

Professor Dieter Wolke - Written evidence (PRT0010)

My expertise: I am Professor of Developmental Psychology and Individual Differences at the University of Warwick and have researched the development of children born preterm, in particular, those born very preterm (VP; <32 weeks gestation) and extremely preterm (EP; <26 weeks gestation) for nearly 40 years. We are conducting several longitudinal studies of VP/EP and moderate to late preterm children from birth into adulthood with the oldest followed up now 38 years of age. We have combined cohorts of VP/EP children and adults born around the world to provide the most comprehensive evidence of their developmental outcome across high income countries [Home - RECAP preterm \(recap-preterm.eu\)](http://recap-preterm.eu). Evidence from low/middle income countries is much more limited or non-existent on the long term outcome after preterm birth. The developmental outcomes from childhood into adulthood are summarised in one comprehensive review [The Life Course Consequences of Very Preterm Birth | Annual Reviews](#) and in hundreds of publications by my research group on the consequences of preterm birth (see <https://warwick.ac.uk/fac/sci/psych/research/lifespan/preterm-lifecourse/>; www.dieterwolke.com). I currently have an ERC-ADG grant guarantee from UKRI to investigate the life course consequences of preterm birth (UKRI grant: EP/X023206/1).

My focus is on the call for evidence on Prevention and Neonatal and Longer-term Care and Support and other topics.

Prevention

The aim to reduce the rate of preterm birth in the UK from just under 8% to 6% is laudable and should be fully supported.

All our research including health economics evaluations indicate that primary prevention of preterm birth would be the most desirable. However, the means to achieve this is the major issue: there is a strong

belief shared in the medical field that a focus on increased medical innovation will solve the issue of preterm birth. However, social research evidence indicates, the less equal the society, the higher the preterm birth prevalence. Despite the focus on medical innovation, the highest rate of prematurity in the developed world is found in the USA (11%) while one of the lowest is in Finland (<5%). Thus, if we want to reduce prematurity rate, we need to reduce social inequality and improve population health, rather than just obstetric and neonatal care. This means, we need to look at the larger picture of inequality and population health ranging from poverty, discrimination, health behaviour to obesity rates etc. These are not short term but long term measures.

Our own unique research on the consequences of preterm birth reveals, that while obstetric and neonatal innovation and care has significantly improved **the survival** after EP birth in the UK and across moderate to high income countries, it has **not led to improvements in outcome**. Our national UK based EPICure and EPICure 2 study of EP (<25 weeks gestation) born in 1995 and 2006 showed clear improvement in survival, but no improvement in neuro-developmental impairment and IQ¹, behaviour or psychiatric diagnoses (e.g. ADHD or autism)² assessed at the children's age of 11 years. Growth improved but not for head circumference,³ and the quality of life of the later cohort (born in 2006) was significantly lower than for EP born in 1995⁴. These findings echo those reported in Australia across successive cohorts^{5,6}.

Thus, **increased survival is NO indicator of improved developmental outcome**. Improved survival with no reduction in impairment and decreasing quality of life in the more recent cohorts indicates that more children born very or extremely preterm will require care in the future⁷ with an increased demand not just of neonatal care but long term support needs well into adulthood.

Thus, there is a requirement to adopt **a two-pronged approach:**

1. To reduce preterm birth in the first place through care that should start even ahead of pregnancy during childhood and adolescence of future parents (lifestyle), timing of pregnancy and better care for all women independent of background during pregnancy.
2. Despite all efforts to prevent preterm birth in the first place, there will still be preterm birth and more survivors of preterm birth will be part of our community. We need to improve their neonatal care but, in particular, address their specific needs beyond the first few weeks or months of neonatal care across the Life course.

I will focus on the second.

Neonatal and longer term care and support

Developmental Outcome

Most of the focus and financial investment has been into obstetric and, in particular, neonatal intensive care for preterm born children.⁸ This has led to improved survival of, in particular, very and extremely preterm born children. However, as discussed above, this increased survival is not matched by improved developmental outcome and may even be linked to reduced health related quality of life. With higher survival and no change or improvement in developmental outcomes, more preterm children enter our community and more need special support, increasing financial burdens on society. Conversely, a majority of surviving preterm born develop within the normal range too.

The current focus on peri- and neonatal care and outcomes related to neuro-developmental outcome **is much too narrow** and does not cover the true personal and economic consequences of preterm birth. Here a

brief review of the association of prematurity with developmental outcomes.

1. In recent prospective research starting before pregnancy, it has been shown that the event of preterm birth is associated with increased stress for both mothers and fathers and reduced life satisfaction. We found no differences before the event of preterm birth.⁹ The good news is that parents are pretty resilient and 27 years after the birth of their preterm child their quality of life is the same as those of parents of fullterm born children.¹⁰
2. Preterm birth means that the birth occurs at a time when the organs are not yet adapted for birth and extrauterine life such as the lungs for breathing without assistance. This affects all organs. For example, from 25 weeks to 40 weeks gestation the brain weight of a foetus quadruples. Thus, any effects of prematurity on developmental outcome are due to an amalgam of immaturity and the effects of insult due to treatment to allow survival (e.g. higher oxygen levels, ventilation, blood pressure).^{11,12} Thus, efforts to increase survival does not always benefit the quality of survival.
3. The highest effect sizes (strongest associations) of prematurity with outcome have been found for motor disorders including cerebral palsy (CP), motor coordination disorder (MCD; i.e., clumsiness), lowered overall cognitive performance (i.e., Intelligence; IQ) and increased neurodevelopmental mental health problems such as Attention Deficit Hyperactivity Disorder (ADHD, mainly of the attention deficit type, ADD) and autism spectrum disorder (ASD). Other mental health problems are also increased and health related quality of life is reduced (for review see: ¹³).

The association between gestation (the degree of prematurity) and core outcomes such as cognitive performance is not linear. To illustrate, every week in gestation lost below 40 weeks is associated with a loss of 0.3 IQ points between 40 and 33 weeks gestation but

every week lower before 33 weeks gestation is associated with a 1.3 to 2.3 IQ point loss.^{14,15} Thus, being born before 33 or 32 weeks exponentially increases the risk of adverse outcome. Furthermore, weight for gestation has an independent effect on IQ with those born at higher weight, i.e., above the 96th percentile had IQ points of 4.2 points higher than those born at the 1st birth weight centile. Thus, being born early (gestation) and being born small (at any gestation) reduces cognitive outcome.

4. Our concerted effort with colleagues around the world (www.recap-preterm.eu) has shown that many of the impairments after preterm birth continue into adulthood with little narrowing of the differences to those born full term. These include persistently lower IQ,^{16,17} CP or ADHD and ASD.^{18,19} Thus, for these developmental domains, the term of “Developmental delay” which implies EP or VP will catch up is not correct – the impairments are, on the group level, persistent. In contrast, in other areas such as anxiety disorder or motor coordination disorders, reductions with age have been documented.^{13,20}

All the previous consequences focus on functional outcome, and scores on scales or diagnoses are assigned. However, **life course development** is not about scores but about mastering life tasks. These include having good relationships in the family (parents, siblings) and with peers, including friends and colleagues in school and later at work. The transitioning into adulthood is accompanied by sexual relationships, finding a romantic partner, become financially independent from the parents, creating an own family and having children. Mastering these life tasks is associated with increased wellbeing and life satisfaction. Our research has shown:

1. Those born preterm, in particular VP/EP, have consistently more often peer relationship difficulties (no circle of friends, more often victims of bullying).^{21,22}
2. Preterm born individuals are less likely to experience sexual relationships by early to mid-adulthood.²³ They are less likely to find a romantic partner and are less likely to have children. However, once they find a partner, they have as good relationships as their full term peers.²¹ Taking into account that parents who have VP/EP children are less likely to have further children (fertility gap),²⁴ and with EP/VP being less likely to have children themselves, prematurity adds to the fertility gap.
3. More preterm born, in particular VP/EP than term born adults, do not live independently and more are in receipt of social benefits.²⁵

While many preterm born master life tasks, a substantial minority have poor peer relationships, not found friends or a partner and are not going to reproduce. Once their parents have passed away, fewer may have an informal support system.

In contrast, despite the difficult start and separation from parents in incubator care, the relationships of preterm born with their parents into adulthood are as good or even a little better than for full term born individuals.

Factors related to Developmental Outcome

Research adopting a medical model usually looks at how medical interventions or biological factors around birth or neonatally are associated with short and long term outcome. This approach has two major deficits:

1. It ignores that many other social factors from socio-economic background, parenting, peer relationships to the quality of education, to name but a few, affect development across the lifespan.
2. Social and educational factors may further increase the risk of adverse outcome, or alternatively, reduce the risk (compensate) by being promotive factors (additive effect); or they may have a particular adverse effect on preterm children (vulnerability) or particularly benefitting preterm children (resilience), i.e., interacting with prematurity.

What does this mean? For example, being born into a family of low socio-economic status (SES) versus one of high socio-economic status has the same effect on IQ (8-12 IQ points reduction) as being born 8 weeks early. Thus, those who are born very preterm and in a low socio-economic background have IQ-scores of 20-24 points lower than those born fullterm into a high SES family (additive effect). We found the effect of SES adding to the effect of prematurity on IQ.²⁶⁻²⁸ It has been shown that markers of SES are superior predictors in preterm children than medical complications such as chronic lung disease (BPD) or bleeds into the ventricles of the brain (IVH).^{29,16}

Even fewer long term studies have assessed or observed parenting of preterm children and studied its effect on developmental outcome.³⁰ Our research shows that preterm born children are more positively or adversely affected by maternal sensitive parenting compared to full term born children. High maternal sensitivity at 6 years of age had a large effect on academic achievement of VP children (resilience) and a highly detrimental when maternal sensitivity was low (vulnerability). This means that very preterm children need super sensitive parents to help them succeed academically at levels similar to term born.³¹⁻³³ In contrast,

maternal warmth in childhood has been found to be associated with better peer relationships in adolescence for both preterm and fullterm children.³⁴ Finally, social relationships with peers are important. Friends can be highly supportive but maladaptive peer relationships such as being bullied can have highly detrimental effects on mental health and wealth and social relationships into adulthood.^{35,36} Children born very preterm are at increased risk of being bullied by their peers in school and in turn, being victimised by bullies explains the effects of VP birth on mental health rather than VP birth per se (mediation effect).^{22,37}

Implications for data collection and monitoring in relation to preterm birth

Significant research funding is allocated to the documentation of medical treatments or interventions in obstetric and neonatal care. In contrast, social factors such as SES or parents' education, parenting behaviour, social relationships with peers and education pathway that have demonstrated to have similar or even larger impact on preterm children's development are not recorded in most neonatal and longitudinal studies involving preterm born children.³⁸ Recommendations for core data sets for research studies of preterm children³³ in high income countries, for assessment in low resource settings³⁹ and preterm born adults⁴⁰ have been developed to counteract this omission. Adopting these recommendations allows for comparable measurement of both medical and social variables. Assessing the core variables including social variables is not just to enhance data sets but to identify which factors along the life course may help to protect preterm children from adverse outcomes, and thus identify potential targets for intervention from early childhood to adulthood.

Improvement in neonatal and longer-term care and support

My focus is here on the preterm born child and their families during neonatal care and beyond. There are NICE guidelines (NG72) that make a range of recommendations for all preterm born children during hospital care and on developmental follow-up monitoring for those born before 30 weeks or 30-36 weeks gestation with major neonatal complications. The recommendations are for follow-up and surveillance up to 2 years, and up to 4 years for those born <28 weeks. There are recommendations for follow-up assessments that have been thoroughly reviewed for their psychometric properties.

However, the focus is on functional assessment and the surveillance and assistance for parents terminates before the children enter school. The transition into nursery (e.g. parents returning to work) and the time of transition into school are highly stressful. It would be important to provide structured support during these periods. Many parents are worried that their child is not mature enough to enter school according to the cut-off for school entry, i.e. the date of the 4th birthday in the UK. There are campaigns (e.g. <https://www.tinylife.org.uk/consultation-on-flexible-school-starting-is-out/>) for a change of law that allows “young for age” preterm born (i.e. they would be born after the cut-off date but their actual birth was before) to be delayed in school entry. This would be a sensible policy. However, our evidence^{41,42} also shows that it is preferable for all other preterm born children not to delay school entry but rather to train teachers to provide adequate support in school such as the PremAware School ([Prem Aware Award – The Smallest Things](#)). The effects of school closures and online learning during COVID illustrate that leaving it to parents increases inequality as those who are more disadvantaged and with less resources are unable to provide the same access and quality of instruction than teachers or socially advantaged parents⁴³. Keeping children out of school increases disadvantage for the children born into disadvantaged families.

The NG72 guidelines are strongly embedded in a traditional medical model with a focus on assessing function of the child rather than consider the context in which the child develops using an ecological approach. The focus is on assessing what the child cannot do. Rather the follow-up visits require information about the family (parents, siblings, grandparent support), the social interaction of the parents with the child, the peer relationships and the neighbourhood.⁴⁴ One aim of any surveillance and follow-up should be to identify resources that can protect a preterm child against adverse outcomes and increase resilience. The current guidelines do not include this aspect.

There are more comprehensive guidelines jointly developed by experts, parents of preterm children and adults, those with lived experience and preterm support organisations. These European guidelines <https://newborn-health-standards.org/> recognise the importance of integrated care, management of transitions from hospital into the community using case managers and a greater emphasis on assessing factors that may promote or protect against the adverse effects of preterm birth. These guidelines include the learnings from countries around Europe. To reduce social inequality, it is important to have outreach services. Those groups who are at highest risk of adverse outcome, i.e. socially disadvantaged are most likely to be lost from follow-up in research and also in routine surveillance and monitoring.⁴⁵⁻⁴⁷

Finally, with the improvements in obstetric and neonatal care, there are now more adults born preterm and this group will further increase. However, they face specific challenges of how to master life tasks in the work environment, peer relationships, finding a partner and dealing with their specific physical and mental health problems. There is also emerging evidence that the stresses of preterm birth may be associated with earlier (premature) ageing. In other countries such as in Germany, these preterm adults have organised to ask for education of adult physicians

and mental health clinicians to understand their plight and special needs <https://www.fruehgeborene.de/familie/erwachsene-fruehgeborene.htm>

Overall, from an ethical perspective we need to consider that if we invest in excess of £300.000 for an extremely preterm born baby to survive, do we not have the moral obligation to invest at least the same to support the preterm child to develop at its best potential?

Research Priorities

The aim to reduce preterm birth is to be applauded. However, any successful intervention will have to address social factors and access to care which is associated with inequality which starts in the womb.

However, even if preterm birth is reduced, there will still be large numbers of babies born preterm. The following research priorities have been developed in a large consultation exercise with experts and parents across Europe.⁴⁷ The topic most highly ranked was research on the education of preterm born children, followed by topics on ethical decisions around extremely preterm babies and their outcome, emotional wellbeing and inclusion, parental stress, the effects of social circumstances on outcome and obstetric and neonatal unit organisation and practices, including policies towards parents.

There is also a need for basic research on understanding how preterm birth affects organs and whether the need for reorganisation may lead to wear and tear and earlier ageing including cell ageing and associated illness and decline.

Current research on the precursors and consequences of preterm birth is hampered by the silo mentality of research funding for biological, medical and social research in the UK. One of the most important factors enhancing the life chances of preterm born children is how the education system supports them to achieve qualifications. However, medical

research councils are not interested in education and educational interventions as it is not their remit and social research councils consider preterm birth as a medical problem and not their concern. Thus, true interdisciplinary research is more often a slogan rather than funding reality in the current UK funding landscape divided by subject areas rather than integrative topics of research, at least around prematurity. This has hampered research progress. Our research integrating medical, biological and social factors has been mainly possible due to European funding that is more interdisciplinary oriented addressing research topics wide enough for various disciplines or allowing innovative out of the box research as provided by European Research Council funding. Thus, the re-association with Horizon Europe is greatly welcomed.

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