

Original citation:

Johnson, Samantha , Gilmore, Camilla, Gallimore, Ian, Jaekel, Julia and Wolke, Dieter. (2015) The long-term consequences of preterm birth : what do teachers know? Developmental Medicine & Child Neurology. (In Press)

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<http://dx.doi.org/10.1111/dmcn.12683>

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The long term consequences of preterm birth: What do teachers know?

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Manuscript word count: 2498

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Abbreviations: PB-KS – Preterm Birth Knowledge Scale; SEN – Special Educational Needs; TA – Teaching Assistant.

Keywords: preterm birth; neurodevelopmental outcomes; learning disabilities, special educational needs.

Disclosures: The authors have no conflicts of interest to disclose

Cite as: Johnson, S., Gilmore, C., Gallimore, I., Jaekel, J., & Wolke, D. (2015). The long-term consequences of preterm birth: what do teachers know? *Developmental Medicine & Child Neurology*, n/a-n/a. doi: 10.1111/dmcn.12683

Abstract

Aim: The knowledge and information needs of education professionals was assessed to determine how prepared they are to support the growing number of preterm children entering schools today.

Method. In a national survey, 585 teachers and 212 educational psychologists completed the Preterm Birth-Knowledge Scale to assess knowledge of outcomes following preterm birth. Total scores (range 0-33) were compared between groups and the impact of demographic characteristics on knowledge was analysed. Training and information needs were also assessed.

Results. Teaching staff (mean 14.7; SD 5.5) had significantly lower knowledge scores than educational psychologists (mean 17.1; SD 5.0; $p < 0.001$); both had significantly lower scores than clinicians surveyed previously (mean 26.0; SD 3.6; $p < 0.001$). Education professionals' poorest areas of knowledge related to the most frequent adverse outcomes following preterm birth. Only 16% of teaching staff received training about preterm birth and >90% requested more information. Having a special educational needs role and being employed ≥ 16 years were associated with higher knowledge scores.

Interpretation. Education professionals have poor knowledge of the needs of preterm children and most feel ill-equipped to support them in school. As teachers have primary responsibility for providing long-term support for preterm children this is of significant public health and educational concern.

What this paper adds

- Teachers and educational psychologists have poor knowledge of the outcomes of children born preterm, especially in areas most commonly affected by preterm birth.
- The vast majority have not received formal training in this area and feel ill-equipped to support preterm children in school.
- There is an urgent need to disseminate information about preterm birth to teachers and psychologists to bridge the knowledge gap between healthcare and education professionals.

Short title: Education professionals' knowledge of preterm birth

Compared with term-born peers, children born very preterm (<32 weeks gestation) are at increased risk for neurodevelopmental sequelae, such as cerebral palsy, vision and hearing impairments.¹ However, cognitive and behavioural problems, particularly inattention, peer relationship problems and deficits in executive functions, are far more prevalent and account for the majority of functional disability in this population.^{2,3} Whilst most research has focused on children born very preterm¹, recent studies have demonstrated a dose-response relationship with adverse outcomes across the full spectrum of preterm gestations (<37 weeks).^{4,5}

Although the vast majority of preterm children attend mainstream schools, they have poorer academic attainment⁶⁻⁸, particularly in mathematics⁹, and a higher prevalence of special educational needs (SEN) than term-born peers.^{7,10} With improved survival rates for extremely preterm births (<26 weeks)¹¹ and an increasing proportion of babies delivered at late preterm gestations (34-36 weeks),¹² more preterm children will enter school in the coming years. Preterm birth has profound societal and economic consequences; after discharge from hospital, the greatest costs associated with prematurity lie not in healthcare but in education.¹³ This will challenge education systems worldwide as their professionals must try to respond to the needs of this growing population.

Previous studies have shown that teachers lack formal training and knowledge about chronic health conditions and the impact of these on children's adaptation at school.¹⁴⁻¹⁷ This is despite teachers' knowledge and preparation about such conditions being considered crucial for appropriate educational management.^{14,15} Teachers' attitudes to children with SEN are important for educational achievement because they need to feel confident about how to support such children in order to meet their needs in the classroom.¹⁸ Given current preterm birth rates (10%), three children in an average mainstream UK class of 30 children are likely to have been born preterm.¹⁹ As such, nearly every education professional will be responsible for supporting a preterm child. Despite this, education professionals' knowledge of the outcomes and educational needs of preterm children has not been investigated, and it is not known whether they feel equipped to support the learning of preterm children. The objective of the present study was to assess the knowledge and information needs of education professionals relating to the consequences of preterm birth.

METHODS

Participants and procedure

- (i) To assess knowledge and information needs of teaching staff, an email was sent to the head teacher of every school in England requesting them to cascade it to their staff. This included information about the study and a weblink to an online survey.²⁰ Posters describing the study and providing the web address of the survey were also sent to all schools in four local counties (Leicestershire, Nottinghamshire, Derbyshire, Warwickshire) inviting teaching staff to participate.
- (ii) To solicit the views of educational psychologists, an email was sent to all members of the Association for Educational Psychologists (AEP), the professional organisation for educational psychologists in the UK. This included information about the study and a weblink to the online survey.

Social media resources were also used to invite teachers and educational psychologists to participate. The study was approved by the University of Warwick Humanities and Social Sciences Research Ethics Committee (Ref 52/12-13).

Measures

Education professionals' knowledge of the outcomes of prematurity was assessed using the Preterm Birth-Knowledge Scale (PB-KS; Appendix A).²¹ This comprises 33 statements with forced choice responses (true, false, don't know). Each statement is evidence-based and was developed from a review of literature relating to outcomes following preterm birth. During scale development the statements were reviewed by experts in the field to assess content validity and accuracy. Responses on individual statements are scored for accuracy based upon current knowledge (don't know/incorrect=0; correct=1) and a total knowledge score (range 0-33) is computed (higher scores

indicate greater knowledge); a percent accuracy score can also be computed to measure the proportion of correct responses across PB-KS items. The PB-KS has excellent internal reliability (Cronbach's Alpha 0.82²¹); in this sample: Teaching staff 0.81, Educational psychologists 0.77) and construct validity discriminating the knowledge levels of neonatal clinicians and education practitioners.²¹ The surveys also explored opinions about who is likely to be responsible for supporting preterm children and the value of disclosing a child's preterm birth status. Self-perceived competence in supporting a preterm child, adequacy of training received, and information needs were also assessed with responses recorded on a 5-point Likert scale (strongly disagree; disagree; neither agree nor disagree; agree; strongly agree; see Appendix B). Items were also included to elicit information about demographic characteristics (Table 1); as these data were non-identifiable participation was anonymous.

Statistical analyses

Data were analysed using SPSS v20. Differences between teachers and educational psychologists in PB-KS scores were assessed using independent samples t-tests. To assess the effect of demographic characteristics on knowledge levels, the association between demographic variables and PB-KS scores were analysed separately for teaching staff and educational psychologists using independent samples t-tests or linear regression as appropriate. Multivariable linear regression was used to assess the independent effect of demographic variables on knowledge scores. Differences in demographic characteristics between respondents and national data for teachers and educational psychologists were assessed using chi-square tests.

RESULTS

Characteristics of respondents

In total, 830 staff responded to the school survey, of which 734 (88%) were teaching staff; 70 (8%) non-teaching staff and 4% with missing demographic data were excluded. Overall, 679 teaching staff answered the PB-KS, of whom 585 (80%) completed all 33 items. Of these, 381 (65%) were employed in community, voluntary aided or controlled schools, 142 (24%) in academies or free schools and 62 (11%) in independent schools. Respondents represented a wide range of ages of children taught with 36% teaching children aged 3-5 years, 46% ages 5-7, 48% ages 7-11, 37% ages 11-14, 36% ages 14-16 and 24% ages 16-18. Detailed demographic characteristics of these respondents are shown in Table 1. Compared with national data for staff in publicly funded schools²², respondents were significantly more likely to be female (86% vs. 83%; $p=0.031$), to be teachers rather than teaching assistants (TAs) (93% vs. 58%, $p<0.001$) and to be from special schools (18% vs. 7%, $p<0.001$).

<TABLE 1>

Overall, 262 educational psychologists responded, of which 212 (81%) completed the PB-KS. Most respondents were female, qualified and employed in local government (Table 1). Compared with national data, respondents were significantly more likely to be female (86% vs. 79%, $p=0.01$) and full members vs. trainees/affiliate/retired (91% vs. 85%, $p=0.02$).

Knowledge of preterm birth

The mean knowledge score for teaching staff was 14.7 (SD 5.5; range 0-27) which equated to a mean accuracy of 45% (SD 17%); 15 (2.6%) scored zero and 12% responded with <25% accuracy. The mean total knowledge score of educational psychologists was 17.1 (SD 5.0; range 1-28) equating to 52% (SD 15%) accuracy; 11 (5.2%) responded with <25% accuracy and none had scores of zero.

Teaching staff had significantly lower scores than psychologists ($t(795) = -5.411$, $p<0.001$). Compared with data of neonatal clinicians obtained in a previous study ($n=70$, mean 26.0, SD 3.6)²¹, both teaching staff and educational psychologists had significantly lower scores with a mean deficit of 11.2 ($t(653) = -22.9$, $p<0.001$) and 8.9 points ($t(280) = 16.1$, $p<0.001$) respectively.

The effect of demographic characteristics on knowledge scores is shown in Table 1. Teaching staff in special schools had significantly higher scores than those in mainstream schools, and those with a SEN Coordinator (SENCO) role had higher scores than other mainstream teaching staff. Being employed for ≥ 16 years was associated with significantly higher scores as was being female. On multivariable analyses, gender, special school and employment ≥ 16 years were independently associated with higher knowledge scores. Among psychologists, there was no difference in knowledge scores by sex, membership status or number of years employed (Table 1).

Specific areas of knowledge

The accuracy of respondents' scores on PB-KS items is shown in Figure 1. Although teaching staff had poorer knowledge than psychologists, the profile of responses was similar between groups. Only 8% of teachers knew that maths difficulties are a particular deficit following preterm birth and 88% held the erroneous belief that most very preterm children will experience developmental delays as a toddler; only 11%-18% knew that very preterm children are likely to be inattentive and have poorer social skills than term-born children. Psychologists also displayed 11%-18% accuracy in these areas. In both groups greatest accuracy was demonstrated on items relating to neurosensory sequelae such as cerebral palsy and the need for assistance with daily functions.

<FIGURE 1>

Information needs

As shown in Figure 2, >90% of respondents felt they were likely to come into contact with a preterm child and most felt that educational management was the responsibility of the class teacher. Around $\frac{3}{4}$ reported that disclosure of preterm birth status would be beneficial for the child; however, only 38% of teaching staff felt adequately equipped to support preterm children and just 14% felt they had received sufficient training in this area. Over 80% of respondents requested more information about preterm birth. Only 16% of teaching staff had received formal training about preterm birth and only 3.1% as part of their initial teacher training (Figure 3).

<FIGURE 2> <FIGURE 3>

Respondents who felt adequately equipped to support a preterm child had significantly higher knowledge scores than those who felt ill-equipped (Table 1); however, mean scores of teaching staff and psychologists who felt adequately equipped were still 10 and 8 points lower than those of neonatal clinicians, respectively. Teaching staff who felt they had received sufficient training had significantly higher knowledge scores than those who lacked training, but there was no difference in psychologists' scores between those who felt sufficiently trained or not (Table 1).

DISCUSSION

The results of this study show that teachers and educational psychologists have remarkably poor knowledge of the impact of preterm birth on children's learning and development, and only a small minority feel sufficiently trained to support these children in school. After discharge from neonatal care, the greatest cost of prematurity lies within the education system¹³ where these children require long-term support for cognitive and behavioural problems to allow for later life success.²³ Given that almost all teachers will be responsible for the management of a preterm child during their career, these results are of significant public health and educational concern.

Typically, only very preterm infants are followed-up by neonatal services to two years corrected age,^{24, 25} after which point those without severe disabilities are discharged from care. Thus the overwhelming majority of preterm survivors receive no developmental surveillance during the preschool years when learning difficulties may become exacerbated or emerge. Schools thus provide the next routine point of contact for these children and educational professionals are increasingly charged with identifying and responding to these needs.

Teachers and educational psychologists in this study had knowledge scores that were 2 SD below those of neonatal clinicians. This represents a large and substantial gap in knowledge. Although educational psychologists had slightly better knowledge than teaching staff, there was only 0.5 SD difference in scores. Notably, both groups had a similar profile of knowledge scores indicating similar areas of greatest, and indeed poorest, knowledge. Worryingly, the areas of poorest knowledge related to the most common adverse outcomes following preterm birth, specifically mathematics difficulties, peer relationship problems and inattention.^{9, 26, 27} This suggests that preterm children may not receive support in the areas they need it the most.

Identifying difficulties and providing appropriate support is further compounded by the special constellation of problems associated with preterm birth. Preterm children have been described as a new generation of children with complex learning difficulties that are different in nature from previous generations of children with SEN.²⁸ Indeed, in terms of ADHD²⁹, ASD³⁰ and mathematics learning difficulties³¹, the problems of very preterm children appear to have different developmental mechanisms compared with those of term-born children with these difficulties. The preterm behavioural phenotype, characterised by inattention, anxiety and social problems alongside a notable absence of an increased risk for hyperactivity/impulsivity and conduct disorders,² means that preterm children are unlikely to be disruptive in the classroom and their problems may be missed in school.²⁶ Education professionals' paucity of knowledge identified here thus raises substantial concern that preterm children's difficulties may go undetected, especially in the areas of greatest need.

It is perhaps unsurprising that education professionals feel unprepared to meet the needs of these children. Teachers have been shown to have a paucity of knowledge and training regarding the needs of children with chronic health conditions.¹⁵⁻¹⁷ The study of the sequelae of prematurity is a relatively new field within clinical research and, as yet, little consideration has been paid to disseminating this evidence to education professionals. Only 16% of teaching staff had received formal training about preterm birth, and only 3% as part of their initial teacher training. Greater knowledge levels were found among those who had a SEN role and those who had been teaching for over 16 years. Coupled with higher knowledge scores among educational psychologists, this suggests that, at present, knowledge of the needs of preterm children is acquired through greater opportunity for professional experience of supporting a preterm child. From September 2014, the UK SEN Code of Practice will require greater collaboration between health, education and social care services for supporting young people with additional needs.³² It is thus imperative that information about preterm birth is communicated to education professionals to bridge the gap in knowledge between those working in the healthcare and education systems. Identifying difficulties has been shown to have a positive effect on outcomes for children with ADHD but only when combined with practical advice about educational management.³³ It is essential that information about the impact of preterm birth is disseminated to education professionals, but also that they are provided with strategies for supporting children in the classroom. There is thus an urgent need for the development and evaluation of educational interventions for improving academic outcomes in preterm children.

Strengths and limitations

The strengths of this study lie in the use of a validated scale to assess knowledge of preterm birth and the recruitment of teachers from across England and educational psychologists throughout the UK. However, the study is limited by the sample size. Despite using personalised emails to head teachers of all 24,000 schools in England, only 734 members of teaching staff responded. Engaging teachers in research is notoriously difficult³⁴, but the low response rate here may reflect the poor understanding of this subject and a perception that prematurity is not a concern for education professionals. Indeed, respondents were more likely to be female, have an SEN role and to be from special schools compared with national statistics, variables that were all associated with higher knowledge scores. As individuals with a particular interest in prematurity are likely to have responded we believe our results may underestimate the true paucity of knowledge of education professionals in the UK.

Conclusions

Education professionals lack knowledge of the impact of preterm birth on children's learning and development and feel ill equipped to support these children in school. As their areas of poorest knowledge relate to the most common adverse outcomes following preterm birth, preterm children

may not be receiving support in the areas they need it the most. Training education professionals about preterm birth is crucial in preparing them to support preterm children in school. This presents a global challenge as the 15 million babies born prematurely each year continue to enter their respective education systems.

Acknowledgements

The authors would like to thank the UK Association of Educational Psychologists for their support for this study. We also acknowledge the work of Dr Charlotte Beer, University of Nottingham, for her contribution to the development of the Preterm Birth-Knowledge Scale in previous studies. This study was funded by a Nuffield Foundation grant to Drs Wolke, Johnson, Gilmore & Jaekel (Ref: EDU/40442). Dr Gilmore is supported by a Royal Society Dorothy Hodgkin Fellowship. The funders were not involved in the design, data collection and analysis and manuscript preparation.

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Table 1. Demographic characteristics of teaching staff and psychologists who completed the Preterm Birth-Knowledge Scale (PB-KS) and associations with total PB-KS scores.

Characteristic		N (%)	PB-KS Mean (SD)	p
Teaching staff (n=585)				
School type				
	Mainstream	480 (82%)	14.5 (5.5)	0.024
	Special	105 (18%)	15.8 (5.6)	
SEN Role [mainstream schools] ^b				
	SEN-Coordinator	99 (21%)	16.4 (4.6)	<0.001
	Non SEN-Coordinator	381 (79%)	14.0 (5.6)	
Qualified Teacher Status (QTS)				
	Has QTS	528 (90%)	14.9 (5.5)	0.072
	Does not have QTS	57 (10%)	13.5 (5.6)	
Teacher vs. Teaching Assistant				
	Teacher	348 (934%)	14.8 (5.5)	0.094
	Teaching Assistant	37 (6%)	13.3 (5.7)	
Head teacher role ^a				
	Head teacher role	196 (34%)	15.2 (5.7)	0.205
	Non-head teacher	389 (67%)	14.5 (5.4)	
Years of employment [teachers only] ^c				
	≤5 years	63 (12%)	12.9 (5.9)	0.003 ^d
	6-15 years	153 (28%)	14.4 (4.8)	
	16-25 years	177 (32%)	15.2 (5.5)	
	26-35 years	88 (16%)	14.9 (5.9)	
	≥35 years	67 (12%)	16.6 (5.5)	
Gender				
	Male	95 (16%)	12.9 (7.1)	0.005
	Female	490 (84%)	15.1 (5.1)	
Equipped to support preterm children ^e				
	Feel equipped	223 (38%)	16.4 (4.9)	<0.001
	Feel ill-equipped	359 (62%)	13.7(5.7)	
Received sufficient training about prematurity ^e				
	Sufficient training	81 (14%)	16.9 (5.9)	<0.001
	Insufficient training	501 (86%)	14.4 (5.4)	
Educational psychologists (n=212)				
Gender				
	Male	29 (14%)	16.0 (5.4)	0.227
	Female	183 (86%)	17.2 (4.9)	
Membership status				
	Fully qualified	191 (91%)	17.0 (4.9)	0.793
	Trainee/affiliate/retired	20 (10%)	17.4 (5.5)	
Years of employment				
	≤5 years	44 (21%)	16.7 (5.0)	0.964 ^d
	6-15 years	81 (38%)	17.0 (4.8)	
	16-25 years	49 (23%)	17.3 (4.6)	
	26-35 years	28 (13%)	17.3 (6.4)	
	≥35 years	10 (5%)	17.8 (4.2)	
Equipped to support preterm children				
	Feel equipped	126 (60%)	17.9 (4.8)	0.003
	Feel ill-equipped	84 (40%)	15.8 (5.1)	
Received sufficient training about prematurity				
	Sufficient training	53 (25%)	17.8 (4.7)	0.223
	Insufficient training	157 (75%)	16.8 (5.1)	

^aHead teachers include head teachers & executive head teachers. ^bDenominator n=480 teaching staff in mainstream school; ^cTeachers only n=548; ^dAssociations explored using linear regression with years of employment as categorical variables; all other comparisons performed using independent samples t-tests. ^eDenominator n=582 with valid data.

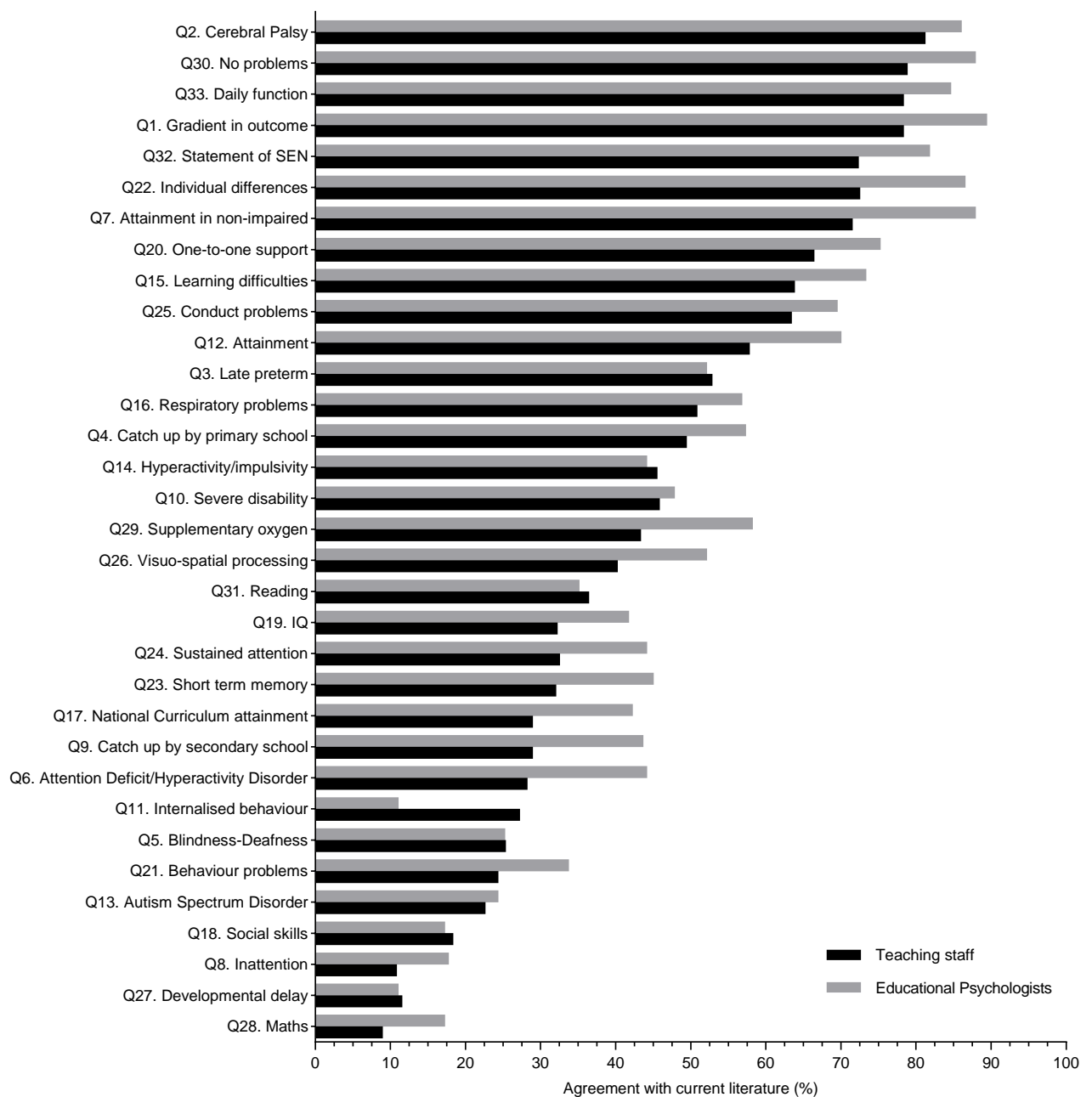


Figure 1. Proportion of correct responses on individual Preterm Birth-Knowledge Scale (PB-KS) items for teaching staff and educational psychologists. The y axis details the PB-KS statement number and a summary descriptor of the statement content. The full statement for each item is shown in Appendix A.

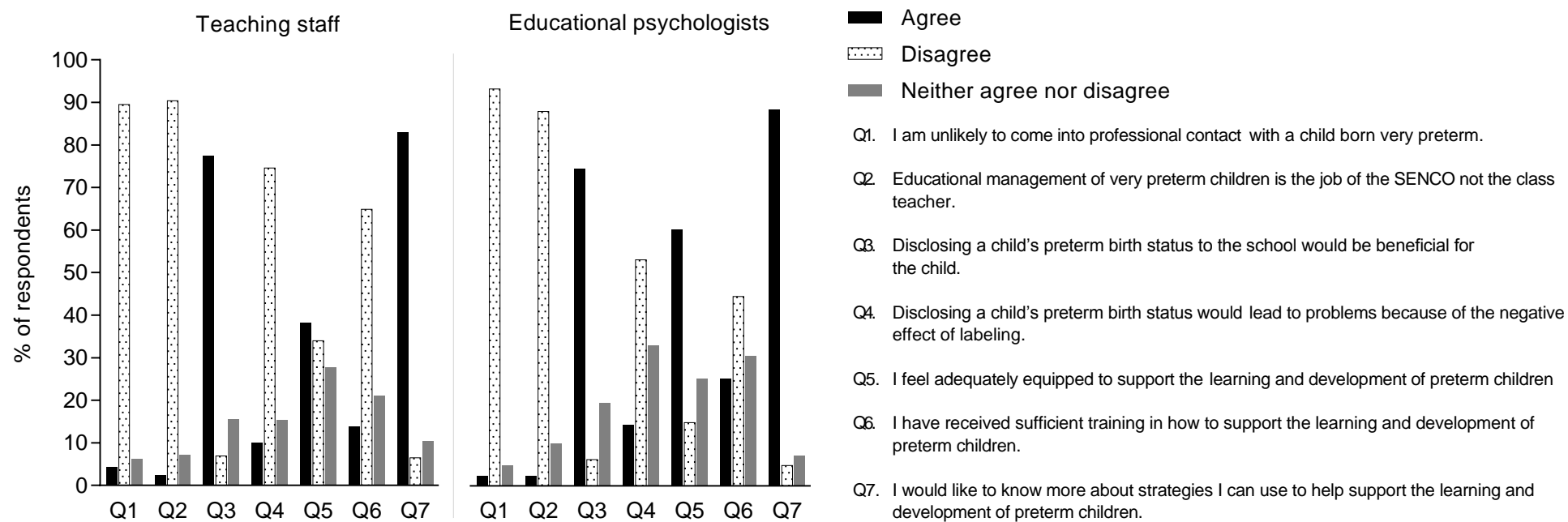


Figure 2. Teaching staff and educational psychologists' opinions on issues relating to the education of preterm children (Q1-4) and on training received (Q5-7).

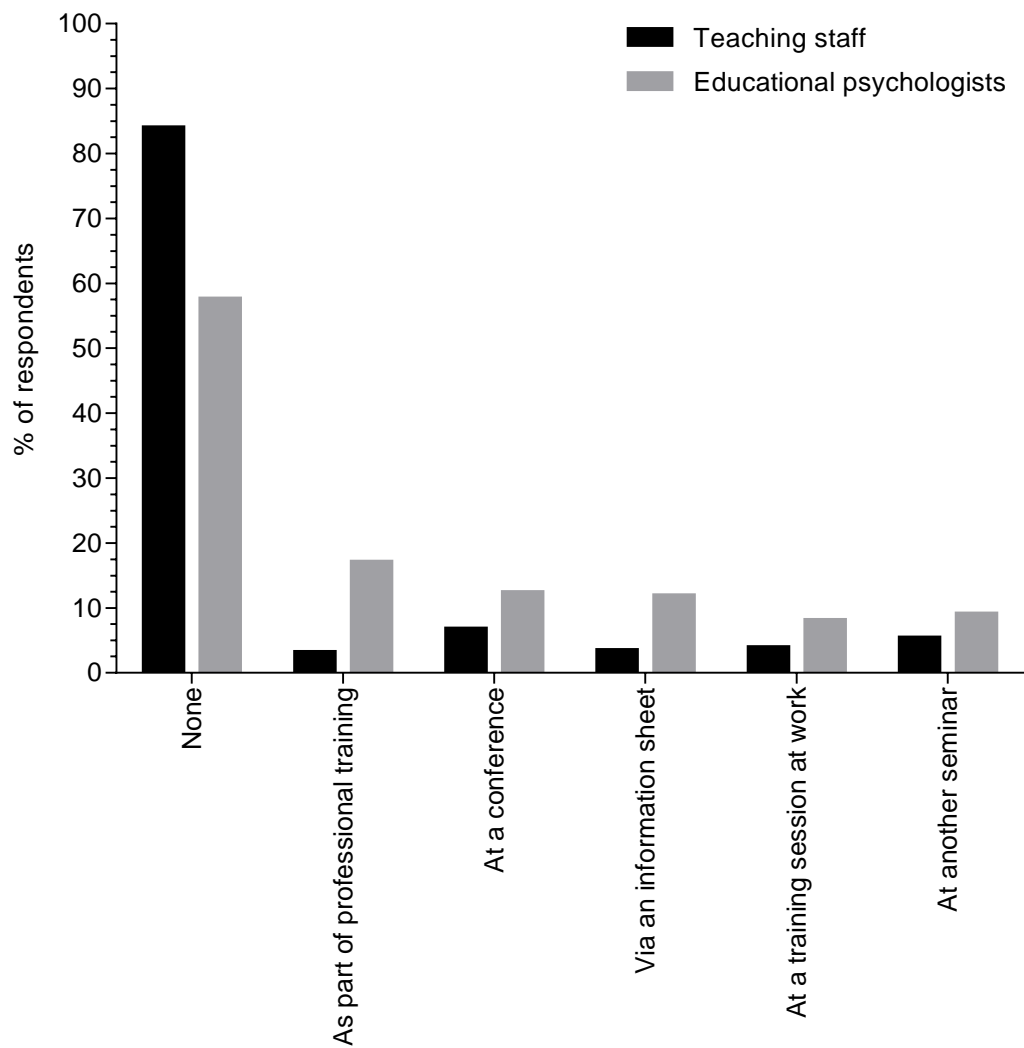


Figure 3. Proportion and method of formal training about preterm birth received by teaching staff and educational psychologists.