A survey of sixth formers' knowledge of early brain development in England

Introduction

Over the last two decades, there has been an explosion in understanding of the importance of the 'critical 1001 days' [1] from conception to two years of age in influencing the life trajectory. While it has long been known that genes, placental functioning, maternal diet and folate intake, exposure to toxins such as alcohol and tobacco, and environmental hazards such as radiation, impact foetal development, new research has demonstrated the impact of maternal stress in pregnancy on early brain development [2]. At birth, the baby's brain is highly 'plastic'; 90% of the growth of the human brain happens in the first 5 years of life[3]. The baby's 'environment of relationships' strongly influences the way in which connections form among the billions of cells in the neocortex[4].

A plethora of studies has built on Bowlby's and Winnicott's pioneering work on attachment[5,6,7]. Studies have reported how babies' embodied communication' enables them to interact before they have a language system[8]; on the adverse impact on the immune system of 'terror without resolution' when babies' distress signals are consistently ignored[9,10,11,12]; on singing and early language development[13,14]; on the role of sensitive parenting in promoting emotional regulation[15,16,17]; on reading to babies[18] and on the importance of play[19]. In response to these and other such studies, the need for 'early intervention' is now well established in health and social care policy[20] and in campaigning by non-governmental organisations such as the WAVE Trust[21] .

Rationale for study

Anecdotal evidence from health visitors, parent educators and Children's Centre staff suggests that many mothers, fathers and co-parents are unfamiliar with new knowledge of early brain

development and how the roots of empathy lie in the baby's early experiences of relationships. The ongoing and often acrimonious debate regarding the pros and cons of 'controlled crying' to encourage babies to sleep through the night testifies to this lack of understanding with both parents and professionals often embracing 'sleep training' despite its known negative impact on very young children[22].

This UK study set out to determine how up-to-date young people's knowledge of early brain development is. It was based on an earlier survey (*Early Brain Development, Parent Knowledge in Ontario*) conducted in 2011 by the Best Start Resource Centre in Ontario, Canada[23] which reported the knowledge of and attitudes towards the care of babies and pre-nursery school children of 512 well-educated parents of 0 to 6 year olds. The survey aimed to help service-providers working with young families to identify key parenting messages and develop effective strategies for promoting knowledge of early brain development in order to enhance 'the social world around the baby'. While the Canadian study provided interesting insights into the knowledge and attitudes of women and men who were *already* parents, it is equally, if not more important, to understand the level of knowledge and the attitudes towards early parenting of young women and men *before* they embark on parenthood. Identifying deficits in the knowledge of such young people would feed into 'early intervention' by providing information to inform the Personal/Social/Health/Economic (PSHE) school curriculum, antenatal education and the care provided by midwives, health visitors and family workers to expectant and new parents.

Survey Instrument

The Best Start Resource Centre was approached in 2013 for permission to use the *Early Brain Development, Parent Knowledge in Ontario*[23] survey (2011) in the UK and permission was granted. The survey consisted of four sections: *Demographics*, *Perceptions and Understanding of Early*

Childhood Development, *Parental Behaviours to Support Early Brain Development*, and *Resource Needs and Usage*. It was devised by a team of experts in mental health promotion, human development, behavioural neuroscience and family health (Early Brain Development: Parent Knowledge in Ontario, 2011: 5-6)[23]. It was therefore decided to retain both the structure and the content of the survey, deleting only those elements from the *Demographics* section which asked respondents about their marital status, pregnancy status, area of residence, household income and for the ages of their child/ren.

The second section, *Perceptions and Understanding of Early Childhood Development*, comprises five forced-choice questions, each one containing 3-6 sub-sections. Respondents are asked about responses to babies' crying*;* skills necessary for 'school readiness'; critical periods in brain development; the impact of stress in pregnancy on the baby; attachment and the role of toys and play in developing babies' brains.

The third section, *Parental Behaviours to Support Early Brain Development*, comprises two forced-choice questions, one with 17 sub-sections and the other, eight. These questions explore respondents' ideas about the degree to which certain parental behaviours (e.g. *comforting them when they are upset*; *reading to them*; *singing to them*; *using flash cards*) affect the development of babies and small children (*major impact*; *minor impact*; *no impact*).

The fourth section, *Resource Needs and Usage*, comprises three forced-choice questions, containing 11, 12 and 9 sub-sections, enquiring about respondents' current use of media, their likely use of named resources if seeking information about babies' development and parenting, and what format they would find most useful if a new resource were to be developed for parents.

In the present study, three open questions asking respondents to list the two or three most important things parents can do to support their baby's or child's brain development, what the respondents most want to know about baby brain development and how to support it, and to list up

to five sources they would consult about babies' development and parenting, are reported in a forthcoming paper.

Schools and Respondents

The three educational institutions that participated in the study were located in the West Midlands of the UK, in the towns of Redditch and Bromsgrove in the county of Worcestershire, and in the town of Hereford in the county of Herefordshire. All three towns have higher White populations than the national UK average (Redditch, 92%[24]; Bromsgrove, 95.8%[25]; Hereford, 93.6%[26]). Redditch has the highest rate of children 'in need' out of the six Worcestershire districts and its rate is almost twice the national average[24], while twelve areas of Hereford are amongst the 25% most deprived in England[26]. By contrast, Bromsgrove is described in its Health and Wellbeing profile as 'healthy and affluent' with child poverty significantly lower than the national average[25].

One of the educational institutions was a sixth form college and the other two were secondary schools which included sixth forms. All were state-funded institutions. A total of 905 young people completed the survey, of whom 479 were female (52.9%) and 426 were male (47.1%). The majority (n=838) were either 16 or 17 years of age (92.5%) and the remaining students (n=67; 7.5%) were 18 and 19. The students were studying a wide range of subjects representative of those available in state schools in England.

Method

All three sixth forms arranged for their students to complete the survey during dedicated tutorial time. All students present on the particular day chosen by the school were invited to participate. One school conducted the survey over two days in order to maximise students' participation.

Guidelines for conducting the survey were sent to the three Head Teachers along with Information for students to be read out prior to their being invited to complete the online survey mounted on Survey Monkey. The survey took no more than 20 minutes to complete and was returned directly to the researcher by each student. School staff had no access to the students' responses. The survey was completed at the three sixth forms between March and October, 2015.

Ethics

The study was approved by the Research Ethics Committee of the University of Worcester, UK. Signed consent for the schools to participate was given by each of the three Head Teachers. The information leaflet for students, which was either handed out or read out prior to students completing the survey, stressed that each individual could choose whether or not to take part, and directed students to their Pastoral Head if the survey raised any difficult issues for them. None of the schools reported that any student had refused to participate or had been upset by the survey, and no school experienced any problems with implementing the survey.

Analysis

This paper reports the findings from the forced-choice questions. Descriptive statistics were used to analyse the data.

Findings

Although all 905 respondents completed the first two demographic questions (gender and age) and 892 out of 905 (98.6%) listed the subjects they were studying at sixth form, not all students responded to subsequent questions. The number of students responding to each question ranged

from 877 (97%) to 833 (92%), with the number answering tending to diminish for the later questions.

Perceptions and understanding of early child development

Almost half of the 877 respondents (n=425; 46.4%) who answered the question about babies' crying did *not* think that 'picking up an infant every time s/he cries will spoil them; however, 25.4% (n=247) *did* think that babies can be 'spoiled' by parents who always respond to their distress and 28.2% (n=255) were unsure. Somewhat at variance with these figures, the majority of respondents (n=544; 62%) thought that the cries of infants and babies up to one year of age did 'indicate a genuine need for attention', and only 17% (n=149) disagreed with 21% (n=184) being unsure.

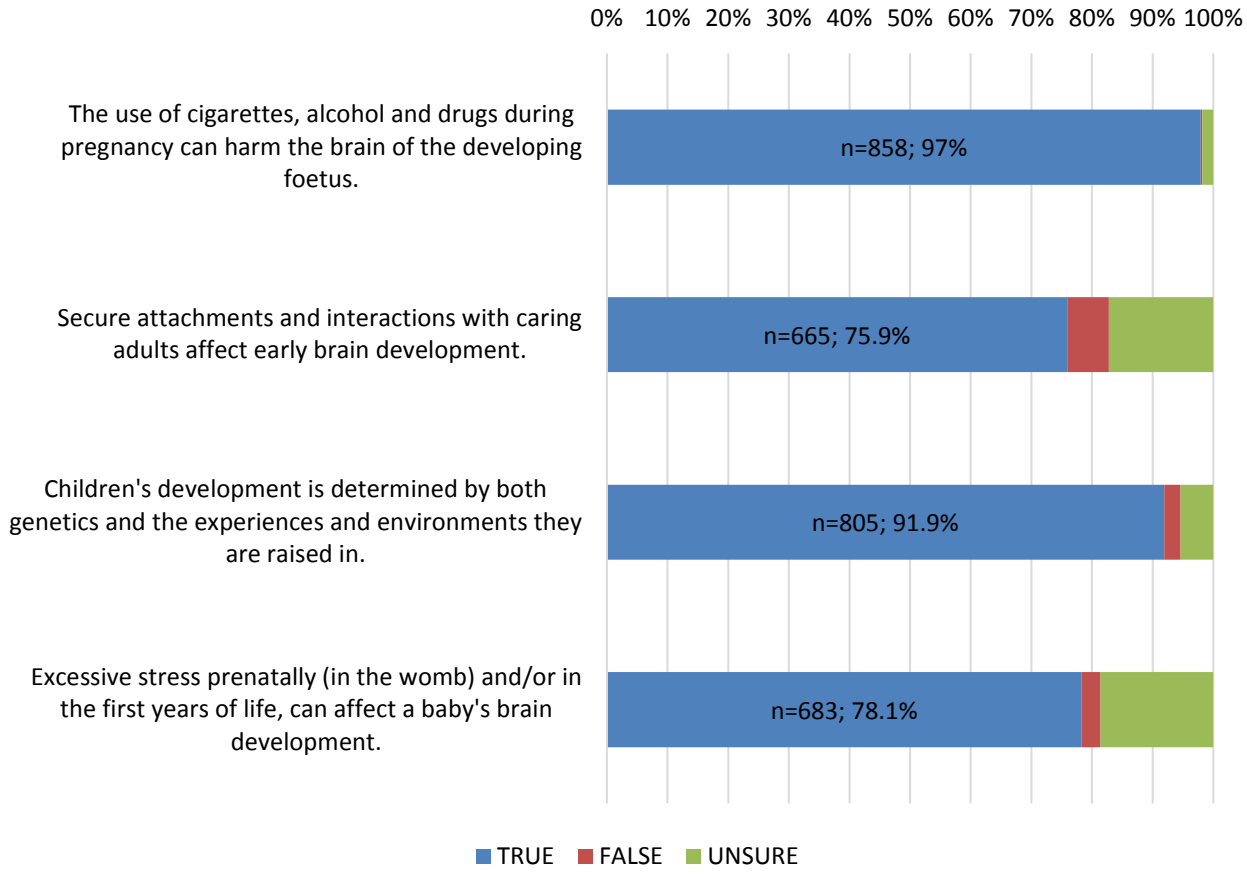
Respondents were asked about the extent to which language is developed in one-year-olds. More than three quarters (n=688; 78.6%) correctly believed that the average one year old can understand more words than they are able to say. When rating the importance of social and emotional skills in relation to school-readiness, 91.5% (n=801) thought that such skills are as important for school readiness as intellectual skills.

Respondents were asked to choose one of three statements describing the plasticity of the brain from birth to age five; the majority (n=775; 89.1%) correctly identified that there are periods during development, such as birth to age five, when the brain is more responsive to stimulation from the environment. Just 2% (n=17) thought that a baby's brain is fully developed at birth and 9% (n=78) that the brain is plastic only during the first five years of life.

Risky health behaviours during pregnancy, such as use of tobacco, alcohol and drugs, were identified by nearly all respondents (n=858; 98%) as harmful to the developing foetus. Most respondents were also aware that secure attachments, the environment in which small children are brought up, and

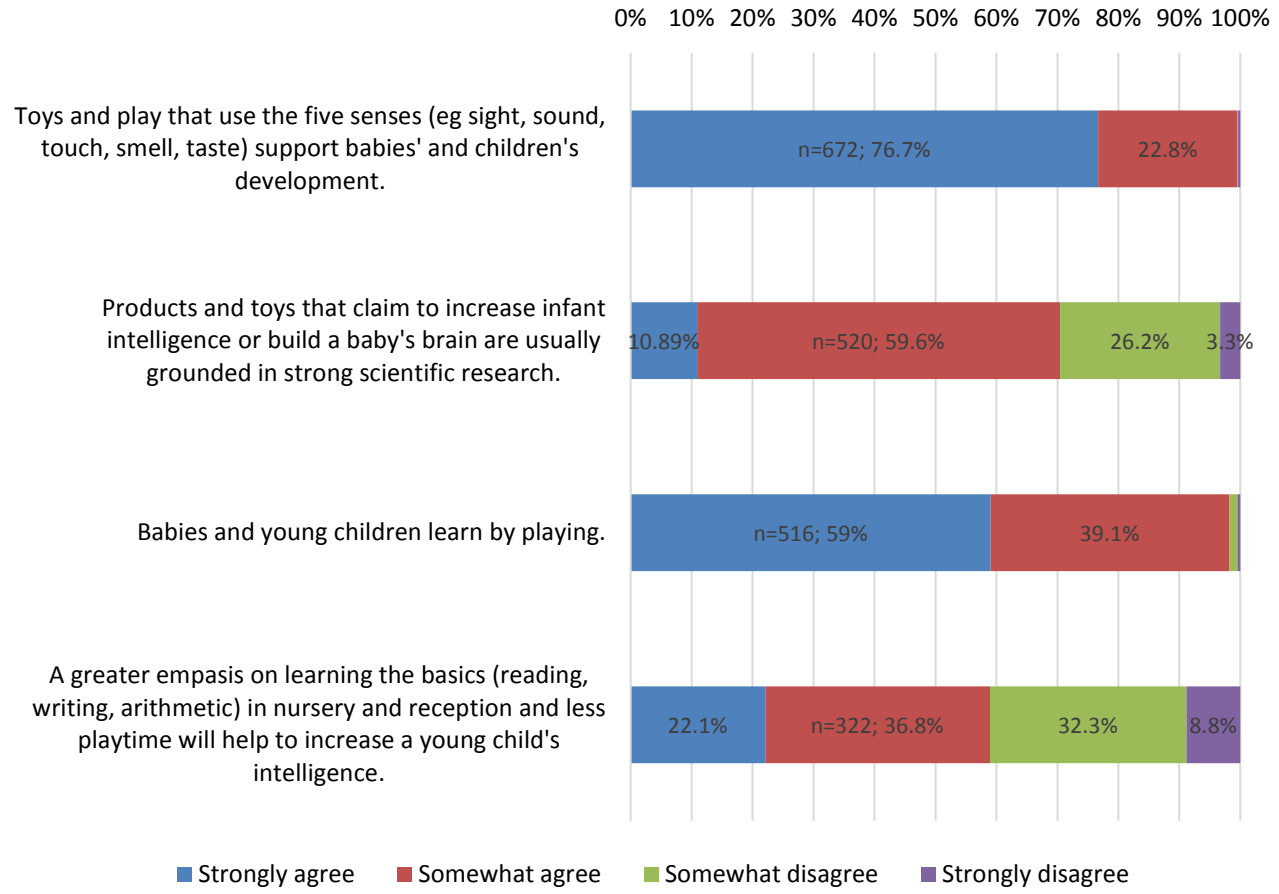
maternal/parental stress can affect the development of the unborn baby and young child, and that development of the brain during the early years of life impacts the life trajectory (Figure 1).

Figure 1: Respondents' understanding of influences on early brain development



The importance of play in stimulating early brain development was explored in four questions (Figure 2).

Figure 2: Responses to statements about the relationship between play and early brain development



Three quarters of respondents (n=672;76.7%) strongly agreed that toys and play that use the five senses support babies' and children's development, but there was less certainty regarding the evidence-base for products and toys that claim to build babies' brains. Nearly 70% of respondents (n=615) thought that there was probably 'strong scientific research' to back up manufacturers' claims. This is not the case, in fact, and 'smart toys' have been described by one professor of cognitive development as 'essentially superfluous or a novelty'[27]. Approximately a third of respondents (n=322; 36.8%) felt that there should be greater emphasis on literacy and numeracy in the early years. Research, however, currently advocates the primacy of play as the means through which children question and think about the world[28].

Parental behaviours to support early brain development

Respondents were asked which of a list of 17 parental behaviours they would consider to have a *major*, *minor* or *no impact* on the development of a child from birth to three years of age. Table 1 rank orders the behaviours according to the importance that respondents attached to them.

Table 1: Respondents' beliefs (rank ordered) about parental behaviours' impact on early development

Activity	Major Impact (%)	Minor Impact (%)	No Impact (%)
1 Feeding them a healthy diet	778(90.2%)	75(8.7%)	10(1.2%)
2 Encouraging and/or praising their efforts	777(90%)	81(9.4%)	5(0.6%)
3 Stimulating their 5 senses	765(89.2%)	86(10%)	7(0.8%)
4 Establishing good sleep routines	749(87%0	102(11.9%)	10(1.2%)
5 Reading to them (sharing picture books and/or reading stories aloud)	730(84.8%)	126(14.6%)	5(0.6%0
6 Playing with them	686(79.6%)	164(19%)	12(1.4%)
7 Comforting them when they are upset	686(79.5%)	169(19.6%)	8(0.9%)
8 Providing the opportunity for daily healthy physical Activity	676(78.5%)	170(19.7%)	15(1.7%)
8 Speaking to them in your home language	672(78.5%)	162(18.9%)	22(2.6%)
10 Cuddling or holding them	605(70.3%)	240(27.9%)	16(1.9%)
11 Setting and enforcing rules	569(66.1%)	257(29.9%)	35(4.1%)
12 Establishing routines	555(64.4%)	278(32.3%)	29(3.4%)
13 Talking with them about feelings / emotions	511(59.3%)	279(32.4%)	72(8.4%)
14 Describing their surroundings	363(42.4%)	401(46.8%)	93(10.9%)
15 Singing to them	254(29.5%)	472(54.8%)	135(15.7%)
16 TVs, DVDs, Computer Programmes and/or Internet Website activities or games	243(28.3%)	493(57.4%)	123(14.3%)
17 Using flash cards	168(19.6%)	419(48.8%)	272(31.7%)

The majority of respondents considered that all the listed behaviours were likely to have some impact on child development, with only a small number considering that these behaviours would have no impact. It is curious that 10 respondents (1.2%) felt that a healthy diet would have *no*

impact on children's early development and that 75 (8.7%) felt that it would only have a *minor* impact.

Developmental psychologists and neuroscientists would consider that 'cuddling or holding' and 'comforting (small children) when they are upset' are vital for the development of a sense of security and self-esteem[29]. Comforting small children when distressed was the 7th ranked item, with 19.6% of respondents (n=169) considering this to have only a *minor* impact on early development; cuddling was ranked 10th, with 27.9% of respondents (n=240) considering this also likely to have only a minor impact. Singing was rated an unimportant activity with 607 respondents (70.5%) considering that it would have little or no impact on a child's development. Singing to babies and children, however, is probably more significant than the respondents realised, given the evidence that it nurtures emotional security and assists language development[30,31]. In accordance with current expert opinion, comparatively few respondents (n=243; 28.3%) considered various electronic media to be significant in relation to early brain development or the use of flash cards (n=168; 19.6%).

Respondents were asked to say at what age parents should begin certain activities with their baby or child in order to have a positive impact on their development (Table 2).

Table 2: Respondents' beliefs (rank ordered) about when key parental behaviours should commence

	From birth (5)	From 1 year (%)	From 2 years (%)	From 3 years (%)	From 4 years (%)
1. Talk to them	823(95.7)	23(2.7)	7(0.8)	3(0.4)	4(0.5)
2. Cuddle, hold or tickle them	802(93.6)	37(4.3)	9(1.1)	7(0.8)	2(0.2)
3. Comfort them when they are upset	796(93.1)	31(3.6)	15(1.8)	9(1.1)	4(0.5)
4. Sing to them	747(88.2)	60(7.1)	21(2.5)	11(1.3)	8(0.9)
5. Feed them a healthy diet	745(86.9)	75(8.8)	23(2.7)	7(0.8)	7(0.8)
6. Read to them (share picture books and/or read stories aloud)	440(51.4)	323(37.7)	65(7.6)	23(2.7)	5(0.6)
7. Show them any of the following tools designed for babies and toddlers: TV, DVDs, computer programmes and/or internet website activities or games	85(10)	165(19.4)	193(22.7)	172(20.2)	235(27.7)
8. Use flash cards	71(8.4)	204(24.1)	222(26.2)	151(17.8)	199(23.5)

The results for this question cast an interesting light on the responses given to the previous one. The majority of respondents considered that birth to one year was the appropriate time to start reading aloud and sharing picture books with babies (n=440; 51.4%), talking to them (n=823; 95.7%), singing to them (n=747; 88.2%), cuddling, holding or tickling them (n=802; 93.6%), feeding them a healthy diet (n=745; 86.9%) and comforting them when upset (n=796; 93.1%). Yet responses given to the previous question (see Table 1) indicated that many respondents did not consider that comforting small children when distressed, cuddling them, or singing to them would have a major impact on their development. It would therefore appear that while respondents think it is important for parents to do certain things with their babies and infants from birth or in the first year of life, they do not necessarily consider these activities will have a major impact on the children's development.

Some of the results are alarming; for example, 93 respondents (10.9%) thought that parents should only start reading to their children when the children were two years of age, and 112 respondents (13.1%) said that feeding babies a healthy diet should commence from when they reached one year of age. This probably suggests that the students did not consider weaning foods to be part of 'a

healthy diet' rather than their considering solid foods should not be commenced until the infant was 12 months of age. Thirty-seven respondents (4.4%) stated that talking to a baby should commence at or after one year of age. Health promotion messages regarding the importance of talking to babies and reading to them from birth would appear, therefore, not to have been universally received.

Resource needs and usage

Respondents were asked how likely it was that they would use various resources in order to get information about babies and children's development and parenting. The results are shown in Table 3.

Table 3: Respondents' likely use of resources on child development and parenting (rank ordered)

	Very likely (%)	Somewhat likely (%)	Somewhat unlikely (%)	Very unlikely (%)
1. Parents/Parents-in-law	609(72.4)	166(19.7)	35(4.2)	31(3.7)
2. Friends/colleagues	528(63.1)	242(28.9)	36(4.3)	31(3.7)
3. Internet	498(59.3)	262(31.2)	53(6.3)	27(3.2)
4. Books	382(45.5)	303(36.1%)	110(13.1)	45(5.4%)
5. Parenting magazines	213(25.6)	322(38.7)	209(25.1)	89(10.7)
6. Brochures/Booklets/Handouts	208(24.8)	375(44.7)	181(21.6)	75(8.9)
7. Brief Online Courses (less than an hour)	171(20.4)	329(39.2)	240(28.6)	100(11.9)
8. You-Tube Videos	157(18.6)	279(33.1)	254(30.1)	153(18.2)
9. Apps	109(13)	189(22.5)	303(36)	241(28.6)
10. Social Media (e.g. FaceBook, Twitter)	107(12.7)	191(22.7)	297(35.2)	248(29.4)
11. e-Newsletters	80(9.6)	262(31.4)	334(40)	159(19)

The majority of respondents would turn to various trusted *people* for information and advice about their babies and parenting. Amongst the 844 students who replied to this question, the resources *very likely* to be used were firstly, parents (n=609; 72.4%), and secondly, friends and colleagues (n=528; 63.1%). Interestingly, despite the fact that these respondents were very much children of the media age, the majority considered it *somewhat unlikely* or *very unlikely* that they would use You-Tube videos (n=407; 48.3%); Apps (n=544; 64.6%); social media (n=545; 64.6%), or e-newsletters (n=493; 59%), although many would be *very likely* to turn to the internet (n=498; 59.3%). Print appears still to be rated highly by these young respondents with 45.5% (n=382) reporting that they would be *very likely* to use books for information; 25.6% (n=213) and parenting magazines; and 24.8% (n=208) to use brochures, booklets or hand-outs.

Respondents were asked what format would be most useful to them if a resource were to be developed for parents about early brain development. Options given in the question comprised Brief Online Course (less than an hour), Brochure/Booklet, Calendar, e-Newsletters, Growth/Development Chart, Set of Activity Cards, Sign to Place on Fridge, Social Media Posting (e.g. FaceBook, Twitter), Telephone Apps, Website, You-Tube Video. The formats most favoured by respondents were a Website (n=402; 48.3%), Brochure/Booklet (n=262; 31.5%), You-Tube Video (n=226; 27.1%) and Growth/Development Chart (n=195; 23.4%). However, none of the options provided were favoured by even half of the respondents.

Finally, respondents were asked to state whether they accessed a variety of media *always/often* or *rarely/never*. Respondents accessed the following media *always/often*:- the internet (n=793; 94.7%), YouTube (n=689; 82.4%), social media (n=684; 82%) and television (n=646; 77.3%), whereas the following media were *rarely/never* accessed:- radio (n=490; 59.5%), newspapers (n=566; 68.9%), cinema ads (n=599; 72.9%), magazines (n=620; 75.6%) and bus/underground ads (n=618; 75.2%).

Discussion

This is a large study of young people's knowledge of parental activities likely to promote early brain development and provides new understanding of the next generation of parents' understanding and knowledge of sensitive parenting. Its strengths lie in the number of respondents (just under 1,000), that they were not selected on the basis of the subjects they were studying at sixth-form, and that they were attending educational institutions in three English towns of varying affluence. However, respondents were probably overwhelmingly White (an assumption based on the likelihood that the demographics of these state schools reflected that of the local population) and it cannot be assumed that a survey including young people from more diverse ethnicities would not have yielded different results.

The findings from the survey reflect those of the only similar study identified in the literature which was reported in 1992. This involved a comparison of 45 pregnant, 39 parenting and 45 non-pregnant adolescents' knowledge of child development and caretaking attitudes[32]. Findings were in line with those from the present study in that non-pregnant adolescent participants tended to underestimate the capabilities of babies and very young children, similar to current respondents' feeling that talking to babies, reading or singing to them from birth would only have a minor impact on their development.

Nearly all the respondents in this survey had an excellent understanding of the hazards posed in pregnancy by tobacco, alcohol and drugs with only 18 young people being unsure about this. The majority also recognised the impact of maternal stress on foetal brain development, although 109 were either unsure about this or felt that this wasn't true. A significant minority of respondents were either not sure whether secure attachments affect early brain development, or thought they didn't. These findings indicate that while messages about healthy pregnancy which have been delivered for many years have successfully impacted on population-level knowledge, 'newer' understandings around maternal stress and attachment may require further elaboration.

Noteworthy findings are that more than half of the respondents thought that babies can be 'spoiled' by too much attention or were unsure about this. Anecdotal evidence from the author's own experience of leading antenatal classes suggests strongly that many parents-to-be are conflicted about whether attention to babies should be restricted, and whether babies can manipulate their carers. These ideas are not supported by a raft of evidence from neuroscience indicating that the young child's brain is not sufficiently developed to be capable of deliberate manipulation because it is, in effect, 'under construction'[33] and from developmental psychology that responding to babies' distress nurtures confident children rather than spoiled ones[22].

It is not encouraging that the importance of reading to babies from birth was recognised by only just over half of the respondents, indicating that campaigns such as those run by the BookTrust to alert mothers and fathers to the benefits of early reading have more work to do.

Respondents' knowledge about the relationship between play and early brain development was insecure. Many believed the claims of manufacturers that their products are 'scientifically proven' to build babies' brains, and more than half felt that it would be valuable to place greater emphasis on literacy and numeracy in the early years in order to increase young children's intelligence. In fact, play underpins the UK's Early Years Foundation Strategy (EYFS) because of its capacity to build children's emotions, creativity, and social and intellectual skills. Yet two fifths of respondents only *somewhat agreed* that 'babies and young children learn by playing'. It is vital to educate about the importance of play to ensure that the next generation of parents is able to provide an optimum developmental environment for their offspring.

Despite respondents' apparent belief in the excellence of manufactured toys in promoting early brain development, they were nonetheless rightly sceptical about the value of trying to support early brain development through the use of television, DVDs, computer programmes and internet activities and games. It was surprising, however, that over one fifth of respondents thought that 'physical activity' had little or no impact on young children's development. This is concerning in light

of recent evidence that a third of children may be starting school with a level of physical development below what might be expected for their age[34] - probably attributable to increasingly sedentary lifestyles even among very young children.

The fact that 91 respondents felt that a healthy diet would have little or no impact on children's early development can only be described as alarming. It is also counter-intuitive that while most respondents were sure of the value of praising young children's efforts, they were less sure of the value of 'cuddling or holding them' with 270 considering this unimportant. It is perhaps the case that recent paedophile scandals have impacted attitudes even towards normal, healthy cuddling of infants and pre-schoolers.

Findings relating to respondents' likely use of resources on child development and parenting were illuminating. Given that the majority use the internet, YouTube, FaceBook and twitter *all the time*, they appeared nonetheless sceptical of the benefits of turning to apps, social media or YouTube for guidance on early parenting, and only three fifths said they would be *very likely* to use the internet. Consistent with findings from other research into preferred sources of advice on health issues[35.36], respondents felt that they would turn first and foremost to parents and parents-in-law and friends and colleagues. This raises an important issue for parent educators about the need to reach out to the key people in new parents' lives, and especially to grandparents, in order to ensure that accurate knowledge is being provided by those who appear to have a significant say in baby care practices. This is in line with literature dating back at least 20 years, to papers written by Peterson & Peterson[37] and Polomeno[38] on the importance of including grandparents in transition to parenthood education, and more recently, with the thrust of organisations such as Family Included which aim to ensure that fathers and other family members are engaged by healthcare workers in a partnership of care for women during pregnancy, labour and the puerperium.

Recommendations for practice

Accurate expectations of young children's behaviour may be one of the key factors which contributes to parents' ability to provide appropriate, age-related and sensitive interactions. Less effective parenting may be due to a lack of knowledge about young children's development. While the relationship between knowledge, attitudes and behaviour remains uncertain and it cannot, therefore, be stated with certainty that improving future parents' knowledge of early brain development will necessarily lead to more sensitive parenting, it seems counter-intuitive that knowledge would be unimportant.

There is considerable scope, therefore, based on the findings of this study, for educating young people about parenting activities that support the all-round healthy development of infants, in particular, about the importance of providing a healthy diet and of physical activity for small children. Early years professionals need to explain the significance of singing to babies in relation to language development, and of play in preference to toys for developing social and cognitive skills. These are topics that could be included in sixth form curricula, and antenatal classes and preparation for parenthood courses. Victorian attitudes which appear to persist around comforting distressed babies ('making a rod for your own back') still need to be challenged, as understanding of the harmfulness of 'stress without resolution' appears to be poor.

REFERENCES

1. Leadsom A, Field F, Burstow P, Lucas C (2013) The 1001 Critical Days: The importance of the conception to age 2 period. A Cross-Party Manifesto. Available at: http://www.andrealeadsom.com/downloads/1001cdmanifesto.pdf (accessed 25 September 2016)

2. Talge NM, Neal C, Glover V (2007) Antenatal maternal stress and long-term effects on child neurodevelopment: how and why? Journal of Child Psychology and Psychiatry, 48(3-4):245-261.

3. Zero to Three (2016) When is the brain fully developed? Available at: https://www.zerotothree.org/resources/1371-when-is-the-brain-fully-developed (accessed 17 September 2016)

4. National Scientific Council on the Developing Child (2009) Young Children develop in an Environment of Relationships, Working Paper 1. Available at: http://developingchild.harvard.edu/wp-content/uploads/2004/04/Young-Children-Develop-in-an-Environment-of-Relationships.pdf. (accessed 17 September 2016)

5. Calkins S and Hill A (2007 Caregiver influences on emerging emotion regulation. In: Gross, J.J. (Ed.) Handbook of Emotion Regulation. New York: Guildford Press, 229-248.

6. Goldberg S (2000) Attachment and Development. London: Arnold.

7. Siegel DJ (1999) The Developing Mind: Towards a Neurobiology of Interpersonal Experience. New York: The Guildford Press.

8. Morganti F, Carassa A, Riva G (2008) Enacting Intersubjectivity: A cognitive and social perspective on the study of interactions. Amsterdam: IOS Press.

9. Perry BD and Pollard R (1998) Homeostasis, stress, trauma & adaptation: A neurodevelopmental view of childhood trauma. Child & Adolescent Psychiatric Clinics of North America, 7:33-51.

10.Teicher MH, Andersen SL, Polcari A et al. (2003) The neurobiological consequences of early stress and childhood maltreatment. Neuroscience and Biobehavioral Reviews, 27:33-44.

11. Sroufe LA, Duggal S, Weinfield N et al. (2000) Relationships, development and psychopathology, Ch. 5 in: Sameroff AJ, Lewis M, Miller SM (Eds.) Handbook of Developmental Psychopathology (2nd ed.) New York: Kluwer Academic/Plenum Publishers.

12. Bremner JD (1998) Effects of stress on memory and the hippocampus throughout the life cycle. Implications for child development and ageing. Developmental Psychology, 10(4):871-85.

13. Brandt A, Gebrian M, Slevc, LR (2012) Music and early language acquisition. Frontiers in Psychology, 3:327.

14. Shenfield T, Trehub SE, Nakata T (2001) Maternal singing modulates infant arousal. Psychology of Music, 31(4):365-375.

15. Panksepp J, Biven L (2012) The Archaeology of the Mind. New York: WW Norton & Co.

16. Couperus JW and Nelson CA (2006) Early brain development and plasticity. In: McCartney K and Phillip D (Eds.) Blackwell Handbooks of Early Child Development. Malden, US: Blackwell Publishing, 85-105.

17. Fonagy P, Gergely G, Jurist EL et al. (2002) Affect Regulation, Mentalization and the Development of the Self. New York: Other Press.

18. Mol SE, Bus AG (2011) To read or not to read: A meta-analysis of print exposure from infancy to early adulthood. Psychological Bulletin, 137(2):267-296.

19. Play for a Change (2008) Available at: http://www.playengland.org.uk/media/135795/play-for-a-change-chapter-3.pdf (accessed 9 September 2016)

20. Department of Health (2013) The National Health Visitor Plan. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/208960/Implementing_the_Health_Visitor_Vision.pdf (accessed 25 September 2016)

21. WAVE Trust (2013) Conception to age 2: The age of opportunity Available at: http://www.wavetrust.org/sites/default/files/reports/conception-to-age-2-full-report_0.pdf (accessed 25 September 2016)

22. Leach P (2015) Controlled Crying: What parents need to know. International Journal of Birth and Parent Education, 2(4):13-17.

23. Best Start Resource Centre (2011) Early Brain Development: Parent Knowledge in Ontario. Ontario, Best Start Resource Centre.

24. Redditch Health and Well-being Profile October 2013. Available at: www.worcestershire.gov.uk/jsna (accessed 24 October 2016)

25. Bromsgrove Health District Profile 2015. Available at: HealthProfile2015Bromsgrove47UB.pdf (accessed 24 October 2016)

26. Hereford County Council, Facts & Figures about Herefordshire, 2015. Available at: https://factsandfigures.herefordshire.gov.uk/about-a-topic/inequalities-and-deprivation (accessed 24 October 2016)

27. Schafer G (2015) How smart are connected toys? The Guardian, 16 July. Available at: https://www.theguardian.com/technology/2015/jul/16/how-smart-are-connected-toys (accessed 3 September 2016)

28. Broadhead P and Burt A (2012) Understanding Young Children's Learning through Play: Building playful pedagogies. London: Routledge.

29. Perry BD (2003) Effects of traumatic events on children. The Child Trauma Academy. Available at: http://www.mentalhealthconnection.org/pdfs/perry-handout-effects-of-trauma.pdf (accessed 25 September 2016)

30. Bergeson T, Trehub S (1999) Mothers' singing to infants and preschool children. Infant Behaviour and Development, 22(1):51-64.

31. Milligan K, Atkinson L, Trehub S et al. (2003) Maternal attachment and the communication of emotion through song. Infant Behaviour and Development, 26:1-13.

32. Stern M and Alvarez A (1992) Knowledge of child development and caretaking attitudes: A comparison of pregnant, parenting and nonpregnant adolescents. Family Relations, 41:297-302.

33. Balbernie R (2013) How maltreatment affects development in the early years. International Journal of Birth and Parent Education, 1(2):23-26.

34. Duncombe R (2016) Are your children ready for school? i Wednesday 17 September: 26-27.

35. Milmo C (2016) 'Kevin and Perry' teen attitude doesn't ring true. i 12 September: 7.

36. McDougall P (2003) Weaning: Parents' perceptions and practices. Community Practitioner, 76.1:25.

37. Peterson KJ, Peterson FL (1993) Family-centered perinatal education. AWHONN's Clinical Issues in Perinatal and Women's Health Nursing, 4(1):1-4.

38. Polomeno V (1999) Perinatal education and grandparenting: Creating an interdependent family environment. Part I: Documenting the need. The Journal of Perinatal Education, 8(2):28-38.