Children playing on Nintendo DS handheld games console, Spain © *Alex Segre / Alamy*

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The Impact Of Screen Media On Children: A Eurovision For Parliament

by Dr Aric Sigman
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Introduction

The EU discusses many aspects of its citizens' lives. Yet the main waking activity of Europeans – watching screen media – has never been thought of as an issue requiring parliamentary consideration. Over the course of childhood, children spend more time watching TV than they do in school (Zimmerman et al 2007a). The average seven-year-old will have already watched screen media for more than one full year of 24-hour days. By age 18 the average European young person will have spent a full 4 years of 24-hour days in front of a screen.

But screen time is no longer merely a cultural issue about how children spend their leisure time. Screen time has now become a medical issue. Research published in the world's most reputable medical and scientific journals shows that the sheer amount of time children spend watching TV, DVDs, computers and the internet is linked with significant measurable biological changes in their bodies and brains that may have significant medical consequences.

Given that children undergoing key stages of development are spending increasingly large parts of their lives watching screen media, the EU must take a serious interest and establish a view on the matter. The following will provide the reasons why.

"There is no data to substantiate the claim that young children need to learn to become comfortable with screen technology. (Linn & Poussaint 1999)

Quality versus Quantity

The advocates of introducing young children to screen media contend that it is the 'quality' of what the children see on the screen – the content – that is critical. It is suggested that provided what the young child sees on the screen is 'educational' and 'age-appropriate' that screen media is at worst harmless. Moreover, there is an implicit message that not to expose young children to this screen material puts them at a developmental and educational disadvantage. There is also the strong belief that children have to start using screen technology early or they will in some way be intimidated by it, or be less competent at using it later on in life. It is vital for them to learn to handle screen media, because this is the way they will work in the future. However, research has found that even monkeys are comfortable with, and capable of using, the same screen technology that children are exposed to (Deadwyler et al., 2008; Tulane University, 2006). In order to redress this misconception researchers at Harvard Medical School have stated, "There is no data to substantiate the claim that young children need to learn to become comfortable with screen technology. The fact that children like something, or parents think they do, does not mean that it is educational, or even good for them. Children like candy, too." (*Linn & Poussaint 1999*)

Just because children are interested in doing something, that does not mean that it is in their best interest to do it. And so this argument appears to be more of a commercial claim, as children and adults can acquire computer skills much later.

While this trend in introducing screen media in early childhood is gathering strength, a growing body of empirical evidence – most of it from beyond the domains of media studies, education and psychology is providing a very different account *(Sigman, 2007, a, b; 2009; 2010*). There seems to be a direct conflict between the advocates of screen media in early childhood, on the one hand, and the warnings arising from studies in paediatric medicine and biology, on the other. Specifically it is the age at which the child starts to watch screen media and the time spent during a child's early years looking at and relating to the medium of the screen that is the central factor. It is the *medium* itself that should concern us, and not merely the content of young children's experiences with screen media.

This concern is not based on an anti-technology or anti-television philosophy. The concerns are based purely on the premature use or overuse of screen media in children whose brains and bodies are not yet fully formed. And there are now sound medical reasons for delaying the introduction of screen media to children.

In 1999, the American Academy of Pediatrics (AAP) issued guidelines recommending that

children under the age of two watch no screen entertainment at all because television 'can negatively affect early brain development' (AAP,1999). In 2006 they issued another statement on 'TV and Toddlers':

'It may be tempting to put your infant or toddler in front of the television, especially to watch shows created just for children under age two. But the American Academy of Pediatrics says: Don't do it! These early years are crucial in a child's development. The Academy is concerned about the impact of television programming intended for children younger than age two and how it could affect your child's development.' (AAP, 2006) And in late 2011 they've gone further, *'media —both foreground and background— have potentially negative effects and no known positive effects for children younger than 2 years.' (AAP 2011b)*

The U.S Department of Health and Human Services (USDHHS, 2010) has announced a 'national 10-year health promotion and disease prevention objective', a main aim of which is to increase the proportion of children aged 0 to 2 years who view no television or videos on an average weekday, and increase the proportion of children and adolescents aged 2 years through 12th grade [18yrs] who view television, videos, or play video games for no more than 2 hours a day.'

'Television viewing hurts the development of children under three years old and poses a certain number of risks, encouraging passivity, slow language acquisition, over-excitedness, troubles with sleep and concentration as well as dependence on screens ... even when it involves channels aimed specifically at them.' (High Audiovisual Council, 2008)

The Australian government is now considering a similar national policy guideline. And it is highly significant that the French government has recently banned French channels from airing all TV shows – 'educational' and otherwise – aimed at children under three years of age. It has declared:

'Television viewing hurts the development of children under three years old and poses a certain number of risks, encouraging passivity, slow language acquisition, over-excitedness, troubles with sleep and concentration as well as dependence on screens ... even when it involves channels aimed specifically at them.' (High Audiovisual Council, 2008) Preschool institutions in Belgium, including those just down the street from the European Parliament, now have similar warnings posted on their walls.

Discussion of screen media and children is dominated almost entirely by experts in media studies and e-learning. Yet, their expertise is not in child health, but in *media* and how children interact with it. We must ask ourselves how we would feel if a discussion about child diabetes, cholesterol levels and obesity in Europe was conducted by gourmet experts on how children interact with a hamburger and French fries as opposed to a scientist who studies the effect that the hamburger and French fries has on the child's bloodstream.

Research should come from academics associated with child health and not from those whose expertise is media and how children relate to it. Research funds and conferences are often supported by the enormous corporate spending of large technology industries.

Another point of confusion is a modern emphasis on differentiating between different technology devices and their related activities: watching TV, playing computer games, surfing the internet, instant messaging, smart phones or any other screen exposure. Yet these are only different market sectors and while adults distinguish between these various activities, the young brain and body generally does not. Many of the effects presented below occur whether the child is sitting in front of a computer or a TV and occur irrespective of what they are watching.

The following can only provide a brief overview of the scientific research on the potential negative effects of screen media. These are the studies that decision makers generally do not know about.
At current TV viewing levels alone, by the age of 80 the average European will have spent a full 13.3 years of 24-hour days of their lives watching television. In other areas of child health and development, when considering the potential effects of profound new developments, the EU instinctively adopts a principle of precaution. Yet even at the level of 13.3 TV viewing years, any consideration of screen time as a major health and developmental issue is conspicuous by its absence.

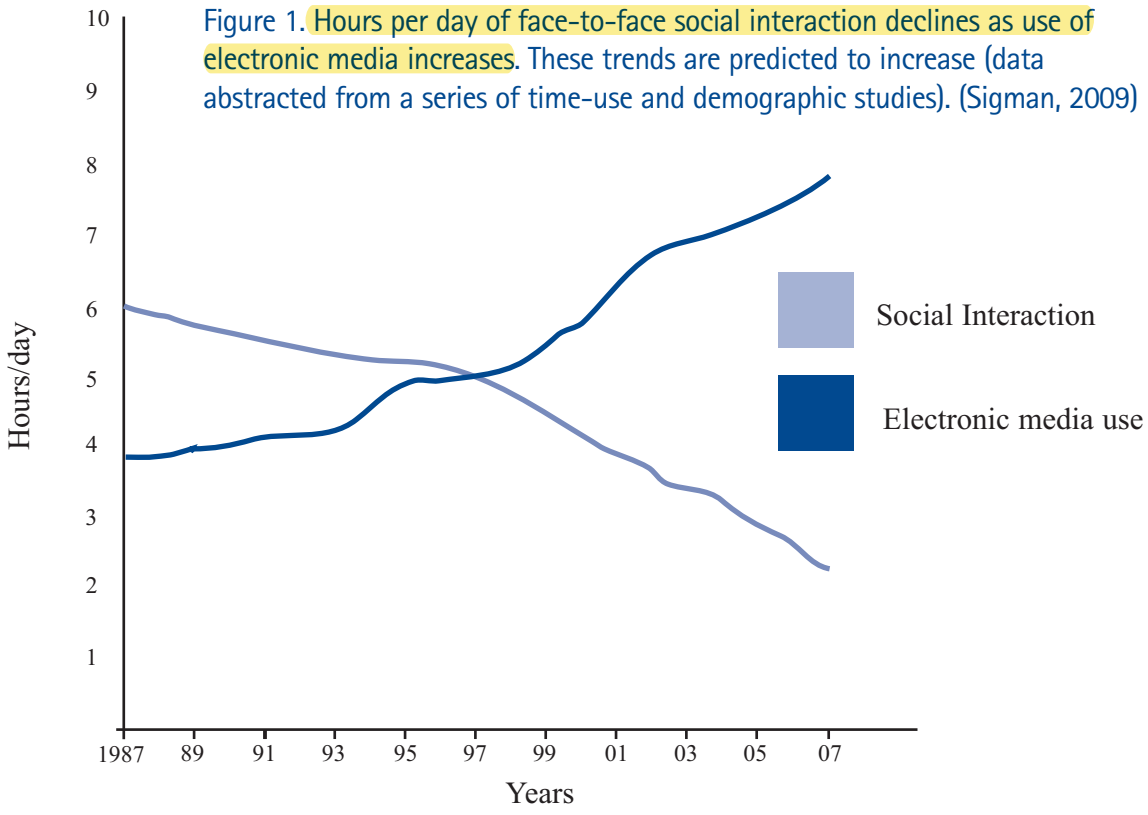

Figure 1. Hours per day of face-to-face social interaction declines as use of electronic media increases. These trends are predicted to increase (data abstracted from a series of time-use and demographic studies). (Sigman, 2009)

Over the last twenty years social interaction (eye-to-eye contact) has gone down while eye-to-screen-contact has gone up. Just before the year 2000 life became literally virtual: people would spend more time in front of a screen than spending time interacting with other human beings.

Time spent in front of screens

Much of the concern regarding screen media is based on the average number of hours a day children spend watching screen media, this is now often referred to as the 'dose' of screen media 'consumed'.

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Studies at Stanford University have led to a 'displacement' theory of internet use:
"In short, no matter how time online is measured and no matter which type of social activity is considered, time spent on the Internet reduces time spent in face-to-face relationships ... an hour on the Internet reduces face-to-face time with family by close to twenty-four minutes." (Nie et al., 2005)

Consumption of a high dose of screen media starts early in life. By 3 months of age 40 per cent of infants are regular viewers of television, DVDs or videos, and by the age of 2, this number increases dramatically to 90 per cent (Zimmerman et al., 2007b). In the United States as elsewhere, children under 8 are spending more time than ever in front of screens. A new study, Zero to Eight: Children's Media Use in America, found almost half of infants watch daily "TV or DVDs, and those who do watch spend an average of nearly two hours doing so.' Nearly one in three infants has a TV in their bedroom. (Zero to Eight, 2011)

The British Office of Communications has recently announced 'TV viewing is still growing, with children watching more TV than ever ...viewing figures increasing by 2 hours [per week] since 2007'. And so is other screen time: *'8-11s are also spending more time playing on games players/ consoles compared with 2010 (an increase of nearly 2 hours).' Seven in ten play computer and video games 'almost every day, up from 59 per cent in 2010.'*
(Ofcom, 2011)

In fact the British government's TV Licensing unit reports *'People of all ages are watching more TV than ever before, an average of 4 hours and 20 minutes per day, this doesn't include the TV watched on equipment other than TV sets. People are also filling their homes with more televisions than ever.' (TV Licensing, 2011).*

British children aged 11–15 spend 55 per cent of their waking lives – 53 hours a week, seven and a half hours a day – watching screen media – an increase of 40 per cent in just a decade (BMRB, 2004).

Scientists are now witnessing compound effects. Children and teenagers are spending an increasing amount of time using 'new media' like computers, the internet, iPod videos and video games, without cutting back on the time they spend with 'old' media like television. Instead, because of the amount of time they spend using more than one screen at a time, they're managing to pack increasing amounts of media content into the same amount of time each day, and at younger and younger ages (Kaiser Family Foundation, 2005; Childwise Monitor, 2008).

The European range of average screen time lies between four to eight hours per day. Northern countries tend to have more hours of screen time and southern countries have less among children. One thing is clear: children have more screens available to them and they now spend *more* time watching TV, playing with computers and surfing the internet at younger ages.

The age at which children start viewing screens and the number of hours watched per day are increasingly linked to negative physiological changes and medical consequences. There appears to be a 'dose-response relationship' with more hours per day linked to greater likelihood that negative effects will appear, often years later, in the child.

Effects

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A general example of this is found in a study published in the American Medical Association journal *Archives of Pediatric and Adolescent Medicine* entitled Prospective Associations Between Early Childhood Television Exposure and Academic, Psychosocial, and Physical Well-being by Middle Childhood', which examined television exposure at 29 months and 53 months and the later effects on the children when they reached the age of 10. The researchers concluded "Although we expected the impact of early TV viewing to disappear after seven and a half years of childhood, the fact that negative outcomes remained is quite daunting". Specifically, they found that "every additional hour of TV exposure per day among toddlers corresponded to a future decrease in classroom engagement and success at math, increased victimization by classmates, a more sedentary lifestyle, higher consumption of junk food and, ultimately, higher body mass index...

Between the ages of two and four, even incremental exposure to television delayed development ... we might have expected the prospective associations to disappear after 5 years. Remarkably, the results suggested adverse effects despite having a low-risk sample, making the "potential for harm" public health argument stronger.' (Pagani et al., 2010)

Hormones

Melatonin is a sleep-promoting hormone produced in the brain. As it grows dark melatonin levels rise and help facilitate sleep. Researchers have recently reported that when children aged 6-12 were deprived of their TV sets, computers and video games, their melatonin production increased by an average 30%. Exposure to a screen media was associated with lower urinary melatonin levels, particularly affecting younger children at a stage of pubertal development when important changes in melatonin's role take place. The lead author speculated that girls are reaching puberty much earlier than in the 1950s. One reason is due to their average increase in weight; but another may be due to reduced levels of melatonin. Animal studies have shown that low melatonin levels have an important role in promoting an early onset of puberty. (Salti et al, 2006)

Another study published in the American Medical Association journal Archives of Pediatric and Adolescent Medicine found an association between daily screen time (ST) (i.e. television/DVD/video and computer use) in mid-adolescence and risk factors for cardiovascular disease and type 2 diabetes. Analysing blood samples in adolescent boys revealed that those boys with ST of 2 or more hours per day on weekdays have twice the risk of abnormal levels of insulin and HOMA-Insulin Resistance compared with boys with ST of less than 2 hours per day on weekdays indicating a greater risk for developing cardiovascular disease and type 2 diabetes. (Hardy et al 2010)

Metabolism and Body Fat

It's hardly surprising that spending hours a day sitting inert rather than running about does not make children fit. But research increasingly identifies screen-viewing as an *independent* and significant factor in child obesity: even more significant in some cases than diet and the amount of physical activity undertaken. In fact, watching screen time appears to lead to more body fat than other sedentary activities, such as reading.

A European study involving preschool children on screen time and body fat found that, " Each extra hour of watching TV was associated with an extra 1 kg of body fat ... Preschool children who watch more TV are fatter and are less active" (Jackson et al 2009) Another study of New Zealand children monitored screen time and body fat at ages 1, 3, 5 and finally at age 7 and found, *"hours of television viewing to be independently associated with Percentage of Body Fat at 7 years ... interventions need to start early [preschool]" (Blair et al 2007)*

But how does TV actually increase body fat? In the Journal of the American Medical Association, Harvard researchers reported that beyond merely displacing physical activity, TV appears to slow metabolism and burns fewer calories compared with other sedentary activities such as sewing, reading, writing or driving a car. They added, *"prolonged TV watching ... directly related to obesity and diabetes risk." (Hu FB et al 2003)* Another study found that children's resting metabolism decreased as average weekly hours of TV viewing increased. *(Cooper et al 2006)*

Watching television also makes us eat significantly more, even if we are not physically hungry. A recent US study found that even children who watched a below average amount of television (less than three hours a day for an average of 2.7 days a week) ate roughly the equivalent of an extra meal a day more than those who watched none. *(Stroebele & de Castro 2004)*

This is not just because of all those tempting food advertisements so cunningly placed in the breaks. One of the reasons is that our brain is monitoring external, non-food cues - the television screen - rather than internal food cues telling us that we have eaten enough.

Experiments have found that when distracted in this way we continue to salivate in response to more and more food when normally we would not. A study concluded that watching television can disrupt the natural link between appetite and eating. (Temple et al 2007)

And the effects on increased appetite may continue long after the screen is turned off and viewing stops. A study in the journal *Appetite* of females in late adolescence found that the 'effects of television watching on food intake extend beyond the time of television watching to affect subsequent consumption ... [TV] increases afternoon snack intake of young women." *(Higgs & Woodward 2009)*

The journal *Physiology & Behavior* reported the findings of an experiment whereby one group of female students was placed in front of a computer and asked to read a document and write a summary of 350 words on-screen, while another group was asked to simply relax for 45 minutes in a chair. Those doing the computer-based task burnt just three more calories than the others, but ate much more food when given access to a buffet afterwards: an extra 230 calories. The researchers describe screen media as "obesogenic". *(Chaput & Tremblay 2007, Chaput et al 2010)*

These findings occur at a time when 75 per cent of evening meals in the UK are eaten in front of the television.

Fortunately, a study by academics at the medical schools of Stanford University and the

State University of New York offers good news. They studied the effects of screen-watching on the weight of 70 four to seven- year-olds in the fattest 25 per cent of the population.

The children were divided into two groups: one had its TV and computer viewing reduced by half; the other did not. After two years, there had been a significant reduction in the body mass index (BMI) of those who had halved their screen-viewing and relatively little in those who hadn't.

> *"Reducing television viewing and computer use may have an important role in preventing obesity and in lowering BMI in young children," adding that putting a television in a child's bedroom might increase the risk of obesity more than televisions in family spaces. (Epstein et al 2008)*

The academics conclude: "Reducing television viewing and computer use may have an important role in preventing obesity and in lowering BMI in young children," adding that putting a television in a child's bedroom might increase the risk of obesity more than televisions in family spaces. (Epstein et al 2008)

Cardiovascular Disease

A joint American-European study has identified TV screen hours as being associated with increased blood pressure (hypertension) in children. The researchers believe that the *'risks may be immediate and not just indicative of potential future problems" (Martinez-Gomez et al 2009)*

A previous study in the American Journal of Preventive Medicine looked at children who were already overweight and found that the 'severity of obesity and daily TV time were significant independent predictors' of high blood pressure in these children. Children watching 2 to 4 hours of TV a day had 2.5 times the likelihood of having high blood pressure compared with children watching 0 to less than 2 hours. While those children watching 4 or more hours of TV were 3.3 times more likely to have high blood pressure. *(Pardee et al 2007)*

The Spanish National Research Council has found a link between 'TV viewing and Cardiovascular Disease Risk Factors in Adolescents'. After analysing blood tests, those adolescents watching more than 3 hours per day were found to have 'significantly less favourable' levels of HDL-cholesterol, glucose, apolipoprotein A1, and overall cardiovascular disease risk scores. The researchers also observed a 'negative influence of TV viewing on waist circumference.' *(Martinez-Gomez D et al 2010)*

Over the long term a picture is emerging. For example, a study published in The Lancet, conducted at the Dunedin School of Medicine, University of Otago, New Zealand, tracked the television viewing habits and health of 1,000 children over 26 years. It found that children who watched more than two hours of television a day between the ages of five and 15 developed significant health risks many years later. The study concluded that 15 per cent of cases of raised blood cholesterol, 17 per cent of obesity, and 15 per cent of poor cardiovascular fitness were linked to the television viewing that took place years before when the adults were children, irrespective of other factors. (Hancox et al, 2004)

Mortality

Taking the above findings to their potential outcome, several new studies have found a link between TV viewing time and life expectancy. In a new study 'Television viewing time and reduced life expectancy', researchers concluded that *'TV viewing time may be associated with a loss of life that is comparable to other major chronic disease risk factors such as physical inactivity and obesity.' (Veerman, 2011)*

Research published in a journal of the American Heart Association followed 8,800 adults aged 25 or older for approximately 6.5 years and found that each daily hour of television viewing was associated with an 18% increase in death from heart disease and an 11% increase in overall mortality from a variety of causes. Those adults watching 4 or more hours per day were 80% more likely to die of cardiovascular disease than those watching 2 hours or less and 46% more likely to die from any of a variety of causes. The findings were independent of whether the person was overweight and it was suggested that that prolonged TV viewing has *"an unhealthy influence on blood sugar and blood fats." (Dunstan, 2010)*

Another new study of 'Screen-Based Entertainment Time, All-Cause Mortality, and Cardiovascular Events' finds that specific biological changes play a significant role in the link between screen time and death. 'Approximately 25% of the association between screen time and cardiovascular disease events was explained collectively by C-reactive protein, body mass index, and high-density lipoprotein cholesterol. Recreational sitting, as reflected by television/screen viewing time, is related to raised mortality and cardio vascular disease risk regardless of physical activity participation. Inflammatory and metabolic risk factors partly explain this relationship.' *(Stamatakis et al 2011)*

> *"The message is simple. Cutting back on TV watching can significantly reduce risk of type 2 diabetes, heart disease, and premature mortality," said senior author Frank Hu, professor of nutrition and epidemiology at Harvard School of Public Health.*

A joint U.S and European study covering data from the United States, Europe, and Australia has come up with similar findings and a strategy: "The message is simple. Cutting back on TV watching can significantly reduce risk of type 2 diabetes, heart disease, and premature mortality," said senior author Frank Hu, professor of nutrition and epidemiology at Harvard School of Public Health. *"We should not only promote increasing physical activity levels but also reduce sedentary behaviors, especially prolonged TV watching,"*
(Grøntved & Hu 2011)

Researchers increasingly believe that sitting down and doing nothing versus sitting down and using screen technology are medically not the same thing and *'must be considered independently of each other because each may be important in the development and prevention of cardiovascular disease.'*
(Martinez-Gomez et al 2010)

Physical Fitness

Children's aerobic and muscle fitness has declined significantly in the last 10 years. A study recently published in Acta Paediatrica found that in 10 year olds, arm strength has dropped by 26 per cent while the ability to do sit ups has fallen by 27 per cent. The scientists reported that children's bodies are now 'made up of more fat and less muscle' and that 'more time spent in sedentary behaviours like watching TV or playing computer games are the most likely causes'. (Cohen et al 2011) Health-related physical fitness has dropped for children in other parts of the world too.
Some researchers now believe we must consider screen time and lack of physical activity as separate issues. The European Youth Heart Study found that *'TV viewing and physical activity are independently associated with metabolic risk in children' and therefore 'preventive action against metabolic risk in children may need to target TV viewing and physical activity separately.' (Ekelund et al 2006)*

> *by reducing children's screen time, they may naturally become more physically active without adults doing anything else at all. (Motl et al 2006)*

Some promising research from the Department of Public Health at Cornell University has suggested that there is a strong and naturally occurring inverse relationship between screen time and physical activity. And that by reducing children's screen time, they may naturally become more physically active without adults doing anything else at all. The idea, that adults have to do something for children or with them, or otherwise they will not be active, is not true. Naturally occurring physical activity can be seen in the many countries I've visited and observed around the world where children have little or no access to screen media. *(Motl et al 2006)*

The Brain

While playing computer games is thought to be more stimulating than passively watching a cartoon, evidence indicates that even this interactive media is associated with limited neurological activity. For example, a study looking at differences in cerebral blood flow between children playing computer games and children doing very simple repetitive arithmetic adding up single digit numbers, found that computer games only stimulated activity in those parts of the brain associated with vision and movement as compared to arithmetic-stimulated brain activity. In contrast, adding up single digit numbers activated areas throughout the left and right frontal lobes. Playing computer games did not. The findings were described by the World Federation of Neurology as *"[computer games are] halting the process of frontal lobe development and affecting children's ability to control antisocial elements of their behaviour ... alarmingly, computer games stunted the developing mind". (Kawashima, 2001).*

Interestingly, a new study in the medical journal Pediatrics has examined the impact of only a small number of minutes of TV cartoon viewing on the intellectual functions carried out by the brain's frontal lobes in 4-year-old children. These 'prefrontal' skills are referred to as a child's executive function which underlies goal-directed behaviour, including attention, working memory, inhibitory control, problem solving, self-regulation, and delay of gratification. Executive function is increasingly recognized as key to positive social and cognitive functioning and is strongly associated with success at school.
The results were that *'Just 9 minutes of viewing a fast-paced television cartoon had immediate negative effects on 4-year-olds' executive function. ... a result about which parents of young children should be aware.' (Lillard & Peterson 2011)*

> *Adolescents spending excessive amounts of time on the internet - referred to by some as 'internet addiction' - have been found to have 'multiple structural changes' deep within the brain.*

Adolescents spending excessive amounts of time on the internet - referred to by some as 'internet addiction' - have been found to have 'multiple structural changes' deep within the brain. The 13 researchers from 7 institutions discovered that several small regions in these adolescents' brains were smaller, in some cases as much as 10 to 20 percent. Furthermore, surface-level brain matter appears to shrink in line with the duration of 'internet addiction'. The study's authors suggest this brain shrinkage could lead to negative effects, such as reduced inhibition of inappropriate behavior and diminished goal orientation. (Yuan et al 2011) A new study is even more specific, reporting 'widespread reductions' in the condition and size of brain cells in 'major white matter pathways... throughout the brain, including the orbito-frontal white matter, corpus callosum, cingulum, inferior fronto-occipital fasciculus, and corona radiation, internal and external capsules,'. (Lin et al, 2012)

Sleep Disturbances

An increasing number of studies have found that children are getting less sleep than previous generations and are experiencing more sleeping difficulties. New research has found a significant relationship between exposure to television and sleeping difficulties in different age groups ranging from infants to adults.
A study of 2068 children found that television viewing among infants and toddlers was associated with irregular sleep patterns. The number of hours of television watched per day was independently associated with both irregular naptime schedule and irregular bedtime schedules. (Thompson and Christakis 2005) Another study of 5-6 year olds found that both active TV viewing and background 'passive' TV exposure was related to shorter sleep duration, sleeping disorders, and overall sleep disturbances. Moreover, passive exposure to TV of more than two hours per day was strongly related to sleep disturbances. TV viewing and particularly passive TV exposure "significantly increase the risk of sleeping difficulties ... parents should control the quantity of TV viewing and ... limit children's exposure to passive TV." (Paavonen et al, 2006).

A study at Columbia University found that young adolescents who watched three or more hours of television a day ended up at a significantly increased risk for frequent sleep problems as adults. Remember that this amount of screen time is actually less than the average. On the other hand, those adolescents who reduced their television viewing from one hour or longer to less than one hour per day experienced a significant reduction in risk for subsequent sleep problems (Johnson et al, 2004).

Triggering Autism?

Autism is a complex disorder, thought to have a genetic basis which may be activated by other things. A study at Cornell University now suggests that early childhood screen viewing may be such a trigger for autism. (Waldman et al 2006, 2008)

Attentional Damage

Screen media are associated with alterations in the child's developing attentional system. A study of 2,500 children, published in the journal Pediatrics, looked at whether early exposure to television during critical periods of brain development would be associated with subsequent attentional problems. The answer is yes, it is.

Although genetic inheritance may account for some of the prevalence of ADHD, and despite decades of research, little thought has gone into the potentially crucial role that early childhood experiences may have on the development of attentional problems. Researchers wondered whether there was an omnipresent environmental agent that is putting some children at risk of developing ADHD. They found that early television exposure was associated with attentional problems at age 7, which was consistent with a diagnosis of ADHD. Children who watched television at ages 1 and 3 had a significantly increased risk of developing such attentional problems by the time they were 7. For every hour of

television a child watched per day, there was a 9 per cent increase in attentional problems. The authors also suggest that their findings may actually be an understatement of the effects on children (Christakis et al., 2004)

A more recent study has found later attention damage in children who watched average amounts of screen time when they were over 5. The study was the first to investigate a possible long-term link between television viewing in childhood between the ages of 5 and 11, and attention problems in adolescence. Symptoms included short attention span, poor concentration and being easily distracted.

The study concluded: 'Childhood television viewing was associated with attention problems in adolescence, independent of early attention problems and other confounders. These results support the hypothesis that childhood television viewing may contribute to the development of attention problems and suggest that the effects may be long-lasting.' These findings could not be explained by early-life attention difficulties, socio-economic factors or intelligence. The authors stated that even after all of these factors were taken into account, watching more television was associated with teenage attention problems. (Landhuis et al., 2007)

> *'Frequent television viewing during adolescence may be associated with risk for development of attention problems, learning difficulties, and adverse long-term educational outcomes. (Swing et al., 2010)*

Another controlled study on children of 14 to 22 years also concluded that: 'Frequent television viewing during adolescence may be associated with risk for development of attention problems, learning difficulties, and adverse long-term educational outcomes. Youths who watched 1 or more hours of television per day at mean age 14 years were at elevated risk for poor homework completion, negative attitudes toward school, poor grades, and long-term academic failure. Youths who watched 3 or more hours of television per day were the most likely to experience these outcomes. In addition, youths who watched 3 or more hours of television per day were at elevated risk for subsequent attention problems and were the least likely to receive postsecondary education.' (Johnson et al., 2007)
A recent longitudinal study in *Pediatrics* included computer game exposure in its assessments of attention, and widened the age-range to include people who were 8–24 years old. Yet the effects seemed ageless: 'Viewing television and playing video games each are associated with increased subsequent attention problems in childhood ... late adolescence and early adulthood. ... The association of television and video games to attention problems in the middle childhood sample remained significant when earlier attention problems and gender were statistically controlled. The associations of screen media and attention problems were similar across media type (television or video games) and age (middle childhood or late adolescent/early adult).' (Swing et al., 2010)

Screen Multi-Tasking

The idea, that children should learn screen multitasking (using both the TV and the computer at the same time) as soon as possible is an unsubstantiated assumption. There may even be damage to them by introducing it too early.
Screen multitasking consists of:

- Constant attentional shifts
- Little *sustained* attention (concentration) and is
- Occurring at younger ages.

Most children today have more than one screen in their bedroom, and even with one screen, often switch between various windows, which leads to the question of what the effects of screen multitasking are:
Brain imaging reveals that screen multi-tasking activates a different brain region (the striatum) to the one used when you learn one thing at a time (medial temporal lobe), and this is a significant hindrance to learning. (Foerde et al., 2006). Studying with a television on makes learning less efficient, and renders what you manage to learn less useful. Homework can take 50 per cent longer to complete. Neuroscientists behind this research are describing the benefits of modern multi-tasking as 'a myth. ... The toll in terms of slowdown is extremely large – amazingly so ... you will never, ever be able to overcome the inherent limitations in the brain for processing information during multitasking' (Myers, 2006). A study of multi-tasking performance conducted at Stanford University, published in the Proceedings of the National Academy of Sciences, compared groups of young people assessed as being either 'heavy' or 'light media multitaskers'. Ironically, they reported 'the surprising result that heavy media multitaskers performed worse'. One of the researchers commented, 'The shocking discovery of this research is that [high multitaskers] are lousy at everything that's necessary for multitasking' (Ophir et al., 2009).

The idea that children leaving primary school are becoming more and more intelligent and competent is also called into question by uncomfortable findings. After examining certain measures of cognitive development, the researchers concluded that, *'An 11-year-old today is performing at the level an 8- or 9-year-old was performing ... 30 years ago ... '.* The decline was attributed in part to the growing use of computer games. Children, especially boys, are playing more in virtual worlds instead of 'outdoors, with tools and things ... *' (Shayer 2006)*

> *"Everything in the past 30 years has speeded up. It's about reacting quickly but at a shallow level ... text messages and computer games are about speed and instant hits, rather than more profound or detailed ways of handling information.' (Shayer & Ginsburg 2009)*

A drop in higher-level-thinking-skills among adolescents has now been reported: 14-year-olds today exhibit the higher level thinking skills of 12 year-olds thirty years ago. Half as many 14 year-olds now exhibit higher level (interpretive) thinking as opposed to quick

(descriptive) thinking. The researchers believe *"Everything in the past 30 years has speeded up. It's about reacting quickly but at a shallow level ... text messages and computer games are about speed and instant hits, rather than more profound or detailed ways of handling information.' (Shayer & Ginsburg 2009)*

Educational Achievement

Television viewing amongst children under 3 is found to have 'deleterious effects' on mathematics ability, reading recognition and comprehension in later childhood. Along with television viewing displacing educational and play activities, this harm may be due to the visual and auditory output from the television actually affecting the child's rapidly developing brain (Zimmerman and Christakis, 2005). A 26-year longitudinal study, tracking children from birth, has concluded that 'television viewing in childhood and adolescence is associated with poor educational achievement by 26 years of age. Early exposure to television may have long-lasting adverse consequences for educational achievement and later socioeconomic status and well-being.' The authors describe a dose–response relationship between the amount of television watched and declining educational performance, which has 'biological plausibility'. Significant long-term effects occurred even at so-called modest levels of television viewing: between one and two hours per day. They also concluded that 'the overall educational value of television viewing was low. ... These findings offer little support for the hypothesis that a small amount of television is beneficial' (Hancox et al., 2005).

Canadian researchers conducted a prospective study examining weekly hours of television exposure at 29 and 53 months of age and later academic, psychosocial and physical well-being at age 10. Among the many negative associations identified, they reported that adjusting for pre-existing individual and family factors, 'every additional hour of television exposure at 29 months corresponded [years later] to 7% and 6% unit decreases in classroom engagement and math achievement. ... Higher levels of early childhood television exposure predicted less task-oriented, persistent, and autonomous learning behavior in the classroom ... early childhood television exposure undermines attention ... early television exposure could eventually foster risk toward a more passive rather than active disposition when attending to learning situations.' (Pagani et al., 2010)

> *'children learn more from live presentations than from televised ones. ... Young children learn best from—and need—interaction with humans, not screens. ... Unstructured play time is more valuable for the developing brain than electronic media.' (AAP 2011b)*

The Video Deficit

Stimulating a child through strong audiovisual sensations is not the same as inspiring or educating the child. Yet screen production interests have cultivated a belief that almost from birth, so-called 'age-appropriate, educational' television and DVDs will provide

children with cognitive/intellectual advantages, including improved language acquisition. Studies have found that 'When learning from videos is assessed in comparison to equivalent live presentations, there is usually substantially less learning from videos' (Anderson and Pempek, 2005). A phenomenon called the 'video deficit' is being used to describe the observation that toddlers who have no trouble understanding a task demonstrated in real life often stumble when the same task is shown onscreen. They need repeated viewings to learn it. Yet the young children's 'educational' television and DVD market has promoted the view that learning and experiencing via a screen rivals, and often exceeds, the process of learning via real-life interactions. The American Academy of Pediatrics has just issued a report stating: 'children learn more from live presentations than from televised ones. ... Young children learn best from—and need—interaction with humans, not screens. ... Unstructured play time is more valuable for the developing brain than electronic media.' (AAP 2011b)

A study of 1–3-year-olds found that even background TV significantly reduced the amount of time they played with their toys, as well as the amount of time they spent in focused attention during play. 'Thus, background television disrupts very young children's play behavior even when they pay little overt attention to it. These findings have implications for subsequent cognitive development.' (Schmidt et al., 2008)

The report by American Academy of Pediatrics 'recommends that parents and caregivers ... recognize that their own [background] media use can have a negative effect on children.'

Language Acquisition

Despite claims that educational DVDs and videos are beneficial to young children, a study published in the medical journal *Pediatrics* found that the use of such productions might actually retard their language development (Zimmerman et al., 2007a). Furthermore, even 'educational' television programmes, DVDs and videos showed no positive effects on children age 2 and under; and there were no benefits, whether the children watched 'educational' or 'non-educational' media or adult television programmes such as 'The Simpsons', 'Oprah' and sports programming. Whether parents sat and watched the screen with the children also made no difference to the outcome. In particular, the researchers found that for every hour per day spent watching specially developed baby DVDs and videos such as 'Baby Einstein' and 'Brainy Baby', children under 16 months understood an average of six to eight fewer words compared to children who did not watch them. One of the authors stated, 'The evidence is mounting that they are of no value and may in fact be harmful. Given what we now know, I believe the onus is on the manufacturers to prove their claims that watching these programs can positively impact children's cognitive development. The bottom line is the more a child watches baby DVDs and videos the bigger the effect. The amount of viewing does matter.' (ibid.)

Another paper published in the European medical journal Acta Paediatrica concluded that 'No studies to date have demonstrated benefits associated with early infant TV viewing (2 yrs and under). The preponderance of existing evidence suggests the potential for harm." (Christakis DA 2009) Disney has now offered refunds to parents who bought Baby Einstein DVDs (Times, 2009).

Researchers at Harvard Medical School have for some time been publishing strong opposition to children's educational TV. For example in 'Say "No" to Teletubbies' they state, 'Television viewing is exactly the opposite of what toddlers need for their development...young children's television viewing should be postponed as long as possible...' (Linn & Poussaint, 1998) The report by the American Academy of Pediatrics above points out that 'Young children with heavy media use are at risk for delays in language development once they start school'.

Screen Viewing Leads to Less Reading

Early exposure to, and increasing time spent watching screen technology is strongly linked to a significant continuing decline in time spent reading books as a regular pastime (Childwise Monitor, 2008). Pre-school children spend three times longer in front of a television or computer than they spend reading; and those with a screen in their bedroom are less likely to be able to read by age 6 (Rideout et al., 2003). A comparative study of children in 41 countries found that England has dropped from 3rd to 19th in the international reading literacy league table since 2001 (PIRLS, 2007) More than a third (37 per cent) of 10-year-olds in England play computer games for more than three hours a day, the study found – one of the highest proportions internationally; and researchers found a link between this use of computer games and lower attainment in reading and literacy. Interestingly it was the lower achievement of better readers that has had the most influence on the overall decline. A survey by Britain's National Literacy Trust found that a third of children did not now enjoy reading and found it 'boring'. And less than half of children aged 9–14 read fiction more than once a month; websites were far more popular. (National Literacy Trust, 2010)

The rapid decline in reading has lead to the recent 'million book giveaway' launched in Britain on 'World Book Night', intended to entice people to read again.

> *a European based study of 15-year-old students in 31 countries concluded that those using computers at school several times a week performed 'sizeably and statistically significantly worse' in both maths and reading than those who used them less often (Fuchs and Woessmann, 2004).*

'Educational' Computers

Politicians, parents and schools are under increasing pressure to incorporate more screen technology in education. Yet few people are aware of large, well-controlled studies that fail to support a presumption of benefit. For example, a European based study of 15-year-old students in 31 countries concluded that those using computers at school several times a week performed 'sizeably and statistically significantly worse' in both maths and reading than those who used them less often (Fuchs and Woessmann, 2004).

Another study from Duke University in the U.S involving 150,000 pupils aged 10 to 14 compared the same children's reading and maths scores before and after they acquired a home computer. Researchers could also compare their scores to those of peers who had always had a home computer and to those who never had access to one. They found that providing children with regular access to a computer could actually hinder their reading and maths skills: 'the introduction of home computer technology is associated with statistically significant and persistent negative impacts on student math and reading test scores' (Vigdor and Ladd, 2010). Researcher Jacob Vigdor concluded that for schools hoping to maximize attainment or reduce the impact of socio-economic disparities, 'a programme of broadening home computer access would be counter-productive'.

Malamud and Pop-Eleches (2010) compared the educational effects of government-provided home computers on Romanian school children, and concluded that children given these home computers 'had significantly lower school grades in Math, English and Romanian but significantly higher scores in a test of computer skills'.

In a randomized controlled study of 6–9-year-old boys who did not have their own computer games, the boys were offered a computer-game system and 'child-appropriate' games in exchange for participating in an 'ongoing study of child development'. The results were unequivocal:

'Boys who received the system immediately spent more time playing video games and less time engaged in after-school academic activities than comparison children. Boys who received the system immediately also had lower reading and writing scores and greater teacher-reported academic problems at follow up than comparison children. ... Altogether, our findings suggest that video-game ownership may impair academic achievement for some boys in a manner that has real-world significance.' (Weis and Cerankosky, 2010)

Adults too have been encouraged to believe that computerized mental workouts and 'brain training devices' advertised widely will improve their general cognitive functioning. With this in mind, a study examining this assumption, published in the science journal Nature involving 11,430 subjects, concluded: *'Computerized mental workouts don't boost mental skills. ... There were absolutely no transfer effects from the training tasks ... [the claims are] completely unsupported.'* As is the case with educational software for children, the authors noted that for adults, *'brain training', or the goal of improved cognitive function through the regular use of computerized tests, is a multimillion-pound industry' (Owen et al., 2010).*

Social networking and academic performance

In a recent study entitled 'A description of Facebook use and academic performance' the results were perhaps unsurprising: *"There's a disconnect between students' claim that Facebook use doesn't impact on their studies, and our finding showing they had lower grades and spent less time studying." (Karpinski & Duberstein 2009)* A similar study found that three-quarters of the Facebook users said they didn't believe spending time on the site affected their academic performance. Yet Facebook users' grades were 20 per cent lower. *(Kirschner & Karpinski 2010)*

Mental Health

Screen time is now associated with child mental health. A recent medical study entitled 'Children's Screen Viewing is Related to Psychological Difficulties Irrespective of Physical Activity' found that 'Children who spent [more than] 2 hours per day watching television or using a computer were at increased risk of high levels of psychological difficulties and this risk increased if the children also failed to meet physical activity guidelines. ...Both television viewing and computer use are important independent targets for intervention for optimal well-being for children, irrespective of levels of moderate/vigorous physical activity (MVPA) or overall sedentary time.' (Page et al 2010)

The American Academy of Pediatrics has published a new report on *The Impact of Social Media on Children, Adolescents, and Families which now refers to* 'Facebook depression... defined as depression that develops when preteens and teens spend a great deal of time on social media sites, such as Facebook, and then begin to exhibit classic symptoms of depression.' They add that the 'intensity of the online world is thought to be a factor that may trigger depression' (AAP 2011a)

> *'The Internet has changed the way people communicate, but some experts argue that social networking sites like Facebook and Twitter undermine social skills and the ability to read body language . . . technology doesn't provide the physical contact that benefits wellbeing. (Mental Health Foundation, 2010)*

A report from the National Society for the Prevention of Cruelty to Children (NSPCC) in 2010 found that more children are reporting they are lonely than in previous years; a detailed breakdown of calls made to their ChildLine in the previous five years showed that calls about loneliness had nearly tripled. Among boys, the number of calls about loneliness was more than five times higher than it had been in 2004 (NSPCC 2010). We are constantly told that with so much modern communication technology and children's ability to understand how to use it, they've never been so connected to one another. Yet in explaining the role of technology in the rise in loneliness, the Mental Health Foundation's report 'The Lonely Society?' points out: 'The Internet has changed the way people communicate, but some experts argue that social networking sites like Facebook and Twitter undermine social skills and the ability to read body language . . . technology doesn't provide the physical

contact that benefits wellbeing. Cognitive function improves when a relationship is physical, as well as intellectual, because of the chemical process that takes place during face-to-face communication.' (Mental Health Foundation, 2010)

Family Interaction

Studies at Stanford University have led to a 'displacement' theory of internet use and the researchers use rather direct language: 'In short, no matter how time online is measured and no matter which type of social activity is considered, time spent on the Internet reduces time spent in face-to-face relationships.' On average 'an hour on the Internet reduces face-to-face time with family by close to twenty-four minutes'. And at weekends 'this means that for every minute spent online, there is a corresponding 0.48 seconds less spent with family members . . . Time spent on the Internet at home has a strong, significant negative influence on time spent with family members.' (Nie 2001,2003, 2005)

An ongoing study of families by the University of California–Los Angeles has found that social disengagement is now rapidly increasing, as side-by-side and eye-to-eye human interactions are being displaced by the eye-to-screen relationship (Campos et al., 2009). The impact of multi-tasking gadgets is one of the most dramatic areas of change, described by the scientists as 'pretty consequential for the structure of the family relationship' (Ochs, 2006). With increasing screen time, any consequent reduction in social interaction and connection is linked to physiological alterations, along with increased morbidity and mortality (Sigman, 2009).

One of the many papers published analysed interaction among dual-income family members after 3 p.m. when children came home from school. And there were some very modern findings. In measuring things such as 'physical proximity in home spaces' they reported that 'family members seldom came together as a group. On average, all family members in the thirty families came together in a home space in only 14.5 per cent of the observation rounds. In contrast, individual family members were observed alone in a home space with far greater frequency – averaging 30–39 per cent of the observation rounds.' The most telling statistic was that children were found alone in almost 35 per cent of observed cases. They also measured the degree of child distraction, defined as not acknowledging their returning parent because they were 'otherwise engaged in activity (e.g. watching TV, playing video game, phone)'. And the findings become more uncomfortable, as the number of parents who were ignored or unacknowledged on their return home 'comprised a substantial percentage of observed behavior. The high level of distraction encountered by fathers when they reunited with their children was particularly striking . . . distraction was displayed by at least one child in the family in over two-thirds of the twenty-nine father–child reunions ... fathers were more likely to be the recipients of distraction from at least one child in the family (86 per cent) than were mothers (44 per cent).' In the bigger picture, from a cross-cultural perspective on how children normally greet their parents and others, the scientists agree: 'These latter results are particularly noteworthy. Social scientists have long documented the near universality of positive

behavior in the form of greetings when two or more people reunite after being apart for a period of time. Greetings recognise a person's arrival, status and display positive intentions that universally facilitate the transition into social interaction with another.' Screen media have changed this. (Campos et al., 2009)

Empathy

Although the media often crows about internet and computer use increasing people's ability to make quick decisions and filter large amounts of information, new research is finding that this may come at the cost of the social and emotional skills central to civilised behaviour. In particular, there seems to be a decline in the subtle skills of reading the nuances of other's emotions. A study of brain function in adults found that when using the internet, the areas of the brain associated with empathy showed virtually no increase in stimulation. *'Young people are growing up immersed in this technology and their brains are more malleable, more plastic and changing than with older brains . . . As the brain evolves and shifts its focus towards new technological skills, it drifts away from fundamental social skills.' (Small et al 2009)*

A study published in Proceedings of the National Academy of Sciences (2009) examined the brain function and development which underlie qualities such as empathy. The scientists drew specific attention to the effects of electronic media: 'The rapidity and parallel processing of attention requiring information, which hallmark the digital age, might reduce the frequency of full experience of such emotions, with potentially negative consequences.' One of the authors explained the possible interference with this process by the speed of today's media: 'For some kinds of thought, especially moral decision-making about other people's social and psychological situations, we need to allow for adequate time and reflection. If things are happening too fast, you may not ever fully experience emotions about other people's psychological states.' (Immordino-Yang et al 2009)

Neuroscientists now believe they have identified specialised brain cells called 'mirror neurons', which, when activated, literally make children and young people absorb, mimic and integrate social behaviours. They're also thought to underlie our children's ability to 'adopt another's point of view'. A child's brain is likely to have multiple mirror neuron systems that specialise in carrying out and understanding not just the actions of others, but their intentions – the social meaning of their behaviour and their emotions.

People who rank high on a scale measuring empathy have particularly active mirror neuron systems. A study of the brain activity of ten-year-olds who observed and imitated emotional expressions and social skills found a direct relationship between the level of activity in the children's mirror neuron systems and 'two distinct indicators of social functioning in typically developing children': empathy and social skills. In the journal Neuroimage, scientists report that the importance of observing and copying everyday social behaviours and the mirror neuron system 'may indeed be relevant to social functioning in

everyday life during typical human development'. It is not surprising, then, that these brain cells have acquired nicknames such as 'empathy' or 'Dalai Lama' neurons. Mirror neurons, by the way, work best in real life, when people are face to face; virtual reality and videos are pale substitutes. (Rizzolatti, 2008ab; Umiltà et al 2008; Pfeifer et al 2008)

Today's university students are not as empathetic as those of the 1980s and 1990s. A University of Michigan and University of Rochester Department of Psychiatry study undertook a meta-analysis, combining the results of seventy-two different studies on empathy conducted between 1979 and 2009 among almost 14,000 university students. And there was little flattery for the young: 'We found the biggest drop in empathy after the year 2000. College kids today are about 40 per cent lower in empathy than their counterparts of twenty or thirty years ago, as measured by standard tests of this personality trait'.

The researchers sought a second opinion too, and in a related but separate analysis they found changes in other people's kindness and helpfulness over a similar time period in nationally representative samples of Americans. Many people see the current generation of university students – 'Generation Me' – as 'one of the most self-centred, narcissistic, competitive, confident and individualistic in recent history ... It's not surprising that this growing emphasis on the self is accompanied by a corresponding devaluation of others'.
In looking for the culprit who stole the empathy, the fingerprints of electronic media were, yet again, everywhere. The investigators believe that the sheer increase in child and adolescent exposure to media during this time could be one very important factor. They noted that compared to thirty years ago, the average American is exposed now to three times as much non-work-related information.

The University of Michigan study concluded that the rise of social media may also play a role in the drop in empathy, *'The ease of having "friends" online might make people more likely to just tune out when they don't feel like responding to others' problems, a behavior that could carry over offline.'* Electronic media has also contributed to a social environment that works against slowing down and listening to someone who needs a bit of sympathy. (Konrath et al, 2010a,b; 2011)

Conclusion: What can be done?

One may ask why the studies above are not reaching decision makers such as the European Parliament. An editorial in the American Medical Association's *Archives of Pediatric and Adolescent Medicine* asked a similar question: "Why is it that something that is widely recognised as being so influential and potentially dangerous has resulted in so little effective action? To be sure, there has been some lack of political will to take on the enormously powerful and influential entertainment industry ... [Screen] media need to be recognised as a major public health issue" (Christakis & Zimmerman, 2006). Politicians have, for several reasons, a vital interest in people watching screen media. And both doctors and politicians want to be liked by the public. Telling parents that screen media might damage the health of their children places them in the position of being the bearer of bad news.

We must also not forget the fact that many newspapers have extensive financial links with television networks and carry many articles and advertisements about screen media, products and services. And television networks are unlikely to feel motivated to tell people to watch less TV: ratings and sales are vital. As long ago as 1999 researchers at Harvard Medical School pointed out that "Teletubbies toys will generate $2 billion this year." (Linn & Poussaint '99)

The relationship between screen media and health is an issue that we have, up until now, left to those in the media along with media studies or education researchers to address. Yet, they have a vested commercial conflict of interest, either through potential profits or funding of academic research. Programme makers, software or web designers and those employed in academic media and education departments must not be considered impartial arbiters of our children's health. Most importantly, it is unnecessary and counterproductive to form a partnership with media industries as a way of reducing children's use of their services. There is a powerful and obvious conflict of interest. A look at many countries' experiences with the tobacco, alcohol and sugar industries gives an immediate glimpse of what will happen.

There is a dose-response relationship, between the age at which children start watching screen media, the number of daily hours they watch and negative effects on physical health and well-being irrespective of the 'quality' of the screen material. Screen time must now be considered a major public health issue and reducing screen time must become the new priority for child health.

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Screen time must now be considered a major public health issue and reducing screen time must become the new priority for child health. Governments are quite willing to advise citizens on personal child matters ranging from breastfeeding and how many fruits and vegetables children should eat per day, grams of daily salt intake, units of alcohol for teenagers, sun SPF factors and passive smoking, to teenagers' sexual habits, and if and how we can smack our children. Therefore, merely providing general guidance on whether infants should be watching television and how much time children should spend in front of the screen is hardly intrusive.

Although popular phrases such as 'striking a balance' or 'everything in moderation' may sound reassuringly sensible, one of the main obstacles in encouraging people to reduce their children's screen time is the vagueness of the terms 'moderation' and 'excessive'. We haven't been told what excessive actually means. Most of the damage linked to screen time seems to occur beyond watching one-and-a-half hours per day. Yet the average child watches 3 to 5 times this amount. While ultimately children's viewing time may be a matter of personal choice, it must be an informed choice. Parents need an ideal reference

point, even if they choose to ignore it or cannot adhere to it. Parents in the EU should in future consider screen time as simply another form of consumption measured in units of hours/minutes consumed per day. And as with reducing consumption of other things it is a simple concept to grasp and act upon. The EU Parliament should consider the content of what children are exposed to as a separate matter altogether, not to be combined with the main issue here of screen time.

Above all, the European Parliament should now have an opinion about the number of hours that young children are spending in front of a screen and in particular the age at which they start. The European goal should be to reduce children's daily dose to fewer hours per day by simply raising awareness.

Above all, the European Parliament should now have an opinion about the number of hours that young children are spending in front of a screen and in particular the age at which they start. The European goal should be to reduce children's daily dose to fewer hours per day by simply raising awareness. The good news is that simple bits of advice can have big impacts on children's health without spending much money. The study by Epstein et al (2008) above (Metabolism and Body Fat), on how reducing screen time appears to reduce child body fat is a good example. If we can reduce total daily screen time for children and delay the age at which they start this should provide significant advantages for their health and well-being. The following are only ideals for parents. Even if they are not adhered to it is important to be aware of such ideals as a reference point to work from:

- Eighty per cent of adult brain size growth occurs during a child's first 3 years when they are most vulnerable to the effects of screen media. There should be an early years buffer zone whereby this stage of child development is 'cordoned off' from premature exposure to screen media. We should delay/minimise screen watching until age 3.

- We should encourage no screens in children's bedrooms. If you put a refrigerator in a child's bedroom they will eat more, if you put a screen in their bedroom they will watch more.

- Parents should be encouraged to monitor and control the time their children spend on hand-held computer games/media.

- Ideal screen time limits are:
  3 - 7 years: 0.5 - 1 hour per day
  7 – 12 years: 1 hour
  12 – 15 years: 1.5 hours
  16+ years: 2 hours

Parents must take into consideration how much time their children are spending doing homework on computers before coming to a decision on screen time for their child.

- The potential influence of background or 'passive' media should be explained
- Advice in maternity ward 'birth packs' should be given to mothers about infants and toddlers watching screens.
- Health visitors should be aware of medical evidence and advise new parents.
- Nurseries and day care centres should make parents aware of this issue, as is the case in Belgium.
- Schools should adopt a position on the amount of time children spend in front of a screen in and out of school and communicate this to pupils and parents.
- As a guiding principle, children should spend far more time in the real world than they do in the virtual world.

Many believe that we should not make parents feel guilty about the amount of time children spend in front of a screen and the early age at which they start. But we must now make a clear judgment that child health is more important than parental guilt. Fortunately parents, especially mothers, have a guilt 'reflex' when it comes to doing the right thing for their children. The EU should use this. If you tell parents of children under the age of three in particular that their children could be at risk, the maternal guilt reflex is in many cases likely to result in fewer EU children with screens in their bedrooms and a reduction in total child screen time.

To my knowledge no medical schools, government health departments nor the World Health Organization have ever suggested that children are at risk if they do not view screen media or that children today need to have a bit more screen time. This should tell any MEP something about the true nature of this issue. What harm could possibly result from preventing very young children from watching screen media and from reducing the amount of screen time for those over three years of age? A more rational perspective might be: 'let's pause for thought before continuing to expose children to this current amount of screen time'.

In short, there is nothing to be lost by children watching less screen media but potentially a great deal to be lost by allowing children to continue to watch as much as they do. By ignoring the growing body of evidence linking screen time with child health we may ultimately be responsible for the greatest health scandal of our time.

Yet enough evidence now exists for the EU to decide to be better safe than sorry and be responsibly decisive. In short, there is nothing to be lost by children watching less screen media but potentially a great deal to be lost by allowing children to continue to watch as much as they do. By ignoring the growing body of evidence linking screen time with child health we may ultimately be responsible for the greatest health scandal of our time.

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