

Title

Aetiological relationships between factors associated with postnatal traumatic symptoms among Japanese primiparas and multiparas: A longitudinal study

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Highlights

- We studied fear of childbirth (FOC) & traumatic stress due to childbirth in Japan
- Higher antenatal FOC was associated with traumatic stress symptoms after childbirth
- FOC in primiparas was associated with a history of mental illness and lower income
- Lower satisfaction with a previous birth was associated with FOC in multiparas

ABSTRACT

Objective: This study aims to identify the aetiological relationships of psychosocial factors in postnatal traumatic symptoms among Japanese primiparas and multiparas

Design: A longitudinal, observational survey.

Setting: Participants were recruited at three institutions in Tokyo, Japan between April 2013 and May 2014. Questionnaires were distributed to 464 Japanese women in late pregnancy (> 32 gestational weeks, Time 1), on the third day (Time 2) and one month (Time 3) postpartum.

Measurements: The Japanese Wijma Delivery Expectancy/Experience Questionnaire (JW-DEQ) version A was used to measure antenatal fear of childbirth and social support, while the Impact of Event Scale Revised (IES-R) measured traumatic stress symptoms due to childbirth.

Findings: Of the 464 recruited, 427 (92%) completed questionnaires at Time 1, 358 (77%) completed at Time 2, and 248 (53%) completed at Time 3. Total 238 (51%) were analysed. A higher educational level has been identified in analysed group ($p = 0.021$). Structural equation modelling was conducted separately for primiparas and multiparas and exhibited a good fit. In both groups antenatal fear of childbirth predicted Time 2 postnatal traumatic symptoms ($\beta = 0.33 - 0.54$, $p = 0.002 - 0.007$). Antenatal fear of childbirth was associated with a history of mental illness ($\beta = 0.23$, $p = 0.026$) and lower annual income ($\beta = -0.24$, $p = 0.018$). Among multiparas, lower satisfaction with a previous delivery was related to antenatal fear of childbirth ($\beta = -0.28$, $p < 0.001$).

Key conclusions: Antenatal fear of childbirth was a significant predictor of traumatic stress symptoms after childbirth among both primiparous and multiparous women. Fear of childbirth was predicted by a history of mental illness and lower annual income for primiparous women, whereas previous birth experiences were central to multiparous women.

Implication for practice: The association between antenatal fear of childbirth and postnatal traumatic symptoms indicates the necessity of antenatal care. It may be important to take account of the background of primiparous women, such as a history of mental illness and their attitude towards the upcoming birth. For multiparous women, focusing on and helping them to view their previous birth experiences in a more positive light are vital tasks for midwives.

Introduction

Childbirth is a significant life event. Many women are overjoyed by the birth of their child, which may constitute the greatest happiness in their life. However, this is not always the case. In Western countries, 24 - 33% of postpartum women are reported to exhibit one or more traumatic stress symptoms due to childbirth (Grekin and O'Hara, 2014; Olde et al., 2006). Traumatic symptoms following childbirth (postnatal traumatic symptoms) consist of four domains: (a) re-experiencing traumatic events, (b) avoidance of situations that recall the traumatic events, (c) negative cognitions and moods related to the traumatic events and (d) alterations in arousal and reactivity (American Psychiatric Association, 2009). Women suffering from postnatal traumatic symptoms are emotionally detached from and afraid of caring for the baby (Nicholls and Ayers, 2007). Furthermore, it has been reported that they avoid sexual activity (Allen, 1998). Healthcare professionals should pay more attention to mothers who report postnatal traumatic symptoms due to the high prevalence and negative impact on the woman and her family.

Primary prevention may be feasible because healthcare professionals, including midwives, have ample opportunity to provide women with psychological support in routine care. A number of authors have emphasized that preventive interventions should be based on the underlying psychological mechanism of traumatic stress symptoms (Ayers et al., 2008; Garthus-Niegel et al., 2013). However, the aetiology of these symptoms remains unclear. Nevertheless, a variety of factors have been reported in previous studies. They include (a) factors existing prior to the current pregnancy (pre-existing factors) such as younger age, new motherhood, low socioeconomic status, history of mental disorders, personality characteristics (e.g., trait anxiety) and previous traumatic experience(s) (e.g., history of sexual abuse and poor attachment to partner) (Czarnocka and Slade, 2000; Olde et al., 2006; Söderquist et al., 2009; Söderquist et al., 2002), (b) psychological factors during the current pregnancy (pregnancy-related factors) such as psychological distress (e.g., antenatal fear of childbirth) and perceived lower social support from family and healthcare professionals (Fairbrother and Woody, 2007; Söderquist et al., 2009; Wijma et al., 1998), and (c) factors related to the present birth (birth-related factors) including obstetric interventions such as emergency Caesarean section, instrumental and induced delivery (Czarnocka and Slade, 2000; Ryding et al., 1998), negative birth experience and pain during labour (Creedy et al., 2000; Furuta et al., 2014; Söderquist et al., 2002). Although these three categories may

contribute to the development of postnatal traumatic symptoms, their aetiological relationships remain unknown.

Previous studies that attempted to reveal the aetiology of postnatal traumatic symptoms were characterised by methodological limitations. Firstly, most were cross-sectional (Creedy et al., 2000; Czarnocka and Slade, 2000; Söderquist et al., 2002; Wijma et al., 1998), making it difficult to determine causal relationships. Secondly, the interaction of independent variables was rarely taken into account (Slade, 2006). Multivariate regressions were often employed, in which conceptually similar and temporally discrete variables were entered into a single regression analysis, meaning that indirect effects of independent variables on dependent variables cannot be ruled out. Thirdly, birth parity should be taken into consideration because the birthing process, labour pain, duration of childbirth and experiences differ between primiparas and multiparas (Waldenström et al., 2004).

In Japan, only one study (Suzuki et al., 2006) investigated traumatic stress symptoms due to the experience of childbirth among 485 Japanese mothers at one month postpartum. The reported prevalence of severe traumatic symptoms was 8.4%. More evidence of postnatal traumatic symptoms due to childbirth from different samples should be explored. The aim of this longitudinal study was to identify the aetiological relationships of factors associated with postnatal traumatic symptoms among Japanese primiparas and multiparas.

Methods

Setting

A longitudinal, prospective, observational study was conducted between April 2013 and May 2014 at three obstetric facilities in Tokyo (Clinic A and Hospitals B and C), all of which had an outpatient and inpatient obstetrics department. Questionnaires were distributed to the participants on three occasions: late pregnancy (> 32 gestational week: Time 1), early postpartum (on the third day after the birth: Time 2) and one month postpartum (Time 3).

Participants and procedure

Women in late pregnancy (Time 1) were invited to participate in the study while attending the outpatient clinic. Women who were less than 20 years old, unable to read Japanese, hospitalized due to major pregnancy complications or who suffered from serious mental disorders were excluded. Women with a planned Caesarean section were not recruited because their expectations and experience related to childbirth were likely to differ from those undergoing vaginal delivery. However, women who underwent an

emergency Caesarean section were included because this intervention generally takes place at the final stage of the childbirth process and includes a combination of normal labour and emergency Caesarean section.

Pregnant women who met the inclusion criteria were asked to complete the first questionnaire in late pregnancy (> 32 gestational weeks, Time 1). Time 1 and Time 2 questionnaires were distributed and collected by the researcher (M.T.). The Time 3 questionnaire was sent to the women's home and returned by post.

Measurements

Pre-existing factors (Time 1)

The participants' age, birth parity, history of disease, history of mental illness, complexity of the pregnancy (pregnancy-induced hypertension, experience of threatened premature labour and placenta praevia) 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, the experiences of previous births (emergency Caesarean section, instrumental delivery and induced delivery) were obtained from the questionnaire. Satisfaction with the previous birth was assessed by the following question: "Were you satisfied with your previous birth experience?", which was answered on a 5-point scale ranging from "Not at all" (1) to "Very much" (5).

Pregnancy-related factors (Time 1)

Antenatal fear of childbirth: Antenatal fear of childbirth may be a key factor *in determining the link* between pre-existing variables and postnatal traumatic symptoms. It was measured by the Japanese version (Takegata et al., 2013) of the Wijma Delivery Expectancy/Experience Questionnaire Version A (JW-DEQ: Wijma et al., 1998), in which women are asked to imagine how their birth will be. The instrument consists of 33 items on a 6-point scale ranging from "Not at all" (0) to "Extremely" (5). The minimum score is 0 and the maximum is 165. 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 studies using the English and Swedish versions (Fenwick et al., 2009; Johnson and Slade, 2002). In the present study, Cronbach's alpha for the JW-DEQ total score was 0.93.

Social support: Two questions were employed to investigate anticipated family support ("How do you expect your family to support you during childbirth?") and professional support ("How do you expect midwives or doctors to support you during childbirth?")

during childbirth. These questions were rated on a 5-point scale ranging from “Not at all” (1) to “Very much” (5).

Birth-related factors (Time 2)

Objective birth experiences: This scale included emergency Caesarean section, instrumental and induced delivery, as well as duration of birth (hours). Duration of birth is defined as the total time from the start of regular labour of ten minutes interval until the placenta is extracted (*Japan Society of Obstetrics and Gynaecology, 2004*).

Emergency Caesarean section was operationally defined as a Caesarean section performed after the onset of regular labour. In the present study the composite variable Complicated birth was defined as emergency Caesarean section, instrumental or induced delivery.

Subjective birth experience: Reflects several emotional aspects including fear, dissatisfaction and perception of pain, but its definition differs between researchers (Garthus-Niegel et al., 2013; Goodman et al., 2004). In the present study we measured (a) postnatal fear of childbirth and (b) perceived labour pain (Garthus-Niegel et al., 2013; Goodman et al., 2004).

Postnatal fear of childbirth: Fear of childbirth *after* delivery was measured by the Japanese W-DEQ version B (Wijma et al., 1998) at Time 2. The items in version B are the same as those in version A, with scores between 0–165 (Takegata et al., 2013). The women were asked: “How did you experience your labour and childbirth as a whole?” The JW-DEQ version B identified four factors which were the same as in 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: Labour pain was measured by the Japanese version of the Short-form McGill Pain Questionnaire (Short-form MPQ) (Arimura et al., 2012; Melzack, 1987). This instrument consists of 15 qualitative pain descriptions (11 sensory and 4 affective) and present pain intensity (PPI) for evaluation of overall pain, measured quantitatively on a visual analogue scale (VAS). The items were rated on a four-point scale: “None” (0), “Mild” (1), “Moderate” (2), and “Severe” (3). The Cronbach’s α of the sensory and affective pain subscales were 0.79 and 0.82 respectively.

Outcome variables

Postnatal traumatic symptoms: We used a self-report measure, the Impact of Event Scale-Revised (IES-R, Weiss and Marmar, 1997), to assess traumatic stress symptoms. The factor and concurrent validity of the Japanese scale was confirmed by comparison with the results obtained from the Structured Clinical Interview for DSM-III (SCID, American Psychiatric Association, 1997). Its reliability has also been confirmed for

adult men and women who experienced several kinds of traumatic event (Asukai et al., 2002). The instructions for respondents are as follows: “Below is a list of difficulties people sometimes have after stressful life events. Please read each item and indicate how distressing each difficulty has been for you with respect to your current childbirth experience. How much have you been distressed or bothered by these difficulties?” The 22 items are scored on a 5-point scale, ranging from “Not at all” (0) to “Extremely” (4). The minimum score is 0 and the maximum is 88 (Asukai et al., 2002). Scores above 25 are considered to denote severe traumatic symptoms, indicating a high risk of Post-traumatic stress disorder (PTSD) (Asukai et al., 2002). The Japanese version identified three factors, Intrusion, Avoidance and Hyper-arousal, among adults who had experienced accidents and disasters, which was consistent with the English version (Weiss and Marmar, 1997). High internal consistency of the Japanese IES-R for postnatal women has been reported (Suzuki et al., 2006). In this study, the Cronbach’s α was also high at Time 2 (0.92) and Time 3 (0.91).

Conceptual Model

The model in this study (Fig. 1) comprises three time points: (A) late pregnancy (Time 1), (B) early postpartum (Time 2), and (C) one-month postpartum (Time 3). These three measurement occasions revealed pre-existing and psychological variables during pregnancy measured at Time 1; birth-related variables (objective and subjective birth experiences) and outcome variables (traumatic stress symptoms) in the early postpartum period at Time 2; and outcome variables (traumatic stress symptoms) at one-month postpartum at Time 3. Although pre-existing variables and psychological variables during pregnancy were measured at the same point (Time 1), it can be assumed that pre-existing variables were treated as antecedent factors of psychological variables because younger women or those who had a history of mental illness were more likely to have a stronger fear of childbirth during pregnancy. Similarly, as objective birth experience was observed retrospectively (Time 2), there was a time lag between objective 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). Several possible mechanisms behind the development of postnatal traumatic symptoms were considered. Firstly, it was hypothesised that the pre-existing variables would directly predict Time 2 and 3 postnatal traumatic symptoms (Fig. 1, path a). Secondly, the psychological variables during pregnancy were hypothesised to

mediate the effects of pre-existing variables on postnatal traumatic symptoms at Time 2 and 3 (Fig. 1, path b). Thirdly, the subjective birth-related variables were hypothesised to mediate the effects of pre-existing variables on postnatal traumatic symptoms at Time 2 and 3 (Fig. 1, path c). Finally, objective birth-related variables were hypothesised to predict postnatal traumatic symptoms at Time 3 (Fig. 1, path d).

Please insert Fig. 1 around here

Statistical analysis

Descriptive statistics were summarised as frequency distributions for categorical data and means and standard deviations for continuous data. For descriptive purposes, univariate statistics, which include the test for continuous data, the chi-square test or Fisher's exact test for categorical data, as well as the chi square test for trend for ordinal data, were obtained for the demographic characteristics and compared between the analysed group and the non-analysed group and parity.

As expected, the pre-existing variables were correlated with professional and family support during childbirth, delivery modes, complicated birth, the JW-DEQ version A and B total scores, complexity of the pregnancy, the Short-form MPQ subscales and the total score of the IES-R. Structural regression analysis models were then separately developed for primiparas and multiparas. The first model included (a) the latent structure of postnatal traumatic symptoms, as well as 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 in the JW-DEQ) measured at different time points. Further modification of models was performed using the "model trimming" method (Kline, 2005). We deleted the least significant path from the model and successively repeated this step as long as $\chi^2(d)$ did not reach a statistically significant level (Kline, 2005).

In order to evaluate the fit of the model with the data, the 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, $\chi^2/df < 3$, CFI > 0.95 and RMSEA < 0.08 indicate an acceptable fit, while $\chi^2/df < 2$, CFI > 0.97 and RMSEA < 0.05 indicate a good fit (Byrne, 2001). All statistical analyses were conducted using IBM SPSS version 20.0 and SPSS Amos version 20.0.

Sample size

In structural regression analysis, cases of more than 100 are considered acceptable, between 100 and 200 as medium, and more than 200 as large (Byrne, 2001; Kline, 2004). The necessary sample size also depends on the structural complexity of the model, such as the number of observed variables. The SEM in this study was complex and developed separately for primiparous and multiparous women. We “trimmed” the model to make it simpler.

Findings*Characteristics of participants*

Of the 494 women recruited, 464 (94 %) agreed to participate in the study, of whom 427 (92%) completed the first questionnaire at >32 weeks gestation (Time 1), 358 (77%) completed the second questionnaire at 3 days postpartum (Time 2) and 248 (53%) completed the third at one month postpartum (Time 3). In order to maintain the quality of the data, ten participants who failed to fill in more than 60% of the total number of items in the JW-DEQ, the IES-R, or the Short-form MPQ were excluded from the subsequent analyses. Little’s missing completely at random test (MCAR) test was not significant ($p = 0.695$), thus the mean for an item across the entire sample (question mean) was applied in such cases (Little, 1988; Shrive et al., 2003). Therefore, the data of 238 (51%) women were included in the Structural regression analysis (primiparas $n = 138$, multiparas $n = 100$).

Comparing the analysed group ($n = 238$) and the non-analysed group ($n = 189$), women in the analysed group had a significantly higher educational level ($p = 0.021$) than women in the non-analysed group (Table 1). Of the 20 women who underwent an emergency Caesarean section, 12 (60%) did not return the questionnaire at one month postpartum.

The average age (SD) was 33.3 (4.8) years and 55% of the women ($n = 133$) were university graduates (Table 2). An annual income of less than three million yen was reported by 11 (5%) women, whereas an annual income over 10 million yen was reported by 76 (32%) women. There were 138 primiparas and 100 multiparas. The average duration (SD) of labour was 10.8 (7.2) hours for primiparas and 5.8 (5.9) for multiparas ($p < 0.001$) (Table 3). Thirteen primiparas (9 %) and four multiparas (4 %) had an instrumental delivery ($p = 0.040$), while 43 primiparas (31 %) and 18 multiparas

(18 %) had an induced delivery ($p = 0.015$). Among the women included in the main analysis, eight primiparous women (6 %) underwent an emergency Caesarean section. 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 ($p = 0.061$).

Please insert Table 1-3 about here

Psychosocial factors associated with postnatal traumatic symptoms among primiparas and multiparas

Among the primiparas, the IES-R scores at Times 2 and 3 were significantly correlated with annual income (Table 4) (Time 2: $r = -0.24, p < 0.001$; Time 3: $r = -0.17, p = 0.042$), the JW-DEQ version 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: $r = -0.24, p < 0.001$), as well as sensory (Time 2: $r = 0.24, p < 0.001$; Time 3: $r = 0.29, p < 0.001$) and affective pain during labour (Time 2: $r = 0.20, p = 0.042$; Time 3: $r = 0.18, p = 0.04$). In multiparous women, Time 2 IES-R scores correlated with the JW-DEQ version A ($r = 0.35, p < 0.001$) and B ($r = 0.23, p < 0.001$), as well as sensory ($r = 0.29, p < 0.001$) and affective pain during labour ($r = 0.20, p = 0.020$).

Please insert Table 4 about here

Taking these correlations into consideration, separate structural regression models were built for primiparas and multiparas based on the conceptual model (Fig. 1). After trimming, our models exhibited acceptable goodness-of-fit for both primiparas ($\chi^2/df = 1.46$, CFI = 0.91, RMSEA = 0.05) and multiparas ($\chi^2/df = 1.13$, CFI = 0.97, RMSEA = 0.03). As expected, Time 3 postnatal traumatic symptoms were predicted by Time 2 postnatal traumatic symptoms in both primiparas and multiparas (primiparas : $\beta = 0.54, p < 0.001$; multiparas: $\beta = 0.61, p < 0.001$) which in turn were predicted by antenatal fear of childbirth (primiparas : $\beta = 0.33, p = 0.002$, multiparas: $\beta = 0.54, p = 0.007$).

However, the models differed between the two groups. In the primiparous group (Fig. 2), annual income significantly predicted expected professional ($\beta = 0.18, p = 0.035$) and family support during childbirth ($\beta = 0.20, p = 0.015$). Annual income ($\beta = -0.24, p = 0.018$) and history of mental illness ($\beta = 0.23, p = 0.026$) were related to antenatal fear of childbirth. Antenatal fear of childbirth significantly predicted sensory

($\beta = 0.20, p = 0.046$) as well as affective ($\beta = 0.20, p = 0.046$) labour pain. Time 3 postnatal traumatic symptoms were also predicted by expected family support ($\beta = -0.26, p = 0.002$) as well as sensory labour pain ($\beta = 0.19, p = 0.017$).

In the multiparous group (Fig. 3), lower satisfaction with a previous birth was related to higher antenatal fear of childbirth ($\beta = -0.28, p < 0.001$). Satisfaction with a previous birth also predicted expected professional ($\beta = 0.20, p = 0.002$) and family support during childbirth ($\beta = 0.24, p = 0.025$) and Time 2 postnatal traumatic symptoms ($\beta = 0.22, p = 0.015$).

Please insert Fig. 2, 3 about here

Discussion

Major findings

This study revealed that some postnatal Japanese mothers suffer from severe traumatic stress symptoms (Table 2). Time 2 postnatal traumatic symptoms were directly predicted by antenatal fear of childbirth in both primiparous and multiparous women. However, Time 3 postnatal traumatic symptoms were predicted by Time 2 postnatal traumatic symptoms but without the direct influence of antenatal fear of childbirth. Antenatal fear of childbirth was only influenced by a history of mental illness and lower annual income among primiparous women. It was only in the primiparous group that the psychological variable of expected family support during childbirth directly predicted the postnatal traumatic symptoms at Time 3. In multiparous women, lower satisfaction with a previous birth was related to a higher antenatal fear of childbirth.

Postnatal traumatic stress symptoms

To the best of our knowledge, this study is the first in Japan to identify the existence of mothers who suffer from traumatic stress symptoms due to childbirth. The IES-R score distributions skewed to zero with a broad range, indicating that a majority of mothers did not exhibit traumatic symptoms, while only a few had a high IES-R score. In our results, the prevalence of severe traumatic symptoms due to childbirth (a total IES-R score above 25) at Time 2 was 21% and 13% for primiparous and multiparous women respectively. At Time 3 it was also 21% and 13% respectively. The ratio of cases with severe symptoms and average traumatic symptom scores decreased

from Time 2 to Time 3, suggesting a natural recovery from acute traumatic reactions to childbirth for some mothers. However, the significant relationship between the traumatic symptoms at Time 2 and Time 3 illustrated by the models (Fig. 2, 3) indicates that some women still had traumatic symptoms and did not experience a natural recovery.

Mechanisms of postnatal traumatic stress symptoms

Antenatal fear of childbirth directly predicted postnatal traumatic symptoms soon after childbirth in both groups, regardless of the birth outcomes. Accordingly, pregnant women with a severe fear of childbirth tend to manifest greater anxiety regarding the safety of their baby (Eriksson et al., 2006). In addition, psychological distress such as fear of childbirth lowers pain tolerance in mothers (Saisto et al., 2000). Our finding that antenatal fear of childbirth is associated with higher sensory pain is only supported by previous research among primiparous groups (Fig. 2). These women may be vulnerable to stress and therefore consider childbirth threatening, even when the birth progresses normally.

The relationship between pre-existing variables and antenatal fear of childbirth differed in the primiparas and multiparas. For primiparous women, lower annual income, which co-varied with younger age and a history of mental illness, was associated with higher antenatal fear of childbirth during pregnancy. Economic stability, a well-balanced coping style and social support generally correlates with age (Aldwin et al., 1996; Reuter et al., 2006), which coping resources have a positive influence on psychological status during pregnancy. On the other hand, a younger individual with a low economic status or a history of mental illness may be more vulnerable due to poor coping resources. In the case of primiparas, antenatal fear of childbirth may develop as a result of a woman's vulnerability.

Among multiparous women (Fig. 3), lower satisfaction with a previous birth contributed to antenatal fear of childbirth. This finding indicates that multiparous women appraise their upcoming childbirth based on their previous birth experience(s) rather than their coping resources. The results support the study by Hofberg and Brockington (2000) that a previous negative birth experience increases subsequent fear of childbirth (secondary tokophobia) and re-traumatizes multiparous women during a subsequent pregnancy (Hofberg and Brockington, 2000).

Of interest was the finding that expected family support during childbirth only lowers the possibility of Time 2 traumatic stress symptoms among primiparous women.

Expected family support during childbirth is perceived availability of social support (Barrera, 1986; Gottlieb, 1983). The expectation of support may have a positive effect on women's emotional response to the birthing experience, thus minimising the development of postnatal traumatic symptoms (Ford and Ayers, 2011). When encountering a stressful event, an individual can judge whether or not it is threatening (primary appraisal) and then decide if it is serious (manageable) or not (secondary appraisal) (Lazarus and Folkman, 1984). If the perceived availability of social support is higher, the secondary appraisal of the stressful event is more optimistic.

In the univariate correlations the type of obstetric intervention was not associated with postnatal traumatic symptoms. Objective birth experiences such as emergency Caesarean section or instrumental and induced delivery had no bearing on postnatal traumatic symptoms in the present study. Unexpected obstetric interventions can cause harm to the mother and often make women feel incapable (Allen, 1998; Beck, 2004; Czarnocka and Slade, 2000). Such events have an adverse effect on a woman's attitude towards birth. However, whether objective birth experience is related to postnatal traumatic symptoms is a matter of debate (Czarnocka and Slade, 2000; Garthus-Niegel et al., 2013; Söderquist et al., 2006; Söderquist et al., 2002). Söderquist et al. (2009) reported that most women who exhibited traumatic stress symptoms delivered babies without any obstetric intervention. Instrumental delivery or emergency Caesarean section is the final phase of their long delivery process: negative feelings may have existed before the intervention (Söderquist et al., 2009; Söderquist et al., 2002). Thus stress symptomatology is more likely to be derived from sources other than the mode of delivery.

Clinical implications

Our models indicate several clinical implications. First, the finding that Time 2 traumatic symptoms predicted those at Time 3 highlights the need for healthcare professionals to detect traumatised women early postpartum. In western countries traumatised women are often not taken seriously by healthcare professionals because their symptoms are only considered to be due to temporal fatigue and emotional vulnerability caused by the physical damage due to childbirth. This may be due to lack of awareness and knowledge on the part of the healthcare professionals (Allen, 1998) and might also be the case in Japan. Enhancing professionals' awareness of postnatal traumatic symptoms should be prioritised for early detection and support.

Secondly, antenatal support for women with severe fear of childbirth is

recommended in order to reduce the risk of postnatal traumatic symptoms. The JW-DEQ version A is considered a useful measurement tool for identifying women with severe fear of childbirth. However, because the cut-off point of the JW-DEQ version B may differ from other language versions, further investigation might be necessary to confirm its cut-off point. Paying special attention to women with severe fear of childbirth, communicating frequently with them, outlining the birth process and creating a reassuring atmosphere that encourages such women to express their feelings will reduce their fear. Individual counselling is recommended in a Japanese cultural context because such women may mask their fear due to concerns that it might be unacceptable.

Thirdly, the results provided us with more understanding of the fact that the approach used should be based on birth parity. For primiparas, documenting rigorous patient information such as age, economic status and the occurrence of mental illness, as well as continuous counselling during pregnancy may be valuable. For multiparas, healthcare professionals need to listen to women's previous birthing experiences and help them to view their experience in as positive a light as possible. The period of pregnancy offers a great opportunity for healthcare professionals to help mothers who were less satisfied with previous childbirth by enabling them to view their previous birth(s) as more acceptable, rebuild their inner self and adopt a more positive attitude to their forthcoming childbirth (Beck and Watson, 2010).

Limitations of the study

First, the women in our sample were not representative of Japanese women (Byrne, 2001). Only three institutions were involved, all of which were in the Tokyo district. The age and educational background of the participants were higher than those in the 2010 national reports (Ministry of Wealth, Labour and Welfare, 2010). Hence the findings should be interpreted with caution.

Second limitation is the sample size. While a larger sample with over 300 participants in each group would provide more robust results, the present sample meets the minimum SEM sample size criterion (> 100) (Byrne, 2001).

Third, only half of the sample completed the questionnaires at all three time points. It should be noted that more than half of the women who underwent an emergency Caesarean Section ($n = 11$) did not return the questionnaire at the end of the postpartum period (Time 3). These women had a higher risk of trauma. Nevertheless, the present results indicate the need for healthcare professionals to be aware of the existence of women who suffer from postnatal traumatic symptoms. With regard to the

prevalence of PTSD, future studies should use a structured diagnostic interview.

Fourth, after examining Little's MCAR test (Little, 1988) a single imputation method instead of a multiple one was employed in the present analysis. Although the authors considered that the single imputation method was an optimal solution, it is often claimed that with this method the distribution of values moves to the centre due to substituted values, which may lead to bias (Shrive, 2003).

Our study was also limited by the fact that some variables examined in previous studies were not investigated for ethical reasons and the lack of suitable scales. For example, a previous experience of trauma prior to pregnancy such as a history of sexual abuse is a significant predictor of traumatic stress symptoms after childbirth.

Suggestions for future research

Further studies are required comprising larger samples from different settings and regions with a variety of psychosocial backgrounds. More psychometric aspects should be considered in order to provide a clear picture of the development of traumatic stress symptoms during the postpartum period.

The present study provides initial support for evidence that antenatal fear of childbirth triggers postnatal trauma symptomatology. However, it should be confirmed whether if a preventive intervention for antenatal fear of birth is demonstrated to lead to a decrease in postnatal traumatic symptomatology.

Conclusion

This study revealed that antenatal fear of childbirth was a significant predictor of traumatic stress symptoms after childbirth among both primiparous and multiparous women. 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.

Details of ethical approval and funding

Ethical approval for this study was obtained from the Ethics Committee of the Graduate School of Medicine at 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 submitting a written sheet.

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Table 1.**Pre-existing characteristics of participants included in and excluded from main analyses**

	Analyzed group		Non-analyzed group		<i>p</i>
	n = 238		n = 189		
	Mean/n SD (%)		Mean/n SD (%)		
Pre-existing variables					
Age	33.3	4.8	33.0	4.6	0.396 ^a
Educational background					
1. <i>High School</i>	38	(16)	41	(22)	0.021 ^b
2. <i>College</i>	67	(28)	63	(33)	
3. <i>University (Undergraduate)</i>	119	(50)	78	(41)	
4. <i>University (Postgraduate)</i>	14	(6)	7	(4)	
Annual income					
1. <i>Less than 3 million yen¹</i> (<i>Less than 21 thousand sterling</i>)	11	(5)	11	(6)	0.051 ^b
2. <i>3 – 5 million yen¹</i> (<i>21 – 36 thousand sterling</i>)	43	(18)	42	(22)	
3. <i>5 – 8 million yen¹</i> (<i>36 – 56 thousand sterling</i>)	66	(28)	60	(32)	
4. <i>8 – 10 million yen¹</i> (<i>57 – 70 thousand sterling</i>)	42	(17)	30	(16)	
5. <i>More than 10 million yen¹</i> (<i>More than 70 thousand sterling</i>)	76	(32)	46	(24)	
Past history of diseases	45	(19)	26	(13)	0.177 ^c
Past history of mental illness	4	(2)	4	(2)	0.734 ^d
Complexity of pregnancy	30	(13)	21	(17)	0.792 ^c

a: t test, b: chi-square test for trend, c: chi-square test, d: Fisher's exact test.

Statistical significance: $p < 0.05$.

1: One hundred forty two Japanese yen equivalent for one sterling (01/09/2016).

Table 2. Pre-existing characteristics of participants included in main analyses by parity

	Total		Primiparas		Multiparas		<i>p</i>
	n = 238		n = 138		n = 100		
	Mean/n	SD (%)	Mean/n	SD (%)	Mean/n	SD (%)	
Pre-existing variables							
Age	33.3	4.8	32.2	4.9	34.8	4.1	<0.001 ^a
Married	229	(96)	135	(98)	94	(94)	0.338 ^b
Educational background							
1. High School	38	(16)	24	(17)	14	(14)	0.589 ^c
2. College	67	(28)	32	(23)	35	(35)	
3. University (Undergraduate)	119	(50)	72	(52)	47	(47)	
4. University (Postgraduate)	14	(6)	10	(7)	4	(4)	
Annual income							
1. Less than 3 million yen [†] (Less than 21 thousand sterling)	11	(5)	7	(5)	4	(4)	0.014 ^c
2. 3–5 million yen [†] (21–36 thousand sterling)	43	(18)	31	(22)	12	(12)	
3. 5–8 million yen [†] (36–56 thousand sterling)	66	(28)	40	(29)	26	(26)	
4. 8–10 million yen [†] (57–70 thousand sterling)	42	(18)	23	(17)	19	(19)	
5. More than 10 million yen [†] (More than 70 thousand sterling)	76	(32)	37	(27)	39	(39)	
Previous history of diseases	45	(19)	23	(17)	22	(22)	0.192 ^b
Previous history of mental illness	4	(2)	4	(3)	0	0	0.490 ^d
Complexity of pregnancy	30	(13)	13	(9)	17	(17)	0.062 ^b
Attendance of husband during childbirth	222	(93)	131	(95)	91	(91)	0.422 ^b

Previous emergency Caesarean section	2 (2)
Previous instrumental delivery	7 (7)
Previous induced delivery	3 (3)
Satisfaction with previous delivery ²	3.9 1.0

a: t test, b: chi-square test, c: chi-square test for trend, d: Fisher's exact test.

Statistical significance: $p < 0.05$

1: One hundred forty two Japanese yen equivalent for one sterling (01/09/2016).

2: Ad-hoc questions: 5-point scale "Not at all (1)" to "Very much (5)"

Table 3. Psychological, birth-related and outcome variables for participants included in main analyses by parity

	Total		Primiparas		Multiparas		<i>p</i>
	n = 238		n = 138		n = 100		
	Mean/n	SD (%)	Mean/n	SD (%)	Mean/n	SD (%)	
Pre-existing variables							
Expected family support during childbirth ¹	4.5	0.7	4.5	0.8	4.5	0.7	0.632 ^a
Expected professional support during childbirth ¹	4.4	0.7	4.3	0.8	4.6	0.5	0.001 ^a
Antenatal fear of childbirth ²	52.1	21.7	56.9	22.0	45.6	19.5	<0.001 ^a
Objective birth experience							
Duration of labour (hours)	8.7	7.1	10.8	7.2	5.8	5.9	<0.001 ^a
Emergency Caesarean section	8	(4)	8	(7)	0	0	<0.001 ^b
Instrumental delivery	17	(7)	13	(9)	4	(4)	0.087 ^c
Induced delivery	61	(26)	43	(31)	18	(18)	0.015 ^b
Birth-related variables (Time 2)							
Postnatal fear of childbirth ²	57.4	23.3	65.3	22.9	46.6	19.3	<0.001 ^a
Sensory pain ³	18.2	6.9	19.0	6.8	15.1	6.8	0.010 ^a
Affective pain ³	7.2	3.5	8.2	3.4	5.9	3.3	<0.001 ^a
Outcome variables (Time 2 • 3)							
Time 2 Postnatal traumatic symptoms ⁴	12.8	11.8	14.1	12.3	10.9	10.8	0.041 ^a
Score > 25	42	(17)	29	(21)	13	(13)	0.122 ^b
Time 3 Postnatal traumatic symptoms ⁴	9.0	10.8	10.1	10.4	7.4	11.1	0.061 ^a
Score >25	22	(9)	15	(11)	7	(7)	0.216 ^c

a: t test, b: chi-square test, c: Fisher's exact test.

Statistical significance: $p < 0.05$

Time 1: Late pregnancy, Time 2: Early postpartum, Time 3: One month postpartum

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

2: Wijma Delivery Expectancy/Experience Questionnaire (33 items, score 0–165): version A for antenatal fear and version B for postnatal fear

3: Short-form McGill Pain Questionnaire; sensory pain (10 items, score 0–30), affective pain (5 items, score 0–15).

4: Impact of Event Scale-Revised (22 items, score 0–88)

Table 4.
Correlations of variables with postnatal traumatic stress symptoms by parity 3 days
(Time 2) and 1 month (Time 3) postpartum

	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
Educational background ²	-0.21 *	0.11	-0.05	0.07
Annual income ³	-0.24 **	0.02	-0.17 *	0.10
Past history of mental illness ⁴	0.16		0.11	
Complexity of pregnancy ⁴	-0.04	0.01	-0.04	0.10
Satisfaction with previous birth		0.14		-0.01
Previous emergency Caesarean section ⁴		0.02		-0.08
Previous instrumental delivery ⁴		0.00		0.06
Previous induced delivery ⁴		-0.07		-1.60
Psychological factors				
Expected professional support during childbirth ⁴	-0.25 **	0.02	-0.24 **	0.09
Expected family support during childbirth ⁵	-0.21 *	-0.13	-0.36 **	-0.10
Antenatal fear of childbirth ⁶	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 ⁶	0.07	-0.06	0.04	-0.04
Subjective birth experience				
Postnatal fear of childbirth ⁷	0.27 **	0.23 **	0.28 **	0.08
Sensory pain ⁸	0.24 **	0.29 **	0.29 **	0.13
Affective pain ⁸	0.20 *	0.20 *	0.18 *	0.06

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

Time 1: Late pregnancy, Time 2: Early postpartum, Time 3: One month postpartum

- 1: Impact of Event Scale-Revised (22 items, score 0–88)
- 2: Education background: 1) High School, 2) College, 3) University (Undergraduate), 4) University (Postgraduate)
- 3: 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.
- 4: Medical history: 1= Yes, 0= No.
- 5: *Ad-hoc* questions: 5-point scale “Not at all (1)” to “Very much (5)”
- 6: Complicated delivery: emergency Caesarean section, instrumental delivery or induced delivery
- 7: Wijma Delivery Expectancy/Experience Questionnaire (33 items, score 0–165)
version A: antenatal version, version B: postnatal version.
- 8: Short-form McGill Pain Questionnaire (15 items), sensory pain (10 items, score 0–30), affective pain (5 items, score 0–15).

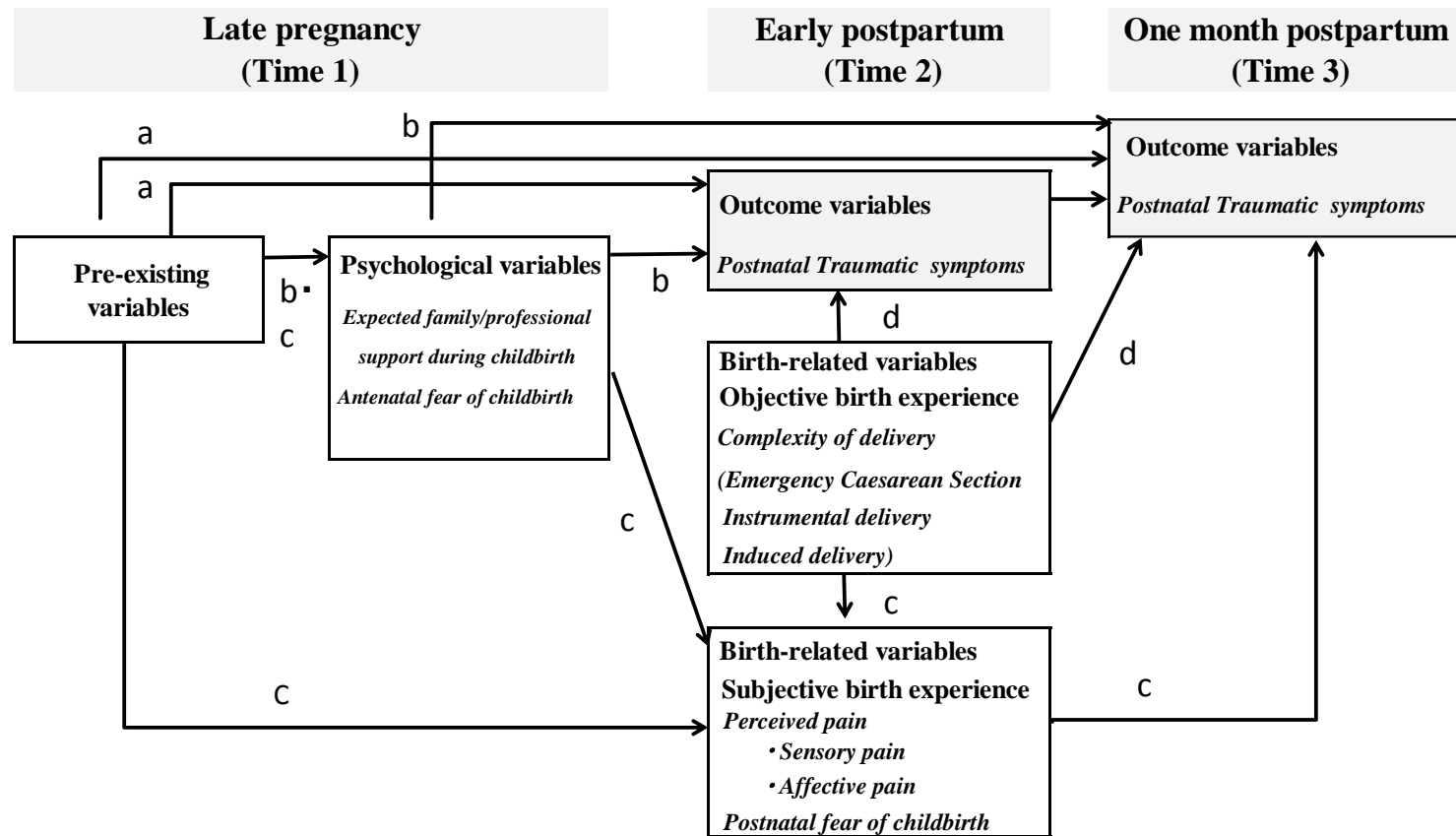


Fig.1. Hypothetical model of causal relationships between postnatal traumatic symptoms.

Possible hypothetical paths are stated below:

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

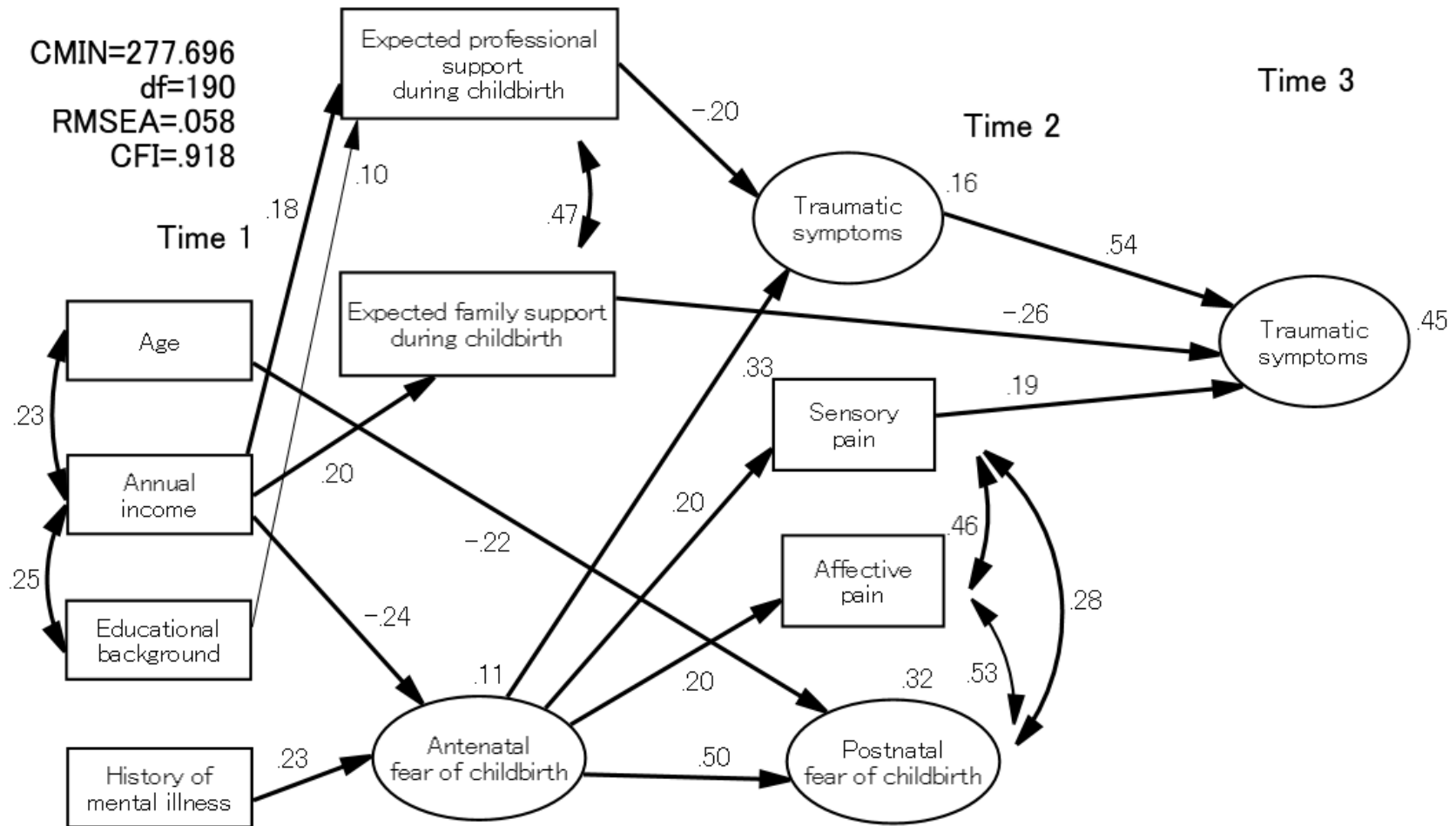


Fig. 2. Results of the structural regression analysis in the primiparous group.

Significant paths are indicated by bold lines.

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

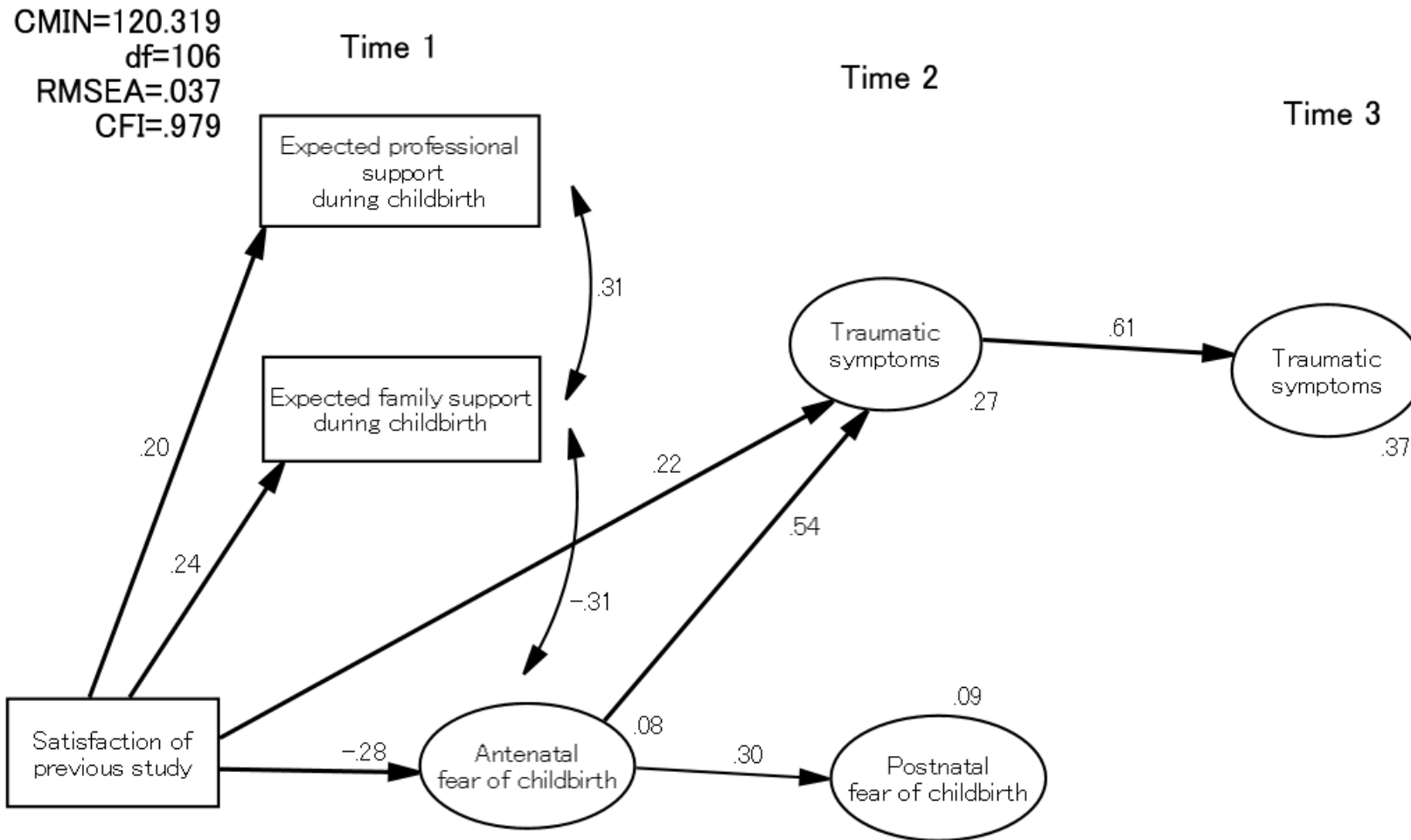


Fig. 3. Results of the structural regression analysis in the multiparous group.
Significant paths are indicated by bold line
Time 1: late pregnancy, Time 2: early postpartum, Time 3: one month postpartum