

COMPLEX LEARNING DIFFICULTIES AND DISABILITIES RESEARCH PROJECT (CLDD)

PREMATURE BIRTH

The number of children with disabilities is continuing to rise (Blackburn et al, 2010). One contributing factor to the rise in childhood disability, particularly in the developed world, is the increase in survival rates of preterm infants. As Hornby and Woodward (2009, p. 247) write:

Recent decades have witnessed dramatically improved survival rates for infants born prematurely, especially those born very and extremely preterm.

What is premature birth?

Prematurity is defined in terms of either gestational age (GA) or birth weight (BW). Table 1 below outlines the varying degrees of prematurity.

Table 1. Classifications of prematurity

Degree of prematurity	Gestational age	Birth weight
Full-term	Over 37 weeks	
Preterm	Less than 37 weeks	
Very preterm	Less than 32 weeks	
Extremely preterm	Less than 28 weeks	
Normal birth weight (NBW)		Greater than 2,500g
Low birth weight (LBW)		Less than 2,500g
Very low birth weight (VLBW)		Less than 1,500g
Extremely low birth weight (ELBW)		Less than 1,000g

Survival among premature infants

The EPICure study, a UK longitudinal study of preterm babies, revealed that survival of infants born at less than 26 weeks had reached 40% by 1995 (Costeloe et al, 2000). A second EPICure study of infants born at under 27 weeks gestation in 2006 showed that, in the 10 years between the two studies, medical technology had advanced to the point that 52% of babies born at less than 26 weeks gestation now survive (BBC News, 2008). This increased survival is particularly notable for those born extremely premature, either in terms of gestational age or birth weight (Hornby and Woodward, 2009). Consequently, preterm births now account for 5–7% of live births (Martin et al, 2005), and very/extremely preterm births account for 1–2% (Tucker and McGuire, 2004).

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Survival among premature infants

Most infants who are premature are born at 35–37 weeks without any significant long term challenges. However, children born premature have been found to be at significantly higher risk of birth defects, weakened immune systems, and a variety of chronic medical and developmental disorders, with many requiring long-term care (Saigal and Doyle, 2008). Hornby and Woodward (2009) found significantly higher risk of these children having neurodevelopmental problems characterised by cognitive, learning, neuromotor and behavioural difficulties.

The EPICure study followed up the survival and health of their first cohort of children (established in 1995) at 1 year, 2.5 years, 6–8 years, and 10–11 years of age. This revealed that, of those surviving at 6 years of age, 80% had some form of disability, and 46% had moderate to severe disability (Marlow et al, 2005). The most recently published follow-up study of the cohort of children at 11 years of age showed that 68.5% of children surviving had some form of disability, and 39.7% had moderate to severe disability (Johnson et al, 2009).

Educational implications

On average, 4 children in a standard size class will have been born preterm, and 2 in every 100 children in schools will have been born either very or extremely preterm (Hornby and Woodward, 2009). Children born prematurely have been found to have a 50% higher probability of presenting with special educational needs (de Rodrigues et al, 2006), and poorer educational achievement has repeatedly been observed for very and extremely premature babies who reach school age (Pritchard et al, 2009). According to a study by Whitfield et al (1997, p. F85):

ELBW survivors were three times more likely to have learning disorders [than their full-term peers] (47% vs 18%) and 22 (41%) of the 54 ELBW children with learning disorders had multiple areas of learning difficulty.

Hornby and Woodward (2009, p. 427) write:

...educational difficulties represent the most commonly occurring cluster of adverse outcomes affecting children born very or extremely preterm, with up to two thirds likely to require educational assistance during their school years.

Very preterm children have been found to have IQs which are both towards the lower end of the normal range, and significantly lower than their full-term peers (Anderson and Doyle, 2008). However, even preterm children who appear to have no disability and present with IQs within the normal range are nevertheless at greater risk of academic performance disabilities (Saigal et al, 2000). According to a study by Bowen et al (2002), although 30% of children born with ELBW were found to function at or above average academic levels, 43% of these children required some form of special educational support, and 27% were academically below average in either numeracy or reading.

Complex learning difficulties

Hornby and Woodward (2009, p. 427) write:

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...some children born very preterm may present with difficulties in only one developmental domain, or in a specific area of learning,...others may be subject to impairments across multiple domains.

This is corroborated by van Baar et al (2005), who identified that approximately half of the preterm children in their studies had impairments in more than one developmental area. Rodrigues et al (2006, p. 6) also noted that 'there was a predominance of children with multiple academic subjects compromised'. Furthermore, studies suggest that very preterm children are particularly 'susceptible to a "pure" form of attention deficit' (Wolke, 2009 in press, p. 26) and have an increased risk of ASDs.

Impact in the classroom

It is therefore clear that the needs of premature children vary widely and span a large range. If these children are to fulfil their potential for educational achievement, it is crucial that emphasis is placed on identifying their needs as early as possible and providing appropriate teaching approaches and interventions (Marlow, 2006). To this end, it is gradually being recognised as important that:

...education professionals, such as psychologists, counsellors, and teachers, are well informed about, and able to identify, the specific difficulties that these children may exhibit. Teachers also need to be provided with training and support in order to adapt their teaching methods and curriculum goals to respond to individual children's needs, to liaise with parents and other professional groups involved with the child, and to implement effective remediation programs (Hornby and Woodward, 2009, p. 250).

Executive functioning

Recent research has focused on identifying neuropsychological difficulties which may be impeding learning for this group of students. One area which has attracted attention is executive functioning – the ability to undertake purposeful, goal-directed, problem-solving behaviour such as initiating activities (Anderson and Doyle, 2008).

Recent studies examining executive functioning in both very and extremely preterm children have found significant executive function deficits amongst these groups as compared to their full-term peers (Marlow et al, 2007), including working memory. Executive function deficits 'have significant impacts on learning' (Hornby and Woodward, 2009, p. 253) and 'contribute...to poor classroom performance' (Marlow et al, 2007, p. 793). This is particularly notable due to the important role that executive functioning plays in working memory. Difficulty in retaining important information for short periods has the potential to impact particularly upon numeracy and reading comprehension ability, both of which are areas in which premature children have been shown to perform at levels significantly below their full-term peers (Johnson et al, 2009; Pritchard et al, 2009).

Language difficulties

Schirmer et al (2006) found that preterm infants were at significantly higher risk of receptive and expressive language delay. Pritchard et al (2009) identified very preterm children as having difficulties

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with both language comprehension and written language, but not receptive language. In addition, Guarini et al (2009, p. 644) concluded that 'even without frank brain damage, preterm birth continues to affect linguistic development up to the end of the preschool years, and probably beyond...pointing to an atypical developmental trajectory in this population'. It therefore seems that speech, language and communication deficits are likely to occur in preterm children, although the ways in which these present may vary. It is therefore important that speech and language therapists, psychologists and teachers work to implement an individualised support programme for preterm children.

Sensory impairment

Studies have revealed a higher incidence of both mild and severe hearing loss amongst ELBW children compared to normal birth weight children (Hack et al, 2005). Studies have also shown that preterm children are more likely to present with visual impairments than their normal birth weight peers (Hack et al 2005). A study of VLBW children at age 10–12 years found that over half had a visual impairment compared to a fifth of normal birth weight children (O'Connor et al, 2002).

Prematurity is also a major cause of multi-sensory impairment. Hearing, visual or multisensory impairment are likely to exacerbate difficulties in communication, reading, writing and perception, and thus negatively influence academic achievement. (For further information, see the Information Sheet on Sensory Impairment.)

Motor difficulties and cerebral palsy

Children born preterm are at significant risk of cerebral palsy, which has the potential to impact greatly upon a child's motor ability and movement (O'Shea, 2008). Studies have also indicated that preterm children without cerebral palsy are particularly susceptible to less obvious motor difficulties such as clumsiness, poor handwriting and co-ordination problems arising from fine and gross motor difficulties (Feder et al, 2005). Consequently, it is likely that preterm children will struggle during tasks requiring writing (amongst others), which would consequently influence their academic achievement.

Social and emotional issues

There has also been extensive research suggesting that preterm children are significantly more likely to succumb to social, emotional and behavioural issues (Msall and Park, 2008). Such studies have found that they are more at risk of a range of issues including behavioural problems, hyperactivity, anxiety, depression and bullying. It is therefore important for schools to be aware of such issues so that proactive strategies, such as counselling and behaviour management, are available.

Health issues

Wood et al (2000) concluded that of children born extremely preterm, 10% suffered severe disability likely to prevent independent living. In addition, Hack et al (2005) concluded that over twice as many ELBW children had high-dependency needs compared with normal birth weight children. These long-term health needs are likely to impact upon preterm children's educational achievement.

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Families

It is also worthy of note that preterm birth has an impact on the families of these children (Champion, 2005). Singer et al (1996) identified that mothers of VLBW children underwent significantly greater amounts of anxiety and stress during the neonatal period compared to mothers of normal birth weight children, a situation which Hornby and Woodward (2009) believe is likely to occur throughout the children's school lives.

Conclusion

Although most infants who are premature are born at 35–37 weeks without any significant long term challenges, preterm birth can have wide and far-reaching consequences for children's educational achievements. An increased awareness of the potential needs of preterm children is urgently needed if their educational outcomes are to improve, and it is essential that adequate resources are available to meet their unique and complex needs.

Clearly, teaching staff should be trained to both recognise the possible learning disabilities and difficulties associated with preterm birth and instigate appropriate support. Specialist support from professionals such as psychologists and SENCOs should be readily available. In addition, support and guidance should be available for families to facilitate parental involvement in their children's education. Finally, it is important to highlight that at present:

...no systematic evaluations of interventions specifically addressing the learning and behavioural needs of preterm children could be located in the literature... There is, therefore, an urgent need for evaluating the effectiveness of such strategies with children born preterm, very preterm, and extremely preterm in order to establish effective school-based educational interventions for children born prematurely. (Hornby and Woodward, 2009, p. 259)

Useful Websites

www.epicure.ac.uk
www.bliss.org.uk

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