

## Research Article

# Temperament, Character, and Depressive Symptoms during Pregnancy: A Study of a Japanese Population

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*Background.* To examine the effects of temperament and character domains on depression during pregnancy. *Methods.* We examined 601 pregnant women using a questionnaire that included the Edinburgh Postnatal Depression Scale (EPDS), the Temperament and Character Inventory (TCI), and demographic variables. *Results.* In a hierarchical regression analysis, severity of depression during pregnancy was predicted by the women's negative response towards the current pregnancy, low self-directedness, and high harm avoidance, persistence, and self-transcendence. *Conclusion.* Depression during pregnancy is predicted by personality traits as well as women's negative attitudes towards the current pregnancy.

## 1. Introduction

The World Mental Health Survey [1], conducted in 17 countries, found that on average about one in 20 people reported having had an episode of depression. The prevalence of depression among women is two to three times higher than that among men. Depression is one of the most serious health problems among women [2], with younger women affected more frequently than middle-age women [3].

Personality is one of the major factors associated with depression [4–7]. Personality traits predict the course and treatment response of depression [8]. Cloninger et al. [9] proposed a psychobiological model that included both temperament and character domains. According to their theory, the temperament domain consists of four dimensions: harm avoidance (HA), novelty seeking (NS), reward dependence (RD), and persistence (PS). The character domain consists of three dimensions: self-directedness (SD), cooperativeness

(CO), and self-transcendence (ST). As a measure of these dimensions, they developed the Temperament and Character Inventory (TCI) [10].

Many studies have used the TCI to explore the relationship between depression on the one hand and temperament and character dimensions on the other. Most of these studies demonstrated that individuals with depressive disorder or depression were more likely to have high HA and low SD and CO [6, 7, 11–16]. No consensus, however, has been reached regarding the relationship between PS and depression. While some researchers [12, 17–19] have reported *high* PS among those with depression, others have found *low* PS among those with depression [7, 20, 21], depressive disorder [22, 23], and bipolar disorder [22, 24–26]. It is of interest to us that PS was reported to be low among individuals with postpartum depression [27].

Depression that appears during pregnancy is called antenatal depression. The prevalence of this condition has been

reported to be between 4% and 29% [28, 29], and it has been associated with unwanted and unplanned pregnancy, high neuroticism, attitudes towards the present pregnancy, lack of social support, and pregnancy complications [28, 30, 31].

Depression and depressive symptoms during pregnancy impact several perinatal health outcomes, including preterm delivery [32], low birth weight, intrauterine growth restriction [33], diabetes [34], and postpartum depression [35]. It is therefore of clinical as well as research importance to identify pregnant women with depression.

However, unlike depression in general and postnatal depression, antenatal depression has been infrequently studied with regard to its association with personality traits. Andriola and colleagues [36] found that antenatal depression was significantly related to high HA and low SD, but this study enrolled only 65 pregnant women. The present study aimed to explore the associations between antenatal depression and temperament and character dimensions in a large population of pregnant Japanese women.

## 2. Methods

**2.1. Participants.** All 55 obstetric clinics in Kumamoto Prefecture were solicited to participate in this multiwave study on perinatal mental health. Eighteen (33%) clinics responded to our request. There were one university hospital (the only academia-affiliated hospital in the prefecture), public and private hospitals ( $N = 12$ ), and private clinics ( $N = 5$ ). Hence we obtained a mixture of different types of antenatal institutions. We then invited pregnant women of at least 28 weeks' gestation who attended one of these antenatal clinics during the whole month of November 2011. It is of note that the gestational age in Japan is calculated as week since the first day of the last menstruation. Women were eligible for the study if they were above 20 years old. Pregnant women who were illiterate, who had severe mental illness, or who had been hospitalized with pregnancy complications were excluded. Of 1442 eligible women, 601 (42%) returned the questionnaire while still pregnant.

### 2.2. Measures

**2.2.1. Depression.** We used the Edinburgh Postnatal Depression Scale (EPDS) [37]. This is a self-report of postnatal depression with 10 items rated on a 4-point scale (from 0 to 3). Its psychometric properties have been reported [37]. The total score ranges from 0 to 30 with higher scores indicating more severe depressive symptoms. The Japanese version of the EPDS was made available by Okano and colleagues [38] who also verified its reliability and validity.

Temperament and character dimensions: we used the 130-item Temperament and Character Inventory [39]. This is based on the original 125-item TCI [10] with the addition of five more PS items in order to increase the internal reliability of the scale, as suggested by Kijima and colleagues [40]. The TCI measures the four temperament dimensions (NS, HA, RD, and PS) and the three character dimensions (SD, CO, and ST). The original true-false response scale was modified into a 4-point scale, which has better internal consistency among

Japanese populations [39]; the 4-point scale ranges from 0 (strongly disagree) to 3 (strongly agree). Reliability and factor validity of the Japanese version of the TCI were reported by Kijima and colleagues [40] and Takeuchi and colleagues [41].

**2.2.2. Demographic Data.** We measured age, partner's age, number of children, complications of pregnancy (such as threatened labour, pregnancy hypertension, placenta previa, and anomaly of the fetus), gestational week, response to the present pregnancy (from very displeased: 1 to very pleased: 5), and desire for baby (from not desired: 1 to very desired: 5).

**2.3. Statistical Analysis.** After examining the means and standard deviations of the variables used in this study, we calculated bivariate correlations between the EPDS scores and the TCI subscale scores and the demographic variables.

In order to identify the relative magnitude of each predictor of depression during pregnancy, we regressed the EPDS scores on predictor variables using the following four steps. First we entered the ages of the participants and their partners. Then we entered the demographic variables that showed significant correlation with the EPDS scores. In the third step, we entered the scores of the character domain scales. This is because we presumed, based on Cloninger and colleagues' [9, 10] assumption, that character domain develops on the basis of temperament domain. Finally, in the fourth step, we entered the scores of the temperament scales.

The criterion for statistical significance was set at  $P < .05$ . All statistical analyses were conducted using the Statistical Package for Social Science (SPSS) Version 20.

**2.4. Procedure.** All the questionnaires were distributed at the clinics. The participants were asked to bring the questionnaire home, fill it in, and return it to the researcher (T.K.) using a stamp-added envelope. The present study was approved by the Ethical Committee of Kumamoto University Graduate School of Life Sciences.

## 3. Results

The EPDS scores were significantly correlated with NS, HA, ST, and negative response to the current pregnancy. They were significantly negatively correlated with SD, CO, the woman's age, the partner's age, and desire for a baby (Table 1).

In the regression analysis, the EPDS scores were predicted by the woman's and partner's ages, negative response to the current pregnancy, low SD, high ST, high HA, and high PS (Table 2).

Because the Cloninger theory dictates that character develops on the basis of temperament, we entered into a regression analysis the temperament scales before character scales. However, the results were virtually the same (table not shown).

## 4. Discussion

As in Andriola and colleagues' [36] study on postnatal depression as well as other studies on depression in general [6, 7, 13, 15], our study showed that severity of depression

TABLE 1: Means, SDs, and correlations of the variables used in this study (N = 608 to 633).

|                              | 1        | 2        | 3        | 4       | 5       | 6       | 7      | 8     | 9       | 10      | 11       | 12    | 13    | 14       | 15   |
|------------------------------|----------|----------|----------|---------|---------|---------|--------|-------|---------|---------|----------|-------|-------|----------|------|
| (1) EPDS                     | —        |          |          |         |         |         |        |       |         |         |          |       |       |          |      |
| (2) NS                       | 0.15***  | —        |          |         |         |         |        |       |         |         |          |       |       |          |      |
| (3) HA                       | 0.35***  | -0.25*** | —        |         |         |         |        |       |         |         |          |       |       |          |      |
| (4) RD                       | -0.08    | 0.3      | -0.01    | —       |         |         |        |       |         |         |          |       |       |          |      |
| (5) PS                       | 0.08     | -0.16*** | -0.03    | 0.11**  | —       |         |        |       |         |         |          |       |       |          |      |
| (6) SD                       | -0.56*** | -0.23*** | -0.48*** | 0.14**  | 0.05    | —       |        |       |         |         |          |       |       |          |      |
| (7) CO                       | -0.29*** | -0.22*** | -0.25*** | 0.45*** | 0.18*** | 0.50*** | —      |       |         |         |          |       |       |          |      |
| (8) ST                       | 0.14**   | 0.21***  | -0.22*** | 0.01    | 0.21    | -0.11** | 0.07   | —     |         |         |          |       |       |          |      |
| (9) Age                      | -0.13**  | -0.01    | -0.11**  | -0.07   | 0.03    | 0.12**  | 0.11*  | 0.07  | —       |         |          |       |       |          |      |
| (10) Partner's age           | -0.09*   | -0.03    | -0.13**  | -0.13** | 0.03    | 0.12**  | 0.05   | 0.09* | 0.68*** | —       |          |       |       |          |      |
| (11) No. of children         | 0.05     | -0.04    | 0.4      | -0.03   | 0.04    | -0.02   | 0.03   | -0.03 | 0.21*** | 0.14**  | —        |       |       |          |      |
| (12) Pregnancy complications | 0.04     | -0.06    | -0.01    | 0.03    | 0.04    | -0.01   | 0.09*  | 0.07  | 0.11**  | 0.11**  | -0.01    | —     |       |          |      |
| (13) Gestational week        | -0.02    | -0.00    | -0.11**  | -0.05   | 0.01    | 0.03    | -0.03  | 0.04  | 0.06    | -0.00   | -0.02    | -0.05 | —     |          |      |
| (14) Response to pregnancy   | 0.16***  | 0.04     | 0.03     | -0.12** | -0.06   | -0.11** | -0.09* | -0.08 | -0.03   | 0.01    | 0.26***  | -0.01 | 0.05  | —        |      |
| (15) Desire for baby         | -0.13**  | -0.05    | 0.00     | 0.08*   | 0.02    | 0.06    | 0.05   | 0.01  | 0.21*** | 0.15*** | -0.18*** | 0.6   | -0.04 | -0.47*** | —    |
| Mean                         | 4.5      | 25.5     | 33.1     | 29.0    | 16.3    | 43.7    | 50.0   | 17.2  | 30.0    | 32.1    | 0.7      | 0.2   | 34.1  | 1.3      | 3.3  |
| SD                           | 4.1      | 6.0      | 7.2      | 4.6     | 3.0     | 8.1     | 6.4    | 5.8   | 4.9     | 5.9     | 0.8      | 0.5   | 3.6   | 0.6      | 1.0  |
| Skewness                     | 1.5      | -0.1     | -0.2     | -0.01   | 0.1     | -0.4    | -0.1   | 0.3   | 0.1     | 0.7     | 1.1      | 2.5   | -1.4  | 2.4      | -0.3 |
| Cronbach's alpha             |          |          |          |         |         |         |        |       |         |         |          |       |       |          |      |

Because pregnancy complications and response to pregnancy were more 2.0 positively skewed, both of them were log-transformed for correlations with other variables. \*  $P < 0.05$ , \*\*  $P < 0.01$ , and \*\*\*  $P < 0.001$ .

TABLE 2: Hierarchical multiple regression analyses predicting EPDS score during pregnancy.

|                                   | $R^2$ | $R^2$<br>increase | Standardised<br>beta | $t$     |
|-----------------------------------|-------|-------------------|----------------------|---------|
| Step 1: demographics              | 0.01  | 0.01*             |                      |         |
| Age                               |       |                   | -0.07                | -1.4    |
| Partner's age                     |       |                   | 0.03                 | 0.7     |
| Step 2: psychological<br>response | 0.04  | 0.03***           |                      |         |
| Response to<br>pregnancy          |       |                   | 0.13                 | 3.1**   |
| Desire for baby                   |       |                   | -0.02                | 0.6     |
| Step 3: character                 | 0.33  | 0.29***           |                      |         |
| SD                                |       |                   | -0.41                | -8.5*** |
| CO                                |       |                   | -0.01                | 0.3     |
| ST                                |       |                   | 0.11                 | 3.0**   |
| Step 4: temperament               | 0.37  | 0.03***           |                      |         |
| NS                                |       |                   | 0.08                 | 1.9     |
| HA                                |       |                   | 0.19                 | 4.2***  |
| RD                                |       |                   | -0.01                | -0.3    |
| PS                                |       |                   | 0.12                 | 3.2**   |
| Standardised $R^2$                | 0.353 |                   |                      |         |

\* $P < 0.05$ , \*\* $P < 0.01$ , and \*\*\* $P < 0.001$ .

during pregnancy was associated with high HA and low SD. Because the effects of the temperament domain on depression remained statistically significant after controlling for the effects of character domains, we could eliminate the possibility that the effects of temperament on depression were wholly explained by mediation of the effects of character domains.

In addition to personality, it was the woman's negative response to the current pregnancy ("I was very displeased") that significantly predicted the severity of depression during pregnancy. We are not aware of any studies examining the association between such negative psychological attitudes and depression during pregnancy. Much remains to be investigated regarding the temporal sequence of depression during pregnancy and negative psychological reactions towards pregnancy.

Like Cloninger and colleagues' [12] study, our research showed a link between high ST and depression. High ST has reported to be characteristic of individuals with bipolar disorder [13, 42]. Because this study used a self-report of depressive symptoms, we were unable to distinguish individuals with bipolar depression from those with unipolar depression. It is likely that our participants who scored highly on the EPDS included individuals who had previously experienced manic or hypomanic episodes.

As in some studies [12, 13, 18, 19], our results showed a link between high PS and depression during pregnancy. This is, however, in contrast with other studies reporting the reverse association of depression with PS [7, 20–27]. People high in PS are hardworking, persistent, and stable, even in frustrating situations [10]. Coupled with high HA, high PS is associated

with obsessive compulsive personality traits [43]. About one-third of people with obsessive compulsive disorder were found to have had current or previous episodes of major depressive disorder [44], and, in about 40% of women with children, obsessive compulsive symptoms had their onset during pregnancy [45]. Depression during pregnancy may be associated with obsessive compulsive traits. Because, however, we failed to measure obsessive compulsive traits or symptoms, our speculation awaits reports in future studies.

Despite the strengths of the present study, including its use of a large community population of pregnant women, its limitations should be discussed. First, caution should be exercised because of the cross-sectional study design. HA is likely to be influenced by the individual's mood at the time of examination [46]. Hence studies with longitudinal follow-up are necessary before firm conclusions can be made regarding the association between personality traits and depression during pregnancy. Alternatively, we could conduct unique statistical analysis applying a nonrecursive model with a "statistical anchor" to fix the effects of an otherwise correlational relationship [47]. Second, the use of a self-report measure of depression made it impossible to distinguish between depressive symptoms and the nosological entity of major depression and allowed for the possible inclusion of individuals with bipolar depression. Another drawback of this study was a low participation rate (42%) though such a high nonparticipation rate was not a rare phenomenon in mental health epidemiologic studies in Japan. For example, in one of the first community studies of mental disorders in Japan [48], the participation rate was 41%. Although it is desirable, we are unaware even of the demographic data such as age and parity of those women who refrained.

Taking these limitations into consideration, the present preliminary study suggests that depression during pregnancy is predicted by high HA, PS, and ST as well as by low SD and women's negative attitudes towards the current pregnancy.

## Conflict of Interests

The authors declare that they have no conflict of interests.

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