



Best practice guidelines

# Behavioural outcomes and psychopathology during adolescence <sup>☆</sup>

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## ARTICLE INFO

**Keywords:**

Preterm  
Behaviour  
Autism spectrum disorders  
ADHD  
Anxiety  
Psychiatric disorders

## ABSTRACT

Preterm birth is associated with a high risk of residual neurodevelopmental disability and cognitive impairment. These problems are closely associated with psychiatric disorders and thus it is unsurprising that preterm birth also confers high risk for poor long term mental health. The risk associated with preterm birth is not a general one, but appears to be specific to symptoms and disorders associated with anxiety, inattention and social and communication problems, and manifest in a significantly higher prevalence of emotional disorders, ADHD and Autism. Adolescence is a key period for mental health and studies have shown that problems evident in childhood persist over this time and are more stable amongst preterm individuals than term-born peers. There is also modest evidence for an increased prevalence of psychotic symptoms in preterm adolescents. The high prevalence of psychiatric disorders, present in around 25% of preterm adolescents, requires long term screening and intervention.

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*Abbreviations:* LBW, Low birthweight; VLBW, Very low birthweight; ELBW, Extremely low birthweight; CBCL, Child Behaviour Checklist; SDQ, Strengths and Difficulties Questionnaire; ASD, Autism spectrum disorder; ADHD, Attention deficit/hyperactivity Disorder; SGA, Small for gestational age.

<sup>☆</sup> D.W. was partly supported by grant 01ER0801 from the German Federal Ministry of Education and Science (BMBF) and grant MR\J01107x\1 from the Medical Research Council (MRC) in the UK. The opinions expressed are those of the authors and not the grant giving bodies.

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In May 2012, the World Health Organization, in partnership with over thirty organisations worldwide, launched “Born Too Soon: The global action report on preterm birth.”<sup>[1]</sup> This report documented the continuing rise in global preterm birth rates and highlighted prematurity as a major cause of long term loss of human potential amongst survivors throughout the world. With concurrent improvements in survival rates for babies born at extremely low gestations <sup>[2]</sup>, growing numbers of children will exert increasing demands on schools, societies and healthcare systems in coming years. An

understanding of the long term sequelae of preterm birth is important for the provision of appropriate ongoing care for individuals and for service planning at the population level.

This is the case not just for neonatal services, but also for child and adolescent mental health services and education systems. Preterm birth is associated with a high risk of residual disability across multiple functional domains which affects individuals throughout their lifespan [3]. Whilst severe neurosensory disabilities were once thought to be the major adverse outcomes, population-based cohort studies have shown that cognitive deficits and behaviour, social and emotional problems are far more prevalent and account for a substantial proportion of long term impairment [4–6]. Increasingly, it is recognised that these problems are not confined to a small cluster of individuals with the most severe adverse outcomes but affect a large proportion of preterm survivors to a greater or lesser degree. In this paper we review literature pertaining to the nature and severity of behaviour, emotional and social problems and psychiatric disorders in adolescents born preterm.

### 1. Adolescence and mental health

Adolescence is typically determined using chronological age and is defined by the World Health Organisation as the period from 10 to 19 years of age. It is a time of rapid growth and development marking the transition from childhood to adulthood, during which individuals experience major physical, social and emotional changes. The biological and physical maturation associated with puberty is accompanied by changes in social expectations and responsibility, increased societal and educational demands, and salient changes in social relationships, including increasing interest in the development of romantic relationships and a shift of support and influence from parents to peers [7].

Adolescence is a key developmental stage in terms of mental health: a number of psychiatric disorders have their onset in adolescence and some childhood-onset disorders are associated with changes in their clinical expression during this time. This includes the onset and rise in rates of depression [8], adolescent-onset conduct disorder [9], and the emergence of psychotic symptoms [10]. Typical neurodevelopment during this sensitive period may also impact on psychiatric illness [11,12], and the female advantage in mental health wanes with girls beginning to display more morbidity than boys, particularly for emotional disorders. Assessments earlier in childhood are thus inadequate for determining the prevalence of psychopathology throughout the adolescent years and both cross-sectional and longitudinal studies should consider this as an essential period for investigation and re-assessment.

### 2. Methodological considerations

Comparisons between population-based studies of preterm cohorts are problematic in general [13]. Differences in population denominators can result in wide variation in outcomes, and the study of birth weight-defined cohorts may confound results with the inclusion of babies born small for gestational age (SGA), which may be associated with different behavioural outcomes [14,15]. Different assessment tools and ages at assessment can also result in varying prevalence estimates for both symptoms and disorders, especially in the case of mental health assessments. In particular, the use of self-report versus informant ratings can produce widely different outcomes [16,17].

The majority of studies have used behavioural screening questionnaires as these are cost and time efficient for large-scale investigations. Two have emerged as the most popular assessment tools facilitating international and cross-cultural comparisons: the Achenbach System of Empirically Based Assessment (ASEBA) [18], comprising the Child Behaviour Checklist (CBCL), Teacher's Report Form (TRF) and Youth Self-Report (YSR), and the Strengths and Difficulties Questionnaire (SDQ) [19] comprising parent, teacher and self-report scales.

These screening tools yield higher rates of individuals scoring in the clinical range than have, or would meet the criteria for, a clinical diagnosis. Thus, like other developmental screening tools, these are associated with high rates of false positive screens and relatively low positive predictive values (PPV) [20]. However, the excess of identified 'cases' should not be disregarded lightly since this may be indicative of a population shift in the frequency of behavioural symptoms. For this reason, it is important to use both dimensional and diagnostic measures to capture the distribution of symptoms at a population level. Indeed, adopting both a dimensional and diagnostic approach has been proposed for studying the aetiology of childhood mental disorders as many conditions may develop on the basis of a dimensional liability with boundaries that extend more broadly than those based on diagnostic categorisations [21,22] and may inform taxonomic classifications [23]. Dimensional measures are also useful where the prevalence of disorders in the general population is low and large samples are therefore required for diagnostic studies. In the following sections we review literature relating to psychopathology in preterm populations focussing on studies using dimensional or clinical diagnostic measures and highlighting the practical implications of these findings.

### 3. The preterm behavioural phenotype

Although a substantial body of evidence has accumulated showing the increased risk for psychopathology in preterm populations throughout early childhood, there is a paucity of studies in adolescence. This may reflect the greater practical difficulties in maintaining long term contact with a cohort over the adolescent years and the assumption that problems identified earlier in childhood persist later in life. In addition, reports of contemporary populations of adolescents born after the advent of modern neonatal intensive care in the 1990s are necessarily fewer and will emerge with greater frequency in coming years.

Where studies do exist these continue to show significantly increased problems over the adolescent years compared with term-born counterparts. Almost all studies using screening measures, such as those outlined above, have found significantly increased rates of behaviour problems in very preterm or VLBW adolescents. Using a cut-off for the risk of clinically significant problems, typically defined as scores >90<sup>th</sup> percentile of a standardisation sample or that of matched controls, authors have reported a 3–8 fold increased risk for behavioural problems compared with term-born peers. e.g., [15,16,24–30]. Varying prevalence estimates can be attributed to differences in population denominators and sample sizes. As in all other domains of outcome, there appears to be a gestational age-related gradient in the risk for behaviour problems with a greater prevalence of positive screens associated with decreasing gestational age at birth; this has been shown in both clinical cohort studies and epidemiological investigations using population-linkage methods [26,31–33].

Although increasing attention has been paid to the outcomes of babies born at moderate (32–33 weeks) and late preterm (34–36 weeks) gestations in recent years, studies of behavioural outcomes remain few in number and are typically confined to assessments earlier in childhood. There is a good deal of consistency in outcomes during the preschool or early school years which have typically shown significantly increased prevalence of problems compared with term-born peers [33]. However, the few existing studies of late preterm adolescents have inconsistent findings with some reporting increased risk for clinically significant anxiety and attention problems in 8–16 year olds [34], and others reporting no difference to term-controls from middle childhood through adolescence [35]. Although findings are currently equivocal, even sub-clinical increases in symptoms may be important at the population level given the large proportion of children that are born at these gestations. Where differences have been identified at younger ages this is purported to be associated with medically indicated deliveries rather than

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