Screen **dependency** in childhood

As children's screen time increases the descriptive term 'addiction' is becoming more frequent; here **Aric Sigman** looks at this aspect of screen dependency and associated topics like the neurological factors, early programming, and the role of parents.

The government's Office of Communications recently issued its annual 'Media Use and Attitudes report', which stated "…the average UK 16-24 year old now spends more time using media or communications than they do sleeping" (Ofcom 2014). Ofcom has also measured total screen time (ST) for younger age groups:

Total Child Screen Time At Home

Ages:	3 – 4	3 hours per day
	5 – 7	4 hours per day
	8 – 11	4.5 hours per day
	12 – 15	6.5 hours per day

(Ofcom: Media consumption 2012)

A pan-European study of 25 countries, 'Young Children and their Internet Use', found "…very young children (0-8) are showing particularly increased patterns of internet use". (Holloway et al 2013)

Most of this screen time is discretionary or recreational and by the age of 7, a child born in Britain or the US today will have spent nearly one full year of 24 hour days watching recreational screen media.

Screen dependence

As concern grows over the sheer **amount** of screen time children are consuming, the term 'addiction' is increasingly used by health professionals to describe the growing number of children engaging in a variety of screen activities in a dependent, problematic manner.

While there is a lack of consensus as to whether such screen use constitutes a formal psychiatric disorder, Britain's National Health Service doesn't consider it a passing phase, stating "as computer use has increased, so too has computer addiction".

Prevalence rates of 'addiction' vary according to the screen activity, method of diagnosis, and age of the children. For example, a longitudinal study in the medical journal *Pediatrics* of a large sample of 8 to 14 year olds concluded "between 7.6 % and 9.9 % of our sample would be classified as pathological [computer] gamers at any point in time." (Gentile et al 2011) Non-pathologically, a study of British students' personal internet use reported that "over 50 % of the sample produced scores on the IAT [Internet Addiction Test] that could be considered to represent some degree of problematic

behaviour". The researchers were surprised to find that "the gender split of those with problematic Internet use versus those without was even, suggesting that typical views of Internet addiction as a male problem are (certainly, now) unfounded." (Romano et al 2013)

It seems that if discretionary, seemingly dependent, screen overuse is a health and development problem, it is a problem that is unlikely to subside and more likely to increase among children and adolescents.

Neurological considerations

A new generation of studies is finding associations between Internet and/computer game addiction and abnormal brain tissue and brain function.

For example one study reported "abnormal white matter integrity in adolescents with internet addiction disorder" in a wide variety of "major white matter pathways … throughout the brain." The authors speculate that "heavy internet overuse, similar to substance abuse, may damage white matter microstructure". Interestingly, these are some of the same brain areas found to exhibit abnormal white matter integrity in substance addictions such as heroin, cocaine and alcohol. (Lin et al 2012)

Although these neurological characteristics may be a precondition rather than a consequence of addiction, child health and development policy must adhere to the principle of precaution. Until the matter is resolved we should heed the concerns of some of the researchers as a prudent approach to protecting child well-being.

There is new evidence that playing video games induces significant structural changes in several regions of the brain. The study, published in *Molecular Psychiatry* was entitled 'Playing Super Mario induces structural brain plasticity: gray matter changes resulting from training with a commercial video game'. Players whose craving for games was stronger exhibited greater structural brain changes. While some of the changes in grey matter may reflect improvements in areas involved in screen-based 'spatial navigation' and related 'motor performance', it also indicates that regular exposure to video gaming in principle may bring about changes in brain structure which reinforce desire for more gaming. Changes may be both for better and possibly for worse. (Kühn et al 2014)

Dopamine is a key chemical component of the brain's reward system (e.g. ventral striatum and caudate), and is heavily implicated in the formation and maintenance of addictions. The addictive potential of a substance or activity is influenced by the speed with which it promotes dopamine release and the intensity and reliability of that release, and many video games are designed to offer an extremely effective 'reward schedule' which is likely to facilitate dopamine release. Significant dopamine release within the brain's reward system is found to occur quickly in young adult brains while playing computer games. A study in the *American Journal of Drug and Alcohol Abuse* reported a 10.5 % change in dopamine release "in the caudate after playing a motorbike riding computer game". The researcher highlighted "growing concerns that extensive computer game playing may lead to long-term changes in the [brain's] reward circuitry that resemble the effects of substance dependence". (Weinstein 2010)

Early programming

Beyond excessive computer game use, young discretionary screen viewing begets more viewing. Early extensive screen exposure appears to be more likely to lead to a long-term lifestyle of higher screen consumption and dependency:

High dose ST from early age → **Risk of screen dependency**

Susceptibility to addictions can start much earlier than we thought. For example, the brain can be programmed in the womb for later addiction by exposing a fetus to alcohol or drugs.

The Newborn-to-Toddler Apptivity Seat for iPad

The iPotty

Children are more susceptible to developing a long-term problematic dependency on technology. The age of initiation and level of exposure to, for example, computer games may increase this risk, which may even be present before birth. Kirzinger et al (2012) reported "a substantial portion" of individual differences "in media habits can be attributed to genes". Prenatal exposure to higher levels of androgens (male hormones) in the womb is associated with later "problematic video gaming behavior" and "video game addiction". (Kornhuber et al 2013) Parental role modelling is another important factor: parents who consume high amounts of discretionary screen time have children who are many times more likely to consume high amounts of discretionary ST.

With a dramatic rise in the number and range of screen devices children have access to and a commensurate rise in discretionary ST, coupled with a marked drop in the age of high screen consumption, problematic screen use is of growing concern and prevention is the best option.

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Parental role modelling

Role modelling is a key influence on child ST. Parent and child levels of screen viewing are strongly related: children who live in a household that promotes TV-watching (TV is on when the child comes home from school, and meals are eaten in front of the TV) are more likely to watch excessive amounts of television themselves. If parents watch television for more than four hours per day, their son and daughter, respectively, will be 10.5 and three times more likely to watch it for more than four hours per day too. (Jago et al 2010)

This phenomenon appears early in life and includes other screen devices and activities too. In the study of "associations between the screen-time of parents and young children" researchers concluded that "results show that time spent SV [Screen Viewing] of both fathers and mothers is strongly associated with child time spent SV, highlighting the need for interventions targeting both parents and children". (Jago et al 2014)

Early years exposure

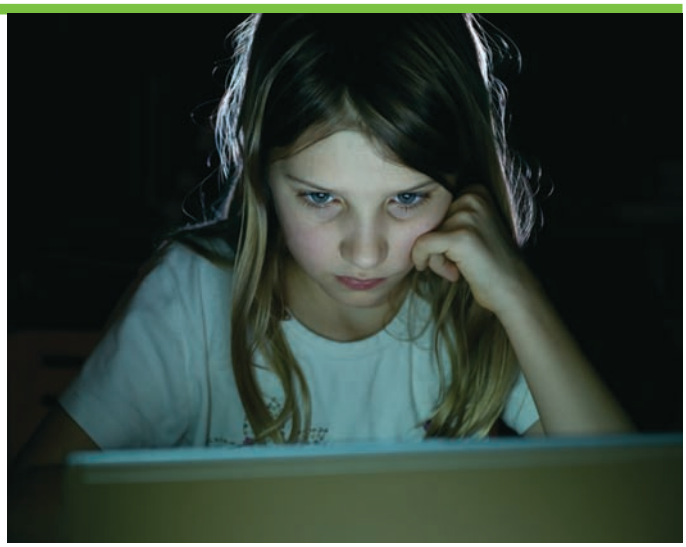
The American Academy of Pediatrics (AAP) felt compelled to issue a 'News Release: Babies And Toddlers Should Learn From Play, Not Screens', highlighting:

- Many video programs for infants and toddlers are marketed as "educational," yet evidence does not support this.
- Unstructured play time is more valuable for the developing brain than electronic media.
- Young children learn best from—and need—interaction with humans, not screens.'

An unprecedented recent policy statement by the AAP along with a technical report addressing "School Readiness" and "Translating Developmental Science Into Lifelong Health", is now recommending aggressive intervention by paediatricians to strongly encourage parents to read to/with and speak to/with their infants and pre-school children.

Executive functioning

It is important for young children to develop self-directed executive functioning. And it is interesting that a recent study entitled 'Less-structured time in children's daily lives predicts self-directed executive functioning', does not see screen time as helpful in achieving this. Researchers at the Department of Psychology and Neuroscience, University of Colorado concluded: "the more time that children spent in less-structured activities, the better their self-directed executive functioning. The opposite was true of structured activities [including media time], which predicted poorer self-directed executive functioning. These relationships were robust … even when controlling for income … participation in less structured activities may benefit the development of self-directed executive functions, while participation in structured activities may hinder the development of self-directed executive functions."



Recommendations

Montessori schools with their long-standing emphasis on multisensorial exploration and play should be highly skeptical of the claims and pressure to embrace technology in early years education. Most of the 'experts', conferences and glowing reports claiming a need and benefit of 'e-learning' and educational apps are funded by the screen-related industries.

Montessori teachers can play a significant role in preventing children from developing an unhealthy dependency on screen media by raising parental awareness. There is good evidence that children's discretionary ST can be reduced partly through raising parental awareness and by parents incorporating screen rules into family life. Most importantly, children must be helped to develop an awareness of discretionary ST as a health and development issue and to cultivate healthier media consumption habits.

Some argue that society has 'moved on' and that high discretionary ST is a reality of the modern world. Children's medical and developmental needs however, have not 'moved on'. There are some biological and developmental realities and limits to the sheer amount of discretionary ST that children can tolerate physiologically and developmentally. Don't believe the digital hype.

Further information and references are available in: Sigman A (2014). *Virtually addicted: why general practice must now confront screen dependency*. British Journal of General Practice. December 2014; volume 64, issue 629 p610-611. DOI: 10.3399/bjgp14X682597

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