

REGULAR ARTICLE

Mental health monitoring in parents after very preterm birth

Eline Vriend¹  | Aleid Leemhuis²  | Monique Flierman¹  | Petra van Schie¹  |
Frans Nollet³  | Martine Jeukens-Visser¹ 

¹Department of Rehabilitation Medicine, Amsterdam Reproduction and Development, Amsterdam UMC, University of Amsterdam, Amsterdam, the Netherlands

²Department of Neonatology, Amsterdam Reproduction and Development, Emma Children's Hospital, Amsterdam UMC, University of Amsterdam, Amsterdam, the Netherlands

³Department of Rehabilitation Medicine, Amsterdam Movement Sciences, Amsterdam UMC, University of Amsterdam, Amsterdam, the Netherlands

Correspondence

Martine Jeukens-Visser, Department of Rehabilitation Medicine, Amsterdam UMC, University of Amsterdam, Meibergdreef 9, 1105 AZ Amsterdam, the Netherlands.
Email: m.jeukens-visser@amsterdamumc.nl

Abstract

Aim: To evaluate parental mental health monitoring during follow-up care for very preterm (VPT) infants, describe symptoms of anxiety and depression and risk factors for mothers and fathers at 1 and 12 months of corrected age.

Methods: Parents completed the Hospital Anxiety and Depression Scale (HADS). Psychological symptoms and risk factors were analysed within and between mothers and fathers.

Results: In 4 years, the monitoring reached 1260 (48%) families. Of these, 693 mothers and 340 fathers (300 couples) completed the HADS twice. At 1 month, 22% and 15% of the mothers and 10% and 9% of the fathers, respectively, reported elevated symptoms of anxiety and depression. At 12 months, these rates were significantly reduced to 14% and 9% for mothers and 5% and 4% for fathers respectively. Within couples, anxiety and depression were positively associated. At 12 months, in 20% of the couples, one or both parents reported elevated symptoms. Risk factors were length of hospital stay, migration background, educational level and employment status.

Conclusion: The mental health of parents of VPT infants improved, but elevated symptoms were still observed in 17% of included families after one year. Acknowledging and remediating parental mental health remain essential during follow-up care.

KEYWORDS

follow-up care, parental anxiety and depression, post-discharge programme, very preterm children

1 | INTRODUCTION

Very preterm (VPT) infants spend the first weeks of their life in the neonatal intensive care unit (NICU). Parents are confronted with neonatal complications, possibly causing long-term adverse effects,

and fear of losing their infant. Feelings of guilt and uncertainty about their child's prognosis may continue after discharge. As a consequence, parents of VPT infants are at greater risk for mental health problems, such as anxiety and depression.¹ Feelings of anxiety or depression are a normal response to the suddenly disrupted pregnancy,

Abbreviations: BW, birth weight; FT, full-term; GA, gestational age; HADS, Hospital Anxiety and Depression Scale; LOS, length of hospital stay; NICU, neonatal intensive care unit; VPT, very preterm.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2021 The Authors. *Acta Paediatrica* published by John Wiley & Sons Ltd on behalf of Foundation Acta Paediatrica

but if these persist, they can negatively affect the parent-child interaction, which in turn can affect the development of the VPT infant.²

Parents of VPT infants continue to report higher levels of mental health problems compared with parents of full-term (FT) infants in the first months and years after birth.^{1,3,4} Peak levels of mental health problems are observed during the NICU stay with a decrease during the infant's first year.^{1,4-11} The severity of mental health problems in mothers of VPT infants seems to depend on sociodemographic data, such as marital status and educational level, and on infant characteristics, such as birth weight, gestational age and medical complications.^{4-6,12,13} From the limited studies available for fathers of VPT infants, it seemed that depressive symptoms were associated with sociodemographic factors, as marital status and financial situation.^{7,13} The studies that included fathers reported that mothers had higher or similar stress levels compared with fathers during the NICU period and after discharge.^{10,14,15} An association between maternal and paternal mental health symptoms in parents of VPT infants is described.³

Supporting parental mental health, both for the parents themselves as well as for the infant's developmental chances, is now recommended as part of follow-up care.¹⁶ Although reports on parental mental health using routinely collected data are scarce, for early identification and referral for treatment, structured monitoring of parental mental health is recommended in routine care after VPT birth.¹⁷ In the Netherlands, in collaboration with the hospital-based follow-up care, a nationwide responsive parenting programme after discharge home for VPT infants¹⁸ and their parents is part of routine care from 2014 onwards, with currently 76% coverage of all Dutch VPT infants born. This so-called TOP (Transmural developmental support for VPT infants and their parents) programme is available for all VPT infants born earlier than 32 weeks of gestation and/or with a birthweight lower than 1500 grams and their parents during the first year. Within the setting of the programme, parents are asked to fill out the Hospital Anxiety and Depression Scale (HADS) twice, at 1 and 12 months of corrected age (CA).

In the current study, we analysed the routinely collected HADS questionnaires completed by mothers and fathers. The first aim was to evaluate the reach of the monitoring per family and the second to evaluate the presence of anxiety and depression symptoms in mothers and fathers over a period from 1 to 12 months CA of their VPT infant. The third aim was to describe differences in mental health between mothers and fathers in the subset of couples. The last aim was to explore which parent and child characteristics were associated with symptoms of anxiety or depression in the clinical range.

2 | METHODS

2.1 | Routine care for VPT infants and their parents in the Netherlands

In the Netherlands, all VPT infants have regular follow-up visits in both regional hospitals and well-baby clinics during the first year. Moreover, in those born before 30 weeks GA there is an eight-year

Key notes

- Parental mental health monitoring in routine care for VPT infants succeeds in almost 50% of the families.
- Symptoms of anxiety and depression were significantly associated within couples, although more often reported by mothers, and symptoms decreased in both parents during the first year.
- Social variables increased the risk for elevated symptoms of anxiety and depression in both parents, while longer length of hospital stay only increased the risk for mothers.

systematic and standardised follow-up programme carried out by the nine national NICU centres. In addition, all VPT infants born earlier than 32 weeks of gestation and/or with a birthweight lower than 1500 grams are eligible to receive the preventive home-based TOP programme.¹⁸ This programme is carried out between discharge home and 12 months CA, by certified paediatric physical therapists. It includes 12 one-hour home visits and individualised parent reports after each home visit. The TOP interventionist uses a strength-based approach, helps the parents to observe and interpret their infant's behavioural cues and encourages the parents to provide adequate responsive reactions to enhance the infant's participation in interactions. Home visits are planned in consultation with parents, aiming to involve both parents as much as possible. There is an exchange of information on the infant's developmental progress between the TOP interventionist and the hospital-based paediatricians and medical doctors in the well-baby clinics if necessary for the care of the infant and its parents. For more detailed description of the TOP programme, see Jeukens-Visser et al.¹⁸ Psychological support by psychologists or social workers is common during hospital stay of the infant. After discharge, there is no national hospital-based protocol on how to support the psychological well-being of parents, but it is common practice that paediatricians include this topic in their history taking. Within the TOP program, psycho-education on experiences related to parenthood after a VPT birth is provided. Therefore, parents are screened for possible mental health problems and are asked to fill out the HADS questionnaire at 1 and 12 months CA. Results of the HADS are discussed with the parents, and involved professionals may aid parents by providing psycho-education or seek additional psychological support when indicated.

2.2 | Study sample

The parents with VPT infants that participated in the TOP programme between April 2014 and December 2018 and completed the HADS questionnaire formed the study sample. Data were only included if parents provided informed consent.

2.3 | Hospital Anxiety and Depression Scale

The HADS¹⁹ is a 14-item self-report questionnaire and consists of two 7-item subscales, measuring symptoms of anxiety and depression in the past week. Item scores range from 0 to 3, and scores on each subscale range from 0 to 21. Higher scores reflect more symptoms and a score of 8 or above on a subscale is suggestive of clinically significant anxious or depressive symptomatology (referred to as 'elevated symptoms'). The Dutch version of the HADS showed good to satisfactory reliability and validity in screening for anxiety and depression.²⁰ The HADS is a short and user-friendly questionnaire. In the current study, the Cronbach's alpha (α) was 0.81 at the infant's age of 1 and 12 months CA for the anxiety subscale. For the depression subscale, α was 0.80 at 1 month CA and 0.78 at 12 months CA.

2.4 | Procedures

The HADS questionnaire and some other questionnaires are included in the TOP programme. TOP interventionists have been trained in using the HADS. They provided verbal and written information about the questionnaire, the purpose and the importance of parental well-being for infant development. Before a home visit, the interventionist invited parents to fill in the HADS questionnaire in an online platform. They encourage both mothers and fathers to complete the HADS. During the upcoming visit, TOP interventionists discuss the outcome of the HADS with the parents. In addition, parents were asked to fill out a general questionnaire to collect sociodemographic data about their age, marital status, educational level, employment status, number of children and country of birth. The available child characteristics were gender, birth weight (BW), gestational age (GA), length of hospital stay until first discharge home (LOS) and multiple birth status. The Medical Ethical Committee of the Amsterdam University Medical Center waived the need for ethical approval and parents gave informed consent for use of these data for scientific research.

2.5 | Statistical analyses

Statistical analyses were performed using SPSS version 25.0. In case of double entries due to multiple births, only the first completed questionnaire was included in the analyses. Data were available of parents who completed the HADS at least on one time point. The reach of the mental health monitoring at 1 and 12 months was described in all parents who had completed the HADS at least once. Parents who completed the HADS at either 1 or 12 months were compared with parents who had completed the HADS at both time points on their HADS score using independent sample *t* tests or chi-square tests. Further analyses were performed on the study population with data on both time points.

To compare changes in anxiety and depression between 1 and 12 months, paired-sample *t* tests were performed on mean levels of anxiety and depression scores and McNemar tests were performed on rates of parents reporting elevated symptoms of anxiety and depression. Trends in reporting elevated symptoms of anxiety and depression levels over time were described.

Within couples, mean anxiety and depression scores as well as the rates of mothers and fathers reporting elevated symptoms at 1 and 12 months were compared using paired-sample *t* tests and McNemar tests. Pearson's correlation coefficient (*r*) was calculated for HADS mean scores at 1 and 12 months between mothers and fathers. As an indication of the strength of the difference in HADS scores between the two time points and between mothers and fathers, Cohen's *d* was used, with effect sizes up to 0.2 described as small, effect sizes around 0.5 described as moderate and effect sizes around 0.8 described as large.²¹

Multiple logistic regression analyses were performed to examine which child and parent characteristics were associated with elevated symptoms of anxiety or depression at 1 and 12 months, separately for mothers and fathers. Multivariable regression models were made based on an entry significance level of $p < 0.2$ in the univariable regression analyses. The analyses were performed with only those of the lowest birthweight and also with those of the longest length of hospital stay in case of multiples. If the Pearson correlation between variables was higher than 0.8, only one variable was included in the multivariable models, to prevent multicollinearity. Due to missing values on some sociodemographic data, final models were validated in the group with the most complete sociodemographic data.

3 | RESULTS

3.1 | Reach of psychological screening and sample characteristics

During the study period, parents from 2612 families were supported by the TOP programme in addition to regular follow-up visits. In 1260 families, at least one parent had completed the HADS at 1 month CA, indicating a reach of 48%. About 13% of these families did not give consent to use their data for scientific purposes. The flowchart (Figure 1) shows that 1225 mothers and 805 fathers completed the HADS at 1 and/or 12 months and provided informed consent. Exploratory analyses revealed no change over time between 2014 and 2018 in the percentage of parents completing the questionnaire. At 12 months, data of at least one of the parents were available for about 41% of the families supported by the TOP programme in the study period. The majority (83.1% of the mothers and 88.4% of the fathers) of the parents who only completed the HADS at 1 month did not drop out of the TOP programme and received twelve home visits.

The study sample of parents who completed the HADS at 1 and 12 months consisted of 693 mothers and 340 fathers (300 couples). The sociodemographic characteristics of the parents and their children are shown in Table 1. The majority of the parents were Dutch, married or living together and had a high educational level. Rates of

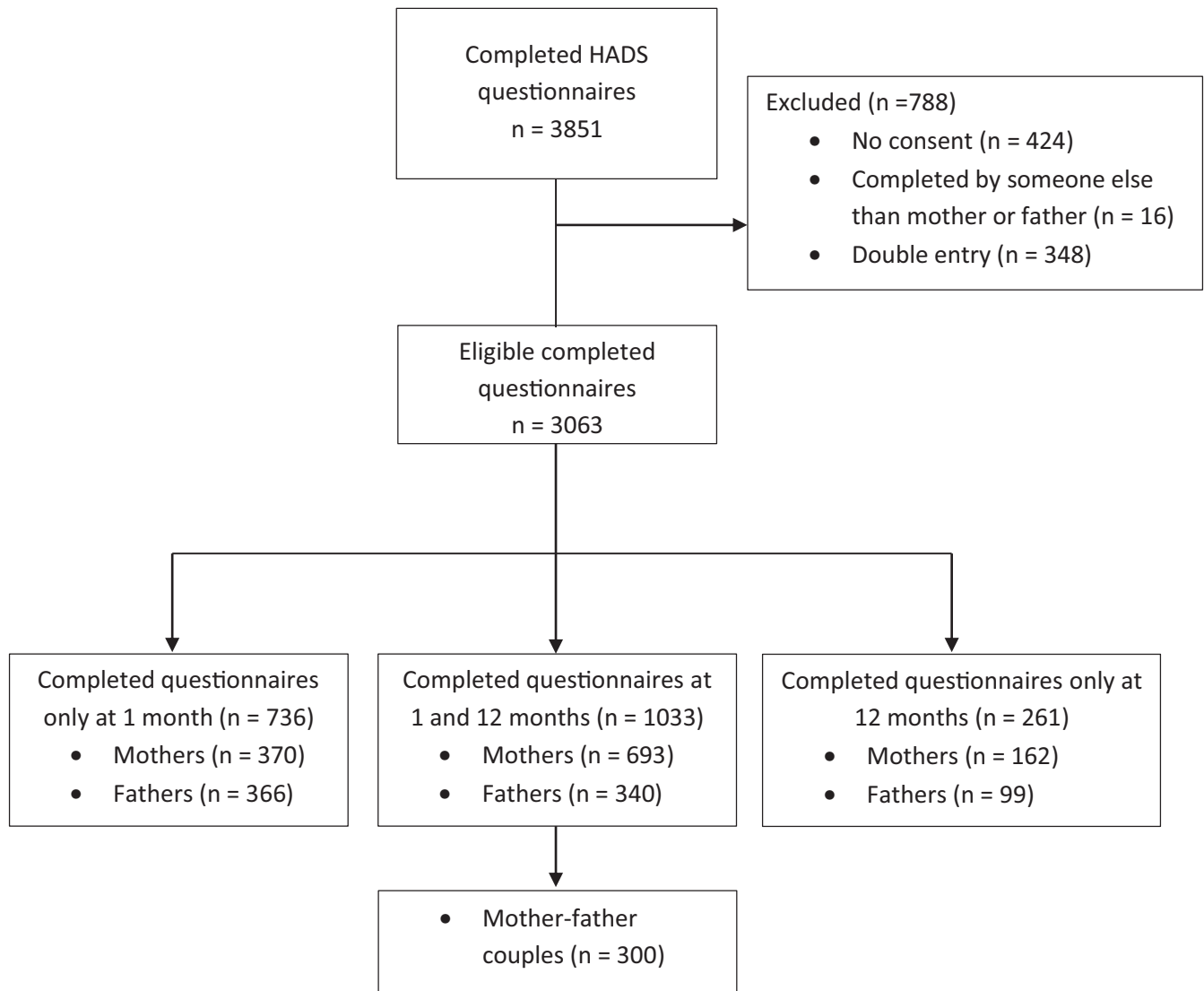


FIGURE 1 Study flowchart of the included questionnaires by mothers and fathers at 1 and 12 months of corrected age. HADS, Hospital Anxiety and Depression Scale

mothers with elevated symptoms of anxiety, but not for depression, were significantly higher for the mothers who completed the HADS only at 1 month (27.6% vs. 21.6%, $p = 0.03$) compared with mothers who completed the HADS at both time points. Also for mothers who only completed the HADS at 12 months ($n = 162$), significantly higher rates of mothers with elevated symptoms of anxiety (22.8% vs. 13.7%, $p = 0.004$) and depression (19.8% vs. 8.7%, $p < 0.001$) were found compared with mothers who completed the HADS at both times. No significant differences in elevated symptoms of anxiety and depression were found for fathers.

3.2 | Symptoms of anxiety and depression at 1 and 12 months CA

At 1 month, both mothers and fathers had significantly higher mean scores and higher rates reporting elevated symptoms of anxiety and depression than at 12 months (Table 2). The effect sizes for the

differences in HADS mean scores between 1 and 12 months were small to moderate for both mothers and fathers (Table 2).

3.3 | Trends in anxiety and depression over the first year

Trends in anxiety and depression over the first year were described as persistent, appearing, disappearing or no symptoms (Table 2). Taking symptoms of anxiety and depression together, 67% of the mothers and 82% of the fathers reported no elevated symptoms on both time points.

3.4 | Symptoms of anxiety and depression in couples

A subgroup of 300 couples both completed the HADS at two time points. Mothers reported significantly higher mean scores ($p < .001$)

	Mothers	Fathers
Parental characteristics	<i>N</i> = 693	<i>N</i> = 340
Age at childbirth—M (SD)	31.6 (4.5)	34.1 (5.1)
Born in the Netherlands, <i>n/n</i> ^a (%)	622/683 (91.1)	318/340 (93.5)
Educational level [*] — <i>n/n</i> ^a (%)		
Low	46/683 (6.7)	26/336 (7.7)
Middle	233/683 (34.1)	133/336 (39.6)
High	404/683 (59.2)	177/336 (52.7)
Paid employment— <i>n/n</i> ^a (%)	540/683 (79.1)	322/340 (94.7)
Parent of a multiple birth, <i>n/n</i> ^a (%)	110/693 (15.9)	52/340 (15.3)
Multiple in TOP programme	88/110 (80.0)	40/52 (76.9)
Twin	78 (88.6)	38 (95.0)
Triplet	10 (11.4)	2 (5.0)
Family status of two parents, <i>n/n</i> ^a (%)	646/677 (95.4)	338/340 (99.4)
First time parent, <i>n/n</i> ^a (%)	542/682 (79.5)	284/340 (83.7)
Child characteristics	<i>N</i> = 786	<i>N</i> = 382
Gender—boy, <i>n/n</i> ^a (%)	427/786 (54.3)	217/382 (56.8)
Birthweight, M (SD)	1284.8 (384.6)	1289.0 (388.3)
GA (weeks/days), M (SD)	29/3 (2/1)	29/3 (2/1)
Length of hospital stay (days), M (SD)	65.6 (30.1)	65.8 (29.4)

Abbreviations: GA, gestational age; *n*^a, the total number of available data for that variable; TOP, transmural developmental support for VPT infants and their parents.

*Low: no education/primary school—4 years after primary school, middle: 5–8 years after primary school, high: bachelor/master level.

than fathers at 1 and 12 months for anxiety and depression. Effect sizes were small to moderate at 1 month (anxiety: *d* = 0.46 and depression: *d* = 0.40) and at 12 months (anxiety: *d* = 0.38 and depression: *d* = 0.26). In addition, at 1 month, the rates of mothers reporting elevated symptoms of anxiety and depression were significantly higher than the rates in fathers. At 12 months, only the rate of mothers reporting elevated symptoms of anxiety was significantly higher than in fathers. For 79 couples (26.3%) at 1 month and for 49 (16.3%) at 12 months, one of the parents reported elevated symptoms of anxiety and/or depression. In 26 (8.7%) at 1 month and 10 (3.3%) at 12 months, both parents reported elevated symptoms of anxiety and/or depression. A significantly small-to-moderate positive correlation between mothers and fathers was found at 1 month (0.28 for anxiety and 0.37 for depression) and 12 months (0.30 for anxiety and 0.38 for depression).

3.5 | Risk factors for elevated symptoms at 1 and 12 months CA

The results of the univariable and multivariable logistic regression analyses for elevated symptoms of anxiety and depression at 1 and 12 months are shown in Tables 3 and 4. Gestational age (GA) and LOS (in hospital days) showed a Pearson correlation of 0.80. LOS was included in the regression analyses, as it combines gestational age and neonatal morbidity. In the final models for mothers, longer LOS (in days) and a migration background of the partner were associated with

TABLE 1 Sociodemographic characteristics of mothers and fathers and their children

an increased risk for elevated symptoms of anxiety and depression at 1 month. Each week in hospital increased the odds of elevated scores by 0.07. Although the increased risk of one day (β = 0.01; OR = 1.01) is minimal, the range in LOS varies between 16 and 226 days, resulting in a considerable effect. LOS was also associated with an increased risk for elevated symptoms of anxiety at 12 months and unemployment was associated with an increased risk for elevated symptoms of depression at 12 months for mothers. For fathers, unemployment, lower educational level and migration background were significantly associated with an increased risk for elevated symptoms of depression at 1 month. No significant risk factors were found for elevated symptoms of anxiety at 1 and 12 months and of depression at 12 months.

4 | DISCUSSION

This study showed that the mental health monitoring within the routine care setting of a nationwide parenting intervention reached almost 50% of the target families. For both mothers and fathers, rates with elevated symptoms decreased in the first year after discharge of their VPT born infant. No elevated symptoms in the first year were found for 67% of the mothers and 82% of the fathers. Within couples, mothers reported more symptoms than fathers, with small-to-moderate effect sizes. In addition, maternal and paternal symptoms of anxiety and depression were positively associated. LOS (as a combined proxy of GA at birth and illness severity), employment

TABLE 2 HADS mean scores and rates of mothers and fathers with elevated symptoms of anxiety and depression at 1 and 12 months CA

	Mothers (N = 693)				Fathers (N = 340)			
	1 month	12 months	p-Value 1 vs. 12 months	Cohen's D	1 month	12 months	p-Value 1 vs. 12 months	Cohen's D
HADS-A, M (SD)	5.0 (3.6)	3.9 (3.4)	<0.001	.33	3.5 (3.0)	2.7 (2.5)	<0.001	.34
HADS-A > cut-off (%)	21.6	13.7	<0.001	—	10.0	5.0	0.002	—
Trends HADS-A								
Persistent, (%)	—	6.9	—	—	—	3.2	—	—
Appearing, (%)		6.8				1.8		
Disappearing, (%)		14.7				6.8		
HADS-D, M (SD)	4.0 (3.4)	3.0 (2.9)	<0.001	.33	3.0 (3.0)	2.3 (2.3)	<0.001	.26
HADS-D > cut-off (%)	14.7	8.7	<0.001	—	8.8	4.1	0.007	—
Trends HADS-D								
Persistent, (%)		3.9				1.8		
Appearing, (%)		4.8				2.4		
Disappearing, (%)		10.8				7.1		
HADS-A and/or HADS-D (%)	25.8	16.5	<0.001	—	14.7	7.6	<0.001	—

Note: Cut-off = subscale score >8, referred to as 'elevated symptoms'.

Abbreviations: HADS, Hospital Anxiety and Depression Scale; HADS-A, HADS anxiety subscale; HADS-D, HADS depression subscale.

status, educational level and migration background were significant risk factors for elevated anxiety and depression symptoms.

Half of the parents did not complete the questionnaires. In addition, only completing the questionnaire once indicated higher scores compared with parents who completed the questionnaire twice in the current study. Unfortunately, we do not have information on reasons for not completing the questionnaires. However, our data showed that the majority of these parents did not drop out of the intervention programme. Therefore, we hypothesise that the interventionist may not have asked parents to fill out the HADS in case of severe symptoms, when parents were seeking for professional support, or when professional psychological support was already provided. More insight in these reasons may help to further tailor the strategies for both monitoring and supporting parents. Participation rates in other studies on parental mental health ranged from 35% to 66%.^{3,10,11,14} In a study on neurodevelopmental follow-up for extreme premature infants, the clinical follow-up rate was only 32%.²² Apparently, as in other studies on parental well-being,^{3,8} also in this routine care setting, collecting questionnaires on parental well-being are feasible in a selective group of the study population. It is therefore possible that our data are an underestimation of anxious and depressive symptomatology in parents, also because we and other studies^{5,13,23} found a positive association with social risk.

Compared with a longitudinal cohort of mothers of full-term infants in Belgium, who completed the HADS at 8 to 12 weeks after birth, our mothers of VPT infants had higher mean levels on the anxiety and depression subscales (by 1 point) at 1 month.^{24,25} This may confirm the negative impact of VPT birth on parental well-being in the first months, especially for mothers. It also implies that the majority of the parents

reached with our mental health screening did not experience severe symptoms of anxiety or depression. Neri et al.²⁶ found that depression rates were only significantly higher for the ELBW and not VLBW parents, compared with mothers and fathers of full-term infants. The latter may be related to the severity of illness. We found LOS (which combines prematurity and related morbidity) as risk factor for anxiety and depression. However, comparing these levels of symptomatology and rates between studies is difficult, because of differences in sample size, sample composition, instruments that were used and timing.

The decline in anxious and depressive symptomatology found in this study during the first year after a VPT birth is in line with other studies with VPT parents,^{5,9,10} indicating parental resilience one year after birth. The parents' ability to adapt to the traumatic experience and improvements in the infant's health status may promote the recovery of parental well-being.⁵ In addition, our data were collected within the context of a responsive parenting programme. The strategies of the TOP programme may add to parental confidence and in combination with screening, psycho-education and referral to additional psychological support, in collaboration with the follow-up care chain, could have contributed to improved parental well-being. Unfortunately, we cannot disentangle the effects of time and elements of regular follow-up care including the TOP programme in this cohort design. From randomised controlled trials of comparable parenting intervention programmes,^{27,28} there are indications that such programmes may aid parental mental health. For example, the ViBeS PLUS, aiming to support responsive parent-infant interactions and parental well-being, has been proven effective in reducing parental anxiety and depression.²⁸

Mothers reported higher levels of anxiety and depression than fathers, which is in line with the results of previous studies during

TABLE 3 Results of the logistic regression analyses for anxiety and depression in mothers at 1 and 12 months

	1 month			12 months		
	Anxiety		Depression	Anxiety		Depression
	Univariable	Multivariable	Univariable	Univariable	Multivariable	Multivariable
	$p < 0.2$	N = 635	$p < 0.2$	N = 636	N = 656	N = 683
Mothers	β	OR (95%CI)	β	OR (95%CI)	β	β
Multiple birth	-0.12		0.15		0.41*	-0.07
BW (grams)	-0.001***		-0.001**		0.00**	0.00
LOS (days)	0.01***	1.01 (1.006-1.02)***	0.01***	1.01 (1.004-1.02***)	0.01**	1.01 (1.00-1.01)**
Maternal age at childbirth	0.04*		0.04*		0.01	0.02
No paid employment						
Mother	0.23		0.46*		0.45*	0.82***
Educational level mother ^a						2.27 (1.29-4.02)***
Low	-0.27		-0.07		-0.39	-0.14
Medium	0.02		0.06		0.35*	0.45*
High (ref)	ref		ref		ref	ref
Educational level father ^a						
Low	0.05		-0.01		0.43	0.08
Medium	-0.27*		-0.003		0.08	-0.20
High (ref)	ref		ref		ref	ref
Migration background						
Mother	0.65**		0.78**		-0.05	-0.06
Father	0.71**	2.03 (1.1-3.6)**	1.08***	2.81 (1.51-5.22)***	0.40	0.87**
Previous children (≥ 1)	-0.45*		-0.12		-0.01	0.68**

Note: ** $p < 0.05$; *** $p < 0.01$; * $p < 0.2$.

Abbreviations: BW, birthweight; LOS, length of hospital stay.

^aLow: no education/primary school - 4 years after primary school, middle: 5-8 years after primary school, high: bachelor/master level.

TABLE 4 Results of the logistic regression analyses for anxiety and depression in fathers at 1 and 12 months

	1 month		Multivariable N = 336 OR (95%CI)	12 months	
	Anxiety ^a	Depression		Anxiety ^a	Depression ^a
	Univariable	Univariable		Univariable	Univariable
Fathers	β	β		β	β
Gender child	-0.30	-0.45		-0.16	-0.90*
Multiple birth	0.79*	0.58		0.18	0.84
LOS (days)	0.005	0.006		0.01*	-0.002
Marital status—single parent	2.22*	2.37*		NC	NC
No paid employment					
Mother	-0.02	0.93**		-0.52	0.23
Father	0.63	1.52***	4.0 (1.1–14.7)**	0.12	NC
Educational level father ^b					
Low	0.34	1.72***	5.79 (1.8–18.7)**	-0.17	-0.03
Medium	0.32	0.79*	2.45 (.99–6.0)*	0.30	-0.05
High (ref)	ref	ref	ref	ref	ref
Migration background					
Mother	NC	0.82*		0.34	1.11*
Father	-0.11	1.24**	4.02 (1.3–12.4)**	-0.11	0.94

Note: * $p < 0.2$; ** $p < 0.05$; *** $p < 0.01$.

Abbreviations: LOS, length of hospital stay; NC, value could not be calculated due to low frequencies.

^aNo significant risk factors found in the multivariable model.

^bLow: no education/primary school—4 years after primary school, middle: 5–8 years after primary school, high: bachelor/master level.

the NICU period after VPT birth¹¹ and after discharge.¹² However, the percentage of mothers scoring in the clinical range for depression was not significantly different from fathers at 12 months in this study. We also found a small-to-moderate positive association between mothers and fathers for anxiety and depressive symptoms, comparable with previous research in parents of preterm infants.^{3,26} The reciprocity of symptoms between mothers and fathers studied by Neri et al.²⁶ was found for the VLBW group, not for parents of full-term and parents of extremely low birth weight infants. However, their sample size was small. Another study showed that relationship distress is related to a higher risk of depression in both mothers and fathers of VPT infants.¹³ Although more research on the reciprocity between symptoms within couples is needed, our and previous findings emphasise the need for strategies to have attention for the couple relationship within follow-up care.

In our study, longer LOS was an important child characteristic associated with higher risks of elevated mental health symptoms in mothers, which is in line with previous research.^{6,11} Unemployment and a migration background showed to be associated with anxiety and depression in our sample group of mothers and fathers. For fathers with a low educational level, we also found an increased risk. Ethnicity,²³ financial stress and low-income status^{5,13} were found to be associated with an increased risk of depression in previous research on VPT parents. The reciprocity between risk factors, preterm birth and parental mental health is complex; adverse circumstances may already increase the risk of anxiety or depression before the

preterm birth of their child. No risk factors were found for anxiety at 1 month and 12 months and depression at 12 months for fathers. This may also be due to the relatively small group of fathers reporting elevated symptoms or the relative homogeneity of the sample.

The decline in symptoms implicate that screening with questionnaires may aid support of parental mental health. However, half of the parents did not complete the questionnaire, for unknown reasons. We would like to gain insight in these reasons and explore what is needed to reach those parents. Therefore, our findings also emphasise the need for other strategies than screening questionnaires to reach those parents, such as discussing parental mental health during the intervention session at the homes. This needs to be done in the chain of care, by professionals involved in follow-up care after VPT birth. Parental mental health is included as important topic in the annual repeat courses that are mandatory for all certified TOP interventionists. Furthermore, our study showed that mothers more often respond to questionnaires than fathers in routine care. Other studies showed an increased risk for mental health problems after VPT birth for fathers,^{8,10} and the mental health of fathers influences the development of the child.^{2,29} Therefore, we recommend engaging the fathers more in follow-up care after VPT birth. For example by strengthening the core strategy of the TOP programme: providing psycho-education. Especially information about the impact of VPT birth on fathers and about the importance of their well-being for infant development would be helpful. For the follow-up care after year one, it is of importance that almost 20% of the mothers

and 8% of the fathers still reported elevated symptoms of anxiety and/or depression. Therefore, we also advocate for the recommendation by others^{14,17} to continue mental health monitoring for those parents, for example at later follow-up moments in order to facilitate additional psychological support when indicated.

The strengths of this cohort study are its large sample size, especially a large sample size of fathers and couples, and the innovative setting within the routine follow-up care of the TOP programme. Limitations are the absence of information on those who did not fill out the questionnaires and the absence of information on parental referrals to additional psychological support. Also, some important predictive factors were missing, as the study did not take into account the history of anxiety or depression before or during pregnancy, which may increase the risk for preterm birth.³⁰ We also had no access to neonatal morbidities, but only to LOS. This may explain the limited predictive value of the current models. For the future, we aim to improve the monitoring of parental well-being, especially in the higher social risk group, by strengthening and amplifying current strategies in follow-up care together with the paediatricians and other professionals taking care of VPT infants and their families.

5 | CONCLUSION

In the current study, approximately 50% of families with VPT infants provided parental mental health data in the routine care of a responsive parenting programme. Mental health improved in both mothers and fathers over the course of the infant's first year. However, after the first year, almost 20% of the mothers and 8% of the fathers still reported elevated symptoms of anxiety and/or depression. Although few risk factors were identified, mental health screening remains important. We recommend that acknowledging and remediating mental health problems for both mothers and fathers, in the broad sense, are included in follow-up programmes and early intervention programmes for VPT infants. More research is needed to strengthen the reach of such preventive efforts and further explore the co-occurrence of mental health symptoms within couples.

ACKNOWLEDGEMENT

We would like to thank Dr. Tinka Bröring-Starre for critically reviewing the manuscript.

CONFLICT OF INTEREST

The authors have no conflict of interests to declare.

ORCID

Eline Vriend  <https://orcid.org/0000-0002-7456-4074>

Aleid Leemhuis  <https://orcid.org/0000-0002-4414-9451>

Monique Flierman  <https://orcid.org/0000-0002-1579-7011>

Petra van Schie  <https://orcid.org/0000-0002-2694-1824>

Frans Nollet  <https://orcid.org/0000-0002-2847-9995>

Martine Jeukens-Visser  <https://orcid.org/0000-0002-7755-4509>

REFERENCES

1. Treyvaud K. Parent and family outcomes following very preterm or very low birth weight birth: a review. *Semin Fetal Neonatal Med.* 2014;19(2):131-135.
2. Zekowitz P, Bardin C, Papageorgiou A. Anxiety affects the relationship between parents and their very low birth weight infants. *Infant Ment Health J.* 2007;28(3):296-313.
3. Helle N, Barkmann C, Bartz-Seel J, et al. Very low birth-weight as a risk factor for postpartum depression four to six weeks postbirth in mothers and fathers: Cross-sectional results from a controlled multicentre cohort study. *J Affect Disord.* 2015;180:154-161.
4. Vigod SN, Villegas L, Dennis CL, Ross LE. Prevalence and risk factors for postpartum depression among women with preterm and low-birth-weight infants: a systematic review. *BJOG.* 2010;117(5):540-550.
5. Greene MM, Schoeny M, Rossman B, Patra K, Meier PP, Patel AL. Infant, maternal, and neighborhood predictors of maternal psychological distress at birth and over very low birth weight infants' first year of life. *J Dev Behav Pediatr.* 2019;40(8):613-621.
6. Hawes K, McGowan E, O'Donnell M, Tucker R, Vohr B. Social emotional factors increase risk of postpartum depression in mothers of preterm infants. *J Pediatr.* 2016;179:61-67.
7. Mackley AB, Locke RG, Spear ML, Joseph R. Forgotten parent: NICU paternal emotional response. *Adv Neonatal Care.* 2010;10(4):200-203.
8. McMahon GE, Anderson PJ, Giallo R, et al. Mental health trajectories of fathers following very preterm birth: associations with parenting. *J Pediatr Psychol.* 2020;45(7):725-735.
9. Miles MS, Holditch-Davis D, Schwartz TA, Scher M. Depressive symptoms in mothers of prematurely born infants. *J Dev Behav Pediatr.* 2007;28(1):36-44.
10. Pace CC, Spittle AJ, Molesworth CML, et al. Evolution of depression and anxiety symptoms in parents of very preterm infants during the newborn period. *Jama Pediatr.* 2016;170(9):863-870.
11. Soghier LM, Kritikos KI, Carty CL, et al. Parental depression symptoms at neonatal intensive care unit discharge and associated risk factors. *J Pediatr.* 2020;227:163-169.e1.
12. Gondwe KW, White-Traut R, Brandon D, Pan W, Holditch-Davis D. The role of sociodemographic factors in maternal psychological distress and mother-preterm infant interactions. *Res Nurs Health.* 2017;40(6):528-540.
13. Winter L, Colditz PB, Sanders MR, et al. Depression, posttraumatic stress and relationship distress in parents of very preterm infants. *Arch Womens Ment Health.* 2018;21(4):445-451.
14. Ouwendijk-Andréa M, Bröring-Starre T, Molderink AC, Laarman CARC, Oostrom KJ, van Dijk-Lokkart EM. Parental emotional distress after discharge from the neonatal intensive care unit: a pilot study. *Early Human Dev.* 2020;140:104892.
15. Schappin R, Wijnroks L, Uniken Venema MM, Jongmans MJ. Rethinking stress in parents of preterm infants: a meta-analysis. *PLoS One.* 2013;8(2):e54992.
16. McGowan EC, Vohr BR. Neurodevelopmental follow-up of preterm infants: what is new? *Pediatr Clin North Am.* 2019;66(2):509-523.
17. EFCNI, Houtzager BA, Van Wassenaer-Leemhuis AG, Wolke D, Virchez M. European Standards of Care for Newborn Health: Parental mental health; 2018.
18. Jeukens-Visser M, Koldewijn K, van Wassenaer-Leemhuis AG, Flierman M, Nollet F, Wolf MJ. Development and nationwide implementation of a postdischarge responsive parenting intervention program for very preterm born children: the TOP program. *Infant Ment Health J.* 2020;42(3):423-437.
19. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand.* 1983;67(6):361-370.
20. Spinhoven P, Ormel J, Sloekers PP, Kempen GI, Speckens AE, Van Hemert AM. A validation study of the Hospital Anxiety and

- Depression Scale (HADS) in different groups of Dutch subjects. *Psychol Med.* 1997;27(2):363-370.
21. Cohen J. *Statistical Power Analysis for the Behavioral Sciences*, 2nd ed. Lawrence Erlbaum Associates; 1988.
 22. Orton JL, McGinley JL, Fox LM, Spittle AJ. Challenges of neurodevelopmental follow-up for extremely preterm infants at two years. *Early Hum Dev.* 2015;91(12):689-694.
 23. Poehlmann J, Schwichtenberg AJ, Bolt D, Dilworth-Bart J. Predictors of depressive symptom trajectories in mothers of preterm or low birth weight infants. *J Fam Psychol.* 2009;23(5):690-704.
 24. van Bussel JC, Spitz B, Demyttenaere K. Anxiety in pregnant and postpartum women. An exploratory study of the role of maternal orientations. *J Affect Disord.* 2009;114(1-3):232-242.
 25. van Bussel JC, Spitz B, Demyttenaere K. Depressive symptomatology in pregnant and postpartum women. An exploratory study of the role of maternal antenatal orientations. *Arch Womens Ment Health.* 2009;12(3):155-166.
 26. Neri E, Giovagnoli S, Genova F, Benassi M, Stella M, Agostini F. Reciprocal influence of depressive symptoms between mothers and fathers during the first postpartum year: a comparison among full-term, very low, and extremely low birth weight infants. *Front Psychiatry.* 2020;11:578264.
 27. Kaarensen PI, Ronning JA, Ulvund SE, Dahl LB. A randomized, controlled trial of the effectiveness of an early-intervention program in reducing parenting stress after preterm birth. *Pediatrics.* 2006;118(1):e9-19.
 28. Spittle AJ, Anderson PJ, Lee KJ, et al. Preventive care at home for very preterm infants improves infant and caregiver outcomes at 2 years. *Pediatrics.* 2010;126(1):e171-e178.
 29. Cheng ER, Kotelchuck M, Gerstein ED, Taveras EM, Poehlmann-Tynan J. Postnatal depressive symptoms among mothers and fathers of infants born preterm: prevalence and impacts on children's early cognitive function. *J Dev Behav Pediatr.* 2016;37(1):33-42.
 30. Staneva A, Bogossian F, Pritchard M, Wittkowski A. The effects of maternal depression, anxiety, and perceived stress during pregnancy on preterm birth: a systematic review. *Women Birth.* 2015;28(3):179-193.

How to cite this article: Vriend E, Leemhuis A, Flierman M, van Schie P, Nollet F, Jeukens-Visser M. Mental health monitoring in parents after very preterm birth. *Acta Paediatr.* 2021;110:2984-2993. <https://doi.org/10.1111/apa.16064>