirth. The effects of past history of mental illness on the development of postnatal trauma symptoms may be mediated by the woman’s fear towards the upcoming childbirth. Classical regression analysis cannot make any conclusion on interaction of these multiple predictors. Traditional mediation model (Baron & Kenny, 1986) is so simple that it can be used in a model where there are only three variables for discussion. (Figure 1, A). The dependent variable, Y, is predicted by the independent variable, X1, which is mediated by the mediator variable, X2.

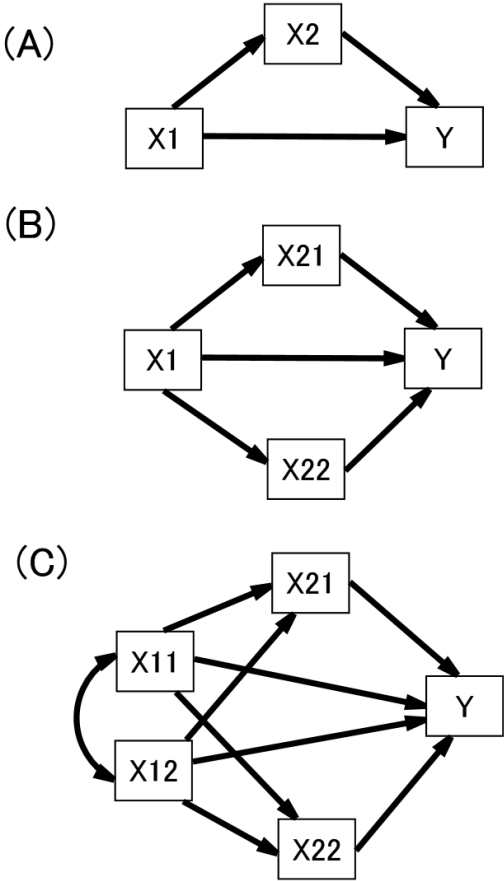


Figure.1. Mediation models

If, however, the number of mediators is two (Figure 1, B), where both X21 and X22 mediate the effect of X1 on Y, the classical Baron and Kenny's (1986) model can no longer be applicable. Probably researchers decompose the model into two: one with X1 to X21 to Y and another with X1 to X22 to Y. Such analyses are very cumbersome if the number of variables increases. For example, if researchers posit more than one independent variable as well as more than one mediator (Figure 1, C), the analyses may be too complicated and thus uninterpretable. In clinical research settings like the present study, researchers wish to assume many variables contribute to the occurrence of the phenomenon in question (in this study, postnatal traumatic stress symptoms) and predictors (e.g., X11, X12, X21, and X22 in Figure 2) influence each other in a fairly complicated manner. In Figure 1, for example, both X11 and X12 predict both X21 and X22 that in turn predict the dependent variable Y. A solution to such research questions is the use of structural equation modelling (SEM: Kline, 2004). The SEM is a generic term to cover a variety of multivariate analyses performed on the variance/covariance matrix of data. Models B and C in Figure 1 can be specified by the method of structural regression analysis, a model of SEM. Hence in the main part of this study, structural regression analysis is used.

Birth parity is another very important issue to be taken into statistical consideration. Birth experiences may be different in quality between primiparas and multiparas, because childbirth is the first time experience for primiparas, while multiparous women appraise childbirth based on their previous experience(s). In addition, the birthing processes, the degree of labour pain, and the duration of childbirth differ between primiparas and multiparas (Waldenstrom, Hildingsson, Rubertsson, & Radestad, 2004). Although primiparas and multiparas are both equally likely to manifest postnatal traumatic stress symptoms and depression after delivery, influence of psychosocial factors on the development of these psychological maladjustments may be different. Therefore, birth parity should be considered as a moderator, and should be examined in each group differently.

Consider the following four proposals to clarify the mechanism of postnatal traumatic symptoms:

- First, a longitudinal study is highly recommended. Only by a prospective longitudinal study can a researcher identify causal relationships between independent and dependent variables, and existence of mediation.
- Second, factors should be considered in a time-frame. Slade (2006) suggested that predictor variables should be categorized into pre-existing, pregnancy-related, and childbirth-related variables. Pre-existing variables are those that started before the conception. Pregnancy-related variables are those that occur during pregnancy. Childbirth-related variables are objective and subjective birth experiences, which are observed during and after delivery.
- Third, in order to reveal the aetiological relationships of postnatal traumatic stress symptoms, SEM is recommended. SEM method is a powerful tool, which identifies a hypothesised model of complex etiological relationship patterns among variables based on observational data (Kline, 2004). SEMs make it possible to confirm whether a hypothesised model is applicable to observational data, and have the potential to differentiate between observed and latent variables, leading to conclusions that are more valid on the construct level.
- Finally, analysis should be conducted in the primiparous and multiparous groups. In this investigation, parity functions as a moderator of the predictors' effects of on the onset of postnatal stress symptoms.

To the best knowledge of the author, only one study has explored the aetiology of the birth trauma (Garthus-Niegel et al., 2013), taking into account all the points mentioned above.

There is a study conducted among Norwegian women at three observational points (at early and late pregnancy, and two-month postpartum), studying the association between antenatal fear of childbirth, depressive and anxiety moods at late pregnancy, objective and subjective birth experiences, and postnatal traumatic symptoms. The results showed that antenatal fear of childbirth predicted postnatal traumatic symptoms at the two-month postpartum period, and this effect was mediated by subjective birth experience. The particular

finding suggests antenatal fear of childbirth is a strong predictor of postnatal traumatic stress symptoms. However, Garthus-Niegel, von Soest, Vollrath, and Eberhard-Gran (2013) have claimed that it is still unclear whether subjective birth experiences can mediate the effects of the antenatal fear of childbirth on the development of postnatal traumatic stress symptoms, because they were observed simultaneously at the two-month postpartum. Thus, the causal relationships are still unknown. Therefore, a longitudinal study that observes at least two points during the postpartum period is recommended to identify the causal relationship between a subjective birth experience and postnatal traumatic stress symptoms. The second limitation of Garthus-Niegel, Von Soest, Vollrath, and Eberhard-Gran's study (2013) is the lack of psychometric scales to measure the subjective birth experience. Three ad hoc questions were used; "How frightened were you during the birth?", "What was your overall birthing experience?" and "To what degree did you feel taken care of during the birth?." Thus, using validated measures will give more robust a result. In addition, in Japan, less attention has been paid to postnatal traumatic symptoms. Only one study focused on postnatal traumatic symptoms (Yokote, 2008). Using semi-structured interviews to investigate PTSD criteria (DSM-IV) at one month after delivery, the above study found that eight of 11 women who delivered by emergency Caesarean section had one or more traumatic stress symptoms. As robust the screening method would be, the number of participants in that study was small. Thus, the psychosocial backgrounds on these traumatic stress symptoms remain unknown among Japanese mothers. A larger population is definitely needed in future.

5. The aim of present study

The aim of this study is to identify the aetiological relationships of psychosocial factors, regarding postnatal traumatic symptoms among Japanese primiparas and multiparas. This study measures postnatal traumatic symptoms rather than assessing the presence of PTSD. This is because having symptoms of trauma immediately after childbirth would

adversely effects daily life, and is very likely to be associated with the occurrence of PTSD in the near future.

This study reveals the causal relationships of pre-existing variables, psychological variables during pregnancy such as fear of childbirth, birth-related variables, and postnatal traumatic symptoms among primiparas and multiparas. Among these variables, antenatal fear of childbirth can be a major factor, which explains the development of postnatal traumatic symptoms mediating between pre-existing variables and outcome variables. Identifying the antenatal fear of childbirth, which would exist between pre-existing variables and outcome variables, help to gain clinical inferences that focus more on psychological aspects. Furthermore, the results may provide a clear picture of mechanisms, leading to postnatal traumatic symptoms (Garthus-Niegel et al., 2013), which help understand psychosocial backgrounds of women who have higher antenatal fear of childbirth and postnatal traumatic symptoms. The present study addresses the postnatal traumatic symptoms, and the need for considering some strategies among Japanese mothers.

6. Definition of postnatal traumatic symptoms

Postnatal traumatic symptoms are defined as having one or more traumatic symptoms which triggered by recent childbirth in this study. Because there is no scale which measures traumatic stress symptoms based on DSM-5 (American Psychiatric Association, 2013) in Japan, traumatic symptoms are operationally referred to having symptoms based on DSM- IV(American Psychiatric Association, 1995): re-experiencing of the traumatic event (Criterion B), avoidance of stimuli associate with the evend (Criterion C), symptoms of increased physiologic arousal (Criterion D).

METHODS

1. Study design and settings

A longitudinal prospective observational study was conducted at three obstetric facilities in Tokyo, between April 2013 and May 2014. All of them (Clinic A, and Hospitals B and C) were with the outpatient and inpatient department of obstetrics.

Clinic A is located at Meguro Ward (residential area of Tokyo). According to a government survey (2010), the total population is 268000 (2010). Out of 138000 households, 62000 (45.6%) are families with more than one child. The average economic status is 7.7 million yen per year. There were about 800 deliveries a year in Clinic A. In the setting, about 56 (7 %) was Caesarean Section.

Hospital B is located at Sumida ward that is in the north eastern part of Tokyo. Total population is 247000 (2010). Out of 168000 households, 120000 (45.6%) are families who have more than one child. The average economic status is 4.2 million yen per year. Hospital B is certified as a Perinatal Medical Centre, which includes Maternal-Fetal Intensive Care Unit and Neonatal Intensive Care Unit, capable of transporting patients in ambulances from other facilities. 1.36000 deliveries per year, 345 (25 %) were Caesarean Sections.

Hospital C is located at Minato Ward, which is an exclusive residential district of Tokyo. Total population is 205000 (2010). Out of 110000 households, 48000 (43%) are families who have more than one child. The average economic status is 10.4 million yen per year. There were about 800 deliveries a year in Clinic A. About 168 (21 %) were Caesarean Sections in the setting. Educational classes, regarding the process of pregnancy, childbirth preparation, childrearing, and breastfeeding are conducted at all settings.

Only Hospital C provides epidural anaesthesia in order to release pain during labour.

The participants were distributed questionnaires on three occasions: late pregnancy (> 32 gestational week, Time 1), early (at the third day after delivery, Time 2) and one-month postpartum (Time 3). These observation time points for the following reasons: First, antenatal fear of childbirth has been recognized to be the highest in late pregnancy (Wijma et al., 1998). Second, the postnatal traumatic symptoms were measured at early postpartum because it is easier for women to answer in hospitals. In addition, with regard to subjective birth experiences, most women synthesize their childbirth experiences at around the third day after delivery as they recover from physical fatigue caused by childbirth (Rubin, 1961). However, memory of labor pain fades in time (Niven & Black, 2000) due to breastfeeding and childrearing.

2. Participants and procedure

Pregnant women at the late pregnancy (>32 gestational weeks) were invited to participate in the study by the current researcher (M.T.) while attending the outpatient clinic. Women who were less than 20 years old, illiterate in Japanese, hospitalized due to major pregnancy complications or suffered from serious mental illness were excluded. Women who planned Caesarean section were not recruited, because their expectancy and experience related to childbirth were likely to be different from those undergoing vaginal delivery. In addition, women who selected epidural anaesthesia were excluded because pain relief may change the subjective birth experience (pain perception). However, women who experienced emergency Caesarean sections were included because this intervention is generally at the final stage of childbirth process. The experience includes a combination of normal progress of labour and emergency Caesarean section. Of the 491 women recruited who met the

inclusion criteria, 464 (94%) agreed to participate and were asked to answer the first questionnaires at Time 1. Time 1 and Time 2 questionnaires were distributed and collected directly by the researcher (M.T.). The Time 3 questionnaires were sent to their homes and returned by postal services.

3. Measurements

Pre-existing variables observed at the late pregnancy (Time 1)

The participant's age, birth parity, history of disease, history of mental illness, complexity of the pregnancy (pregnancy-induced hypertension, experience of threatened premature labour and placenta previa) and attendance of husband during childbirth were obtained from medical records. Marital status, educational background and annual income were obtained via the questionnaire. In multiparous women, prior birth experiences such as birth complication were obtained from the questionnaire; and an *ad hoc* question regarding satisfaction of previous delivery was assessed. Women were asked, "Are you satisfied with previous birth experience?" - The question was rated on a 5-point scale ranging from "not at all" (1) to "very much" (5).

Psychological variables during pregnancy (Time 1)

Antenatal fear of childbirth: This was measured by the Japanese Wijma Delivery Expectancy/ Experience Questionnaire (JW-DEQ) Version A (Takegata et al., 2013; Wijma et al. 1998).

Women were asked to imagine how the moment of their delivery would be. This scale consists of 33 items with a 6-point scale, ranging from "not at all" (0) to "extremely" (5). The minimum score is 0 and the maximum is 165. Scores over 85 indicate severe fear of childbirth and scores of over 100 indicate a phobia (Wijma et al., 1998). The JW-DEQ version A has four factors - fear, lack of positive anticipation, isolation and riskiness (Takegata et al., 2013), which were extracted from an exploratory factor analysis and are consistent with those identified in the studies using the English and Swedish versions

(Fenwick et al., 2009; Johnson & Slade, 2002). For the JW-DEQ total score in this study, the Cronbach's alpha was 0.93.

Social support: Social support generally is categorized into two concepts - perceived and enacted (Henderson, 1981). Perceived support is reported to buffer the adverse effects of negative life events on the onset of psychopathology (Cohen & Wills, 1985). Several studies investigated the social supports regarding childbirth during labour, including women's perceptions of care and adequate intra-partum care by health care providers and partners (Creedy et al., 2000; Czarnocka & Slade, 2000; Ford & Ayers, 2011). Although perceived support by key persons would be more influential (Terry, Rawle, & Callan, 1995), it has been claimed that lack of social support observed after delivery cannot be a cause of postnatal traumatic symptoms, but a reflection of these emotional distresses (Furuta et al., 2014). Thus, *ad-hoc* questionnaires were measured during pregnancy. In this study, expected family support during childbirth ("How do you expect your family to support you during delivery?") and professional support ("How do you expect midwives or doctors to support you during delivery?") details were asked. These questions were rated on a 5-point scale ranging from "not at all" (1) to "very much" (5).

Birth-related variables on the early postpartum (Time 2)

Objective birth experiences: This scale included emergency Caesarean section, instrument and induced delivery, and duration of labour (hours). Emergency Caesarean section was defined as a Caesarean section performed after the onset of regular labour. The composite variable Complicated Delivery was defined in this study as either emergency Caesarean section, instrumental or induced delivery.

Subjective birth experience: The definitions of subject birth experience differ between researchers (Garthus-Niegel et al., 2013; Goodman, Mackey, & Tavakoli, 2004). It reflects several emotional aspects of birth experiences, including fear, dissatisfaction, and perception

of pain. In this study, (a) postnatal fear of childbirth, and (b) perceived labour pain were measured.

Postnatal fear of childbirth was measured by the Japanese Wijma Delivery Expectancy/Experience Questionnaire, (W-DEQ) version B (Wijma, et al., 1998) at Time 2. Items of the version B are the same as those of version A, and scored between 0–165 (Takegata et al., 2013). Women were asked, “How did you experience your labour and delivery as a whole?” The JW-DEQ version B identified four factors as with the version A (Fenwick et al., 2009; Slade, 2006). The Cronbach’s α was 0.92 for the total score in this study.

Perceived labour pain was measured by the Japanese version of the Short-formed McGill Pain Questionnaire (Short-formed MPQ) (Arimura et al., 2012; Melzack, 1987). Pain is manifested by the complex interaction of physiological and psychological mechanisms (Niven & Gijbbers, 1984). This questionnaire measures multi-dimensional aspects of pain, including not only physiological but also emotional elements. It should be noted that perception of labour pain which was observed at early postpartum (Time 2) differs from actual pain which women experienced while in labour (Norvell, Gaston-Johansson, & Fridh, 1987). This is the experience of labour pain that a woman recalls after delivery. This measurement consists of 15 qualitative pain descriptions (11 sensory and 4 affective pains), the present pain intensity (PPI) which evaluates over-all pain, and the visual analogue scale (VAS) which measures pain quantitatively. Sensory pain items that represent sensory dimension of pain experience were stated as follows: “throbbing”, “shooting”, “stabbing”, “sharp”, “cramping”, “gnawing”, “hot/burning”, “aching”, “heavy”, “tender”, and “splitting” (Melzack, 1987). Affective pain is defined as the tension and fear aspects that are brought about by the painful experience: “tiring and exhausting”, “sickening”, “fearful”, and “punishing and cruel” (Melzack, 1987). These items were rated on four alternative points: “none” (0), “mild” (1), “moderate” (2), and “severe” (3). The Cronbach’s α of sensory and affective pain subscales were 0.79 and 0.82 respectively.

Outcome variables

Postnatal traumatic symptoms: The Impact of Event Scale–Revised (IES-R: Weiss & Marmar, 1997) is a self-report measure, used to assess traumatic stress symptoms. The scale consists of 22 items scored on a 5-point rating, ranging from “not at all” (0) to “extremely” (4) - The minimum score is 0, and the maximum score is 88 (Asukai et al., 2002). The scale was translated into Japanese and its factor validity and reliability was confirmed for adult men and women (Asukai et al., 2002). The Japanese version identified three factors - intrusion, avoidance, and hyper-arousal - among adults who experienced accidents and disasters, which were consistent with the English version (Weiss & Marmar, 1997). In this study, the scale was assessed at Time 2 (Cronbach’s $\alpha = 0.92$), and Time 3 (Cronbach’s $\alpha = 0.91$).

4. Hypothetical model

The model in this study (Figure. 2) comprises three time periods: (A) late pregnancy (Time 1), (B) early postpartum (Time 2), and (C) one-month postpartum (Time 3). These three observation periods reflect pre-existing and psychological variables during pregnancy measured at Time 1; birth-related variables at early postpartum (objective and subjective birth experiences) and outcome variables (traumatic stress symptoms) at early postpartum period measured at Time 2; and outcome variables (traumatic stress symptoms) at one-month postpartum measured at Time 3. Although pre-existing variables and psychological variables during pregnancy were observed at the same point (Time 1), it can be considered that pre-existing variables were treated as antecedent factors of psychological variables because women who were at younger age or had a history of mental illness were more likely to have a higher fear of childbirth during pregnancy. Similarly, since objective birth experience was observed retrospectively (Time 2), there was a time lag between objective birth and subjective birth experiences and Time 2 outcome variables (traumatic stress symptoms). Objective birth experiences were treated as antecedent factors of subjective birth experiences and Time 2 outcome variables (traumatic stress symptoms).

Traumatic stress symptoms measured at Times 2 and 3 were outcome measures, whereas pre-existing variables, psychological variables, and birth-related variables (objective and subjective birth experiences) were predictor variables.

Several possible mechanisms of the development of postnatal traumatic symptoms were considered. First, it was hypothesised that the pre-existing variables would predict Time 2 and 3 postnatal traumatic symptoms directly (Figure 2, a). Second, the psychological variables during pregnancy were hypothesised to mediate the effects of the pre-existing variables on postnatal traumatic symptoms at Times 2 and 3 (Figure 2, b). Third, the subjective birth-related variables were hypothesised to mediate the effects of the pre-existing variables on postnatal traumatic symptoms at Times 2 and 3 (Figure 2, c). Finally, objective birth-related variables were hypothesised to predict postnatal traumatic symptoms at Time 3 (Figure 2, d). A series of SEM analyses were conducted based on these hypotheses.

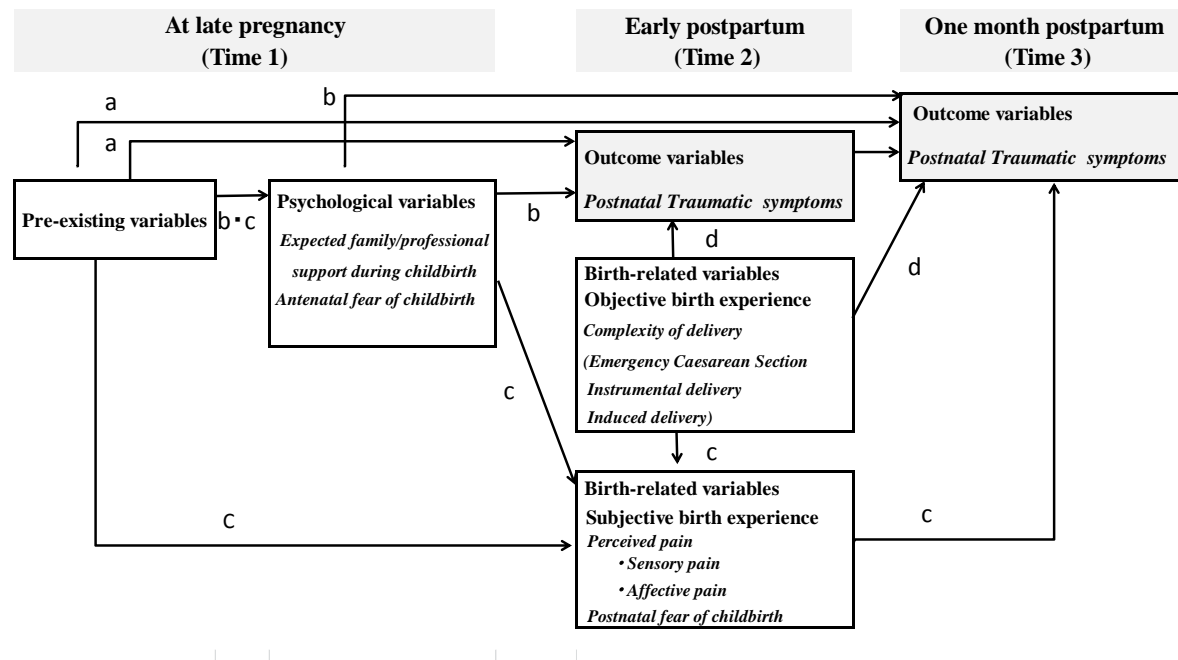


Figure.2. Hypothetical model of causal relationships of postnatal traumatic symptoms

Possible hypothetical paths are stated as below:

- a) Pre-existing variables predict Time 2 and 3 postnatal traumatic symptoms directly.
- b) Psychological variables during pregnancy mediate the effects of the pre-existing variables on postnatal traumatic symptoms at Times 2 and 3.
- c) Subjective birth-related variables mediate the effects of the pre-existing variables on postnatal traumatic symptoms at Times 2 and 3.
- d) Objective birth-related variables predict postnatal traumatic symptoms at Time 3.

4. Statistical analysis

Descriptive statistics were summarised as frequency distributions for categorical data and means and standard deviations (SD) for continuous data. For descriptive purposes, univariate statistics were obtained for the demographic characteristics by parity and settings. The differences between respondent and non-respondent groups were analysed.

Before conducting SEM based on the hypothetical model (Figure 2), the pre-existing variables, expected professional and family support during childbirth, delivery modes, complicated delivery, the total scores of the JW-DEQ versions A and B, complexity of pregnancy, the Short-formed MPQ subscales and the total score of the IES-R, were correlated in order to examine their statistical associations (alpha levels were set at $p < 0.05$ because of their exploratory nature).

Models of structural regression analyses were developed separately for primiparas and multiparas (Figure 3-a, b). The first model included (a) construction of latent structure of postnatal traumatic symptoms and antenatal and postnatal fear of childbirth, (b) paths from variables at early time points towards variables at later time points, (c) correlations between variables measured at the same time point, and (d) item specific correlations between the same items (e.g., isolation of the JW-DEQ) measured at different points of time. However, complicated delivery was set to predict postnatal traumatic symptoms and postnatal fear of childbirth in the model. Such models are quite similar to the saturated models, and thus are promised a very high goodness-of-fit at the expense of a very low degree of freedom. A model with low degree of freedom indicates that it has been built only to fit the present data. Hence, the model is hardly applicable to other sets of data, and therefore, further modification of models was performed using the “model trimming” method (Kline, 2005). I confirmed mediation between variables using bootstrapping methods based on Baron and Kenny’s mediation method (1986). Error variables reflect parts of each construct that cannot be explained by the observable variables that form the latent variables.

In model trimming, specification of models started from a full matrix of structural

path coefficients. Then, one by one, parameters were restricted to zero until the procedure caused a significant “jump” of chi-square.

In order to evaluate the fit of the model with the data, chi-square/df (χ^2/df), comparative fit index (CFI) and root mean square error of approximation (RMSEA) were used as goodness-of-fit indices. According to conventional criteria, $\chi^2/\text{df} < 3$, CFI > 0.95 , and RMSEA < 0.08 indicate an acceptable fit while $\chi^2/\text{df} < 2$, CFI > 0.97 , and RMSEA < 0.05 indicate a good fit (Byrne, 2001). All statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 20.0, and Analysis of Moment Structures (Amos) version 20.0.

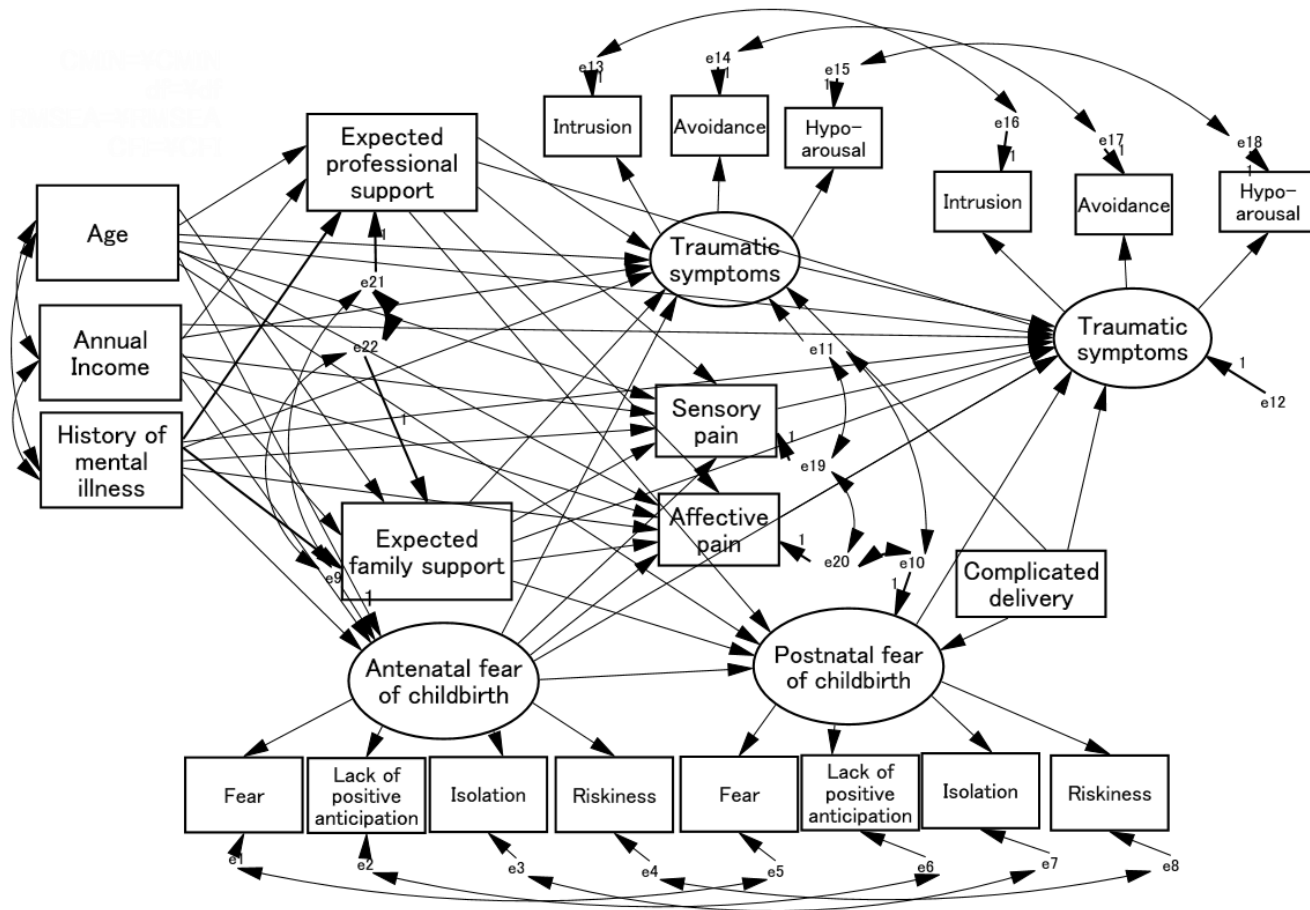


Figure.3-a.Hypothetical model of structural regression analysis in the primiparous group
 Time 1: late pregnancy; Time 2: early postpartum; Time 3: one month postpartum
 Error variable : variables of each construct that cannot be explained by the observable variables that form the latent variables

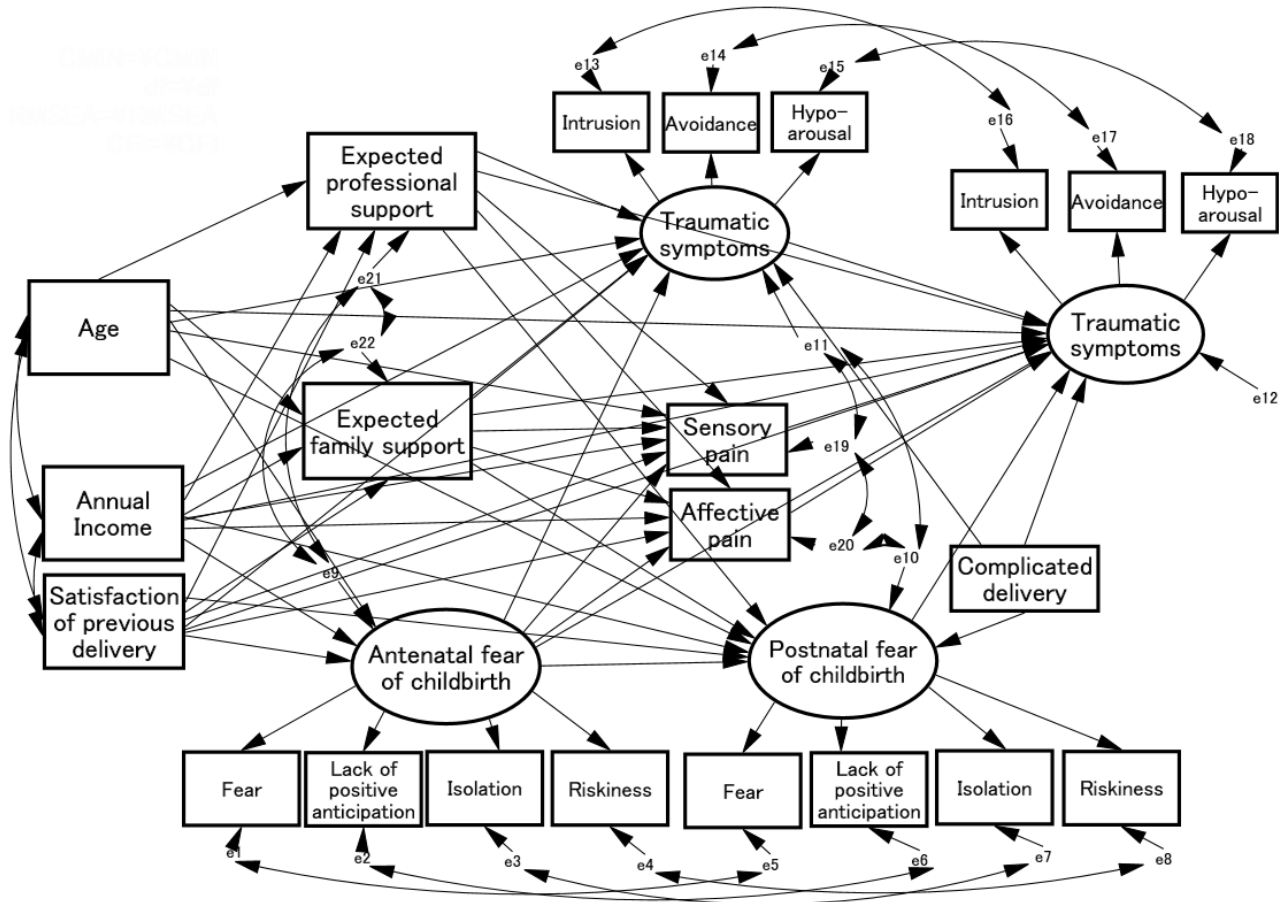


Figure.3-b.Hypothetical model of structural regression analysis in the multiparous group

Time 1: late pregnancy; Time 2: early postpartum; Time 3: one month postpartum

Error variable : variables of each construct that cannot be explained by the observable variables that form the latent variables

5. Sample size

In SEM analysis, cases more than 100 are considered as acceptance, between 100 and 200 as a medium, and more than 200 as large (Kline, 2004). However, taking into consideration that a maximum of 50% of subjects may be lost to follow-up by postal service, the maximum number of participants to be recruited in this study was more than 400 subjects.

6. Ethical approval

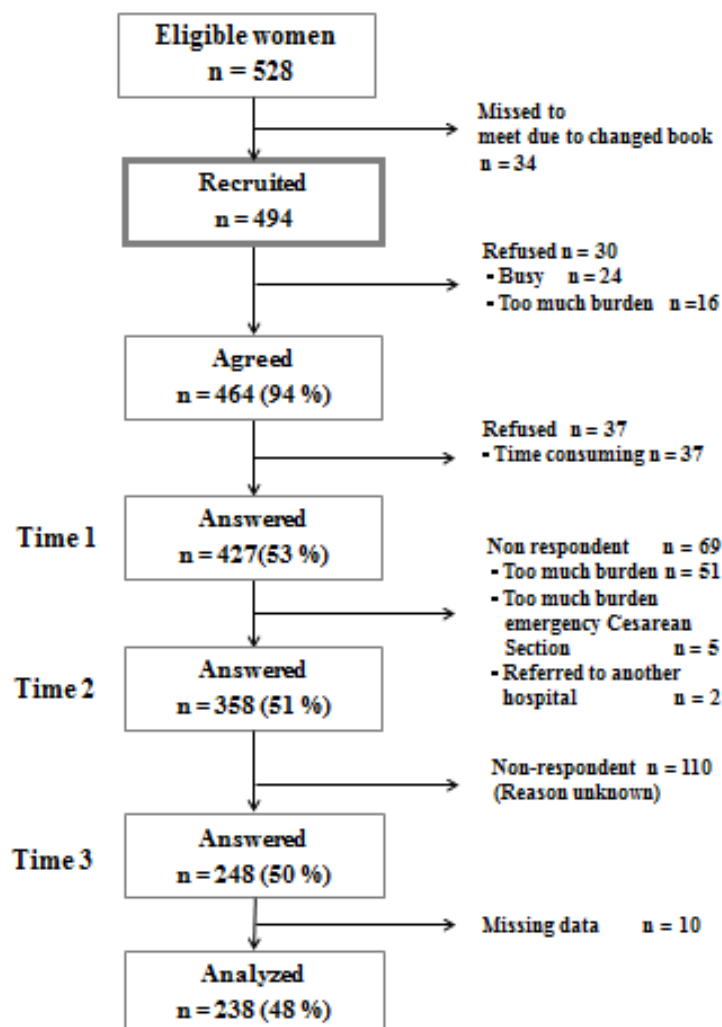
Ethical approval for this study was obtained from the Ethics Committee of the University of Tokyo (No. 3417, 2011). All participants were informed about the study, including the fact that anonymity and confidentiality were assured, and that they could withdraw at any time by means of a written request. Women who scored above 85 of the JW-DEQ or above 25 of the IES-R were referred to midwives and doctors for follow-up care.

RESULTS

1. Characteristics of participants

Of the 494 women recruited, 464 (94 %) agreed to participate in the study. 427 (53%) at Time 1, 358 (51%) at Time 2, and 248 (50%) responded at Time 3. Main reasons for refusal are “Busy (n = 24)”, “Too much burden (n = 16)”, and “Answering Questionnaires are time consuming (n = 37)”. Ten participants who did not fill in more than 60% of total items of either the JW-DEQ, the IES-R, or the Short-formed MPQ, were excluded from the subsequent analyses in order to maintain the quality of the data. Therefore, the data of 238 (48%) women out of 464 who agreed to participate in this study were analysed.

Figure 4. Flow chart



Comparing the respondent (n =248) and the non-respondent groups (n =179), women in the respondent group were significantly higher educated than women in the non-respondent group. 60% who experienced emergency Caesarean section (n = 12) did not return the questionnaires at one-month postpartum.

Table 1. Differences of respondent and non-respondent group (n=427)

	Respondents		Non-respondents		<i>p</i>		
	(n = 248)		(n = 179)				
	Mean/n SD (%)	Range	Mean/n SD (%)	Range			
Pre-existing variables							
Age	33.4	4.8	21, 44	33.0	4.6	19, 44	0.396
Educational background							
<i>High School</i>	35	(14)		39	(22)		0.044
<i>College</i>	73	(30)		63	(35)		
<i>University (Undergraduate)</i>	125	(50)		72	(40)		
<i>University (Postgraduate)</i>	15	(6)		5	(3)		
Annual income							
<i>Less than 3 million yen</i>	11	(4)		15	(8)		0.197
<i>3 – 5 million yen</i>	44	(18)		45	(25)		
<i>5 – 8 million yen</i>	61	(25)		49	(27)		
<i>8 –10 million yen</i>	44	(18)		26	(14)		
<i>More than 10 million yen</i>	88	(35)		44	(25)		
Past history of diseases	48	(19)		26	(15)		0.075
Past history of mental illness	5	(2)		4	(2)		0.367
Complexity of pregnancy	25	(10)		30	(17)		0.500
Attendance of husband during childbirth	238	(95)		154	(86)		0.119
Satisfaction of previous delivery (Multiparas n = 159)	3.9	1.1	1, 5	3.7	1.4	1, 5	0.365

Objective birth experience							
Duration of labour (hour)	9.1	7.3	1, 32	9.7	7.5	1, 32	0.787
Emergency Caesarean section	11	(4)		15	(8)		0.151
Instrumental delivery	24	(9)		17	(9)		0.330
Induced delivery	66	(26)		46	(25)		0.139
Psychosocial factors (Time 1)							
Expected family support during childbirth ¹	4.5	0.7	1, 5	4.4	0.7	1, 5	0.062
Expected professional support during childbirth ¹	4.5	0.7	1, 5	4.5	0.7	1, 5	0.246
Antenatal fear of childbirth ²	52.2	21.4	15, 109	55.5	21.9	8, 129	0.126
Birth-related variables (Time 2)							
Postnatal fear of childbirth ²	56.8	23.3	4, 107	57.4	24.0	5, 116	0.814
Sensory pain ³	16.3	7.8	0, 40	15.7	7.0	1, 30	0.471
Affective pain ³	9.1	4.2	0, 15	9.2	4.2	0, 15	0.817
Outcome variables (Time 2/3)							
Time 2 Traumatic symptoms ⁴	12.8	11.8	0, 51	14.8	11.2	0, 63	0.064
Time 3 Traumatic symptoms ⁴	8.6	10.5	0, 60	9.3	3.9	0, 39	0.322

Mean \pm SD or n(%), Analysis of variance (ANOVA) or Chi-square test, Statistical significance: $p < 0.05$

1: Ad-hoc questions: 5-point scale “not at all (1)” to “very much (5)”

2: Wijma Delivery Expectancy/experience Questionnaire (33 items): version A for antenatal fear, and version B for postnatal fear

3: Short-formed McGill Pain Questionnaire; sensory pain (11 item), affective pain (4 item)

4: Postnatal traumatic symptoms, Impact of Event Scale-Revised (22 items)

The number of primiparas was 51, 71, and 9 in Clinic A and Hospitals B and C respectively. The number of multiparas was 81, 18, and 1 in Clinic A and Hospitals B and C, respectively. Only a few differences of characteristics were observed between the three settings (Table 2). Thus, women who attended Clinic A were from higher educational backgrounds and incomes than that of the other settings. In addition to the antenatal and postnatal fear of childbirth, the traumatic symptoms at early postpartum of women attending Clinic B was higher than that of those attending the other settings. The number of cases of emergency Caesarean section and instrumental delivery in Clinic B was higher than those in the other settings. Expected family support during childbirth among women attending the Clinic C was better than that in the other settings. Apart from the stated, the three institutions did not differ in terms of the variables studied in this investigation. Hence, the data from these institutions have been combined.

Table 2. Differences of participants in settings

	Clinic A			Hospital B			Hospital C			<i>p</i>
	(n = 139)			(n = 89)			(n = 10)			
	Mean/n	SD (%)	Range	Mean/n	SD (%)	Range	Mean/n	SD (%)	Range	
Pre-existing variables										
Age	33.8	3.9	24, 43	32.4	6.0	19, 44	32.4	3.0	24, 44	0.092
Educational background										
<i>High School</i>	16	(12)		21	(24)		1	(10)		0.002
<i>College</i>	37	(27)		29	(33)		0	(0)		
<i>University (Undergraduate)</i>	79	(57)		34	(38)		6	(60)		
<i>University (Postgraduate)</i>	7	(5)		5	(6)		2	(20)		
Annual income										
<i>Less than 3 million yen</i>	3	(2)		6	(4)		0	(0)		0.001
<i>3 – 5 million yen</i>	9	(6)		38	(42)		1	(10)		
<i>5 – 8 million yen</i>	39	(27)		27	(30)		0	(0)		
<i>8 –10 million yen</i>	34	(23)		7	(8)		1	(0)		
<i>More than 10 million yen</i>	58	(42)		15	(18)		8	(80)		
Past history of diseases	32	(25)		2	(11)		1	(0)		0.153
Past history of mental illness	0	(0)		4	(4)		0	0		0.033
Complexity of pregnancy	21	(15)		8	(9)		1	(0)		0.385
Attendance of husband during childbirth	130	(94)		82	(92)		10	(100)		0.380
Objective birth experience										
Duration of labour (hour)	9.1	7.3	1, 37	9.7	7.5	1, 38	8.1	2.8	2, 44	0.787
Emergency Caesarean section	1	(0)		8	(9)		1	(10)		0.006
Instrumental delivery	2	(0)		13	(22)		2	(20)		<0.001
Induced delivery	26	(14)		30	(33)		5	(50)		0.008

Psychosocial factors (Time 1)										
Expected family support during childbirth ¹	4.6	0.6	1, 5	4.2	0.7	2, 5	4.8	0.4	3, 5	0.001
Expected professional support during childbirth ¹	4.5	0.8	1, 5	4.5	0.7	2, 5	4.5	0.3	1, 5	0.305
Antenatal fear of childbirth ²	46.5	19.1	8, 109	62.1	22.3	8, 129	41.3	15.8	21, 93	<0.001
Birth-related variables (Time 2)										
Postnatal fear of childbirth ²	50.0	22.1	5, 104	68.9	20.6	16, 116	52.8	20.8	4, 94	<0.001
Sensory pain ³	17.6	6.8	2, 31	19.1	7.0	0, 40	17.2	5.7	0, 24	0.263
Affective pain ³	6.4	3.4	0, 15	8.4	3.3	0, 15	7.4	3.4	0, 14	0.001
Outcome variables (Time 2/3)										
Time 2 Traumatic symptoms ⁴	10.0	10.0	0, 63	17.1	13.3	0, 60	11.8	7.6	0, 51	0.001
Time 3 Traumatic symptoms ⁴	8.2	11.0	0, 60	10.1	10.5	0, 47	8.5	7.4	0, 22	0.421

Mean \pm SD or n(%), Analysis of variance (ANOVA) or Chi-square test, Statistical significance: $p < 0.05$

1: Ad-hoc questions: 5-point scale “not at all (1)” to “very much (5)”

2: Wijma Delivery Expectancy/experience Questionnaire (33 items): version A for antenatal fear, and version B for postnatal fear

3: Short-formed McGill Pain Questionnaire; sensory pain (11 item), affective pain (4 item)

4: Postnatal traumatic symptoms, Impact of Event Scale-Revised (22 items)

Table 3 presents the characteristics of the participants. The average age (SD) was 33.3 (4.8) years and 55% of women (n =133) were graduates from a University. Annual income with lower than three million yen was reported by 11 (5%) of women, whereas higher than 10 million yen was reported by 76 (32%) of women. The mean (SD) IES-R score at Time 2 was 14.1 (12.3) for primiparas and 10.9 (10.8) for multiparas ($p = 0.041$). The mean (SD) IES-R score at Time 3 was 10.1 (10.4) for primiparas, and 7.4 (11.1) for multiparas ($p = 0.061$). Forty two women (17%) at Time 2 (primiparas: n = 29, multiparas: n = 13) and 22 women (9%) at Time 3 (primiparas: n = 15, multiparas: n = 7) had above 25 of the IES-R. The average duration (SD) of labour was 10.8 (7.2) hours in primiparas and 5.8 (5.9) in multiparas ($p < 0.001$). Thirteen primiparas (9 %) and four multiparas (4 %) had instrumental delivery ($p = 0.040$), and 43 primiparas (31 %) and 18 multiparas (18 %) had an induced delivery ($p = 0.015$). In this study, eight primiparous women (7 %) had an emergency Caesarean section.

Table 3. Characteristics of participants

	Total			Primiparas			Multiparas			<i>p</i>
	(n = 238)			(n = 138)			(n = 100)			
	Mean/n	SD (%)	Range	Mean/n	SD (%)	Range	Mean/n	SD (%)	Range	
Pre-existing variables										
Age	33.3	4.8	19, 44	32.2	4.9	19, 44	32.4	3.0	22, 44	0.092
Educational background										
<i>High School</i>	38	(16)		24	(17)		14	(14)		0.168
<i>College</i>	67	(28)		32	(23)		35	(35)		
<i>University (Undergraduate)</i>	119	(50)		72	(52)		47	(47)		
<i>University (Postgraduate)</i>	14	(6)		10	(7)		4	(4)		
Annual income										
<i>Less than 3 million yen</i>	11	(5)		7	(5)		4	(4)		0.151
<i>3 – 5 million yen</i>	43	(18)		31	(22)		12	(12)		
<i>5 – 8 million yen</i>	66	(28)		40	(29)		26	(26)		
<i>8 –10 million yen</i>	42	(18)		23	(17)		19	(19)		
<i>More than 10 million yen</i>	76	(32)		37	(27)		39	(39)		
Past history of diseases	45	(19)		23	(17)		22	(22)		0.192
Past history of mental illness	4	(2)		4	(3)		0	(0)		0.130
Complexity of pregnancy	30	(13)		13	(9)		17	(17)		0.062
Attendance of husband during childbirth	222	(93)		131	(95)		91	(91)		0.422
Previous emergency Caesarean section							2	(2)		
Previous instrumental delivery							7	(7)		
Previous induced delivery							3	(3)		
Satisfaction of previous delivery							3.9	1.0	1,5	

Objective birth experience										
Duration of labour (hour)	8.7	7.1	1, 38	10.8	7.2	1, 38	5.8	5.9	1,37	<0.001
Emergency Caesarean section	8	(4)		8	(7)		0	0		0.040
Instrumental delivery	17	(7)		13	(9)		4	(4)		0.087
Induced delivery	61	(26)		43	(31)		18	(18)		0.015
Psychosocial factors (Time 1)										
Expected family support during childbirth ¹	4.5	0.7	1, 5	4.5	0.8	2, 5	4.5	0.7	2, 5	0.632
Expected professional support during childbirth ¹	4.4	0.7	1, 5	4.3	0.8	2, 5	4.6	0.5	2, 5	0.001
Antenatal fear of childbirth ²	52.1	21.7	8, 129	56.9	22.0	8, 129	45.6	19.5	8, 105	<0.001
Birth-related variables (Time 2)										
Postnatal fear of childbirth ²	57.4	23.3	4, 116	65.3	22.9	4, 116	46.6	19.3	5, 96	<0.001
Sensory pain ³	18.2	6.9	0, 40	19.0	6.8	1, 40	15.1	6.8	0, 31	0.010
Affective pain ³	7.2	3.5	0, 15	8.2	3.4	0, 15	5.9	3.3	0, 14	<0.001
Outcome variables (Time 2/3)										
Time 2 Traumatic symptoms ⁴	12.8	11.8	0, 63	14.1	12.3	0, 63	10.9	10.8	0, 60	0.041
Time 3 Traumatic symptoms ⁴	9.0	10.8	0, 60	10.1	10.4	0, 47	7.4	11.1	0, 52	0.061

Mean \pm SD or n(%), Analysis of variance (ANOVA) or Chi-square test, Statistical significance: $p < 0.05$

1: Ad-hoc questions: 5-point scale “not at all (1)” to “very much (5)”

2: Wijma Delivery Expectancy/experience Questionnaire (33 items): version A for antenatal fear, and version B for postnatal fear

3: Short-formed McGill Pain Questionnaire; sensory pain (11 item), affective pain (4 item)

4: Impact of Event Scale-Revised (22 items)

2. Correlations of postnatal traumatic symptoms at Times 2 and 3 with predictor variables

The correlation patterns of the postnatal traumatic symptoms (the IES-R) with predictor variables showed marked differences between the primiparous and multiparous women (Table 2). Among the primiparas, the IES-R scores at both Times 2 and 3 were significantly correlated with the annual income (Time 2: $r = -0.24$, $p < 0.001$; Time 3: $r = -0.17$, $p = 0.04$), the JW-DEQ versions A (Time 2: $r = 0.28$, $p = 0.004$; Time 3: $r = 0.33$, $p = 0.001$) and B (Time 2: $r = 0.27$, $p = 0.001$; Time 3: $r = 0.28$, $p = 0.002$), expected family support (Time 2: $r = -0.21$, $p = 0.046$; Time 3: $r = -0.36$, $p = 0.004$) and professional support during childbirth (Time 2: $r = -0.25$, $p < 0.001$; Time 3: $r = -0.24$, $p < 0.001$), and sensory (Time 2: $r = 0.24$, $p < 0.001$; Time 3: $r = 0.29$, $p < 0.001$) and affective pain of labour (Time 2: $r = 0.20$, $p = 0.042$; Time 3: $r = 0.18$, $p = 0.04$). In addition, Time 2 IES-R scores of the primiparas were correlated with educational background ($r = -0.21$, $p = 0.041$), whereas Time 3 IES-R scores of the primiparas were correlated with the women's age ($r = -0.22$, $p = 0.043$). The multiparous women showed significant correlations with much fewer predictor variables. Time 2 IES-R scores of the multiparas were correlated only with the JW-DEQ versions A ($r = 0.35$, $p < 0.001$) and B ($r = 0.23$, $p < 0.001$), and sensory ($r = 0.29$, $p < 0.001$) and affective pain of labour ($r = 0.20$, $p = 0.020$). The Time 3 IES-R scores were correlated with none of the predictor variables.

Taking into consideration these correlation results, SEM models were built for the primiparas and multiparas separately based on the conceptual model (Figure 4).

Table 3: Correlation of variables

	Postnatal traumatic stress symptoms ¹ (Time 2)		Postnatal traumatic stress symptoms ¹ (Time 3)	
	Primiparas	Multiparas	Primiparas	Multiparas
Pre-existing variables				
Age	-0.09	-0.05	-0.22 *	-0.06
Marital status ²	-0.12	0.15	-0.05	0.13
Educational background ³	-0.21 *	0.11	-0.05	0.07
Annual income ⁴	-0.24 **	0.02	-0.17 *	0.10
Past history of mental illness ⁵	0.16		0.11	
Complexity of pregnancy ⁵	-0.04	0.01	-0.04	0.10
Satisfaction of previous delivery ⁶		0.14		-0.01
Previous emergency Caesarean section ⁵		0.02		-0.08
Previous instrumental delivery ⁵		0.00		0.06
Previous induced delivery ⁵		-0.07		-1.60
Psychosocial factors				
Expected professional support during childbirth ⁶	-0.25 **	0.02	-0.24 **	0.09
Expected family support during childbirth ⁶	-0.21 *	-0.13	-0.36 **	-0.10
Antenatal fear of childbirth ⁷	0.28 **	0.35 **	0.33 **	0.07
Objective birth experience				
Emergency Caesarean section	0.06		-0.02	
Instrumental delivery	0.04	0.09	0.05	0.10
Induced delivery	0.02	0.07	-0.04	0.12
Complicated delivery	0.07	-0.06	0.04	-0.04
Subjective birth experience				
Sensory pain ⁸	0.24 **	0.29 **	0.29 **	0.13
Affective pain ⁸	0.20 **	0.20 *	0.18 *	0.06
Postnatal fear of childbirth ⁷	0.27 **	0.23 **	0.28 **	0.08

*. $P < 0.05$, **. $P < 0.01$ Pearson's correlation or Spearman's correlation

1: Impact of Event Scale-Revised (22 items, scored 0-88)

2: Marital status: 0= Single, 1= Married.

3: Education background: 1) High School, 2) College, 3) University (Undergraduate),
4)University (Postgraduate)

4: Annual income: 1) less than 3 million yen, 2) 3–5 million yen, 3) 5–8 million yen,
4) 8–10 million yen, 5) more than 10 million yen.

5: Medical history: 1= Yes, 0= No.

6: *Ad-hoc* questions: 5-point scale “not at all (1)” to “very much (5)”

7: WijmaDelivery Expectancy/Experience Questionnaire (33item, scored 0-165)
version A: antenatal version, version B: postnatal version.

8: Short-formed McGill Pain Questionnaire (15 item), sensory pain (10 item, scored 0–30),
affective pain (5 item, scored 0–15).

3. Aetiological psychosocial factors on postnatal traumatic symptoms among primiparas and multiparas

The SEMs in this study displayed acceptable goodness-of-fit for both primiparas ($\chi^2/df = 1.56$, CFI = 0.91, RMSEA = 0.06) and multiparas ($\chi^2/df = 1.19$, CFI = 0.95, RMSEA = 0.04). As expected, in both primiparas and multiparas, Time 3 postnatal traumatic symptoms were predicted by Time 2 postnatal traumatic symptoms (Primiparas: $\beta = 0.53$, $p < 0.001$, Multiparas: $\beta = 0.72$, $p < 0.001$) that were in turn predicted by antenatal fear of childbirth (Primiparas: $\beta = 0.30$, $p < 0.001$, Multiparas: $\beta = 0.53$, $p < 0.001$). As a result of mediation analysis, direct effect of antenatal fear of childbirth on Time 3 postnatal traumatic symptoms was not significant (Primiparas: $p = 0.377$, Multiparas: $p = 0.161$), however the indirect effect mediating antenatal fear of childbirth was significant (Primiparas: $p = 0.009$, Multiparas: $p = 0.012$).

The models are, however, different between these two groups in other aspects. In the primiparous group (Figure 5-a), annual income significantly predicted expected professional ($\beta = 0.20$, $p = 0.021$), and family support during childbirth ($\beta = 0.20$, $p = 0.022$). Annual income ($\beta = -0.27$, $p = 0.016$), and history of mental illness were related to antenatal fear of childbirth ($\beta = 0.23$, $p = 0.010$). Higher age was negatively related to postnatal fear of childbirth ($\beta = -0.25$, $p = 0.005$). Antenatal fear of childbirth significantly predicted affective pain ($\beta = 0.24$, $p = 0.025$), expected family support during childbirth ($\beta = -0.25$, $p = 0.005$), Time 2 postnatal traumatic symptoms, and predicted Time 3 postnatal traumatic symptoms ($\beta = 0.53$, $p < 0.001$). In the multiparous group (Figure 5-b), lower satisfaction of previous delivery was related to lower antenatal fear of childbirth ($\beta = -0.24$, $p < 0.001$), and related to higher expected professional ($\beta = 0.20$, $p < 0.001$) and family support during childbirth ($\beta = 0.24$, $p < 0.001$).

About 50% and 43% of the variance of Time 3 traumatic symptoms was explained in the primiparas and multiparas, respectively. Similarly, 19% and 25% of the variance of Time 2 traumatic symptoms was explained in the primiparas and multiparas, respectively.

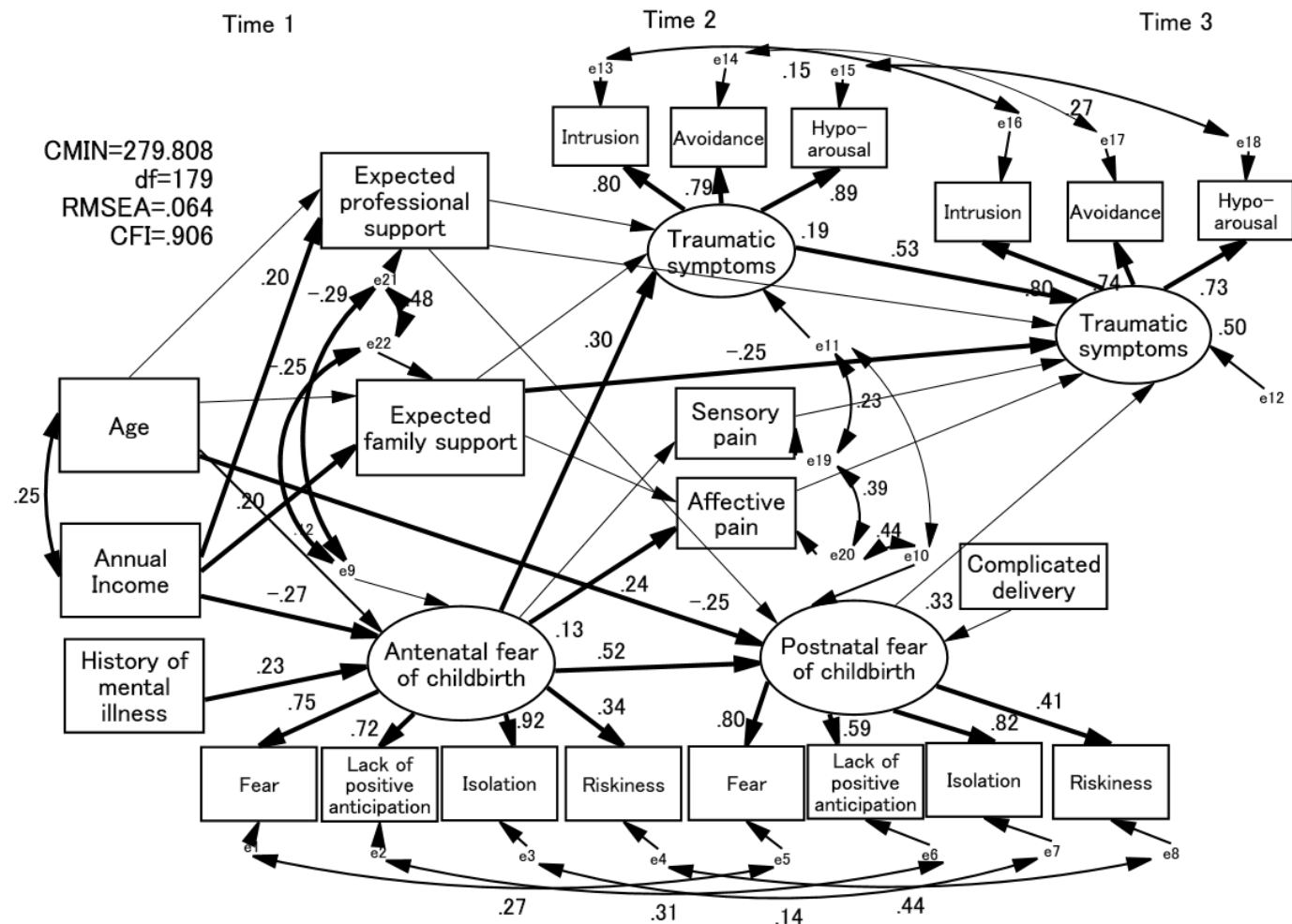


Figure.5-a. Results of model of structural regression analysis in the primiparous group

Significant path was shown with bold.

Time 1: late pregnancy, Time 2: early postpartum, Time 3: one month postpartum

Error variable : variables of each construct that cannot be explained by the observable variables that form the latent variables

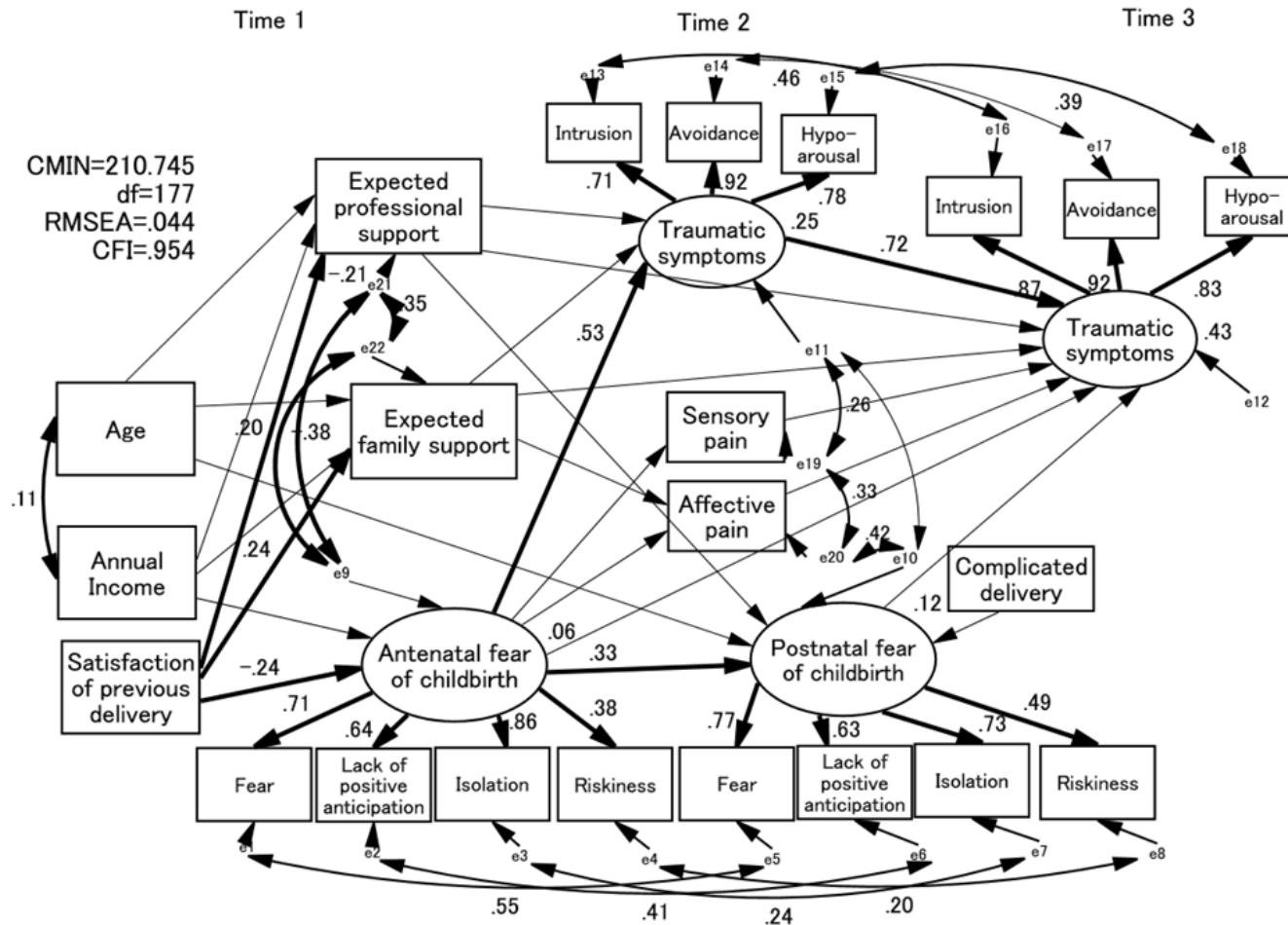


Figure.5-b. Results of structural regression analysis in the multiparous group

Significant path was shown with bold.

Time 1: late pregnancy, Time 2: early postpartum, Time 3: one month postpartum

Error variable : variables of each construct that cannot be explained by the observable variables that form the latent variables

DISCUSSION

1. Major findings

Results of this investigation indicated that in both primiparous and multiparous women, Time 2 postnatal traumatic symptoms were directly predicted by antenatal fear of childbirth (psychological variables during pregnancy); whereas Time 3 postnatal traumatic symptoms were predicted by Time 2 postnatal traumatic symptoms. The birth related variables did not predict Time 3 postnatal traumatic symptoms (Figure 2, c and d).

In addition, it has been identified that pre-existing variables significantly predict psychological variables during pregnancy, and associate with the postnatal traumatic symptoms of Time-2 (Figure 2, b). Antenatal fear of childbirth was influenced by the primiparas' history of mental illness and lower annual income. Expected family support during childbirth was the only psychological variable that directly predicted the postnatal traumatic symptoms of Time- in the primiparous group (Figure 2, a). For multiparous women, lower satisfaction of previous delivery was related to a higher antenatal fear of childbirth.

2. Psychosocial mechanisms

Antenatal fear of childbirth and postnatal traumatic stress symptoms

The results of the SEM identified that antenatal fear of childbirth directly predicts postnatal traumatic symptoms early postpartum, regardless of the delivery outcomes in both primiparous and multiparous groups. Assumably, pregnant women with higher fear of childbirth are more likely to feel anxious of uncertainty regarding safety of their baby's life and progress of the delivery in labour (Eriksson et al., 2006). They may, therefore, recognize their childbirth as threatening even if their delivery goes normally. Severe fear of childbirth during pregnancy is associated with the negative appraisal of birth. In the study of Nilsson (2009), women who were offered psychological counselling due to intense fear of childbirth, described their birth experiences as dangerous (reflecting the unpredictability of childbirth, because there are no guarantees for successful childbirth), lonely, losing one's identity as a

woman, and feeling like an inferior mother-to-be. Loneliness in the woman was captured by pregnancy and delivery, which only she could do. Losing one's identity as a woman was only for primiparous women. Their confidence plummeted because they felt that they could not behave as midwives and doctors expected. Thus, the negative interaction with staff would raise feeling of shame and increase the woman's vulnerability. The mother-to-be feels inferior because she is ashamed of having fear that is not acceptable in the eyes of the mother and others. Although these feelings also exist among women without severe fear of childbirth, midwives should be aware that women with intense fear of childbirth tend to feel the same way. This qualitative study suggests that trust and interaction between midwives and mothers during pregnancy and delivery would be important for a positive appraisal of the birthing experience.

The type of obstetric interventions was not associated with the postnatal traumatic symptoms in the univariate correlations. Objective birth experiences such as emergency Caesarean section, instrumental and induced delivery were irrelevant to postnatal traumatic symptoms in this study. This may be because of low respondent rate of questionnaires especially among women who experienced complicated delivery at one month postpartum. Unexpected obstetric interventions often make women feel incapable and feel fearful, helpless and not in control of the situation (Allen, 1998; Beck, 2004; Czarnocka & Slade, 2000). These events would have an adverse effect on a woman's acceptance towards delivery. However, whether objective birth experience is relevant to postnatal traumatic symptoms is controversial (Czarnocka & Slade, 2000; Garthus-Niegel et al., 2013; Söderquist et al., 2006; Söderquist et al., 2002). Söderquist et al. (2009) report that most postnatal women who show one or more traumatic stress symptoms, delivered babies without any obstetric intervention. They suggested that even normal vaginal delivery could be experienced as traumatic. An emergency Caesarean section or an instrumental delivery may not be necessarily traumatic. Instrumental delivery or emergency Caesarean section is a final part in their long delivery process: negative feelings may have existed before the intervention (Söderquist et al., 2009; Söderquist et al., 2002). Thus stress symptomatology may be derived more from other

sources than the mode of delivery.

Pre-existing factors on antenatal fear of childbirth

However pre-existing variables related to antenatal fear of childbirth were different between primiparas and multiparas. For primiparous women, lower annual income, which co-varied with younger age, was associated with higher antenatal fear of childbirth during pregnancy. As compared with younger women, older women with higher income had higher self-esteem, a more well-balanced coping style, and more helpful social support resources (Aldwin, Sutton, Chiara, & Spiro, 1996; Reuter et al., 2006), and, thus, may show lower fear of childbirth. Intrapersonal resources such as higher self-esteem, and environmental resources including the availability of social support were defined coping resources, which help with positive well-being and deal with levels of depression (Terry, Mayocchi, and Hynes, 1996). On the other hand, an individual who is younger in age with low economic status and less social support has less coping resources, and hence, a more vulnerable coping style. Antenatal fear of childbirth develops as reflected by a woman's vulnerability to stress.

Among multiparous women, lower satisfaction of previous delivery contributed to antenatal fear of childbirth. This finding indicates that multiparous women appraise their upcoming childbirth based not only on their coping resources (such as age and educational background), but on their previous birth experience(s) as well. The results support the previous claim that the negative birth experience increases antenatal fear of childbirth (secondary tokophobia), and re-traumatizes the previous experience during the current pregnancy for multiparous women (Hofberg & Brockington, 2000). Some qualitative reports help us understand that multiparous women who have negative appraisal regarding their previous experience may have some ambivalent feelings. They recognise their previous birth experience as an insecure, isolated, less cared and uncontrollable one and feel intensive fear during the current pregnancy (Nilsson, Bondas, & Lundgren, 2010). On the other hand, they try to review their previous birth experience as more acceptable; rebuild their inner self; and recognize their subsequent childbirth as more positive (Beck & Watson, 2010). Therefore, the

pregnancy period may provide mid-wives with an excellent opportunity to help multiparous women who are less satisfied with previous childbirth resynthesize the experience and reclaim her life.

Expected family support during childbirth and postnatal traumatic symptoms

What is interesting is that expected family support during childbirth lowers the possibility of Time 3 traumatic stress symptoms among primiparous women. This finding supports previous studies that the risk and recovery of traumatic symptoms are dependent on social support (Ford & Ayers, 2011). . Expected family support during childbirth is a woman's perceived availability of social support (Barrera, 1986; Gottlieb, 1983). Perceived support may have a positive effect on women's emotional response towards the birthing experience, and lowers the development of postnatal traumatic symptoms (Ford & Ayers, 2011). On encountering a stressful event, an individual can judge if the event is threatening or not (Primary Appraisal), and then decide if the event is serious (manageable) or not (Secondary Appraisal) (Lazarus & Folkman, 1984). If the perception that the availability of social support is higher, the secondary appraisal of the stressful event is more optimistic (Wilcox & Vernberg, 1985). Although some researchers consider that this measure of social support reflects the person's trait or personality, it also plays a role to buffer the impact of stressful events. The relationship between expected family support during pregnancy and enacted family support during and after delivery remains unknown. However, being respected and emotionally supported by their family members during and after delivery may help women re-appraise the experience of childbirth, and decrease the development of traumatic symptoms later.

Birth-related factors and postnatal traumatic symptoms

Antenatal fear of childbirth predicted affective pain of labour only among primiparas in this study. Perceived labour pain may be determined by a variety of resources such as duration of labour, obstetric event, and emotional distress in labour (Niven & Murphy-Black,

2000). Primiparous women experience greatest pain during the first stage of labour, which is the longest part of delivery compared with other stages (Lowe, 1987). They feel very tense, unsure, and lonely at this stage when compared to multiparous women because childbirth is the first experience for them (Fridh, Kopare, Gaston-Johansson, & Norvell, 1988). Since affective pain is a reflection of emotional aspects of pain experience (Fridh et al., 1988), the negative feelings associated with perceived pain in the first stage of labour also influences the experience of affective pain. Furthermore, primiparous women who have severe antenatal fear of childbirth may feel more vulnerable feelings during labour than those who do not. Therefore, fear of childbirth during pregnancy is related to affective pain in labour for primiparous women (Fridh et al., 1988). Intense antenatal fear of childbirth is reported to increase demand for the amount of pain anaesthesia in labour (Alehagen, Wijma, & Wijma, 2001). This report indicates that pain and discomfort still remain under medical control of pain among women accompanied with the increased risk of adverse effects of anaesthetic drug. Although there is no association between perception of pain and postnatal traumatic symptoms at one-month postpartum, there is still a need of both antenatal care to reduce fear of childbirth and pain management to reduce the discomfort during labour.

Contrary to my expectation, neither sensory, affective pain perceptions nor postnatal fear of childbirth directly predicted Time 3 postnatal traumatic symptoms. The experience of childbirth may not increase the risk of traumatic stress symptoms. However, considering univariate correlations of pain perceptions and Time 2 postnatal traumatic symptoms, there is a possibility that Time 2 postnatal traumatic symptoms may be strengthened by negative and catastrophic appraisal of pain, which influence Time 3 postnatal traumatic symptoms.

Antenatal fear of childbirth among the multiparous women was not associated with perception of labour pain. This may be due to the difference of delivery process between primiparas and multiparas. In multiparas, most of their childbirth progresses more quickly than in their first childbirth experience (Friedman, 1955). Their pain intensity reaches a peak during the second stage of labour, which is also shorter than that of primiparas (Friedman, 1955). Longer labour may make mothers have a negative appraisal of childbirth, and also

experience severe pain (Waldenstrom et al., 2004). Although they may feel intense fear of childbirth based on their previous birth experiences, they may recognize pain memories as more acceptable because the pain did not last as they experienced in their first childbirth. However, as stated above, there is a gap between pain observed during labour and experience of pain assessed retrospectively after delivery. It is still unknown whether antenatal fear of childbirth influences pain perception during labour for multiparous women.

3. Clinical implications

This study revealed that some postnatal women after delivery are suffering from traumatic stress symptoms. Postnatal traumatic symptoms that many women suffer from are sometimes undetected in the eyes of medical staff (Allen, 1998). Researchers and clinicians primarily focus on postnatal depression. Unduly, less attention has been paid to postnatal traumatic symptoms during the postnatal period (Glasheen, Richardson, & Fabio, 2010; Limlomwongse & Liabsuetrakul, 2006; Martini et al., 2013). The present study, thus, warns that perinatal health professionals should be more alert to the traumatic stress of delivery.

Although, it is still unconfirmed whether the antenatal fear of childbirth mitigates the risk of postnatal traumatic symptoms, providing antenatal care to support women who experience severe fear of childbirth may be necessary. In Sweden, professional support provided by the 'Aurora team' - counselling via the telephone, education with regard to the process of childbirth, and birth planning has proved to be effective (Ryding, Persson, Onell, & Kvist, 2003). The intervention also includes referring cases of severe mental disorders to a psychiatrist when it needed. In Japan, some part of these interventions such as planning the birth, and providing information regarding childbirth by group-education is common in clinical settings. However, individual counselling may be more effective as some women conceal or mask their severe fear of childbirth. They hesitate to tell others because they feel that talking about their fears will be unacceptable (Nilsson, & Lundgren, 2009).

It is important to consider the difference of parity between the approaches adapted

by nulliparous and multiparas genres. Recording rigorous patient histories such as previous birth experiences, history of mental illness, and expectations towards upcoming delivery, and continuous counselling by health care workers during pregnancy may be promising.

Regarding economic status, it may not be common to ask such information in clinical settings. However, information that suggests lower economic status such as livelihood assistance may be available. Multiparous women who were less satisfied with previous delivery displayed a higher fear of childbirth. Healthcare professionals need to take on roles of listening to women's previous birthing experiences, and helping them recognize their experience(s) as positive.

As well as antenatal care, intra-partum care should be more important. During delivery, midwives should give close attention to these women with severe fear of childbirth. The following can reduce the anguish faced during delivery: frequent communication, patiently explain the process of delivery and the baby's condition, and provide an assuring atmosphere so that women can easily express their fear and concern.

In addition, enhancing family support towards childbirth and support for reducing pain and discomfort during delivery is important for primiparous women. Paying attention to a woman's relationship with her partner is also important. Parental class for childbirth preparation would provide both parents with precise information, encourage them to have consensus and collaborate to cope with labour.

The findings that postnatal traumatic symptoms early postpartum predicted that one month postpartum also suggest early intervention after delivery. With regard to intervention during postpartum period, previous studies have proposed group counselling (Kershaw, Jolly, Bhabra, & Ford, 2005; Ryding, Wijma, & Wijma, 1998) and debriefing (Bisson, Jenkins, Alexander, & Bannister, 1997; Mayou, Ehlers, & Hobbs, 2000; Rose, Brewin, Andrews, & Kirk, 1999), which provide environments where women can express their birth experience. Caution should be paid in case the women show reluctance to talk about their experience(s) because these treatments may increase the risk of traumatic stress symptoms among women. However, creating environments so that women are able to talk about their experiences

spontaneously in order to support individually may be effective for early detection and treatment. Furthermore, it is also important for midwives to assess the difficulty of daily life and child-rearing among traumatised mothers, and arrange/ access support from other key supporters to reduce social impairments.

4. Limitations of the study

Several limitations should be addressed. First, the results are not representative of the total sample of Japanese women. The number of institutions was only three and they were all in the Tokyo district. Age and educational backgrounds of the participants are higher than those of the national reports in 2010 (Ministry of Health, Labor & Welfare, 2010). In addition, some women declined to participate and only half of the sample responded to the questionnaires at all the three observational points. Women who declined from participating in this study may have been at a higher risk of traumatic stress symptoms such as severe antenatal fear of childbirth, and lower satisfaction of previous delivery. It should be noted that more than half of these women who experienced emergency Caesarean Section ($n = 11$) did not return questionnaires at the end of the postpartum period (a month).

It can be assumed that these unresponsive women may be at a high risk of trauma. The rate of traumatic symptoms may be underestimated. Several reasons for the limited agreement and low response rate can be considered. There is a possibility that some questionnaires to measure fear of childbirth and postnatal traumatic symptoms might cause mental anguish to the women who were at a high risk of trauma. In addition, although the postpartum questionnaires were set so that the required time is within ten minute considering their burden, higher dropout rate (50 %) was seen at early (Time-2) and 'one-month' postpartum (Time 3). Due to the fatigue of childbirth, and childrearing, women were reluctant to answer the questionnaires, and send it by postal service .To increase the respondent rate, the following methods could have been adopted: distributing questionnaires by e-mail instead of postal service, attractive form of cover letter, and mentioning more clear privacy

protections.

Second, there is possibility that some variables related to facilities might influence on the results. Variables such as the average length of service by obstetricians and midwives, and the number of doctors and midwives, were not considered. Potential difference of professional intra-partum care between settings may affect appraisal of childbirth and the development of traumatic symptoms among women.

Third, we did not assess women's mental state by a direct diagnostic interview such as the Structured Clinical Interview for DSM-IV-TR (SCID: First, Spitzer, Gibbon, & Williams, 2010). Data based on a structured diagnostic interview may show different results. However, the present results would indicate that there is at least a need for health care professionals to be aware of the existence of women suffering from postnatal traumatic symptoms. With regard to the PTSD prevalence, further studies are needed.

Fourth, some questionnaires have limitations. Ad-hoc questionnaires regarding expected family/professional support during delivery have several limitations to be addressed. These questionnaires asked women about their 'expectancy'. The vocabulary might not be adequate to measure the availability of social support because it does not question if the woman believes that she will be supported. In addition, it remains unknown what kind of support would buffer the risk of postnatal traumatic symptoms of Time-3.

Some variables that previous studies examined were not studied in this investigation because of lack of suitable scales and for ethical reasons. For example: prior trauma experience before pregnancy such as history of sexual abuse is a significant predictor of traumatic stress symptoms after delivery. In addition, social support variables during and after delivery were not included in this study because perceived social support may be reflected by traumatic stress symptoms and there was no suitable scale. Therefore, further investigation including development of suitable scales would be needed in order to understand women who are likely to show these traumatic symptoms.

Another limitation is that a larger sample with over 300 participants in each group would provide more robust results, although the present sample met the minimum SEM

sample size criterion (> 100) (Byrne, 2001). Overall goodness-of-fit was only acceptable in this study. Re-specification may be necessary to improve the model's ability to explain the chain of causation. However, fairly large portion of the variance of postnatal traumatic symptomatology in this study is promising that future re-specification can be based on the main causal link between antenatal fear of childbirth and postnatal traumatic symptomatology.

5. Suggestions for further studies

Further studies are needed including larger sample(s) with a variety of psychosocial backgrounds in different settings and regions. More psychometric aspects including factors during postpartum periods should be considered in order to reveal a clear picture of the development of traumatic stress symptoms during postpartum period. In addition, assessing postnatal traumatic symptoms using a structural diagnostic interview would give more robust findings.

The present study gave supporting evidence that antenatal fear of birth causes postnatal trauma symptomatology. However, this causal link should be examined in an intervention study. It cannot be proven without doubt unless preventive intervention for antenatal fear of birth is demonstrated to be followed by subsequent decrease of postnatal traumatic symptomatology. Such investigations are thus tightly linked to the development of treatment and prevention of postnatal traumatic symptoms.

There may remain women who suffer from postnatal traumatic symptoms even if preventative measures are used. Hence, what remains to be studied are psychological and physical consequences of postnatal traumatic symptoms on the health status of mothers, babies and family members. Causal mechanism of such links also requires investigation. Knowledge about them is necessary to provide health intervention in order to avoid

secondary impacts of postnatal traumatic symptoms.

CONCLUSION

This study aimed to identify the aetiological relationships of psychosocial factors regarding postnatal traumatic symptoms among Japanese primiparas and multiparas. The present study proposed a causal flow between pre-existing variables, psychological variables during pregnancy (such as fear of childbirth, birth-related variables) and postnatal traumatic symptoms. Also proposed was the distinction between primiparas and multiparas. Thus, structural regression models were performed in the primiparous and multiparous groups differently. This study revealed that among both primiparous and multiparous women, antenatal fear of childbirth was a significant predictor of traumatic stress symptoms after childbirth. Among primiparous women, antenatal fear of childbirth was predicted by past history of mental illness and lower annual income. Among multiparous women, it was predicted by poor satisfaction of previous deliveries.

Relationship between antenatal fear of childbirth and postnatal traumatic symptoms would suggest the need of antenatal intervention for future study. Taking into consideration a patient's background (case sheet) such as previous birth experiences, history of mental illness, and expectations towards upcoming delivery may be important for primiparous women by health care workers. Especially, for multiparous women, paying attention to their previous birth experiences and helping them to recognize their experience as more positive would be important roles that midwives should practice.

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REFERENCES

Aldwin, C. M., Sutton, K. J., Chiara, G., & Spiro, A., 3rd. (1996). Age differences in stress, coping, and appraisal: Findings from the Normative Aging Study. *Journal of Gerontology. Series B: Psychological Sciences and Social Sciences*, 51 (4), 179-188.

Alehagen, S., Wijma, K., & Wijma, B. (2001). Fear during labor. *Acta Obstetrica et Gynecologica Scandinavica*, 80 (4), 315-320.

Allen, S. (1998). A qualitative analysis of the process, mediating variables and impact of traumatic childbirth. *Journal of Reproductive and Infant Psychology*, 16 (2), 107-131.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Arimura, T., Hosoi, M., Tsukiyama, Y., Yoshida, T., Fujiwara, D., Tanaka, M.,...Kubo, C. (2012). Pain questionnaire development focusing on cross cultural equivalence to the original questionnaire: The Japanese version of the short-form McGill Pain Questionnaire. *Pain Medicine*, 13(4), 541-551.

Asukai, N., Kato, H., Kawamura, N., Kim, Y., Yamamoto, K., Kishimoto, J., ... Nishizono-Maher, A. (2002). Reliability and validity of the Japanese-language version of the impact of event scale-revised (IES-R-J): Four studies of different traumatic events. *Journal of Nervous and Mental Disease*, 190 (3), 175-182.

Austin, M.P., Frilingos, M., Lumley, J., Hadzi-Pavlovic, D., Roncolato, W., Acland, S., & Saint K. et al. (2008). Brief antenatal cognitive behaviour therapy group intervention for the prevention of

postnatal depression and anxiety: a randomised controlled trial. *Journal of Affective Disorder*, 105 (1-3), 35 - 44.

Ayers, S., Joseph, S., McKenzie-McHarg, K., Slade, P., & Wijma, K. (2008). Post-traumatic stress disorder following childbirth: Current issues and recommendations for future research. *Journal of Psychosomatic Obstetrics and Gynaecology*, 29 (4), 240-250.

Ballard, C.G., Stanley, A.K., Brockington, I.F. (1995). Post-traumatic stress disorder (PTSD) after childbirth. *The British Journal of Psychiatry*, 166 (4), 525-528.

Barrera M. Jr. (1986). Distinctions between social support concepts, measures, and models. *American Journal of Community Psychology*, 14(4), 413-445.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182.

Beck, C.T. (1995). The effects of postpartum depression on maternal-infant interaction: a meta-analysis. *Nursing Research*, 44(5), 298-304.

Beck, C.T. (2002). Theoretical perspectives of postpartum depression and their treatment implications. *American Journal of Maternal Child Nursing*, 27(5), 282-287.

Beck, C. T. (2004). Post-traumatic stress disorder due to childbirth: The aftermath. *Nursing Research*, 53 (4), 216-224.

Beck, C. T., & Watson, S. (2010). Subsequent childbirth after a previous traumatic birth. *Nursing Research*, 59 (4), 241-249.

Bisson, J. I., Jenkins, P. L., Alexander, J., & Bannister, C. (1997). Randomised controlled trial of psychological debriefing for victims of acute burn trauma. *British Journal of Psychiatry*, *171*, 78-81.

Brockington, I. (2004). Postpartum psychiatric disorders. *Lancet*, *24*, 363 (9405), 303-10.

Brockington, I. F., Macdonald, E., & Wainscott, G. (2006). Anxiety, obsessions and morbid preoccupations in pregnancy and the puerperium. *Archives Women's Mental Health*, *9* (5), 253-263.

Byrne, B. M. (2001). *Structural equation modeling with Amos. Basic concepts, applications, and programming*. Erlbaum: Mahwah

Canadian Association of Midwives. (2009). *Vision and Mission*.

Montreal: Retrieved from <http://www.canadianmidwives.org/vision-and-mission.html>.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*, 310-357.

Creedy, D. K., Shochet, I. M., & Horsfall, J. (2000). Childbirth and the development of acute trauma symptoms: Incidence and contributing factors. *Birth*, *27* (2), 104-111.

Cuijpers P, Brannmark JG, & van Straten A. (2008). Psychological treatment of postpartum depression: a meta-analysis. *Journal of Clinical Psychology*, *64* (1), 103-18.

Czarnocka, J., & Slade, P. (2000). Prevalence and predictors of post-traumatic stress symptoms following childbirth. *British Journal of Clinical Psychology*, *39* (Pt 1), 35-51.

Eriksson, C., Jansson, L., & Hamberg, K. (2006). Women's experiences of intense fear related to childbirth investigated in a Swedish qualitative study. *Midwifery*, 22 (3), 240-248.

Fairbrother, N., & Woody, S. R. (2007). Fear of childbirth and obstetrical events as predictors of postnatal symptoms of depression and post-traumatic stress disorder. *Journal of Psychosomatic Obstetrics and Gynaecology*, 28 (4), 239-242.

Fenwick, J., Gamble, J., Nathan, E., Bayes, S., & Hauck, Y. (2009). Pre- and postpartum levels of childbirth fear and the relationship to birth outcomes in a cohort of Australian women. *Journal of Clinical Nursing*, 18 (5), 667-677.

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (2010). *Structured Clinical Interview for DSM-IV-TR Axis I Disorders (SCID-IV)*. New York: New York Institute of Psychiatry.

Ford, E., & Ayers, S. (2011). Support during birth interacts with prior trauma and birth intervention to predict postnatal post-traumatic stress symptoms. *Psychology & Health*, 26(12), 1553-1570.

Fridh, G., Kopare, T., Gaston-Johansson, F., & Norvell, K. T. (1988). Factors associated with more intense labor pain. *Research in Nursing and Health*, 11 (2), 117-124.

Friedman, E. A. (1955). Primigravid labor: A graphicostatistical analysis. *Journal of Obstetrics and Gynecology*, 6 (6), 567-89.

Furuta, M., Sandall, J., Cooper, D., & Bick, D. (2014). The relationship between severe maternal morbidity and psychological health symptoms at 6-8 weeks postpartum: A prospective cohort study in one English maternity unit. *BMC Pregnancy and Childbirth*, 14, 133.

Gamble, J. A., Creedy, D. K., Webster, J., & Moyle, W. (2002). A review of the literature on debriefing

or non-directive counselling to prevent postpartum emotional distress. *Midwifery*, 18, 72-79.

Garthus-Niegel, S., von-Soest, T., Vollrath, M. E., & Eberhard-Gran, M. (2013). The impact of subjective birth experiences on post-traumatic stress symptoms: A longitudinal study. *Archives of Women's Mental Health*, 16 (1), 1-10.

Geissbuehler, V., & Eberhard, J. (2002). Fear of childbirth during pregnancy: A study of more than 8000 pregnant women. *Journal of Psychosomatic Obstetrics and Gynaecology*, 23 (4), 229-235.

Glasheen, C., Richardson, G. A., & Fabio, A. (2010). A systematic review of the effects of postnatal maternal anxiety on children. *Archives of Women's Mental Health*, 13 (1), 61-74.

Goodman, P., Mackey, M. C., & Tavakoli, A. S. (2004). Factors related to childbirth satisfaction. *Journal of Advanced Nursing*, 46 (2), 212-219.

Gottlieb, B. H. (1983). Social support as a focus for integrative research in psychology. *American Psychologist*, 38(2), 278-287.

Grekin, R., & O'Hara, M.W. (2014). Prevalence and risk factors of postpartum posttraumatic stress disorder: A meta-analysis. *Clinical Psychological Review*, 34(5), 389-401.

Hall, W. A., Hauck, Y. L., Carty, E. M., Hutton, E. K., Fenwick, J., & Stoll, K. (2009). Childbirth fear, anxiety, fatigue, and sleep deprivation in pregnant women. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 38 (5), 567-576.

Harvey, A. G., Bryant, R. A., & Tarrier, N. (2003). Cognitive behavior therapy for posttraumatic stress disorder. *Clinical Psychological Review*, 23 (3), 501-502.

Henderson, S. (1981). Social relationships, adversity and neurosis: an analysis of prospective observations. *British Journal of Psychiatry*, *138*, 391-398.

Hertzberg, T., & Wahlbeck, K.(1999). The impact of pregnancy and puerperium on panic disorder: a review. *Journal of Psychosomatic Obstetric & Gynaecology*, *20*(2), 59-64.

Hofberg, K., & Brockington, I. (2000). Tokophobia: An unreasoning dread of childbirth. A series of 26 cases. *British Journal of Psychiatry*, *176*, 83-85.

Horowitz, M. (1974). Stress response syndromes. Character style and dynamic psychotherapy. *Archives Gender Psychiatry*, *31*(6), 768-81.

Johnson, R., & Slade, P. (2002). Does fear of childbirth during pregnancy predict emergency caesarean section? *BJOG: An International Journal of Obstetrics and Gynaecology*, *109* (11), 1213-1221.

Kendell, R.E., Chalmers, J.C., & Platz, C. (1987). Epidemiology of puerperal psychoses. *British Journal of Psychiatry*, *150*, 662-673.

Kershaw, K., Jolly, K., Bhabra, K., & Ford, J. (2005). Randomised controlled trial of community debriefing following operative delivery. *BJOG: An International Journal of Obstetrics and Gynaecology*, *112*, 1504 -1509.

Kline, R.B. (2004). *Principles And Practice Of Structural Equation Modeling*. 2nd ed. New York: Guilford publications.

Lapp, L. K., Agbokou, C., Peretti, C. S., & Ferreri, F. (2010). Management of post traumatic stress disorder after childbirth: A review. *Journal of Psychosomatic Obstetrics and Gynaecology*, *31* (3),

113-122.

Lazarus, R. S., Folkman, S. (1984). *Stress, appraisal, and coping*. New York, Springer.

Limlomwongse, N., & Liabsuetrakul, T. (2006). Cohort study of depressive moods in Thai women during late pregnancy and 6-8 weeks of postpartum using the Edinburgh Postnatal Depression Scale (EPDS). *Archives of Women's Mental Health*, 9(3), 131-138.

Lowe, N. K. (1987). Parity and pain during parturition. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 16 (5), 340-346.

Martini, J., Wittich, J., Petzoldt, J., Winkel, S., Einsle, F., Siegert, J., ...Wittchen, H. U. (2013). Maternity anxiety disorders prior to conception, psychopathology during pregnancy and early infants' development: A prospective-longitudinal study. *Archives of Women's Mental Health*, 16(6), 549-560.

Mayou, R. A., Ehlers, A., & Hobbs, M. (2000). Psychological debriefing for road traffic accident victims. *British Journal of Psychiatry*, 176, 589-593.

Melzack, R. (1987). The short-form McGill Pain Questionnaire. *Pain*, 30 (2), 191-197.

Ministry of Health, Labor & Welfare. (2010). *Longitudinal Survey of Newborns in the 21st Century (2010 Cohort)*. Tokyo: Retrieved from <http://www.e-stat.go.jp/SG1/estat/List.do?lid=000001117995>.

Statistics of Bureau Japan, Ministry of Internal Affairs and Communications. (2010). *Report of population census*. Tokyo: Retrieved from <http://www.e-stat.go.jp/SG1/estat/List.do?bid=000001034991&cycode=0..>

Nicholls, K., & Ayers, S. (2007). Childbirth-related post-traumatic stress disorder in couples: A qualitative study. *British Journal of Health Psychology*, 12 (Pt 4), 491-509.

Nieminen, K., Stephansson, O., & Ryding, E. L. (2009). Women's fear of childbirth and preference for Cesarean section: A cross-sectional study at various stages of pregnancy in Sweden. *Acta Obstetrica et Gynecologica Scandinavica*, 88 (7), 807-813.

Nilsson, C., Bondas, T., & Lundgren, I. (2010). Previous birth experience in women with intense fear of childbirth. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 39 (3), 298-309.

Nilsson, C., & Lundgren, I. (2009). Women's lived experience of fear of childbirth. *Midwifery*, 25 (2), 1-9.

Niven, C., & Gijssbers, K. (1984). A Study of labour pain using the McGill Pain Questionnaire. *Social Science and Medicine*, 19, 1347-1351.

Niven, C. A., & Murphy-Black, T. (2000). Memory for labor pain: A review of the literature. *Birth*, 27 (4), 244-253.

Norvell, K. T., Gaston-Johansson, F., & Fridh, G. (1987). Remembrance of labor pain: How valid are retrospective pain measurements? *Pain*, 31 (1), 77-86.

O'Hara, M.W., & Swain, A.M. (1996). Rates and risk of postpartum depression—a meta-analysis. *International Review of Psychiatry*, 8(1), 37-54.

Olde, E., van der Hart, O., Kleber, R., & van son, M. (2006). Posttraumatic stress following childbirth: A review. *Clinical Psychological Review*, 26 (1), 1-16.

Pitt, B. (1968). "A typical" depression following childbirth. *The British Journal of Psychiatry*, 114 (516), 1325-1335.

Priest, S. R., Henderson, J., Evans, S. F., & Hagan, R. (2003). Stress debriefing after childbirth: A randomised controlled trial. *Medical Journal Australia*, 178, 542-545.

Reuter, K., Classen, C. C., Roscoe, J. A., Morrow, G. R., Kirshner, J. J., Rosenbluth, R.,... Spiegel, D. (2006). Association of coping style, pain, age and depression with fatigue in women with primary breast cancer. *Psycho-Oncology*, 15 (9), 772-779.

Rubin, R. (1961). Puerperal change. *Nursing Outlook*, 9, 753-755.

Ryding, E.L., Persson, A., Onell, C., & Kvist, L. (2003). An evaluation of midwives' counselling of pregnant women in fear of childbirth. *Acta Obstetrica et Gynecologica Scandinavica*, 82, 10-17.

Rose, S., Brewin, C. R., Andrews, B., & Kirk, M. (1999). A randomized controlled trial of individual psychological debriefing for victims of violent crime. *Psychological Medicine*, 29, 793-799.

Ryding, E. L., Wijma, K., & Wijma, B. (1998). Postpartum counselling after an emergency cesarean. *Clinical Psychology and Psychotherapy*, 5, 231-237.

Slade, P. (2006). Towards a conceptual framework for understanding post-traumatic stress symptoms following childbirth and implications for further research. *Journal of Psychosomatic Obstetrics and Gynaecology*, 27 (2), 99-105.

Söderquist, J., Wijma, B., Thorbert, G., & Wijma, K. (2009). Risk factors in pregnancy for post-traumatic stress and depression after childbirth. *BJOG: An International Journal of Obstetrics and Gynaecology*, 116 (5), 672-680.

Söderquist, J., Wijma, B., & Wijma, K. (2006). The longitudinal course of post-traumatic stress after childbirth. *Journal of Psychosomatic Obstetrics and Gynaecology*, 27 (2), 113-119.

Söderquist, J., Wijma, K., & Wijma, B. (2002). Traumatic stress after childbirth: The role of obstetric variables. *Journal of Psychosomatic Obstetrics and Gynaecology*, 23 (1), 31-39.

Sorenson, D.S. (2003). Healing traumatizing provider interactions among women through short-term group therapy. *Archives of Pediatrics Nursing*, 17, 259-269.

Speisman, B.B., Storch, E.A., & Abramowitz, J. S. (2011). Postpartum obsessive-compulsive disorder. *Journal of Obstetric Gynecology Neonatal Nursing*, 40 (6), 680-690.

Takegata, M., Haruna, M., Matsuzaki, M., Shiraishi, M., Murayama, R., Okano, T., & Severinsson, E. (2013). Translation and validation of the Japanese version of the Wijma Delivery Expectancy/Experience Questionnaire version A. *Nursing & Health Sciences*, 15 (3), 326-332.

Terp, I.M., & Mortensen, P.B. (1998). Post-partum psychoses. Clinical diagnoses and relative risk of admission after parturition. *British Journal of Psychiatry*, 171. 511-516.

Terry, D. J., Mayocchi, L., & Hynes, G. J. (1996). Depressive symptomatology in new mothers: a stress and coping perspective. *Journal of Abnormal Psychology*, 105 (2), 220-231.

Terry, D. J., Rawle, R., & Callan, V. J. (1995). The effects of social support on adjustment to stress: The mediating role of coping. *Personal Relationships*, 2, 97-124.

Verreault, N., Da Costa, D., Marchand, A., Ireland, K., Banack, H., Dritsa, M., & Khalife, S. (2012). PTSD following childbirth: A prospective study of incidence and risk factors in Canadian women.

Journal of Psychosomatic Research, 73 (4), 257-263.

Waldenstrom, U., Hildingsson, I., Rubertsson, C., & Radestad, I. (2004). A negative birth experience: prevalence and risk factors in a national sample. *Birth*, 31(1), 17-27.

Waldenstrom, U., Hildingsson, I., & Ryding, E. L. (2006). Antenatal fear of childbirth and its association with subsequent caesarean section and experience of childbirth. *BJOG: An International Journal of Obstetrics and Gynaecology*, 113 (6), 638-646.

Weiss, D. S., & Marmar, C. R. (1997). *Assessing Psychological Trauma and PTSD*. New York: Guilford Press.

Wijma, K., Söderquist, J., & Wijma, B. (1998). Posttraumatic stress disorder after childbirth: A cross sectional study. *Journal of Anxiety Disorder*, 11(6), 587-597.

Wijma, K., Wijma, B., & Zar, M. (1998). Psychometric aspects of the W-DEQ: A new questionnaire for the measurement of fear of childbirth. *Journal of Psychosomatic Obstetrics and Gynaecology*, 19 (2), 84-97.

Yokote, N. (2008). "Women's experiences of labor, surgery and first postnatal week by an emergency Caesarean section (in Japanese)". *Journal of Japan Academy of Midwifery*, 22, 37-48.

Zar, M., Wijma, K., & Wijma, B. (2002). Pre- and postpartum fear of childbirth in nulliparous and parous women. *Scandinavian Journal of Behavior Therapy*, 30 (2), 75-84.

Zaers, S., Waschke, M., Ehlert, U. (2008). Depressive symptoms and symptoms of post-traumatic stress disorder in women after childbirth. *Journal of Psychosomatic Obstetrics & Gynecology*, 29(1), 61-71.

Zhang, Z., Ran, M.S., Li, Y.H., Ou, G.J., Gong, R.R., Li, R.H... Fang, D.Z. (2012). Prevalence of post-traumatic stress disorder among adolescents after the Wenchuan earthquake in China. *Psychological Medicine*, 42(8), 1687-93.

Zlotnick, C., Miller, I.W., Pearlstein, T., Howard, M., & Sweeney, P. (2006). A preventive intervention for pregnant women on public assistance at risk for postpartum depression. *American Journal of Psychiatry*, 163(8), 1443-5.

Appendix

Appendix 1:

**Japanese version of Wijma Delivery Expectancy/Experience Questionnaire
(JW-DEQ) versions A and B**

出産の思いに関する質問表

(Takegata et al., 2013; Wijma, Wijma, et al., 1998)

出産の思いに関する質問紙表

Wijma Delivery Expectancy/Experience Questionnaire 日本語版 version A

お願い

この質問紙調査票は、女性の方が出産に先立って、どんな気持ちや考えを抱かれるかについてお伺いするものです。

各項目の回答は0点～5点の目盛になっています。目盛の両端（0点と5点）は、それぞれの気持ちや考え方の正反対の両端を表しています。あなたのご出産がどうなると予想されているかについて、**あなたが今思っていることを、もっともあてはまる点数の数字に○をつけて、各項目にご回答下さい。**
どのような出産になるとよいと願っているかではなく、あなたの出産がどうなると予想しているかについてあなたが今思っていることをお答え下さい。回答には、肯定的な言葉に「とても」よくあてはまるかどうか答えるものと、否定的な言葉に「とても」よくあてはまるかどうか答えるものがあります。回答を記入する際には一問ずつ、よく考えてください。

ご回答の際は、項目をとばさないようにお気をつけください。

I 全体的に、あなたの出産はどうなると思いますか？

- | | | | | | | | |
|------------|---|---|---|---|---|---|------------|
| 1 とても素晴らしい | 0 | 1 | 2 | 3 | 4 | 5 | 全く素晴らしいくない |
| 2 とても恐ろしい | 0 | 1 | 2 | 3 | 4 | 5 | 全く恐ろしくない |

II 出産の間、おおむねあなたはどんな気持ちになると思いますか？

- | | | | | | | | |
|---------------------|---|---|---|---|---|---|-------------------|
| 3 とても孤独である | 0 | 1 | 2 | 3 | 4 | 5 | 全く孤独ではない |
| 4 とても強くいられる | 0 | 1 | 2 | 3 | 4 | 5 | 全く強くいられない |
| 5 とても自信がある | 0 | 1 | 2 | 3 | 4 | 5 | 全く自信がない |
| 6 とても心配である | 0 | 1 | 2 | 3 | 4 | 5 | 全く心配でない |
| 7 とても
とり残されている | 0 | 1 | 2 | 3 | 4 | 5 | 全く
取り残されていない |
| 8 とても弱々しく
感じる | 0 | 1 | 2 | 3 | 4 | 5 | 全く弱々しく
感じない |
| 9 とても安全が保障
されている | 0 | 1 | 2 | 3 | 4 | 5 | 全く
安全が保障されていない |
| 10 とても自立している | 0 | 1 | 2 | 3 | 4 | 5 | 全く自立していない |
| 11 とても見放されて
いる | 0 | 1 | 2 | 3 | 4 | 5 | 全く
見放されていない |
| 12 とても緊張している | 0 | 1 | 2 | 3 | 4 | 5 | 全く緊張していない |
| 13 とても嬉しい | 0 | 1 | 2 | 3 | 4 | 5 | 全く嬉しくない |
| 14 とても誇りに思う | 0 | 1 | 2 | 3 | 4 | 5 | 全く誇りに思わない |
| 15 とても
みすてられている | 0 | 1 | 2 | 3 | 4 | 5 | 全く
みすてられていない |

16 とても落ち着いている 0 1 2 3 4 5 全く落ち着かない

17 とてもくつろいでいる 0 1 2 3 4 5 全くくつろいでいない

18 とても幸せである 0 1 2 3 4 5 全く幸せでない

III 出産の間、あなたは何を思いますか?

19 とても混乱する 0 1 2 3 4 5 全く混乱しない

20 とても絶望する 0 1 2 3 4 5 全く絶望しない

21 子どもが とても待ち遠しい 0 1 2 3 4 5 子どもは 全く待ち遠しくない

22 とても強い 自信がある 0 1 2 3 4 5 全く自信がない

23 上手くいくと とても信じられる 0 1 2 3 4 5 上手くいくとは 全く思えない

24 とても苦痛である 0 1 2 3 4 5 全く苦痛でない

IV 出産の一番大変な時に何が起こると思いますか?

25 非常に取り乱す 0 1 2 3 4 5 全く取り乱さない

26 身体に起こる変化に 身をゆだねる 0 1 2 3 4 5 身体に起こる変化に 全く身をゆだねない

27 自分自身の コントロールを完全に失う 0 1 2 3 4 5 自分自身のコントロールを 全く失わない

V 赤ちゃんを産む時はどんな気持ちがするとおもいますか?

28 とても楽しい 0 1 2 3 4 5 全く楽しくない

29 とても自然である 0 1 2 3 4 5 全く自然でない

30 とても当たり前の ことである 0 1 2 3 4 5 全く当たり前の ことではない

31 とても危険である 0 1 2 3 4 5 全く危険ではない

VI 最近一ヶ月の間、出産について以下のような想像をしたことがありますか?

32 出産の間子どもが死んでしまうかもしれないと想像した 全くない 0 1 2 3 4 5 非常にしばしば

33 出産の間子どもが傷つけられてしまうかもしれないと想像した 全くない 0 1 2 3 4 5 非常にしばしば

回答を忘れた項目がないかお確かめ下さい。ありがとうございました。

出産の思いに関する質問紙調査票

Wijma Delivery Expectancy/Experience Questionnaire 日本語版 version B

お願い

この質問紙調査票は、女性の方が出産の後で振り返るときに、どんな気持ちや考えを抱かれるかについてお伺いするものです。

各項目の回答は0点～5点の目盛になっています。目盛の両端（0点と5点）は、それぞれの気持ちや考え方の正反対の両端を表しています。あなたの出産を思い出して、実際にどんなものであったか今思うことを、もっともあてはまる点数の数字に○をつけて下さい。

こんな出産だったらよかったのに、という願望ではなく、あなたの出産が実際にどうだったかについてあなたが今思うことをお答え下さい。

回答には、肯定的な言葉に「とても」よくあてはまるかどうか答えるものと、否定的な言葉に「とても」よくあてはまるかどうか答えるものがありますので、回答を記入する際には一問ずつ、よく考えてください。

ご回答の際は、項目をとばさないようにお気をつけ下さい。

I 全体的に、あなたは出産をどのように思いましたか？

- | | | | | | | | |
|------------|---|---|---|---|---|---|----------|
| 1 とてもすばらしい | 0 | 1 | 2 | 3 | 4 | 5 | 全く良くない |
| 2 とても恐ろしい | 0 | 1 | 2 | 3 | 4 | 5 | 全く恐ろしくない |

II 出産の間、おおむねあなたはどんな気持ちがしましたか？

- | | | | | | | | |
|---------------------|---|---|---|---|---|---|-------------------|
| 3 とても孤独である | 0 | 1 | 2 | 3 | 4 | 5 | 全く孤独ではない |
| 4 とても強くいられる | 0 | 1 | 2 | 3 | 4 | 5 | 全く強くいられない |
| 5 とても自信がある | 0 | 1 | 2 | 3 | 4 | 5 | 全く自信がない |
| 6 とても心配である | 0 | 1 | 2 | 3 | 4 | 5 | 全く心配でない |
| 7 とても
取り残されている | 0 | 1 | 2 | 3 | 4 | 5 | 全く
取り残されていない |
| 8 とても弱弱しく
感じる | 0 | 1 | 2 | 3 | 4 | 5 | 全く弱弱しく
感じない |
| 9 とても安全が保障
されている | 0 | 1 | 2 | 3 | 4 | 5 | 全く安全が保障されて
いない |
| 10 とても自立している | 0 | 1 | 2 | 3 | 4 | 5 | 全く自立していない |
| 11 とても
見放されている | 0 | 1 | 2 | 3 | 4 | 5 | 全く見放されて
いない |
| 12 とても緊張している | 0 | 1 | 2 | 3 | 4 | 5 | 全く緊張していない |
| 13 とても嬉しい | 0 | 1 | 2 | 3 | 4 | 5 | 全く嬉しくない |
| 14 とても
誇りに思う | 0 | 1 | 2 | 3 | 4 | 5 | 全く
誇りに思わない |
| 15 とても
みすてられている | 0 | 1 | 2 | 3 | 4 | 5 | 全く
みすてられていない |

16	とても落ち着いている	0	1	2	3	4	5	全く落ち着かない
17	とてもくつろいでいる	0	1	2	3	4	5	全くくつろいでいない
18	とても幸せである	0	1	2	3	4	5	全く幸せでない

III 出産の間、何を思いましたか?

19	とても混乱する	0	1	2	3	4	5	全く混乱しない
20	とても絶望する	0	1	2	3	4	5	全く絶望しない
21	子どもがとても 待ち遠しい	0	1	2	3	4	5	子どもは全く 待ち遠しくない
22	とても強い 自信がある	0	1	2	3	4	5	全く自信がない
23	上手くいくと とても信じられる	0	1	2	3	4	5	上手くいくと 全く信じられない
24	とても苦痛である	0	1	2	3	4	5	全く苦痛でなかった

IV 出産の一番大変な時に何が起こりましたか?

25	非常に取り乱した	0	1	2	3	4	5	全く取り乱さなかった
26	身体に起こった変化に 身をゆだねてみた	0	1	2	3	4	5	身体に起こった変化に 全く身をゆだねなかった
27	自分自身の コントロールを 完全に失った	0	1	2	3	4	5	自分自身の コントロールを 全く失わなかった

V 赤ちゃんを産む時はどんな気持ちでしたか?

28	とても楽しい	0	1	2	3	4	5	全く楽しくない
29	とても自然である	0	1	2	3	4	5	全く自然でない
30	とても当たり前 のことである	0	1	2	3	4	5	全く当たり前 のこと ではない
31	とても危険である	0	1	2	3	4	5	全く危険ではない

VI 出産時に以下のようなことを考えましたか?

32	出産時に子どもが亡くなるかもしれないと考えた	全くなかった	0	1	2	3	4	5	非常にしばしば
33	出産時に子どもが傷つけられてしまうかもしれないと考えた	全くなかった	0	1	2	3	4	5	非常にしばしば

回答を忘れた項目がないかお確かめ下さい。ありがとうございました。

Appendix 2: Japanese version of Impact of Event Scale-Revised

出来事インパクトスケール

(Asukai et al., 2002; Weiss & Marmar, 1997)

下記の項目はいずれも強いストレスを伴うような出来事に巻き込まれた方々に後になって生じることがあるものです。出産に関して、この1週間ではそれぞれの項目の内容についてどの程度強く悩まされましたか？当てはまる欄に○をつけてください。

(尚答えに迷われた場合は不明とせず、最も近いと思うものを選んでください)

	この1週間の状態で、	全く無し	少し	中位	かなり	非常に
1	どんなきっかけでもそのことを 思い出すとその時の気持ちが ぶり返してくる	0	1	2	3	4
2	睡眠の途中で目が覚めてしまう	0	1	2	3	4
3	別のことをしていてもそのことが頭から離れない	0	1	2	3	4
4	イライラして怒りっぽくなっている	0	1	2	3	4
5	そのことについて考えたり思い出すときは何とか 気を落ち着かせるようにしている	0	1	2	3	4
6	考えるつもりはないのにそのことを考えてしまう ことがある	0	1	2	3	4
7	そのことは実際に起きなかったとか現実のことでは なかったような気がする	0	1	2	3	4
8	そのことを思い出せるものには近寄らない	0	1	2	3	4
9	そのときの場面がいきなり頭にうかんでくる	0	1	2	3	4
10	神経が過敏になっていてちょっとしたことでドキッ としてしまう	0	1	2	3	4

11	そのことは考えないようにしている	0	1	2	3	4
12	そのことについてはまだいろいろな気持ちがあるがそれについては触れないようにしている	0	1	2	3	4
13	そのことについての感情は麻痺したようである。	0	1	2	3	4
14	気がつくともまるでその時に戻ってしまったのようにつまったり感じたりすることがある。	0	1	2	3	4
15	寝つきが悪い	0	1	2	3	4
16	そのことについては感情がこみあげてくることがある	0	1	2	3	4
17	そのことを何とか忘れようとしている	0	1	2	3	4
18	ものごとに集中できない	0	1	2	3	4
19	そのことを思い出すと身体が反応して汗ばんだり、息苦しくなったり、むかむかしたりドキドキしたりすることがある	0	1	2	3	4
20	そのことについての夢をみる	0	1	2	3	4
21	警戒して用心深くなっている気がする	0	1	2	3	4
22	そのことについては話さないようにしている	0	1	2	3	4

再体験、侵入的想起項目：1、2、3、6、9、14、16、19.

回避項目：5、7、8、11、12、13、17、22.

覚醒亢進項目：4、10、15、18、20、21.

Appendix 3:
Japanese version of Short-formed McGill Pain Questionnaire

(Arimura et al., 2012; Melzack, 1987)

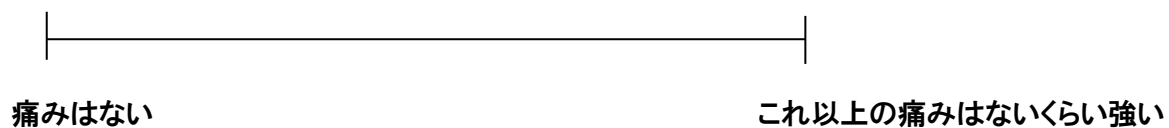
出産時のあなたの痛みを評価してください

		全くない	いくらかある	かなりある	強くある
1	ズキンズキンと脈打つ痛み	0	1	2	3
2	ギクッと走るような痛み	0	1	2	3
3	突き刺されるような痛み	0	1	2	3
4	鋭い痛み	0	1	2	3
5	締めつけられるような痛み	0	1	2	3
6	食い込むような痛み	0	1	2	3
7	焼け付くような痛み	0	1	2	3
8	うずくような痛み	0	1	2	3
9	重苦しい痛み	0	1	2	3
10	さわると痛い	0	1	2	3
11	割れるような痛み	0	1	2	3
12	心身ともにもうんざりするような痛み	0	1	2	3
13	気分が悪くなるような痛み	0	1	2	3
14	恐ろしくなるような痛み	0	1	2	3
15	耐え難い、身のおきどころのない痛み	0	1	2	3

質問 B 過去一週間のあなたの痛みを評価してください

下の下線は「痛みはない」から「これ以上の痛みはないくらい強い」までの内、
右側ほど痛みが強いことを意味します。

直線上に過去一週間のあなたの痛みの強さを縦棒 (/) で記入してください。



質問 C 現在の痛みの強さ（該当する番号に○をつけてください）

- 1) 全く痛みなし
- 2) わずかな痛み
- 3) わずらわしい痛み
- 4) やっかいで情けない痛み
- 5) 激しい痛み
- 6) 耐え難い痛み

Appendix 4:

Add hoc questionnaire

Expected family/professional support during childbirth

Satisfaction of previous delivery

Q: 出産の間、助産師や産科医はあなたを心身でサポートしてくれると思いますか？

全くそう思わない

非常に思う

1 2 3 4 5

Q: 出産の間、パートナーやご家族はあなたを心身でサポートしてくれると思いますか？

全くそう思わない

非常に思う

1 2 3 4 5

Q: 経産婦さんにお尋ねします。

前回(一つ前)の出産体験についてお聞きします。

前回の出産体験はあなたにとって満足のいくものでしたか？

該当するところに○をつけてください。

全く満足でない

非常に満足

1 2 3 4 5