Factors associated with cognitive failure among mothers involved in child care

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Abstract: Mothers involved in child care may be prone to various cognitive failures (e.g., leaving things behind) as a result of being overburdened with maternal duties, with limited attentional capacity for responding to children’s frequent demands. Therefore, this study aimed to explore factors associated with cognitive failure among mothers involved in child care in Japan. The participants were 310 mothers aged 25–45 (155 full-time workers, 155 housewives). The self-reported questionnaire covered cognitive failure (outcome variable), basic demographic characteristics, sociological factors, health status, and personality. Cognitive failure was assessed using the 15-item Japanese version of the Short Inventory of Minor Lapses. The variables evaluated for potential associations with cognitive failure included mother’s age, youngest child’s age, number of children, employment status, daily sleep duration, time spent on leisure activities, fatigue, social support (instrumental and emotional), use of child care services, and the Big Five personality traits (neuroticism, extraversion, openness, agreeableness, and conscientiousness). Multiple regression analysis showed that number of children, fatigue, emotional support, neuroticism, agreeableness, and conscientiousness were independently and significantly associated with cognitive failure. Our results may help facilitate the

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PUBLIC INTEREST STATEMENT
Mothers involved in child care may be prone to various cognitive failures (e.g., leaving things behind) as a result of being overburdened with maternal duties, with limited attentional capacity for responding to children’s frequent demands. To date, there is a paucity of knowledge regarding cognitive failures and its related factors among mothers. Thus the present study aimed to explore factors associated with cognitive failure among mothers involved in child care. We conducted a self-reported questionnaire survey for 310 mothers aged 25–45 to evaluate for potential associations with cognitive failure included mother’s age, youngest child’s age, number of children, employment status, daily sleep duration, time spent on leisure activities, fatigue, social support, use of child care services, and personality traits. Our findings may help facilitate the development of effective strategies to prevent adverse effects on children’s and parents’ health by preventing cognitive failure among mothers.
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**Keywords:** Child care; Cognitive failures; Emotional support; Mothers; Personality

1. **Introduction**

Child care involves mentally and physically intense work. Parents' physical and mental health may deteriorate because of various factors, including an overload of activities related to child care and chores, constantly dealing with children's demands, and physical and cognitive decline in the postpartum period (Creti et al., 2017; Dunning & Giallo, 2012; Norhayati et al., 2015; Wenze et al., 2015). However, time spent performing housework and child care tasks differs between genders. This tendency is particularly remarkable in Japan, where mothers spend considerably more time than fathers on such tasks. The average daily time spent on tasks related to raising a child under 6 years old was 7 hours 34 minutes for mothers vs. 1 hour 23 minutes for fathers in Japan, compared with 5 hours 40 minutes for mothers vs. 3 hours and 10 minutes for fathers in the United States, and 5 hours 29 minutes for mothers vs. 3 hours 21 minutes for fathers in Sweden (Gender Equality Bureau Cabinet Office, 2018).

Mothers involved in child care need to respond to frequent requests from their children on a daily basis (Kano, 2017). Oftentimes, mothers must manage young children's disruptive behaviors (e.g., irritable, aggressive, and noncompliant behaviors) (Roberts et al., 2018) that occur frequently during the so-called “terrible twos” and “horrible threes” (the period from 2 to 3 years of age). Mothers must respond to their child without delay while also having to perform daily tasks such as housework. As a result, many home activities are likely to require multitasking (e.g., cooking while monitoring the child’s safety), and it is likely that the mother's attention is constantly limited.

Moreover, it has been reported that postpartum women are prone to cognitive decline. A comparison of cognitive function tests of 200 women in the postpartum period (7 days after delivery) and 100 women with no pregnancy experience who were matched in age and socio-economic indicators showed that the performance of postpartum women was significantly lower (Meena et al., 2016). In another study (Henry & Sherwin, 2012), 55 pregnant women were compared with 21 non-pregnant women who were matched in age, language used, and education; at both 34 to 38 weeks of pregnancy and 14 weeks after delivery, the former had significantly lower memory performance. Furthermore, the cognitive decline that tended to occur during the perinatal period was associated with changes in hormonal levels (Henry & Sherwin, 2012).

As stated above, as a result of being overloaded with child care activities and chores and possessing limited attention, as well as experiencing cognitive deterioration in the postpartum period, mothers involved in child care may be prone to various forms of cognitive failure. Cognitive failure refers to various failure experiences in daily life defined as cognition-based slips and lapses in simple tasks that a person can usually perform without errors (e.g., leaving things behind, missing appointments) (Broadbent et al., 1982; Martin, 1983; Reason, 1993). Cognitive failure is a problem that cannot be overlooked, as it may adversely affect the health of children and parents because of incidents in the home as well as negative feelings. Factors associated with cognitive failure have also been examined in healthy adults (Carrigan & Barkus, 2016). These include low cognitive function (i.e., attention and memory function) (Unsworth et al., 2012); memory complaints (Wilhelm et al., 2010); personality, including neuroticism (Broadbent et al., 1982) and conscientiousness (Elfering et al., 2011); fatigue (Cuttler et al., 2011); sleep disorders (Wilkerson et al., 2012); and daytime sleepiness (Wallace & Vodanovich, 2003). Exploring the various factors associated with cognitive failure could help identify countermeasures among mothers involved in child care.
Therefore, we conducted an observational survey-based study to explore factors associated with cognitive failure among mothers who were involved in child care, married, and living with their husbands in Japan.

2. Methods

2.1. Participants

We used an internet research company with 1.2 million registered members to administer the survey. The company selected mothers based on stratification by age (two categories: 25–35 and 36–45 years old), employment status (two categories: full-time employees and part-time/unemployed), and age of youngest child (three categories: 0–2, 3–4, and 5–6 years old). Self-employed and freelance workers and those taking maternity or child care leave were not included. Only those mothers who were married and lived with their husbands were included. Among full-time employees, those who were working under the short working hour system were also included. Therefore, we instructed the research company to recruit 300 women who were married, whose youngest child was under 6 years old, and who were currently not on maternity or child care leave. The survey was conducted from August 21 to 23, 2018. In total, 310 participants completed the survey. Table 1 shows the characteristics of the participants.

| Table 1. Characteristics of participants (N = 310) |
|-----------------------------------------------|
| Participants’ characteristics | Mean (SD) or n (%) |
| Mother’s age (year), mean (SD) | 35.6 (4.5) |
| Age of youngest child (month), mean (SD) | 45.1 (20.8) |
| Number of children (one), n (%) | 133 (42.9) |
| Employment status, n (%) | |
| Full-time worker | 155 (50.0) |
| Part-time worker | 44 (14.2) |
| Unemployed | 111 (35.8) |
| Sleep duration in a day (minute), mean (SD) | 395.3 (69.8) |
| Time for leisure activity in a day (minute), mean (SD) | 87.5 (74.9) |
| Fatigue$^{11}$ (point), mean (SD) | 5.2 (1.3) |
| Emotional support$^{12}$ (no support), n (%) | 13 (4.2) |
| Instrumental support$^{12}$ (no support), n (%) | 16 (5.2) |
| Childcare services$^{13}$ (not used), n (%) | 48 (15.5) |
| Neuroticism$^{11}$ (point), mean (SD) | 4.4 (1.1) |
| Extraversion$^{11}$ (point), mean (SD) | 4.1 (1.3) |
| Openness$^{12}$ (point), mean (SD) | 3.7 (1.1) |
| Agreeableness$^{12}$ (point), mean (SD) | 4.8 (1.0) |
| Conscientiousness$^{12}$ (point), mean (SD) | 3.8 (1.2) |
| Cognitive failure$^{13}$ (point), mean (SD) | 33.8 (11.1) |

Notes. $^{11}$ Overall feeling of fatigue was assessed based on seven response options (0 to 6 points). The higher the score, the greater the fatigue. $^{12}$ To assess social support, we created two subscales: Emotional Support (including “Do you have someone who you consult with in case of trouble?”) and Instrumental Support (including “Do you have someone who helps with child care?”). Participants were asked whether they received such support from the husband, parents, and friends. $^{13}$ We asked whether participants used any of child care services (e.g., authorized nursery school, non-authorized nursery school, kindergarten, babysitter, housekeeping service). $^{14}$ We administered the Japanese version of the Ten-Item Personality Inventory to measure the big five personality traits; namely, neuroticism, extraversion, openness, agreeableness, and conscientiousness. $^{15}$ Cognitive failure was measured using the 15-item Japanese version of Short-Inventory of Minor Lapses (range: 15 to 75 points). A higher score indicates a higher degree of cognitive failure.
2.2. Measures

2.2.1. Cognitive failure
The Short Inventory of Minor Lapses is a tool for measuring cognitive failure (Reason, 1993). In the present study, we used the Japanese version of this instrument (Iwasa et al., 2020). This scale consists of 15 items (e.g., “How often do you forget to say something you were going to mention?”) assessing the frequency of cognitive failure experiences in daily life. Items are rated on a five-point scale ranging from 1 (hardly ever) to 5 (nearly all the time). Responses to the 15 items are added to obtain a cognitive failure score ranging from 15 to 75. A higher score indicates a higher degree of cognitive failure (Cronbach’s alpha in the present study = 0.94).

2.2.2. Factors related to cognitive failure
Participants’ age, age of youngest child, number of children, employment status, daily sleep duration, time spent on leisure activity, fatigue, emotional support, instrumental support, and personality were examined as factors potentially associated with cognitive failure. For the number of children, we used two categories: only one child, or two or more children. Employment status had two categories: full-time employment or housewife (including part-time workers and full-time homemakers). Daily sleep duration was the total number of sleep hours during the day and night. To assess time spent on leisure activity, we asked about free time other than paid labor, child care, housework, and unpaid work (e.g., volunteer activities). Overall feeling of fatigue was assessed on a seven-point scale (0 to 6 points); the higher the score, the greater the fatigue. To assess social support, we created two subscales based on previous research (Nakayama & Saegusa, 2003; Takeda et al., 1998): emotional support (e.g., “Do you have someone who you consult with in case of trouble?”) and instrumental support (e.g., “Do you have someone who helps with child care?”); participants were asked whether or not they received such support from their husband, parents, and friends. We also collected information on child care service usage to describe participants’ basic attributes. Regarding the use of child care services, we dichotomized participants’ responses into two categories: “not used” indicated none of the child care services were used, and “used” indicated the services were used.

We administered the Japanese version of the 10-item Personality Inventory (Gosling et al., 2003; Oshio et al., 2013) to assess the Big Five personality traits, namely neuroticism, extraversion, openness, agreeableness, and conscientiousness. Respondents rate each of the 10 items on a seven-point Likert scale ranging from 1 (disagree strongly) to 7 (strongly agree). The average numerical response of the two items for each personality trait is calculated to yield a score ranging from 1 to 7, with higher scores indicating a higher level of the trait.

2.3. Statistical analysis
We performed Pearson’s correlation analysis to examine correlations with variables used in the present study. We conducted a multiple regression analysis to explore factors associated with cognitive failure. Participants’ age, age of youngest child, number of children, employment status, daily sleep duration, time for leisure activity, fatigue, emotional support, instrumental support, child care services, and the five personality traits were entered into the model simultaneously. We calculated the variance inflation factor to check for multicollinearity. All probability values were two-tailed, and p-values < 0.05 were considered statistically significant. We used SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA) for the analyses.

2.4. Ethical considerations
This study was conducted with the approval of the Fukushima Medical University Ethics Committee (approval number 30009, approved on 28 June 2018). The questionnaires did not collect any personally identifying information from the participants. After reading about the study, completing the survey questionnaire was considered an indication of consent to participate.
Table 2. Correlation matrix for variables used in the regression analysis in the present study (N = 310)

|       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 2     | .04  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 3     | −.08 | .21**|      |      |      |      |      |      |      |      |      |      |      |      |      |
| 4     | .11* | .18**| −.01 |      |      |      |      |      |      |      |      |      |      |      |      |
| 5     | .02  | −.04 | −.01 | .02  |      |      |      |      |      |      |      |      |      |      |      |
| 6     | −.17**| −.01 | .08  | −.07 | −.01 |      |      |      |      |      |      |      |      |      |      |
| 7     | −.09 | −.07 | .08  | −.03 | .35**| .05  |      |      |      |      |      |      |      |      |      |
| 8     | .32**| −.02 | −.18**| .03  | .04  | −.21**| −.16**|      |      |      |      |      |      |      |      |
| 9     | −.20**| −.06 | −.02 | .14* | .02  | .14* | .08  | −.20**|      |      |      |      |      |      |      |
| 10    | −.12*| −.02 | .06  | −.06 | .16**| .11  | −.19**| .39**|      |      |      |      |      |      |      |
| 11    | −.07 | .01  | .18**| .13* | −.29**| .07  | −.14* | .06  | .04  | .02  |      |      |      |      |      |
| 12    | .22**| −.06 | .03  | −.06 | .15**| −.03 | .02  | .18**| .02  | .01  | .13* |      |      |      |      |
| 13    | −.08 | −.01 | −.06 | .17**| −.13* | .12* | −.06 | −.06 | .03  | .01  | .07  | −.28**|      |      |      |

(Continued)
|    | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 14 | Openness | -0.01 | 0.05 | 0.04 | 0.03 | -14* | -01 | -02 | -08 | 0.01 | 0.07 | 0.05 | -17** | 0.39** | -   |
| 15 | Agreeableness | -0.18** | 0.01 | -01 | 0.02 | 0.09 | -04 | 0.06 | -03 | 0.09 | 0.12* | 0.02 | -18** | -04 | 0.01 | -   |
| 16 | Conscientiousness | -0.19** | -0.07 | 0.01 | -01 | -10 | -03 | -08 | 0.01 | 0.04 | -03 | 0.05 | -18** | 0.20** | 0.16** | 0.15** |

Notes.
Pearson correlation coefficients stated in each cell. ** p < 0.01, * p < 0.05. 1) 1 = one, 2 = two or more. 2) 1 = full-time worker, 2 = part-time worker/unemployed. 3) 1 = no, 2 = yes. 4) 1 = no, 2 = yes. 5) 1 = not used, 2 = used.
Table 3. Factors associated with cognitive failure among mothers involved in child care (N = 310)

|                                | β    | p    |
|--------------------------------|------|------|
| Mother's age 1)                | .02  | .78  |
| Age of youngest child 2)       | −.04 | .53  |
| Number of children             | .13  | .02  |
| Employment status              | .01  | .96  |
| Sleep duration 2)              | −.09 | .11  |
| Time for leisure activity 2)   | −.05 | .38  |
| Fatigue 1)                     | .23  | <.01 |
| Emotional support              | −.14 | .02  |
| Instrumental support           | .01  | .93  |
| Childcare services             | −.04 | .52  |
| Neuroticism 1)                 | .14  | .02  |
| Extraversion 1)                | −.05 | .46  |
| Openness 1)                    | .08  | .18  |
| Agreeableness 1)               | −.12 | .03  |
| Conscientiousness 1)           | −.15 | .01  |
| Adjusted R²                    |      | .18  |

Notes. We conducted a multiple regression analysis to explore factors associated with cognitive failure. Participant's age, age of youngest child, number of children (1 = one, 2 = two or more), employment status (1 = full-time worker, 2 = part-time worker/unemployed), daily sleep duration, time for leisure activity, fatigue, emotional support (1 = no, 2 = yes), instrumental support (1 = no, 2 = yes), childcare services (1 = not used, 2 = used), and the five personality traits (neuroticism, extraversion, openness, agreeableness, and conscientiousness) were entered into the model simultaneously. Cognitive failure was measured using the 15-item Japanese version of Short-Inventory of Minor Lapses (range: 15 to 75 points). A higher score indicates a higher degree of cognitive failure. 1) Continuous variables.

3. Results

Table 2 shows the correlation matrix for variables used in the regression analysis. Pearson's correlation analysis showed that sleep duration (r = −.17), fatigue (r = .32), emotional support (r = −.20), instrumental support (r = −.12), neuroticism (r = .22), agreeableness (r = −.18), and conscientiousness (r = −.19) were significantly associated with cognitive failure.

Linear regression analysis was performed to examine the factors associated with cognitive failure (Table 3). Number of children (β = 0.13), fatigue (β = 0.23), emotional support (β = −0.14), neuroticism (β = 0.14), agreeableness (β = −0.12), and conscientiousness (β = −0.15) were significantly and independently associated with cognitive failure. The coefficient of determination (R²) was 0.18.

4. Discussion

The significant relationship between the number of children and cognitive failure revealed that mothers with two or more children were more likely to experience cognitive failure compared with mothers who had only one child. As many activities in the home during child rearing involve multitasking (e.g., cooking while checking that children are safe), attention is usually limited (Kano, 2017). Such multitasking situations may be more likely to occur when raising two or more children than only one child. Attention resources are more likely to be consumed and failures more likely to occur during multitasking (Shinohara, 2011). To reduce cognitive failure in a family raising two or more children, it is necessary to reduce parental burden by using social support from family and friends, as well as public or private parenting support services.

Although the univariate relationship between sleep duration and cognitive failure was significant (r = −.17, p < .01, Table 2), multiple regression analysis did not reveal a significant and independent
relationship (Table 3). We had expected a negative relationship between sleep duration and cognitive failure; that is, the more sleep a mother gets, the lower the frequency of cognitive failure. It would be expected that a shorter amount of daily sleep would contribute to sleep problems, such as dissatisfaction with sleep, sleep disorders, and daytime sleepiness (Creti et al., 2017), which would lead to cognitive decline (Wardle-Pinkston et al., 2019) and thereby cognitive failure. A close relationship between sleep problems and cognitive decline has been reported (Wardle-Pinkston et al., 2019). Other studies have reported a close relationship between cognitive failure and sleep disorders (Wilkerson et al., 2012) and daytime sleepiness (Wallace & Vodanovich, 2003). However, contrary to expectations, an independent relationship between sleep duration and cognitive failure was not observed, possibly because of sleep duration’s correlation with fatigue (r = −.21). Further research is needed to examine the association between sleep problems and cognitive failure using well-validated measures of sleep problems (Johns, 1991; Soldatos et al., 2000).

Mothers with a high degree of fatigue showed a higher frequency of cognitive failure, which is consistent with a study that found a relationship between fatigue and cognitive decline (Gullett et al., 2019). Additionally, studies have reported that postpartum fatigue can lead to mental health deterioration (Creti et al., 2017; Dunning & Giallo, 2012) and maladjustment in child rearing (Dunning & Giallo, 2012). Thus, in order to lessen cognitive failure, it is necessary to reduce fatigue through interventions such as early specialized care by nurses and midwives (Tsuchiya et al., 2016), use of social support from family and friends, and child care and housework services.

The present study examined the relationship between two types of social support (i.e., emotional and instrumental support) and cognitive failure. We found that both emotional support (r = −.20) and instrumental support (r = −.12) were significantly associated with cognitive failure in the univariate analysis (Table 2). However, multiple regression analysis revealed that only emotional support (β = −.14) was significantly and independently related to cognitive failure (Table 3). There are two possible reasons for the diminishment of the independent relationship between instrumental support and cognitive failure. First, the emotional support and instrumental support were closely correlated (r = .39). Second, the extent of the relation to cognitive failure was relatively greater for emotional support than instrumental support. Although social support is a powerful protective factor for mental health (Ikeno & Kishi, 2009), emotional support has been found to be more effective for mothers than instrumental support (Eastwood et al., 2012; Takeda et al., 1998). Given our results and previous findings, emotional support (e.g., listening to the mother’s stories, praising her efforts) may be particularly important for preventing or reducing cognitive failure in mothers. In Japan, where the nuclear family is gaining prominence, the most important source of support for women involved in child care is their husband, but this support is not necessarily obtained (Gender Equality Bureau Cabinet Office, 2018). A supportive workplace environment that allows flexible work arrangements would enable husbands to provide more support to mothers, for example, using care support systems such as child care leave and having the option of shorter working hours, flextime, and remote work (Takekshi, 2014). In addition, child care and housework services are considered useful to address this issue. In order to reduce the burden of child care, it may be necessary to widely disseminate child care support services operated by local governments and the private sector. For example, in the “Family Support Center Project” operated by municipalities, temporary child care services are provided by citizens (Ministry of health, Labour and Welfare, 2016). This kind of child care support service should be recommended not only for working parents but also for families where full-time homemakers are involved in child care.

With regard to personality, neuroticism, agreeableness, and conscientiousness were significantly and independently related to cognitive failure. Participants with higher levels of neuroticism showed more frequent cognitive failure, which is consistent with previous findings (Broadbent et al., 1982). According to the definition of the Big Five model of personality (McCrae & John, 1992), neuroticism denotes a tendency to experience psychological distress; individuals with high levels of neuroticism are prone to experiencing more negative emotions, such as depression, anxiety, and anger. A previous study also reported a relationship between negative emotions and cognitive failure (Payne & Schnapp,
2014). With regard to interpreting this relationship, two mechanisms have been discussed in the literature. First, as individuals high in neuroticism are more likely to consider experienced events as overly negative, they may report more failures and judge them more negatively. Second, those high in neuroticism frequently worry about and are easily upset by everyday concerns (McCrae & John, 1992); consequently, they tend to get distracted, and their attentional resources for dealing with daily tasks are diminished. As a result, they may be more likely to experience cognitive failure.

The trait of agreeableness was negatively associated with cognitive failure. Agreeableness as a personality trait can be defined as a tendency to be trusting, sympathetic, and cooperative (McCrae & John, 1992). Individuals who are agreeable tend to be psychologically healthy and are socially desirable because they are usually warm and sympathetic to others. Owing to this tendency, they may receive and effectively utilize sources of social support. In a previous study involving a 1.5-year follow-up of 59 patients with chronic kidney disease (Hoth et al., 2007), there was a moderating effect of level of agreeableness in the relationship between social support and recovery from depression. In patients who were low in agreeableness, the level of social support had little effect on improvement in depression during the follow-up period, whereas for patients high in agreeableness, greater social support was associated with improvement in depression. Thus, it may be that mothers who are high in agreeableness experience less frequent cognitive failure because of their effective use of social support.

Conscientiousness was also negatively associated with cognitive failure, which is consistent with a previous study that found that individuals with high levels of conscientiousness were less likely to experience cognitive failure at work (Elfering et al., 2011). Conscientiousness is a disposition characterized by being diligent, self-disciplined, organized, and achievement-oriented (McCrae & John, 1992). Individuals high in conscientiousness may have a “cognitive-behavioral style” that works well for handling tasks in daily life (Jokela et al., 2014). For example, they are more likely to do well in organizing living environments and managing schedules, and their attentional resources for dealing with daily tasks are not wasted; therefore, they may be less prone to cognitive failure. Additionally, highly conscientious people are more likely to perform tasks without delay, which means they are less likely to forget important arrangements. Lastly, highly conscientious people are better equipped to avoid daily frustrations because they tend to make long-term plans (e.g., carefully preparing in advance for important tasks, making preparations for future risks, such as having life insurance) (Friedman et al., 1993).

Our study has several limitations. First, because we conducted a cross-sectional survey, causal relationships cannot be inferred. Future research using a longitudinal design is needed to reveal cause-effect relationships. Second, the representativeness of our sample is limited. We surveyed registered members of an internet survey company; thus, in this non-random selection, sampling errors were more likely to occur than if random sampling had been employed (Yasunaga et al., 2006). Furthermore, only women who were married and lived with their husbands were included. Consequently, the sample reflected a group of mothers with specific attributes, different from the general population of mothers in Japan. In the future, it will be necessary to conduct a random sampling survey of the general population to examine the reproducibility of the present findings.

In conclusion, we explored factors associated with cognitive failure among mothers involved in child care in Japan. Multiple regression analysis showed that number of children, fatigue, emotional support, neuroticism, agreeableness, and conscientiousness were independently and significantly associated with cognitive failure. Based on these findings, we recommend some measures for reducing cognitive failure in this population. First, it is necessary to eliminate fatigue by taking sufficient rest, and utilizing early specialized care for severe postpartum fatigue if required. Second, social support (especially emotional support) from family members and the
active use of governmental and privately operated child care support services are needed to reduce mothers’ burden. Third, additions to daily life may be needed to reduce cognitive failure. Namely, using memory aids (e.g., notes for daily tasks) and alert notifications (e.g., on smartphones) may be effective. Fourth, the cognitive-behavioral style of highly conscientious people, which includes good organizational and management skills, a proactive approach to tasks, and long-term planning, may be helpful.

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Competing interest
The authors declare no competing interest.

Data availability statement
Data is not suitable for public deposition due to ethical concerns. Researchers who have an interest in the analysis using the data, please submit requests to the Fukushima Medical University Ethics Committee (rs@ifmu.ac.jp) for access to confidential data.

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