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ORIGINAL ARTICLE

Mental health in adults born preterm with very low birth weight at 14 and 26 years of age assessed by the Strengths and Difficulties Questionnaire

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Abstract

Aim: Very low birth weight (VLBW: <1500 g) is associated with risk of adverse long-term outcomes, including mental health problems. We assessed whether self-reported mental health differed between young adults born preterm with VLBW and term-born controls. We also examined changes in mental health from 14 to 26 years.

Methods: In a prospective cohort study, 61 VLBW and 88 control participants completed the Strengths and Difficulties Questionnaire at 26 years. Group differences were analysed by linear regression with adjustment for sex and parental socioeconomic status. Longitudinal changes from 14 to 26 years were analysed using linear mixed model.

Results: Mean total difficulties score was 1.9 (95% CI: 0.5 to 3.5) higher in the VLBW than in the control group. Internalising and its subscale emotional problems as well as externalising and its subscale hyperactivity/inattention symptoms were higher in the VLBW group. From 14 to 26 years, changes in emotional symptoms, peer relationship problems, externalising problems, hyperactivity/inattention, and prosocial behaviour differed between the groups.

Conclusion: At 26 years, VLBW participants had more self-reported mental health difficulties than controls. Emotional symptoms increased from 14 to 26 years in the VLBW group, whereas hyperactivity and inattention did not decrease with age as it did in the control group.

Abbreviations: ADHD, attention deficit hyperactivity disorder; ASEBA ASR, Achenbach System of Empirically Based Assessment Adult Self-Report; B, unstandardised beta; BCa, bias corrected and accelerated; CI, confidence interval; CP, cerebral palsy; IQ, intelligence quotient; NICU, neonatal intensive care unit; NTNU LBW Life, NTNU Low Birth Weight in a Lifetime Perspective; SD, standard deviation; SDQ, Strengths and Difficulties Questionnaire; SES, socioeconomic status; VLBW, very low birth weight.

1 | INTRODUCTION

Approximately 5.4% of children in Norway are born preterm.[1] About 4.4% are born with low birth weight (<2500 g), and 1% with very low birth weight (VLBW: <1500 g).[1] In a global perspective, most countries have increasing preterm birth rates.[2] At the same time, advances in perinatal care allow a higher number of these children to survive and grow up.[3] This accumulates in a rising number of people being born too soon. The question of how preterm birth with VLBW may affect health into adult age is therefore of vital importance.

Being born preterm with VLBW is associated with higher risk of several adverse outcomes, including mental health problems. Long-term follow-up of individuals born with VLBW to adulthood has uncovered a high prevalence of internalising problems,[4] for example emotional difficulties, such as relational issues, anxiety, and depressive symptoms and disorders.[5] Findings of externalising problems, like conduct and hyperactivity traits, are mixed; Pyhala et al.[4] reported less externalising problems, including less rule-breaking behaviour, while others have found more attention deficit hyperactivity disorder (ADHD).[5,6] Anderson et al.[5] also reported higher odds of meeting criteria for autism spectrum disorder in adulthood. Despite the considerable difficulties that VLBW individuals may face, a surprisingly low fraction receives specialised health care addressing these difficulties.[7] Thus, there may be a concealed need for health care, consequently emphasising the importance of screening these individuals.

The Strengths and Difficulties Questionnaire (SDQ) is a brief screening questionnaire used to assess mental health. Few studies have used the SDQ to screen VLBW individuals, and there are no studies reporting results from the SDQ in an adult VLBW population. By parent-report, one study found that most preterm-born children with birth weight <1000 g had minimal difficulties on the SDQ problems scales.[8] We have previously reported results of SDQ in the current cohort in adolescence. At 14 years of age, the VLBW participants overall reported similar SDQ scores as controls, whereas parents and teachers reported more mental health problems for their VLBW teenagers compared with controls.[7] Therefore, as the SDQ questionnaire seemed to catch group differences in adolescence in parent- and teacher-reports but not in self-reports, it is important to know whether this short self-report screen catches problems in adulthood. This study aimed to uncover whether mental health assessed by the SDQ self-report differed between young adults born preterm with VLBW and control participants born at term with a normal birth weight. Furthermore, we wanted to examine the development of self-reported mental health symptoms from adolescence to young adulthood.

Key Notes

- Adults born preterm with very low birth weight reported more mental health difficulties compared with term-born normal birth weight controls.
- Both internalising and externalising problems were higher in the very low birth weight group, especially emotional symptoms and hyperactivity/inattention.
- Longitudinal analyses suggested increased emotional difficulties from adolescence to young adult age in the very low birth weight group.

2 | MATERIALS AND METHODS

2.1 | Study design

The Norwegian University of Science and Technology Low Birth Weight in a Lifetime Perspective (NTNU LBW Life) study is a geographically based prospective cohort study of VLBW individuals born between 1986 and 1988 and admitted to the neonatal intensive care unit (NICU) at St. Olavs Hospital, Trondheim University Hospital, Norway. A control group born to mothers living in the Trondheim area was recruited from a multicentre study in the same time period.[9] The participants have been examined at several time-points during childhood, adolescence, and adult life, recently presented in a systematic review.[10] At 26 years of age, participants were invited to a multidisciplinary assessment including assessment by the SDQ. The participants had previously been assessed by using the SDQ at 14 years of age.[7]

2.2 | Participants

2.2.1 | VLBW

The VLBW group was defined by a birth weight at or below 1500 g and were all born before 37 weeks of gestational age. Exclusion criteria at birth were syndromes or congenital malformations. Of 121 possible participants, 33 died as neonates, two were excluded due to syndromes or anomalies, and two were not testable due to severe quadriplegia and mental retardation (Figure 1). Of the 84 eligible participants, 23 did not consent to the study, leaving 61 participants (32 males, 29 females) in the VLBW group. At 14 years of age, SDQ data were available for 67 VLBW participants (35 males, 32 females). In total, 88 VLBW participants had SDQ data at 14 and/or 26 years of age.

2.2.2 | Control

The control group comprised 120 children born at or above 37 weeks of gestational age with a birth weight at or above the 10th centile for gestational age, corrected for sex and parity, according to a reference standard using data from the Norwegian Medical Birth Registry.[9] Two children were excluded due to syndromes or anomalies, two could not be reached, and 28 did not consent to the study, leaving 88 participants (38 males, 50 females) in the control group (Figure 1). At 14 years of age, SDQ

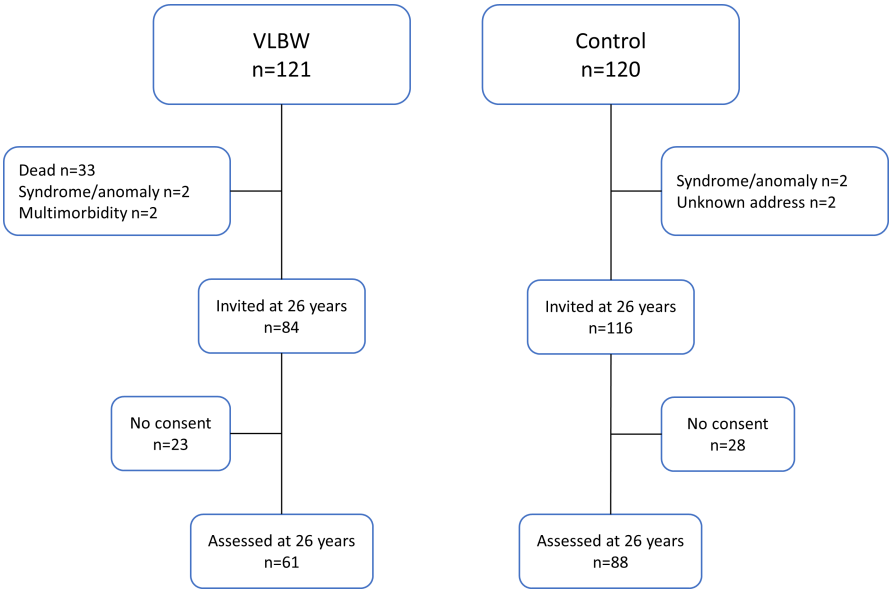

FIGURE 1 Flow of participants at the 26-year follow-up. Abbreviations: VLBW, Very low birth weight.

data were available for 87 control participants (37 males, 50 females). In total, 102 control participants had SDQ data at 14 and/or 26 years of age.

2.2.3 | Non-participants

There were no statistically significant differences in infants' perinatal data, parental socioeconomic status (SES), proportions of being born small for gestational age, having cerebral palsy (CP) or low estimated intelligence quotient (IQ) between participants and those who did not consent to participation at 26 years of age in any of the groups (Table S1). Mothers of VLBW participants were 28.4 years (SD = 5.1) compared with 26.2 years (SD = 2.9) in mothers of VLBW individuals who did not consent to participation ($p = 0.008$). Previous SDQ scores at 14 years of age were higher for internalising problems and its subscale emotional symptoms among control participants compared with control individuals who did not consent to participation (Table S2).

2.3 | Background variables

Perinatal and newborn characteristics were retrieved from hospital records. Small for gestational age was defined as birth weight < 10th percentile for gestational age, corrected for sex and parity.[11] Parental SES were recorded at the 14- and 19-year follow-up visits, based on a combination of education and occupation of both parents according to Hollingshead Two-Factor Index of Social Positioning.[12] At 14 years of age, IQ was estimated by using two subscales of the Wechsler Intelligence Scale - Third edition (WISC-III); "Vocabulary" and "Block design".[13] Low estimated IQ was defined as below two standard deviations (SD) of the mean in the control group. In addition, CP was diagnosed by a project paediatrician at the 14-year follow-up.

2.4 | Outcome measures

The SDQ is a brief behavioural screening questionnaire, available for various ages and informants (parents, teachers, other informants).[14] We used the self-report from 11 to 17 years of age (S11-17) and the adult form from 18 years (s18+), both in authorised Norwegian versions (www.sdqinfo.org). The SDQ has been validated in several studies from various countries and proved to be useful as an outcome measure.[15,16] The questionnaire consists of 25 items divided into four problem scales of (a) emotional symptoms, (b) conduct problems, (c) hyperactivity/inattention, and (d) peer relationship problems, and one prosocial behaviour scale.

Each item is rated "not true", "somewhat true" or "certainly true". "Somewhat true" is always scored 1, whereas "not true" and "certainly true" are scored either 0 or 2 depending on the wording of the item. This generates a score between 0 and 10 for each of the four problem scales, where a higher score indicates more problems. An internalising score (range 0–20) includes the two scales of emotional symptoms and peer relationship problems, and an externalising score (range 0–20) includes the two scales of conduct problems and hyperactivity/inattention.[17] All four problem scales add up to generate a total difficulties score between 0 and 40. The scoring reverses for the prosocial behaviour scale, where a higher score indicates more prosocial behaviour.

An impact supplement consists of five questions asking whether the respondent thinks he/she has difficulties regarding emotions, concentration, conduct or in getting along with others. If so, it enquires further about chronicity of the problem, overall distress to the study participant, interference in everyday life, and burden to others. This generates a score that ranges from 0–10, where a high score indicates more distress and everyday impairment. If the respondent answers "no" to the first question, the rest of the questions are not completed, and the impact supplement automatically receives a score of zero.[18]

2.5 | Statistics

Background characteristics of the two study groups were compared by Student's *t* test for continuous and normally distributed data, Chi square test for categorical data and Mann–Whitney U test for ordinal data. Normality was assessed by visual inspection of the histograms and QQ-plots of the residuals. Due to some deviations from normality for the SDQ subscales, we used bootstrapping with B = 2000 bootstrap samples and bias corrected and accelerated (BCa) method for all SDQ analyses. Group differences in the SDQ scales were analysed by linear regression with adjustment for sex and parental SES, as these factors could potentially affect mental health. We performed sensitivity analyses excluding participants with CP and low estimated IQ. Longitudinal changes from 14 to 26 years of age were analysed using all available SDQ data at one or both timepoints in a linear mixed model with SDQ scales as dependent variables, and time, group, time × group and sex as independent variables. Statistical significance was set at two-sided *p*-values at or below 0.05, and confidence intervals at 95%.

2.6 | Ethics

The study was conducted in accordance with the Helsinki Declaration. The Regional Committee for Medical and Health Research Ethics in Central Norway approved the protocols for each follow-up (78–00 May 2000; 2013/636). Participation in the study required written informed consent from the study participants as well as from parents/legal guardians at the 14-year follow-up.

3 | RESULTS

3.1 | Background characteristics

Clinical characteristics of the study participants are presented in Table 1. As expected by the study design, the VLBW group had significantly lower birth weight, gestational age, and head circumference, as well as lower Apgar score at 1 and 5 minutes. Maternal age at birth was lower in the VLBW group compared with the control group. Parental SES and participant sex did not differ significantly between the two groups. More VLBW than control participants had CP or low estimated IQ.

3.2 | Strength and Difficulties Questionnaire at 26 years

The results from the SDQ self-report at 26 years of age are presented in Table 2. Adjusted for sex, the mean total difficulties score was 1.9 points (95% CI: 0.5 to 3.5) higher in the VLBW compared with the control group. Furthermore, VLBW participants had higher mean scores for internalising problems and its subscale emotional symptoms, as well as higher externalising score and its subscale

TABLE 1 Clinical characteristics in a group of very low birth weight participants compared with a term-born control group

	VLBW (*n* = 61)		Control (*n* = 88)		*p*-value
	Mean	(SD)	Mean	(SD)	
Birth weight (g)	1203	(247)	3702	(451)	<0.001
Gestational age (weeks)	28.9	(2.7)	39.8	(1.2)	<0.001
Birth head circumference (cm)[a]	27.0	(2.5)	35.4	(1.1)	<0.001
Apgar score 1 min[b]	6.7	(2.2)	8.9	(0.4)	<0.001
Apgar score 5 min[c]	8.3	(1.8)	9.8	(1.0)	<0.001
Maternal age at birth (years)[d]	28.4	(5.1)	30.6	(4.4)	0.005
Parental SES[e]	3.5	(1.2)	3.8	(1.1)	0.162
	n	(%)	*n*	(%)	*p*-value
Female	29	(47.5)	50	(56.8)	0.317
Small for gestational age	20	(32.8)	0	(0)	<0.001
Cerebral palsy	3	(4.9)	0	(0)	0.067
Low estimated IQ[f]	7	(15.9)	1	(1.4)	0.006

Abbreviations: IQ, intelligence quotient; SD, standard deviation; SES, socioeconomic status; VLBW, very low birth weight.

[a]Data missing for 12 VLBW and five control participants.

[b]Data missing for two VLBW and six control participants.

[c]Data missing for two VLBW and five control participants.

[d]Data missing for one VLBW and three control participants.

[e]Data missing for 11 VLBW and 14 control participants.

[f]Data missing for 17 VLBW and 19 control participants.

TABLE 2 Results of the SDQ self-report at 26 years of age in a group of very low birth weight participants compared with a term-born control group

	VLBW ($n = 61$)		Control ($n = 88$)							
	Mean	(SD)	Mean	(SD)	Mean difference adjusted for sex (95% CI)	*p*-value	Mean difference adjusted for sex for participants with data on parental SES (95% CI)[a]	*p*-value	Mean difference adjusted for sex and parental SES (95% CI)[a]	*p*-value
Internalising problems	4.1	(3.0)	3.2	(2.6)	1.0 (0.1, 1.9)	0.036	0.6 (−0.3, 1.5)	0.209	0.5 (−0.4, 1.5)	0.264
Emotional symptoms	2.6	(2.2)	1.8	(1.8)	0.9 (0.3, 1.6)	0.003	0.6 (−0.1, 1.2)	0.104	0.5 (−0.2, 1.1)	0.162
Peer relationship problems	1.6	(1.4)	1.5	(1.6)	0.04 (−0.4, 0.5)	0.888	0.03 (−0.5, 0.5)	0.886	0.04 (−0.5, 0.5)	0.894
Externalising problems	4.6	(2.8)	3.6	(2.5)	1.0 (0.1, 1.9)	0.031	1.0 (0.1, 2.0)	0.035	1.0 (−0.02, 2.0)	0.063
Conduct problems	1.3	(1.2)	1.2	(0.9)	0.1 (−0.2, 0.5)	0.460	0.2 (−0.1, 0.6)	0.243	0.2 (−0.2, 0.6)	0.303
Hyperactivity/inattention	3.3	(2.0)	2.4	(2.2)	0.8 (0.1, 1.5)	0.019	0.8 (0.1, 1.5)	0.036	0.8 (−0.01, 1.5)	0.060
Total difficulties	8.7	(4.5)	6.8	(4.1)	1.9 (0.5, 3.5)	0.008	1.6 (0.2, 3.1)	0.037	1.5 (−0.02, 3.1)	0.063
Prosocial behaviour	9.2	(1.2)	9.0	(1.2)	0.1 (−0.3, 0.5)	0.668	−0.1 (−0.5, 0.3)	0.716	−0.1 (−0.6, 0.3)	0.557

Abbreviations: CI, confidence interval, SD, standard deviation; SDQ, Strengths and Difficulties Questionnaire; SES, socioeconomic status; VLBW, very low birth weight.

[a]Data missing for 11 VLBW and 14 control participants.

hyperactivity/inattention. In these scales, mean differences were of magnitude 0.36 to 0.50 SD units. Scores for conduct problems, peer relationship problems and prosocial behaviour did not differ significantly between the groups (Table 2).

Median impact score in both groups were zero (range: 0–5). In the VLBW group, 16 (26.7%) participants had an impact score above zero compared with 13 (14.9%) participants in the control group. Adjusted for sex, the odds of having an impact score above zero was 2.0 (95% CI: 0.9, 4.6, $p = 0.097$).

Not all participants had data on parental SES. Birth weight was 1232 (234) g in VLBW participants with data on parental SES ($n = 50$) compared with 1070 (275) g ($p = 0.048$) in VLBW participants missing data on parental SES ($n = 11$). When we restricted the analyses to those with available data on parental SES, mean differences adjusted for sex were reduced and no longer statistically significant for internalising problems and emotional symptoms (Table 2). When further adjusting for parental SES in this sample, the group differences remained similar. When we excluded participants with CP and low estimated IQ, the mean differences adjusted for sex were slightly reduced and no longer significant for internalising problems (0.8; 95% CI: −0.3 to 1.8, $p = 0.130$), externalising problems (0.8; 95% CI: −0.2 to 1.6, $p = 0.110$), hyperactivity/attention (0.6; 95% CI: −0.1 to 1.3, $p = 0.083$) and total difficulties (1.5, 95% CI: −0.02 to 3.0, $p = 0.056$).

3.3 | Longitudinal changes from 14 to 26 years

The longitudinal changes from 14 to 26 years of age adjusted for sex differed significantly between the two groups regarding emotional symptoms and peer relationship problems, externalising problems, hyperactivity/inattention, and prosocial behaviour (Table 3). While both groups had an increase in the score for internalising problems, this was mainly caused by an increase in score for emotional problems in the VLBW group, and peer relationship problems in the control group. Both groups had an increased score for prosocial behaviour; however it was largest in the VLBW group. In the control group, scores for externalising problems, conduct problems, and hyperactivity/inattention decreased from 14 to 26 years of age.

4 | DISCUSSION

4.1 | Main findings

At 26 years of age, the VLBW participants reported overall more mental health difficulties than the control group, indicating a greater burden of mental health problems. The VLBW individuals had higher mean scores for total difficulties, internalising and externalising problems due to higher scores on the emotional symptoms and hyperactivity/inattention scales. One out of four reported that the difficulties influenced their daily life. Parental SES could not explain the group differences, however, mean differences were slightly reduced when we excluded participants with CP or low estimated IQ. From

TABLE 3 Longitudinal changes in SDQ scales from 14 to 26 years of age in a group of very low birth weight participants compared with a term-born control group

	VLBW ($n = 81$)			Control ($n = 102$)			
	B	(95% CI)	*p*-value	B	(95% CI)	*p*-value	*p*-value[a]
Internalising problems	0.6	(0.1, 1.1)	0.048	0.6	(0.2, 1.0)	0.030	0.958
Emotional symptoms	0.8	(0.4, 1.1)	<0.001	0.1	(−0.2, 0.4)	0.544	0.026
Peer relationship problems	−0.1	(−0.4, 0.1)	0.541	0.5	(0.3, 0.7)	<0.001	0.011
Externalising problems	−0.1	(−0.7, 0.3)	0.676	−1.2	(−1.8, −0.5)	<0.001	0.017
Conduct problems	−0.3	(−0.5, 0.1)	0.056	−0.3	(−0.5, −0.2)	0.003	0.725
Hyperactivity/ inattention	0.2	(−0.2, 0.5)	0.401	−0.8	(−1.2, −0.4)	0.002	0.003
Total difficulties	0.5	(−0.3, 1.2)	0.333	−0.6	(−1.4, 0.1)	0.189	0.115
Prosocial behaviour	1.6	(1.3, 1.8)	<0.001	1.1	(0.8, 1.3)	<0.001	0.033

Note: Regression coefficient B for change between 14 and 26 years in linear mixed models with SDQ scales as dependent variables, and time, group, time × group and sex as independent variables.

Abbreviations: B, unstandardised beta; CI, confidence interval; VLBW, very low birth weight.

[a]*p* value for between-group differences in longitudinal changes from 14 to 26 years.

14 to 26 years of age, both groups had increasing prosocial behaviour and internalising problems, the latter caused by increased emotional problems in the VLBW group, and increased peer relationship problems in the control group. The decreased hyperactivity/inattention which was seen in the control group was not present in the VLBW group.

4.2 | Strengths and weaknesses

A strength to the study is the prospective longitudinal design with follow-up until adult age, which allows for repeated measurements, and enable comparison of adolescent and adult scores. Relatively few cohort studies have had follow-up to adult age and have studied longitudinal changes. Loss to follow-up is inevitable in long-term follow-up studies.[19] However, there were no differences in background characteristics between participants and those who did not consent to participation at 26 years of age, indicating that the adult participants were representative of the initial sample. A relatively small sample size may have reduced the power to detect group differences. Yet, for the non-significant findings in the main outcome analyses, the mean values and standard deviations were highly similar between the groups, making type II errors less likely. However, the sample size was reduced when we excluded participants with CP and low estimated IQ and when we adjusted the analyses for parental SES among those with available data. Altogether, 25 participants did not have data on parental SES, and mean differences for internalising problems, emotional problems, and total difficulties were slightly reduced when we ran the analyses without these participants. This may indicate that VLBW individuals not assessed at the 14-year or 19-year follow-up, when parental SES was collected, had poorer mental health, which could be related to the lower birth weight in these VLBW participants. However, mean differences remained essentially the same after adjustment for parental SES, indicating that parental SES could not explain the results, even though some of the *p*-values increased from 0.04 to 0.06 in the smaller sample.

Another strength to our study was the opportunity to test the usability of a short screening tool in this population. The SDQ is extensively validated through numerous previously published studies. In a review of the psychometric properties, it was found to have satisfactory internal consistency, test-retest reliability and inter-rater agreement in childhood and adolescence,[15] and also promising psychometric properties in young adulthood, although the adult SDQ version is only preliminary examined and needs to be further explored.[20] The SDQ combines hyperactivity and inattention, so that separate assessment of these traits is not possible. This is especially relevant when studying preterm individuals who typically have inattention more than hyperactivity.[21]

In this study, only the self-reported version of the SDQ was used at 26 years of age. Several studies found that sensitivity increased with multi-informant rather than single-informant screening.[16,22] A recently conducted systematic review found that VLBW adolescents often report symptoms within the normal range regarding emotional and behavioural problems, whereas their parents consistently report lower general health and behaviour scores than for controls.[23] This was also true for our study population at 14 years of age, where self-report scores in the VLBW group were similar to those in the control group, except for a lower score on the prosocial behaviour scale, while mothers, fathers, and teachers reported higher scores for the VLBW compared with the control adolescents in most scales, including total difficulties and impact scores.[24] One can therefore speculate whether use of mother- and father-reports of the SDQ at 26 years would have revealed a higher burden of difficulties. Nevertheless, self-reports provide descriptions of the participants' lives from their own perspective, and we cannot disregard that the

change in self-reported scores could be real and trustworthy. We might furthermore speculate that the insight and perspective in adult age contribute to a better understanding of one's own strengths and difficulties when confronted with adult demands. Thus, the adult self-report may give a more correct picture of real-life functioning than self-report at younger ages. As one might expect corresponding age influences for observations in VLBW and control participants, the group differences as well as the longitudinal changes may well reflect true differences.

4.3 | Consistency with literature

This is the first study using the SDQ in adults born preterm. However, Burnett et al. used the SDQ in extremely preterm-born children with birth weight <1000 g and found that most preterm children had a profile of minimal difficulties at age 7–8 years, although more preterm children than controls exhibited the proposed preterm behavioural phenotype with difficulties in emotional, attention, and peer or social functioning.

At 26 years of age, we found that the VLBW participants had overall more self-reported mental health challenges, best demonstrated by the higher mean score in the total difficulties scale. Our findings of internalising problems, especially more emotional symptoms in VLBW adults are in line with previously published findings. Combining several cohorts, including the NTNU LBW Life cohort, Pyhälä et al.[4] revealed a higher prevalence of internalising problems in VLBW adults measured by the Achenbach System of Empirically Based Assessment Adult Self-Report (ASEBA ASR). In individual participant data meta-analysis, Anderson et al.[5] reported that VLBW and very preterm born adults were at a significant risk of meeting diagnostic criteria for anxiety disorder and mood disorder. Findings of externalising problems are mixed in the literature. While Pyhälä et al.[4] found less externalising problems by the ASEBA ASR in combined datasets, Lærum et al.[25] reported more externalising problems at 26 years of age in the NTNU LBW Life cohort using the ASEBA ASR, in line with the present SDQ findings. However, it should be noted, as pointed out as a limitation, that the SDQ combines hyperactivity and inattention and includes this in the externalising problems scale, while attention problems are not part of the ASEBA ASR externalising scale. Nevertheless, both individual participant data meta-analyses and a registry-linkage study have reported a higher prevalence of ADHD.[5,6]

The lack of significant differences between the VLBW and control group regarding peer relationship problems and prosocial behaviour contradicts previously published results. Poor social functioning of adults born preterm has been reported in terms of deficits in romantic partnership and self-reported poorer relationship with friends.[26,27] The discrepancy between such findings and the results in this study may be due to the nature of assessment. In the meta-analysis of Mendonça et al.[27] dichotomous outcomes were used, and Ni et al.[26] used the ASEBA ASR which tends to measure quantity of social contacts, while SDQ targets more the experience in social relations. It is also possible that the participants were in fact satisfied with their peer relations and social functioning in the present setting and life situation.

The increased scores in internalising problems due to more emotional symptoms from 14 to 26 years of age indicate long-lasting difficulties that follow VLBW individuals into adult life. In support of this, the Bavarian Longitudinal Study found a persistent risk of attention problems in VLBW individuals from childhood to adulthood,[28] and Lærum et al.[29] even reported a slight increase in psychiatric diagnoses from adolescence to adult age. Also, compared with their peers who experienced reduced externalising problems due to less conduct problems and hyperactivity/inattention, the VLBW adults did not shodecline in these scales. They have therefore worsened in these areas relative to their peers. Overall, the present study support findings of elevated symptom burden of mental health difficulties in VLBW individuals.

4.4 | Clinical implications

The results of this study suggest that VLBW individuals have a greater burden of mental health problems at 26 years of age compared with their peers. The significant group differences ranged from 0.36 to 0.50 SD units in magnitude, indicating small to moderate effects,[30] and one of four experienced an impact in everyday life. The emotional problems and the elevated hyperactivity/inattention score indicates long-lasting difficulties in these domains. Previous findings from our study have documented lower educational level and functioning scores than controls, and a higher frequency of unemployment and disability[29] as well as lower health-related quality of life.[31] This emphasises the importance of using screening tools, to ensure early detection and tailored follow-up in school, work-life, and social settings for these individuals. The SDQ is short, easy to administer, and well suited to give gross information about mental health status. It is also an agreeable questionnaire to fill in as it focuses not only on difficulties, but also on strengths. In clinical practice, the subjective experience of the patient himself/herself is essential when assessing the burden and appropriate intervention.

The study participants were all born between the years of 1986 and 1988. Even though continuous advancements in medicine allow for more children to survive preterm birth with even lower birth weights, the sequelae from preterm birth are still overall the same.[32] Recent reports uncover that children born with birth weight less than 1000 g have an even elevated risk for inattention and hyperactivity, internalising and externalising problems, as well as a higher prevalence of depression, anxiety and social difficulties.[33] These outcomes resemble the long-term outcomes of the VLBW adults reported in the present study. As the preterm birth rates are rising, and a growing number of these children survive to adult age, the sequelae following preterm birth constitute an increasingly relevant topic.

5 | CONCLUSIONS

In our study, VLBW adults had overall more mental health difficulties than peers of the same age. They reported more, internalising problems due to emotional symptoms and externalising problems due to hyperactivity and inattention. The emotional symptoms increased from 14 to 26 years of age, whereas the hyperactivity and inattention did not decrease with age as it did in the control group. As a rising number of adults are living with sequelae from being born too small and too soon, a screening tool such as the SDQ could be helpful for identifying mental health problems of individuals in this population.

AUTHOR CONTRIBUTIONS

MME was involved in analysing and writing up the work. IMHH reviewed the manuscript. AMWL was involved in data collection and reviewed the manuscript. MSI was involved in conception, planning, and carrying out of the study, and reviewed the manuscript. KAIE was involved in conception, planning, carrying out, analysing, and writing up the work in the present study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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