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Personality Traits Predict Meeting the WHO Recommendation of 6 Months' Breastfeeding

A Prospective General Population Cohort Study

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ABSTRACT

Background: Although personality as well as anxiety and depression are recognized as predictors for breastfeeding initiation, evidence of an association of these factors with 6 months' exclusive breastfeeding as recommended by the World Health Organization (WHO) is sparse.

Purpose: The purpose of this study was to investigate the associations of personality and symptoms of anxiety and depression during and after pregnancy with meeting the WHO recommendation of 6 months' exclusive breastfeeding.

Methods: In their first trimester of pregnancy, 5784 pregnant women were enrolled in Dutch primary obstetric care centers and hospitals, of which 2927 completed the breastfeeding assessments 6 months postpartum. We performed logistic regression analyses to test the associations of "big five" personality traits (NEO Five Factor Inventory), anxiety (State-Trait Anxiety Inventory), and depression (Edinburgh Postnatal Depression Scale) symptom levels during pregnancy and postpartum with meeting the WHO recommendation of 6 months' exclusive breastfeeding.

Results: Agreeableness (odds ratio [OR] = 1.18, P = .006) and openness (OR = 1.31, P < .001) were positively associated with meeting the WHO recommendation, whereas extraversion (OR = 0.83, P = .005) and neuroticism (OR = 1.18, P = .006) were negatively associated. After adjustment for both antenatal and postpartum symptom levels of anxiety and depression, the associations of the agreeableness, extraversion, and openness personality traits remained strong and statistically significant (P < .05).

Implications for Practice: Patient-centered care should take personality into account in an effort to tailor interventions to optimize breastfeeding behavior.

Implications for Research: In contrast to earlier findings, personality traits may be of greater importance than symptoms of anxiety and depression for meeting the WHO recommendation of 6 months' exclusive breastfeeding.

Key Words: anxiety, breastfeeding continuation, depression, exclusive breastfeeding, personality traits

Breastfeeding is widely recognized as the ideal form of infant feeding.[1] Infants who are exclusively breastfed during the first 6 months of life experience less gastrointestinal and acute lower respiratory infections than those who are partially breastfed.[2,3] In the long term, a history of breastfeeding is associated with reduced risks of allergies, asthma, atopic dermatitis, acute otitis media, type I and II diabetes, obesity, childhood leukemia, and sudden infant death syndrome.[4-6] In addition, breastfeeding improves mother–infant bonding and secure attachment.[7] Finally, breastfeeding is beneficial for maternal health, as it may reduce the risk of breast cancer, ovarian cancer, and type II diabetes.[8-10]

Because of these profound health benefits for the mother and the child, the World Health Organization (WHO) recommends that all infants should be exclusively breastfed for the first 6 months of life.[1] Although women are often aware of the "breast is best" message,[11] and 63% to 99% of all women in industrialized countries initiate breastfeeding,[12] many do not exclusively breastfeed their infant or do not continue for 6 months and therefore do not meet the WHO recommendation.[13] To target and design interventions that promote breastfeeding, it is essential to have a clear understanding of the determinants of continuation of breastfeeding to meet this WHO recommendation.

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Previous studies into breastfeeding (dis)continuation have revealed maternal age, parity, socioeconomic status (SES), relationship status, and medical conditions (eg, metabolic syndrome) as possible predictors of the decision to discontinue exclusive breastfeeding before reaching 6 months.[14] Nevertheless, another study showed that psychological factors such as symptoms of anxiety and depression were more predictive of exclusive breastfeeding duration than these factors combined.[15] Symptoms of anxiety and depression frequently occur during pregnancy and in the postnatal period.[16-19] Women experiencing these symptoms tend to breastfeed for a shorter period of time and are less likely to exclusively breastfeed.[20,21] Other possibly important factors in relation to breastfeeding are the "big five" personality traits of agreeableness (characterized by good-naturedness, cooperativeness, and trust), conscientiousness (characterized by orderliness, responsibility, and dependability), extraversion (characterized by talkativeness, assertiveness, and energy), neuroticism (characterized by "upsetability" and is the polar opposite of emotional stability), and openness (characterized by originality, curiosity, and ingenuity). Two studies showed positive associations of higher levels of agreeableness, extraversion, and openness with breastfeeding, although these studies were not all methodologically robust.[22,23] However, research examining psychological factors affecting 6 months' exclusive breastfeeding is still scarce.[24]

Associations between personality traits and breastfeeding outcomes might, in part, be explained by symptoms of anxiety or depression because links have been established between personality traits and psychopathology,[25-28] which, in turn, are associated with breastfeeding.[20,21] However, this explanation has never been studied.

This prospective cohort study investigates associations of personality traits and symptom levels of anxiety and depression during pregnancy and the postpartum period with meeting the WHO recommendation of 6 months' exclusive breastfeeding. In addition, the extent to which these associations are independent is addressed.

What This Study Adds

- Insight into associations of anxiety and depression during and after pregnancy with meeting the WHO recommendation of 6 months' exclusive breastfeeding.
- An exploration of the relation between personality traits and breastfeeding continuation.

METHODS

Sample

This study was carried out as a secondary data analysis using measurements from the Pregnancy,

Anxiety and Depression (PAD) study.[29] This population-based prospective cohort study was designed to investigate symptoms of and risk factors for antenatal and postpartum anxiety and depression. All pregnant women in their first trimester of pregnancy visiting a total of 109 collaborating primary obstetric care centers and 9 hospitals in the Netherlands were invited to participate. Unfortunately, because of logistic factors, we could not ascertain how many women had been invited to the study and, of these, how many agreed to participate. However, given the number of participating centers and the number of women participating in our study, we had reason to suspect that the response rate was considerably lower than expected. Therefore, a survey was conducted among participating midwives and gynecologists to probe inclusion strategies. The results indicated that time constraints were mostly deemed responsible and that they had not specifically invited women they suspected to have risk factors, psychopathology, or other conditions. Therefore, we have no reason to believe that responders and nonresponders differed in any considerable way with respect to characteristics relevant to the research questions addressed in the present study. Written informed consent was obtained from each participant. After the baseline questionnaires at the end of the first trimester, follow-up assessments took place at the end of the second and third trimesters, as well as 6 weeks and 3 and 6 months postpartum.

The PAD study was approved by the medical ethical review board of the University Medical Centre Groningen (METc2009.235, 13-10-2009).

Measurements

Demographic variables and pregnancy-related variables used in the present study were assessed using online questionnaires and included age, parity, relationship status, and a composite measure of SES. This measure was based on the Leidsche Rijn study and was calculated by equally weighing and subsequently averaging 3 aspects of SES: educational level, occupation (yes/no), and family annual gross income.[30] Educational level was defined as the highest completed education, divided into 3 categories: low (elementary and lower tracts of secondary education), intermediate (higher tracts of secondary education and intermediate vocational education), and high (higher vocational education and university). Family annual gross income was divided into low (€0-€30,999/US $0-$36,199), modal (€31,000-€59,999/US $36,200-$69,999), and high (€60,000/US $70,000 or more).

Personality traits were assessed at baseline using the NEO Five Factor Inventory (NEO-FFI).[31,32] The NEO-FFI is a shortened version of the NEO-Personality Inventory-Revised, consists of 60 items, and covers the "big five" of personality

(agreeableness, conscientiousness, extraversion, neuroticism, and openness). Responses are provided on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The items cover 5 subscales, each with 6 facets: agreeableness (vs antagonism; trust, straightforwardness, altruism, compliance, modesty, tender mindedness); conscientiousness (vs lack of direction; competence, order, dutifulness, achievement striving, self-discipline, deliberation); extraversion (vs introversion; warmth, gregariousness, assertiveness, activity, excitement seeking, positive emotion); neuroticism (vs emotional stability; anxiety, hostility, depression, self, consciousness, impulsiveness, vulnerability to stress); and openness (vs closedness; fantasy, aesthetics, feelings, actions, ideas, values).[31,32]

Symptom levels of anxiety and depression were measured each trimester (baseline, 24 weeks' gestational age [GA], and 36 weeks GA) as well as 6 weeks and 3 and 6 months postpartum. The Spielberger[33] State-Trait Anxiety Inventory (STAI) was used to assess symptom levels of anxiety. We used the 6-item short form to measure state anxiety, which produces scores similar to those obtained using the full form. The 10-item Edinburgh Postnatal Depression Scale (EPDS) was used to measure depression symptom levels.[34] The versions of both the STAI and the EPDS we used have shown to be valid during and after pregnancy.[33-35]

Breastfeeding status, that is, meeting the WHO recommendation of providing 6 months' exclusive breastfeeding, was assessed using an online questionnaire at 6 months postpartum. Exclusive breastfeeding is defined as the infant receiving only (expressed) human milk and, if necessary, drops and syrups such as vitamins, minerals, and medicines.[36] Obstetric outcomes were obtained from the birth records of the gynecologists and midwifes.

Multiple Imputation of Missing Data

To avoid risk of bias and loss of statistical power in complete case analyses, missing data were imputed. Multiple imputation is a widely known statistical technique for analyzing incomplete data sets.[37] We used multiple imputation by chained equations (MICE) under the assumption that data were missing at random (MAR) or completely at random (MCAR).[37] Instead of filling in a single value for each missing value, Rubin's[38] multiple imputation procedure replaces each missing value with a set of plausible values that represent the uncertainty about the right value to impute. Twenty data sets were imputed (created using statistical software) and combined according to the so-called Rubin's[38] rules. The percentage of missing data was approximately 32 (range = 8%; age = 29%; relationship status). The missing data mechanism (ie, assessing whether data were missing at random) was studied for each

of the variables, by predicting missingness of each of these variables from the other variables in the imputation model using multivariable logistic regression analyses. These analyses showed explained variances ranging from 4.3% to 41.2% (ie, Nagelkerke's R^2), implying that data were at least partly missing at random and, consequently, multiple imputation may have minimized bias and therefore improved the quality of our analyses. The final imputation model included those variables that predicted the value of the incomplete variable and whether the incomplete variable was missing or not. Because both the MAR and MCAR assumption are impossible to prove, we added complete case analyses as a sensitivity analysis.

Data Analyses

Descriptive statistics for demographic variables and pregnancy-related variables, personality traits, and symptom levels of anxiety and depression during pregnancy and postpartum were calculated according to meeting the WHO recommendation of providing 6 months' exclusive breastfeeding. Differences between both groups were tested using χ^2 and independent-samples t tests, where appropriate.

Hereafter, using multivariable linear regression analyses, we assessed the associations of anxiety and depression symptom levels both during pregnancy and postpartum as dependent variables, with all 5 personality traits as independent variables. First, we assessed the associations using all separate measurements of anxiety and depression successively, both during pregnancy and postpartum. To allow for valid comparison of the associations with anxiety and depression, we created Z-scores for the corresponding variables.

Furthermore, the associations between symptom levels of both anxiety and depression with meeting the WHO recommendation of 6 months' exclusive breastfeeding were assessed. To obtain results that can be considered dimension specific, we performed an additional analysis in which we adjusted the analysis of anxiety symptoms for the level of depressive symptoms by adding depression symptom level as independent variable, and vice versa.

Finally, using multivariable logistic regression, we assessed the associations of meeting the WHO recommendation as dependent variable, with all 5 personality traits as independent variables. Subsequently, to assess to what extent the associations could be explained by psychopathology during and after pregnancy, we added the average symptom levels of anxiety and depression during pregnancy and postpartum as independent variables and assessed to which extent the associations of personality attenuated. All analyses were repeated including potential confounders: age, relationship status, parity, and SES.

Multiple imputation and all analyses were performed with SPSS 22 (IBM, Armonk, New York). The level of statistical significance was conventionally set at .05, 2-sided.

RESULTS

Data used for the present study were collected from May 2010 to May 2015. By the end of that period, 5784 women had consented to participate in the study and had completed baseline assessments. Of these, 2927 women completed breastfeeding assessments 6 months postpartum (response rate 50.6%). Nonresponders did not significantly differ from responders on relationship status, occupational status, and postpartum measurements of anxiety and depression symptom levels. However, nonresponders were marginally but significantly younger (30 vs 31 years, $P < .04$), had lower SES ($P < .01$), and experienced more symptoms of anxiety and depression during pregnancy ($P < .02$).

Of the study population comprising 2927 women, 447 women (15.3%) were classified as having met the WHO recommendation of providing 6 months' exclusive breastfeeding. As shown in Table 1, the majority (n = 2892; 98.8%) had a relationship, were multiparous (n = 1645; 56.2%), and had a high SES (n = 1997; 68.2%), irrespective of meeting the WHO recommendation. Women who met the WHO recommendation were on average half a year older ($P = .018$) than those who did not.

Results show that women who did not meet the WHO recommendation experienced similar anxiety symptom levels during pregnancy and postpartum as women who did meet the recommendation. However, women who did not meet the WHO recommendation had statistically significantly higher depression symptom levels during pregnancy ($P = .035$) than women who did meet the recommendation but not postpartum. Furthermore, women who met the WHO recommendation showed a higher score on the agreeableness domain of the NEO-FFI ($P = .004$) and on the domain of openness ($P < .001$) than women who did not meet the WHO recommendation. No statistically significant differences were found between both groups on the remaining personality traits (conscientiousness, extraversion, and neuroticism). Results were similar for all measurements (first and third trimesters, and 6 months postpartum).

As can be seen in Table 2, the personality traits of agreeableness and extraversion were negatively associated with anxiety symptom levels whereas the personality traits of neuroticism and openness were positively associated with anxiety symptom levels, both during pregnancy and postpartum ($P < .05$). Comparable associations were found with symptom levels of depression, except for the association of

personality trait of agreeableness with depression, which was not statistically significant, both during pregnancy and postpartum.

As shown in Table 3, anxiety symptom levels during pregnancy and postpartum, as well as depression symptom levels postpartum, were not statistically significantly associated with meeting the WHO recommendation. Depression symptom levels during pregnancy were statistically significantly associated with meeting the WHO recommendation (OR = 0.96, $P = .036$); however, after adjustment for symptom levels of anxiety, the small effect diminished. Furthermore, the personality traits of agreeableness (OR = 1.18, $P = .006$) and openness (OR = 1.31, $P < .001$) were positively associated with meeting the WHO recommendation whereas extraversion (OR = 0.83, $P = .005$) and neuroticism (OR = 0.87, $P = .031$) were negatively associated. After adjustment for symptom levels of anxiety and depression, the negative association of neuroticism diminished but the effects of agreeableness, openness, and extraversion remained stable ($P < .01$).

When repeating the analyses including all confounders (maternal age, relationship status, parity, and SES), similar results were found. Results of complete case analyses were not notably different from imputed data analyses.

DISCUSSION

Main Findings
In this large, population-based, prospective cohort study, we found associations of the personality traits of agreeableness, extraversion, and openness with meeting the WHO recommendation of 6 months' exclusive breastfeeding. In contrast to earlier findings,[21,22] depression symptom levels after pregnancy, as well as anxiety symptom levels during and after pregnancy, were not associated with meeting this recommendation. Furthermore, while depression levels during pregnancy were associated with meeting this recommendation, adjustment for depression and anxiety symptom levels did not significantly alter the associations of the 3 personality traits.

Therefore, mediation of this association may be largely caused by a direct effect of the agreeableness, extraversion, and openness personality traits on continuation of breastfeeding. To target and design interventions aimed at exclusive breastfeeding continuation, it is essential that these personality traits are acknowledged as important determinants.

Interpretation
The recent review conducted by De Jager et al[24] concluded that there is very limited research examining the role of symptoms of anxiety and depression on exclusive breastfeeding to 6 months' duration. In our study, we found significant lower symptom

TABLE 1. Demographic Characteristics of the Study Population (n = 2927) According to Meeting the WHO Recommendation of Providing 6 Months' Exclusive Breastfeeding[a]				
	Total Sample (N = 2927)	**Meeting WHO Recommendation (n = 447)**	**Not Meeting WHO Recommendation (n = 2480)**	***P***
Age, mean (min-max), y	30.7 (17-45)	31.0 (17-45)	30.5 (21-41)	**.018**
In a relationship, n (%)	2892 (98.8)	443 (99.1)	2449 (98.8)	.100
Primiparae, n (%)	1282 (43.8)	174 (38.9)	1108 (44.7)	.062
Birth weight, mean (SD), g	3518 (554)	3523 (542)	3514 (562)	.833
Gestational age, mean (SD), wk	39.6 (1.98)	39.7 (1.69)	39.6 (2.04)	.558
SES, n (%)				.206
Low	184 (6.3)	23 (5.1)	161 (6.5)	
Medium	746 (25.5)	108 (24.2)	638 (25.7)	
High	1997 (68.2)	316 (70.7)	1681 (67.8)	
Personality traits, mean (SD)				
Agreeableness	5.85 (1.63)	5.90 (1.63)	5.69 (1.63)	**.004**
Conscientiousness	5.48 (1.79)	5.46 (1.86)	5.50 (1.74)	.601
Extraversion	5.58 (1.63)	5.51 (1.65)	5.60 (1.61)	.221
Neuroticism	3.83 (1.69)	3.77 (1.69)	3.86 (1.69)	.267
Openness	5.54 (1.68)	5.76 (1.70)	5.40 (1.67)	**<.001**
Average anxiety level, mean (SD)				
During pregnancy	32.94 (8.13)	31.87 (6.91)	33.05 (8.25)	.082
Baseline	32.39 (8.73)	31.05 (7.40)	32.53 (8.86)	**.049**
24 wk' GA	32.88 (9.36)	31.55 (8.53)	33.03 (9.41)	.646
36 wk' GA	33.30 (9.16)	33.01 (7.95)	33.33 (9.28)	.066
Postpartum	32.30 (9.16)	31.82 (8.61)	32.35 (9.22)	.152
6 wk postpartum	32.00 (9.73)	31.16 (8.20)	32.09 (9.87)	.057
3 mo postpartum	31.76 (9.94)	30.28 (8.68)	31.92 (10.06)	.061
6 mo postpartum	32.47 (10.43)	32.70 (9.91)	32.45 (10.49)	.381
Average depression level, mean (SD)				
During pregnancy	4.76 (3.34)	4.32 (2.84)	4.81 (3.39)	**.035**
Baseline	4.39 (3.61)	3.86 (3.04)	4.45 (3.67)	**.014**
24 wk' GA	4.93 (3.65)	4.41 (3.27)	4.98 (3.69)	**.028**
36 wk' GA	4.84 (3.62)	4.51 (3.21)	4.88 (3.66)	.148
Postpartum	4.80 (3.73)	4.79 (3.48)	4.80 (3.75)	.418
6 wk postpartum	4.83 (3.90)	4.77 (3.30)	4.84 (3.96)	.081
3 mo postpartum	4.52 (3.89)	4.21 (3.71)	4.56 (3.91)	.253
6 mo postpartum	4.77 (4.18)	4.91 (4.12)	4.75 (4.18)	.710

Abbreviations: EPDS, Edinburgh Postnatal Depression Scale; GA, gestational age; NEO-FFI, NEO Five Factor Inventory; SD, standard deviation; SES, socioeconomic status; STAI, Spielberger State-Trait Anxiety Inventory; WHO, World Health Organization.

[a]SES consisted of a composite measure in tertiles based on equal weighing of educational level, occupation (yes/no), and family annual gross income. Personality traits according to NEO-FFI (min-max = 1-9). Symptom levels of anxiety and depression were assessed using STAI (min-max = 20-80) and EPDS questionnaires (min-max = 0-30) during pregnancy (baseline, 24 weeks' GA, and 36 weeks' GA) and postpartum (6 weeks, 3 months, and 6 months postpartum) and were subsequently averaged. Bold numbers are $P < .05$.

levels of depression during pregnancy in women who met the WHO recommendation than in women who did not. However, the observed difference between the groups was subtle and the association was weak. In addition, because the association lost its statistical significance after correction for anxiety symptom levels, the association of depression should not be considered as independent of anxiety.

In contrast, the results of our analyses on personality traits showed only strong and significant effects of the agreeableness, extraversion, and openness traits, suggesting that these are directly associated with meeting the WHO recommendation, independently from symptoms of anxiety and depression.

Earlier studies on the association of personality traits with breastfeeding initiation in the United States (n = 87) and with breastfeeding duration in the United Kingdom (n = 602) showed associations between high conscientiousness, high extraversion, low neuroticism, and high openness with breastfeeding.[22,23] In our study, we found that breastfeeding initiation and duration are altered not only by personality but also by reaching the WHO recommendation of providing 6 months' exclusive breastfeeding.

TABLE 2. Associations Between Personality Traits and Symptoms of Anxiety and Depression (n = 2927)[a]

	Associations With Symptom Levels During Pregnancy	
	Anxiety	**Depression**
Personality traits		
Agreeableness	−**0.057** (−0.075; −0.038), $P < .001$	−0.014 (−0.038; 0.009), $P = .232$
Conscientiousness	−0.009 (−0.027; 0.009), $P = .333$	−0.012 (−0.036; 0.012), $P = .336$
Extraversion	−**0.051** (−0.073; −0.029), $P < .001$	−**0.420** (−0.072; −0.013), $P = .005$
Neuroticism	**0.303** (0.282; 0.324), $P < .001$	**0.360** (0.331; 0.389), $P < .001$
Openness	**0.033** (0.015; 0.051), $P < .001$	**0.047** (0.023; 0.071), $P < .001$
	Associations With Symptom Levels Postpartum	
	Anxiety	**Depression**
Personality traits		
Agreeableness	−**0.026** (−0.045; −0.006), $P = .011$	−0.012 (−0.035; 0.012), $P = .333$
Conscientiousness	−0.008 (−0.027; 0.011), $P = .408$	−0.009 (−0.033; 0.015), $P = .469$
Extraversion	−**0.056** (−0.078; −0.034), $P < .001$	−**0.044** (−0.073; −0.015), $P = .003$
Neuroticism	**0.284** (0.261; 0.306), $P < .001$	**0.368** (0.339; 0.397), $P < .001$
Openness	**0.029** (0.011; 0.048), $P = .002$	**0.044** (0.020; 0.067), $P < .001$

Abbreviations: CI, confidence interval; EPDS, Edinburgh Postnatal Depression Scale; NEO-FFI, NEO Five Factor Inventory; STAI, Spielberger State-Trait Anxiety Inventory.

[a]Multivariable linear regression analyses, values are B (95% CI), P value. Symptom levels of anxiety and depression were assessed using STAI and EPDS questionnaires during pregnancy and postpartum and were subsequently averaged and standardized by calculating Z-scores. Personality traits according to NEO-FFI. B is the standardized coefficient from linear regression. Bold numbers are $P < .05$.

After adjustment for symptoms of anxiety and depression, we found only a significant association of high openness (ORs = 1.304-1.318) with reaching the WHO recommendation of providing 6 months' exclusive breastfeeding. Our findings suggest that women who succeed in providing breastfeeding for 6 months might be more open to new experiences and appear to be more outgoing, seeking novelty, and variety.

Furthermore, earlier studies on different subjects suggested that openness influences the processes of receiving information and decision making. Individuals who showed high scores in openness found it easier to accept information and were more prone to choose the options for protection than people with other dominant personality traits.[39,40] Thus, women with high levels of openness may accept information about breastfeeding more easily and may choose for protection of their infant compared with women with lower levels of openness. This may be an explanation why women with higher scales of openness are more likely to meet the WHO recommendation.

Our findings that personality traits are associated with psychopathology are in line with earlier research conducted both in pregnant women and in the general population.[25-28] In our sample, low agreeableness, low extraversion, high neuroticism, and high openness were associated with symptoms of both anxiety and depression during pregnancy and postpartum. Earlier research was somewhat inconclusive about which trait is associated with psychopathology. Two studies among pregnant women in Sweden (n = 1037) and China (n = 292) showed that low agreeableness, low consciousness, and high neuroticism seem to be associated with symptoms of depression.[27,28] No associations were seen with extraversion and openness, which may be explained by their smaller sample sizes. In a large meta-analysis in the general population, low conscientiousness, low extraversion, and high neuroticism were associated with major depressive disorder and general anxiety disorder.[25] No associations with agreeableness and openness were observed, possibly because psychiatric disorders were used as outcome measures. In contrast, in our study, we used symptom-level scores to include differences in subclinical symptoms. These symptom-level scores were also used in a recent meta-analysis in which the associations between personality traits of the 5-factor model and risk of depressive symptoms were assessed in the general population.[26] Our results correspond to that study, suggesting that the associations between personality traits with both anxiety and depression symptoms are similar in pregnant and nonpregnant women.

TABLE 3. Associations Between Personality Traits and Meeting the WHO Recommendation of Providing 6 Months' Exclusive Breastfeeding (n = 2927)[a]			
	Unadjusted	**Adjusted for Symptoms of Anxiety[b]**	**Adjusted for Symptoms of Depression[b]**
Anxiety level			
During pregnancy	0.99 (0.97; 1.00), *P* = .082		
Postpartum	0.99 (0.98; 1.00), *P* = .153		
Depression level			
During pregnancy	**0.96** (0.92; 0.99), *P* = .036	0.96 (0.91; 1.02), *P* = .217	
Postpartum	0.99 (0.95; 1.02), *P* = .418		
Personality traits			
Agreeableness	**1.18** (1.05; 1.32), *P* = .006	**1.17** (1.04; 1.31), *P* = .009	**1.18** (1.05; 1.32), *P* = .006
Conscientiousness	0.96 (0.85; 1.07), *P* = .438		
Extraversion	**0.83** (0.72; 0.94), *P* = .005	**0.82** (0.72; 0.93), *P* = .003	**0.82** (0.72; 0.93), *P* = .003
Neuroticism	**0.87** (0.76; 0.99), *P* = .031	0.93 (0.80; 1.08), *P* = .334	0.95 (0.82; 1.10), *P* = .457
Openness	**1.31** (1.18; 1.45), *P* < .001	**1.32** (1.18; 1.46), *P* < .001	**1.32** (1.19; 1.47), *P* < .001

Abbreviations: CI, confidence interval; EPDS, Edinburgh Postnatal Depression Scale; NEO-FFI, NEO Five Factor Inventory; OR, odds ratio; STAI, Spielberger State-Trait Anxiety Inventory.
[a]Multivariable logistic regression analyses, values are OR (95% CI). Symptom levels of anxiety and depression were assessed using STAI and EPDS questionnaires during pregnancy and postpartum. Personality traits according to NEO-FFI. Bold numbers are *P* < .05.
[b]Averaged symptom levels of anxiety and depression during pregnancy and postpartum.

Initiating and continuing breastfeeding has significant health benefits for the infant,[1-7] as well as for the mother.[8-10] Promoting the initiation and continuation of breastfeeding and providing adequate support when a breastfeeding woman experiences problems are therefore important. There are numerous interventions concerning breastfeeding, which may help women initiate breastfeeding and prevent women from stopping breastfeeding when they encounter problems; however, their effects are rather small.[41,42] Targeting enhancing openness and treating depression in the antenatal and/or postnatal periods, for instance by reinforcing new experiences, role models that emphasize that breastfeeding is a new experience that might be initially a hassle whereas later just becomes a normal daily routine, might improve initiation and continuation of breastfeeding. Earlier research demonstrated that subtle change in personality traits may be effected.[43,44] More research is needed to assess whether tailored personality-specific interventions to improve breastfeeding may be more effective. In particular, further research is needed on mothers of hospitalized patients, who might face additional challenges to establish and maintain a milk supply and even more challenges when they try to directly breastfeed. Further research is needed in this specific group of patients.

Strengths and Limitations

A few limitations of this study need to be considered. First, measurements of symptoms of anxiety and depression were based on self-report questionnaires.

Summary of Recommendations for Practice and Research	
What we know:	• Exclusive breastfeeding during the first 6 months of live is associated with several health benefits for the mother and the child. • The WHO recommends that all infants should be exclusively breastfed for the first 6 months of life. • Personality as well as anxiety and depression are recognized as predictors for breastfeeding initiation, but evidence of a relation of these factors with 6 months' exclusive breastfeeding is limited.
What needs to be studied:	• Determinants of continuation of breastfeeding to meet the WHO recommendation of 6 months' exclusive breastfeeding. • The associations of symptoms of anxiety and depression during and after pregnancy with meeting this WHO recommendation. • The impact of personality traits on 6 months' exclusive breastfeeding.
What we can do today:	• Pay attention to anxiety and depression symptoms as well as personality traits in both pregnant and breastfeeding women. • To tailor interventions, patient-centered care may take personality into account to optimize breastfeeding behavior. • Research is needed to assess whether tailored personality-specific interventions may be more effective to promote breastfeeding continuation.

No diagnosis could be made using these questionnaires, although both STAI and EPDS questionnaires are commonly used in identifying symptoms of psychopathology.[33-35]

Second, of the 5784 women who had completed baseline assessments, only 2927 women (50.6%) completed breastfeeding assessments 6 months postpartum. Nonresponders were younger, had a lower SES, and experienced more symptoms of anxiety and depression during pregnancy but did not significantly differ from responders on relationship status, occupational status, and postpartum measurements of anxiety and depression. In addition, van Loon et al[45] showed that nonresponse may not cause bias in examined associations. Nevertheless, this follow-up rate may decrease generalizability.

These limitations are potentially offset by strengths of this study. Our sample size was considerable and as far as we know one of the largest in this field. The inclusion of this large, population-based, prospective sample of women living in a large part of the Netherlands, in both rural and urban areas, may have enhanced the study's precision and generalizability.

In addition, in contrast to earlier studies, in the present study, we adjusted our analyses on the associations of personality traits with meeting the WHO recommendation for anxiety and depression symptom levels.

CONCLUSION

We found evidence that the personality traits of agreeableness, extraversion, and openness are associated not only with breastfeeding initiation but also with meeting the WHO recommendation of providing 6 months' exclusive breastfeeding. In contrast, anxiety and depression symptom levels both during and after pregnancy were not associated with meeting the WHO recommendation on breastfeeding. Patient-centered care should take personality into account in an effort to tailor interventions to optimize breastfeeding behavior.

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