

# Vital Link

The journal of the Canadian Association of Naturopathic Doctors

## Feature Articles

- Psychological Health Benefits of Social Media Use in Silver Surfers
- The Effects of Digital Media Use on Childhood Brain Development and Self-Regulation
- Online Pornography: Problematic Patterns of Usage and Clinical Consequences
- Physical-Health Impacts of Prolonged Screen Use in Children and Adolescents

## Screen Time, Social Media, and the Internet; How Are They Changing our Health?

Volume 22, Issue 2

Summer 2015



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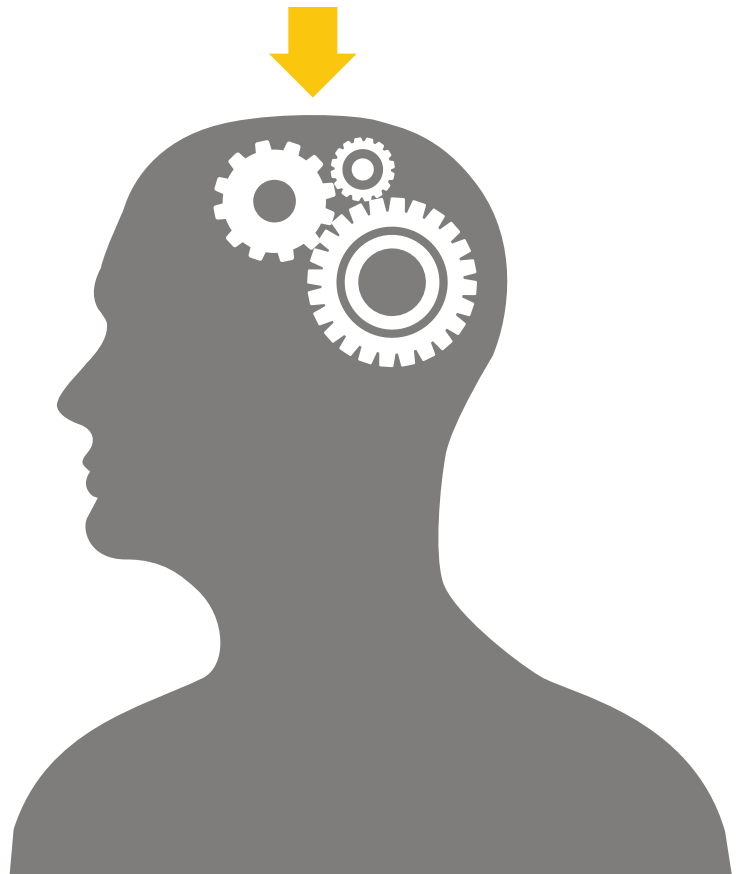
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**Volume 22, Issue 2, Summer 2015**

Screen Time, Social Media, and the Internet; How Are They Changing our Health?

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The *Vital Link* is the professional journal of the Canadian Association of Naturopathic Doctors (CAND). It is published primarily for CAND members and features detailed reviews of specific causal factors: philosophical and research-based papers, clinical practice articles and case reviews, as well as international updates on the profession. The *Vital Link* has an outreach to other health care professions and promotes qualified naturopathic doctors to corporations, insurance companies and the Canadian government.

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# Naturopathic Notes

Dr. Iva Lloyd, BScH, BCPP, ND

In our summer edition of the *Vital Link* we have chosen to explore the health impacts associated with digital and social media use.

For many, sitting in front of a computer or hunched over a smartphone has displaced face-to-face social and/or physical activities. From a family-medicine-practitioner's perspective, the use of digital media can affect — positively and negatively — the physical and psychological health of a wide range of patient populations. It would appear people of all ages could be spending as many hours connected to a screen or digital-media device as they do sleeping.

Naturopathic doctors Leslie Solomonian, Carly King and Holly WhiteKnight start us off with an assessment of the effects of digital media use on childhood brain development and self-regulation. They look at how the quality and quantity of media consumption impacts brain development and behaviour. The link between screen-time and sleep problems, stress, fear, attention problems, and other behaviours are discussed. Check out the article for specific recommendations for the different age groups, as it relates digital media use.

An area of concern often overlooked is the effects of digital device use on the child and adolescent musculoskeletal system. I took on the task of writing about the link between screen-time and postural changes, sleep disturbances, headaches, vision and behavioural changes in this population. Research indicates that children and adolescents are more susceptible than adults to the physical impacts of being hunched over a screen for hours on end.

Dr. Jacqueline Cooper, ND has written on the topic of adolescent use of Internet pornography and its impacts to health-status and relationships. The availability of pornography (online) has increased dramatically, especially in terms of the high level of exposure adolescents and young adults now have, regardless of whether they are actively seeking it. Dr. Cooper's article explores the health ramifications of prolonged pornography exposure, including decreased self-esteem, lethargy, brain fog, apathy and adverse effects on sexual relationships, including sexual dysfunction.

We conclude our exploration of this topic with a thorough review of the literature about the role of digital and social media in eliminating

social barriers, as well as feelings of loneliness and social isolation in the elderly. Dr. Adam Gratton, ND discusses social media's ability to connect individuals over larger geographical distances, provide platforms for real-time online conversations and generally enable older adults to stay in contact with family and friends and make new acquaintances.

An important note: In the media, a very common topic associated with social and digital media is online, or cyber bullying. Listed below are some resources for assessing and dealing with cyber-bullying that you can provide to patients if cyber bullying is a concern. Following this article are some Canadian statistics from a 2011 Ipsos Reid survey about online bullying.

- RCMP: <http://www.rcmp-grc.gc.ca/cycp-cpcj/bull-inti/index-eng.htm>
- Government of Canada – Protecting Canadians from Online Crime Act: <http://www.canada.ca/en/campaign/cyberbullying/index.html>
- PREVNet: <http://www.prevnet.ca/bullying/cyber-bullying>
- U.S. Department of Health site providing tips on reporting cyber-bullying: <http://www.stopbullying.gov/cyberbullying/how-to-report/>

There are some tremendous benefits to the current level of digital communication available to us; however, as naturopathic doctors, it is our responsibility to work with our patients and address any negative health impacts of digital media use.

As always, we welcome your feedback and your suggestions. Enjoy the summer. 🍁

## CANADA ONLINE BULLYING STATISTICS

1 in 5 Canadian Teens have witnessed online Bullying
25% of kids between 12-15 have witnessed cyberbullying
25% of girls and 17% of boys have witnessed online harassment
51% of all teens have had negative experience with social networking
16% said someone posted an embarrassing photo of them
12% said someone hacked their account

Source: Ipsos Reid 2011 Survey of 416 Canadian Teenagers




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# Psychological Health Benefits of Social Media Use in Silver Surfers

Dr. Adam Gratton, ND

Loneliness is not something that practitioners often consider when assessing a patient's psychological wellbeing. However, loneliness can be a common source of impaired quality of life.<sup>1</sup> Research has shown correlation between loneliness and a number of adverse health effects, including: depression,<sup>2,3</sup> cognitive decline,<sup>4</sup> suicide,<sup>5</sup> reduced mobility and ability to participate in activities of daily living (ADLs),<sup>1</sup> and overall risk of death.<sup>1</sup> Studies done in Western countries have suggested 20 to 40% of older adults report feeling lonely at any given time and 5 to 7% of older adults report intense or persistent loneliness.<sup>6</sup>

There are many factors that influence loneliness and overall psychological wellbeing that are somewhat specific to an aging population, and the aging process in general.<sup>7</sup> As individuals age, they frequently experience a shrinking of their social network due to retirement, death of friends and family, and changing geographical factors as individuals move to new areas or care facilities.<sup>7</sup> Of particular research interest has been the changing psychological health of individuals who move into assisted and independent living communities (AICs) as these individuals often experience new social and spatial barriers when they enter institutional care.<sup>7</sup> Aging in place and remaining in one's home is most often cited as the preferred living option by most older adults, however, declining health and other factors often make this an unviable option.<sup>7</sup> Feelings of loneliness and social isolation are not specific to individuals in AICs, as these feelings do have a higher prevalence in older adults in general.<sup>1</sup>

Loneliness and social isolation are related but distinct concepts.<sup>7</sup> Loneliness is a subjective experience defined by negative feelings pertaining to levels of social contact.<sup>7</sup> It emerges from the existence of differences between levels of desire for social relationships and the availability of these relationships.<sup>7</sup> Social isolation is an objective experience stemming from the absence of contact with other people who can provide needed or desired social support.<sup>7</sup> One does not need to live alone in order to feel lonely.<sup>8</sup>

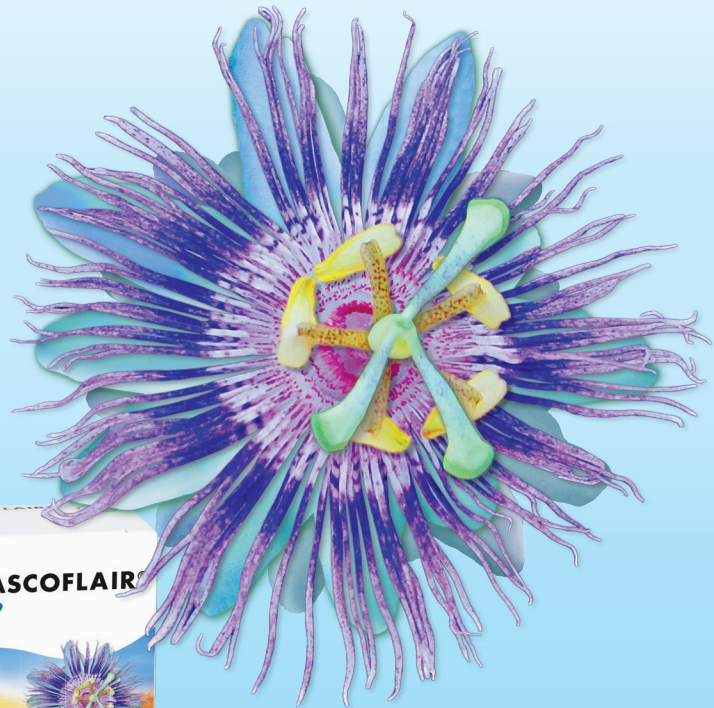
With respect to older adults' use of Internet based technologies, the Pew Research Center has been tracking American statistics related to Internet use and has reported some interesting trends in the uptake of Internet technologies in this population. In April 2012, 53% of Americans age 65 and older report using the Internet or e-mail, and once online, 70% of these Internet users report daily use.<sup>9</sup> With respect to social networking site (SNS) use, 34% of Internet users age 65 and older report using these sites and 18% of these Internet users report doing so on a typical day.<sup>9</sup> Canadian statistics are very similar, with 45% of adults between the ages of 65 and 74, and 21% of adults 75 and older are online.<sup>10</sup> Although the percentages of the total population in this older adult age group are the smallest amongst all age categories, they represent the fastest growing Internet user group.<sup>10</sup>

SNS use has garnered research interest given the potential for it to eliminate a number of the barriers or factors that influence the feeling of loneliness and social isolation. It has the potential to connect individuals over larger geographical distances, provide platforms for real time online conversations and generally enable older adults to stay in contact with their social ties.<sup>7</sup> Research has largely focussed on younger populations given the larger numbers of SNS users within younger demographics. Additionally, earlier qualitative studies of general Internet use have complicated the body of evidence on the topic and have generally lagged behind the speed at which the technology has evolved. A meta-analysis published in 2010 summarized some of the difficulties with the research conducted and concluded that type of Internet use, indicators of wellbeing, quality of Internet use measure, participant age and gender were all *insignificant* with respect to wellbeing.<sup>11</sup> One of the issues here was that earlier research paid little attention to what drove Internet use, and how Internet use influenced the lives of the users. This largely factors into the displacement versus augmentation hypothesis that has arisen within the context of Internet use. The displacement hypothesis simply suggests that time spent using a given technology replaces time spent using other technologies.<sup>10</sup> For example, time spent using e-mail substitutes time spent using the telephone. Along the same line, time spent using the Internet replaces real-life interaction.<sup>11</sup> Given that online interactions are considered superficial and lack feelings of affection and commitment, at least with adolescent users, Internet use is believed to reduce the quality of existing relationships and, by extension, their wellbeing.<sup>11</sup> The augmentation hypothesis is essentially the opposite, in that use of one technology can enhance or facilitate the use of other technologies,<sup>11</sup> and by extension, facilitate real-life interactions amongst existing

# *Sleeplessness*

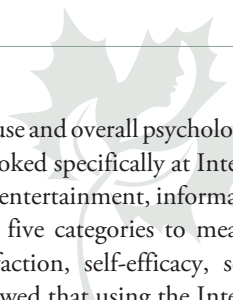
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1. Dimpfel et al. 2012 Neuroscience Med 3:130-140.



social ties. For example, the use of e-mail may improve face-to-face interactions amongst existing friends.<sup>11</sup> An important observation was made in this meta-analysis based on the mixed results obtained. It was noted that particular types of Internet use may be better at affecting psychological wellbeing under certain conditions.<sup>11</sup>

A later study by Cotten, *et al* looked into the type, amount and timing of Internet use with respect to psychological distress.<sup>12</sup> They found that all of the studied factors influenced psychological distress, but in different ways. For example, they found that weekday usage of the Internet for personal reasons was associated with higher distress, but using it for online health activities was associated with decreased distress.<sup>12</sup> Again, given rather mixed results, they make the observation that although type, amount and timing are all linked with mental health outcomes, the concept of how Internet use builds “social capital” may be an important factor in mental health outcomes.<sup>12</sup> This concept of how Internet use builds social capital has formed the basis for a number of more recent studies focussed on how Internet use influences overall mental health.

Social capital theory suggests that social networks and relationships create various benefits, both emotional and instrumental, that vary depending on who one knows and how well one understands their social relationships.<sup>13</sup> The idea was popularized by R.D. Putnam in a publication in 2000,<sup>13</sup> but there has been debate among researchers about its definition and how to measure it.<sup>14</sup> In essence, social capital refers to the beneficial outcomes that stem from social relationships.<sup>13,14</sup> This theory has formed the basis for a number of studies looking at the use of SNSs as a way to improve social networks and therefore improve social capital in a way to improve psychological wellbeing. This also complements the displacement/augmentation theory. With declining social networks in aging populations, there is less potential to displace real-life interactions with SNS use. When the frequency of real-life interactions decreases, it is possible that SNS use can in fact augment an individual’s social network, provide social capital, and therefore maintain the benefits one may gather from having an active social network. This theme of building social capital has stratified the various ways an individual can use the Internet within the context of psychological health.

An Australian study looked at the relationship between Internet use, social capital and overall wellbeing in 222 older adults.<sup>13</sup> The authors specifically looked at Internet use in five different categories: information, entertainment, commerce, finding new people, and communication. They found that increasing Internet usage built social capital for all different Internet applications, to a point, and then it levelled off. The exception was with using the Internet for communication, where increasing usage continued to correlate with increased measures of social capital. Overall the results suggested that increasing Internet use for communication and information seeking were most likely to have positive effects on loneliness and overall wellbeing through their ability to build social capital. Interestingly, using the Internet for entertainment purposes or to find new people predicted a decrease in overall wellbeing.

A Canadian study also looked at Internet use and overall psychological wellness in a similar way.<sup>10</sup> This study looked specifically at Internet use in the categories of: communication, entertainment, information and total Internet use. The study used five categories to measure overall wellbeing: loneliness, life satisfaction, self-efficacy, social support, and depression. The results showed that using the Internet for communication improved measures of all wellbeing outcomes studied to a statistically significant level.

A Dutch study analyzing the relation between SNS use and loneliness and mental health in assisted and independent living community (AIC) residents did not find similar results as the Australian and Canadian studies.<sup>8</sup> In this study no significant associations were found between SNS use and mental health. The percentage of individuals using SNS was particularly high in this study (56.2% of participants reporting SNS use several times per week). This study was the first to look specifically at SNS use in older adults. One particular limitation to this study was the data pertaining to SNS use and mental health measurement were gathered at different times.

A cross-sectional analysis conducted using data from an ongoing study of information and communication technology (ICT) usage in older adults in AICs studied the correlation between the frequency of going online and isolation, loneliness and the perception of Internet use affected communication and social interaction.<sup>7</sup> The results showed that increased frequency of going online was associated with statistically significant reductions in loneliness scores, but not with perceived isolation. With respect to measuring participant changes in perception of how the Internet affected communication and social interaction, response to seven statements was measured: made it easier for me to reach people, contributed to my ability to stay in touch with people I know, made it easier to meet new people, increased the quantity of my communication with others, made me feel less isolated, helped me feel more connected to friends and family, and increased the quality of my communication with others. Increased frequency of going online showed a statistically significant correlation with increased agreement with all seven statements. It is interesting to note the improvement in loneliness scores, but not with isolation. It might be suggested that although online interactions can help with loneliness, it cannot replace all of the effects of actual face-to-face encounters.

From a critical appraisal standpoint, “snapshot,” qualitative studies, such as the three studies above, are good at providing correlational evidence. However, it is difficult to ascertain how SNS use could be used from an interventional perspective given that these studies do not follow the participants over time. With psychological health being dynamic, it is impossible to differentiate the natural course of psychological health with time within context of Internet use.

Longitudinal studies have been conducted to help contribute evidence in this regard. An American panel survey of 740 individuals from 2000 to 2002 studied the effects of different types of Internet use on health and depression.<sup>15</sup> Interestingly, using the Internet for

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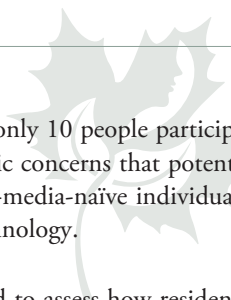
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health-information-seeking purposes was associated with increased depression. However, using the Internet to communicate with friends and family was associated with declines in depression over the course of the survey.

A longer American longitudinal study was conducted using information from the Health and Retirement Survey.<sup>16</sup> This study also examined the relationship between Internet use and depression, specifically among retired older adults. This particular study was quite large, including 3075 survey respondents over four waves of data collection. The results obtained from this survey found that Internet use reduced the probability of a depression state by 33%. The relationship between Internet use and depression is consistent with the other studies discussed above; however, the magnitude of response is larger. This study did not further refine what constituted Internet use, although the survey question asked potentially primed respondents towards a communication basis, as it asked, “Do you regularly use the World Wide Web, or the Internet, for sending and receiving e-mail or for any other purpose...?”

The above studies suggest that using the Internet for communication purposes has the greatest potential for positively influencing psychological health in older adults. This differentiation of Internet use is critical in understanding how Internet use can potentially be used to help maintain social relationships in older adults. This is especially true since studies focussing on general Internet use have shown very mixed results in much of the older literature. This is also important in that much of the research done in younger populations cannot necessarily be extended to older populations, given the potential differences in the way these technologies are used. Younger age groups are more likely to own SNS profiles and tend to use these SNSs for four main reasons: to show the world who they are, to keep in touch with old friends, to occasionally meet new ones, and to check on romantic relationships.<sup>17</sup> In general younger age SNS users value these sites as a way to convey social identity.<sup>17</sup> This is in contrast to the trends in older adult SNS use, where older adults use these technologies primarily as a way to reconnect with people from their past and to bridge the gap between generations.<sup>17</sup>

Older adults also have different needs, values and concerns regarding adopting SNS or Internet. A small exploratory study was conducted to determine older adults’ perception of social media and educational strategies to facilitate learning how to use social media.<sup>18</sup> Ten adults between 61 and 83 years of age with no prior experience with social media participated in weekly semi-structured, open-ended discussions for seven weeks. Negative pre-existing perceptions were evident at the beginning, with themes related to difficulty differentiating social media from e-mail and concerns related to access to a computer. With minimal introduction to SNS, the topic of privacy dominated most of the weekly sessions. Additionally, assistance was typically required to guide these users through actions like entering usernames and passwords, signing into various SNS and accounts. However, at the end of the seven-week period, the group was generally more accepting of SNS use and more

comfortable with basic tasks. Although only 10 people participated in the study, it highlights major thematic concerns that potentially need to be addressed in order for social-media-naïve individuals to feel comfortable enough to use SNS technology.

Another qualitative study was conducted to assess how residents in AICs could use the web to overcome social and spatial barriers.<sup>19</sup> In this study, portable computer labs were set up twice a week in three different American AICs for training purposes for eight week cycles. This particular study focussed on whether or not ICT use could assist with overcoming spatial and social barriers. The training session included SNS use as part of the curriculum. Participant interest in the training sessions was somewhat dependent on the barriers that existed within the AIC they resided in. AICs with little social interaction had participants that were particularly interested in learning to use ICT to connect or reconnect with other people. In AICs with substantial spatial barriers, the participants were more likely to use ICTs to explore cultural sites or old neighbourhoods. With respect to social barriers, participants were asked how the use of the Internet has changed their lives and describe how or why. Shifts in attitudes along the theme of being reconnected with society were evident.

Looking at the other end of the spectrum, an Australian exploratory study gathered data from 154 Internet users aged 55 years or older.<sup>14</sup> These confident and competent older ICT users, often referred to as “silver surfers,” showed Internet usage patterns that suggest electronic communication has become an important supplement to their primary relationships with close family and friends. The participants in this study consistently highlight the use of e-mail for communication purposes with other family members, not SNS use.

These qualitative-intervention-style studies show that getting SNS naïve older adults to use SNS sites to assist with connecting them to a larger social network involves more than access to the technology. A qualitative study gathered information specific to benefits and barriers to computer, Internet and e-mail use in older adults.<sup>20</sup> In general, noted benefits fell into four main categories: connectedness, satisfaction, utility and positive learning experiences. Participants noted that Internet use helped them stay connected with friends and family members, provided satisfaction with being able to use technology, and provided a useful skill in helping to perform various tasks. Noted barriers or setbacks generally fell along four themes of: frustration, functional limitations, mistrust and time. Participants note frustration with there being multiple ways to perform similar tasks, functional limitations related to pain, memory and factors influencing their ability to type, mistrust with levels of Internet security and privacy, and the amount of time needed to devote to these activities.

It is clear that research specifically pertaining to SNS use in older adults is lacking. Older studies that focus on general Internet use are of little use given the variety of ways the Internet can be used with current technological advances. What is clear, however,



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is that technologies that assist with maintaining and promoting communication with social networks may very well have a place in improving psychological wellbeing in older adults. It is within this realm that SNSs have the potential to elevate how older adults interact with their social networks beyond the limitations of e-mail. The outcomes analyzed in these studies have varied from being specific to feeling of loneliness or objective factors of social isolation, to broader psychological outcomes like depression or overall wellbeing. It is evident that SNS use is not suited for every older adult. There are prerequisites in SNS use; older adults must have the functional capacity to use a computer or web-enabled device in a meaningful way.<sup>21</sup> Also, some degree of familiarity and proficiency in necessary in order to operate SNS.<sup>21</sup> This may necessitate some degree of mentorship or training in order for an older adult to gain the necessary skills to use SNS in a meaningful way.<sup>21</sup>

Clinically speaking, SNS has the potential to link individuals to groups or communities that share a common characteristic. Discussion forum style participation has been shown to have positive effects on overall wellbeing by facilitating communication with other people who have experienced, or are experiencing similar health challenges.<sup>21</sup> However, the evidence doesn't support that statement for all health concerns. Health status is not typically a significant predictive factor in studies analyzing trends in SNS use. The exception to that may be with individuals with a history of cancer. In an American study assessing communication inequalities and public health implications of SNS use, a history of having cancer was associated with 43% lower odds of using SNS compared to adults with no history of cancer, even after controlling for influential factors like age and health status.<sup>22</sup> It is possible that the support needs for these individuals are not met by the current SNS technologies available. Given the current evidence that supports social network maintenance as a predictor of overall psychological health and wellbeing, the potential role for SNS should not be discounted in adults who meet the prerequisites necessary to use the technology in a meaningful way. As current society ages, and brings with them the computer literacy skills acquired throughout life, many of the current barriers to older adults may diminish provided adults maintain Internet access and the functional capacity to use these technologies. 🍌

## About the Author

**Adam Gratton, ND** is a licensed naturopathic doctor and has been practicing since 2008. He received his honours specialist degree in toxicology from the University of Toronto and his naturopathic medical diploma from the Canadian College of Naturopathic Medicine (CCNM), where he also completed his residency. He currently is nearing completion of his Master's degree in pharmacology from Michigan State University. He is an assistant professor at CCNM where he teaches the principles of evidence based medicine and clinical physiology, as well as supervises interns at the Robert Schad Naturopathic Clinic (RSNC). He is a regular contributor to the RSNC blog and has a special interest in clinical naturopathic dermatology and social media use within the medical profession. He maintains a popular professional blog and is active on many social media sites. Learn more at [www.adamgrattonND.com](http://www.adamgrattonND.com).

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# The Effects of Digital Media Use on Childhood Brain Development and Self-Regulation

**Dr. Leslie Solomonian, ND, Dr. Carly King, ND, and Dr. Holly WhiteKnight, ND**

Media use by children and adolescents has reached an unprecedented level, and is ubiquitous.<sup>1</sup> A recent study reported that Canadian children spend 8.5 hours per day engaged in sedentary media activities.<sup>2</sup> Those under the age of two are spending on average 2.5 hours a day in front of a television.<sup>5</sup> Youth also report using more than one device at a time.<sup>3</sup> Both quantity and quality of media consumption have effects on brain development and the behavior of youth.

**A** developing brain is a sensitive organ that slowly builds from the bottom up.<sup>4</sup> Development begins with the brainstem in younger years to the midbrain and limbic system, ending with the cortex which continues to be fine-tuned well into adulthood.<sup>4</sup> During the first five years, the most essential and voluminous neuronal connections are activated to create a strong foundation for future learning, and behaviour, which can greatly impact one's health. The young child's voracious appetite for knowledge can easily be thwarted with excessive screen time, which according to the research is becoming more common.

## Effects of Media on Children

### *Impact of Media on Dietary Choice, Metabolism and the Brain*

Digital media exposure plays a role in self-regulation when it comes to food choices and eating behaviours in youth. Television viewing preferentially exposes children to advertisements for energy dense, sugar-laden foods.<sup>7, 8</sup> Higher amounts of both television viewing and commercial viewing have been shown to independently increase positive attitudes toward "junk food" and the consumption of such foods in children.<sup>9</sup> Even brief exposures to televised food commercials embedded in cartoon programming can affect children's food preferences.<sup>10</sup> Eating meals while watching television is further associated with less consumption of fruits and vegetables and a greater consumption of low-nutrient foods and beverages.<sup>11</sup>

Independent of physical exercise and dietary choices, screen-based activities are correlated with increased BMI and obesity in children,<sup>13,14</sup>

and they increase the risk of comorbidities such as diabetes and cardiovascular disease both in adolescence and adulthood.<sup>15, 16</sup> The emerging understanding of the link between obesity, its associated metabolic conditions and cerebrovascular impairment and neurocognitive decline<sup>17, 18</sup> underscores the importance of screen-based activities in youth that promote such metabolic derangements.

### *The Influence of Media on Stress and Fear*

One concerning outcome of exposing children and youth to television media is the perpetuation of feelings of fear and worry and their associated stress.<sup>19</sup> Both fictional and news content can produce emotions, resulting in impaired sleep and anxiety.<sup>20-22</sup> Younger children (three to seven years of age) seem to be more frightened by fantasy, and by visual portrayals, whereas older children are progressively more frightened by the perception of potential violent threats to themselves.<sup>22</sup> Studies have specifically examined the impact of reports of war and terrorist attacks on children, demonstrating significant and enduring effects.<sup>20-22</sup>

### *Impact of Media on Sleep*

Sleep is critically important to brain and body development in youth, and media use can negatively impact both quantity and quality of sleep in all populations. According to "Common Sense Media" in 2011 over 30% of children ages 0-8 had a television in their bedroom.<sup>23</sup> Use of electronic media of all kinds throughout the day is reported to postpone bedtime in youth, and result in decreased quantity of sleep overall.<sup>24</sup> A connection was established in one study with television viewing and subsequent irregular sleep schedules in children up to four years old.<sup>25</sup> The quality of sleep seems to be most detrimentally affected by watching violent content.<sup>22, 26</sup> The cognitive and developmental effects of impaired sleep quantity and quality in young people are well documented and include diminished memory, concentration and learning capacity.<sup>24</sup>

### *Impact of Media on Attention*

With both media exposure and attention span difficulties on the rise, speculations on correlation have been ubiquitous. Several factors including timing, duration, media type and content are important considerations when evaluating the effects of media use on attention span.

Television use has been shown to contribute to both short- and long-term attention difficulties throughout all stages of childhood. Early television exposure in children between the ages of one and three has been associated with subsequent attention problems at age

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seven, with a dose-dependent effect.<sup>27</sup> Greater exposure through the elementary school years is further linked to attention problems that can persist into adolescence.<sup>28-30</sup> The amount of time spent watching television during adolescence is predictive of attention difficulties and subsequent academic failure.<sup>31</sup>

In addition to timing and duration of media exposure, visual content may be a key mediator regarding subsequent attention effects. Educational television viewing before age three has not consistently been found to negatively influence attention levels later in childhood, whereas both non-violent and violent entertainment television are significantly associated with attention problems.<sup>32</sup> One study showed that watching just nine minutes of a fast-paced cartoon show had immediate negative effects on attention, working memory and problem-solving capabilities in four-year-olds, compared to those who watched slower-paced, realistic educational programming. While the majority of research has focused on television exposure, computer use and video games have been similarly associated with increased attention problems in childhood and adolescence.<sup>34, 35</sup>

There is concern that the simultaneous use of multiple devices and applications within a device will impair young people's ability to concentrate deeply on one task at a time.<sup>3</sup> However, some have observed that youth may actually be more able to rapidly change tasks and efficiently negotiate content,<sup>36</sup> perhaps due to the plasticity of the brain during this period of development. The long term effects of such exposure remain to be determined.

## Age Specific Concerns

### Media Exposure in Ages 0-3

In 1999 the American Academy of Pediatrics began to discourage parents from allowing children under the age of two to view television entirely.<sup>37, 38</sup> Since then, the Academy has supported their recommendations with studies that have demonstrated adverse health and developmental effects of media for children under the age of two.<sup>37</sup> Despite these overt recommendations, 90% of parents report that their children under the age of two years have viewed some sort of electronic media.<sup>6</sup>

The “serve and return” relationship between infants and toddlers and their caregivers help develop the brain's architecture. In the absence of typical parent-child interactions like babbling, voice and facial mirroring, simultaneously with parental viewing of media or frequent background television (even if only audible), the infant's limbic system becomes underdeveloped.<sup>4</sup> This leads to poor attachment and subsequent learning and behaviour disparities.<sup>4, 37, 39</sup>

The link between media exposure and poor language development in toddlers has been well researched.<sup>39-42</sup> Some of the documented explanations for the delay in speech are due to a lack of audible adult speech and vocabulary interaction. Since approximately 30% of American homes have the television on at all times while occupied, there are fewer opportunities for parents to give their undivided attention to children and provide sufficient audible interactions. It

has been found that for every hour that a television was on, 500-1000 fewer adult words were spoken in the household.<sup>27</sup> It has been shown that infants learn language better from a native speaker in their household such as a parent or caregiver than from a screen, even if the media usage is in the child's native language.<sup>40</sup>

Although screen-time guidelines incrementally increase after the age of two years<sup>43</sup> (zero screen time recommended for children under the age of two years, to one hour by the age of three and two hours by the age of five) studies demonstrate that under the age of five, media time cuts into creative and imaginative play as well as positive interaction with parents, caregivers or siblings.<sup>37</sup> It is critical to encourage unstructured playtime in young children to help them learn problem-solving skills and foster creativity.<sup>37, 44, 45</sup>

Research has also demonstrated that there are negative long-term effects on a child's attention span when using screen time between the ages of one and three years old.<sup>13, 27, 42</sup> Children who watch little television and regularly engage in active play have fewer problems with attention and focus than those who indulge heavily in digital media and computer time. It has also been hypothesized that rapid computer or television screen changes observed by can have adverse effects on the developing brain of young children.<sup>39</sup>

### Media Exposure in Preschoolers

Preschoolers are also advised to consume media in moderation. The health and cognitive development these of preschoolers is enhanced when they engage in free-play and physical activity.

The executive function, the collection of prefrontal skills in the brain, includes goal-directed behaviour (including attention, working memory, inhibitory control, problem solving, self-regulation and delay of gratification) and is central to positive social interactions and cognitive functioning, all critical for success in school. Executive function can be negatively affected when young children are exposed to early screen-viewing. These consequences are thought to be a result of dopamine release within the striatum of the brain, which has been studied in young adults when playing video games.<sup>46</sup> With dopamine being a key component in the reward system, it is worrisome that screens have the potential to re-arrange the circuitry of the brain's neurons and therefore encourage poor decision-making and risky behaviour.

### Media Exposure in Adolescence

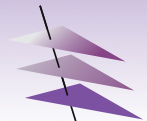
Adolescence marks a unique period of brain development, distinguished by asynchronous maturation of the brain accompanied by characteristic behaviours.<sup>3,47</sup> While there is significant development of skill and specificity of complex cognition, the prefrontal cortex develops, which governs planning and impulse control, matures more slowly.<sup>48</sup> Dopaminergic pathways in the brain are still developing during this stage. As a result, adolescents characteristically manifest increased risk-taking and sensation-seeking behaviours.<sup>48</sup> This, paired with developmentally normal movement away from parental influence, makes adolescents uniquely vulnerable to the influence of media on risky behaviours.<sup>3, 47</sup>



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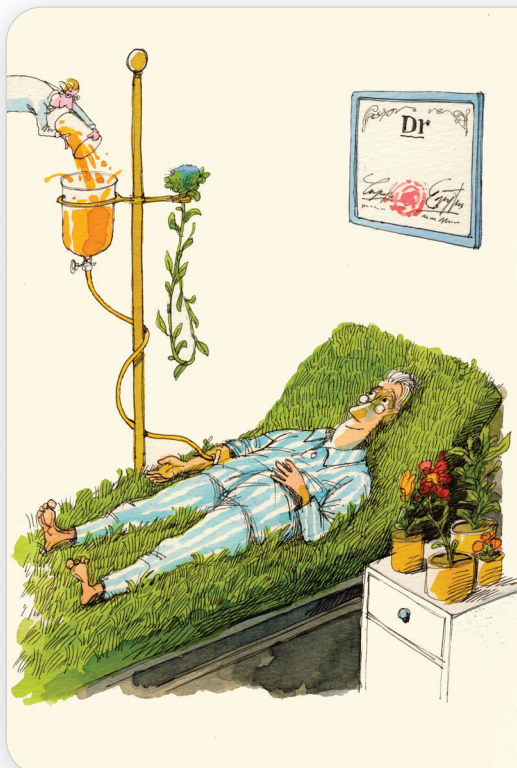
It is well noted that exposure to sexuality and alcohol consumption in movies predicts an earlier age of debut of sexual activity, greater degree of risky sexual behaviour (multiple partners and lack of condom use), as well as increased quantity and frequency of alcohol consumption.<sup>49-52</sup> Pornography specifically is readily accessible to youth, and may predispose to poor self-evaluation, unhealthy relationship patterns and risky sexual behaviours.<sup>53</sup> Multiple studies support the theory that engagement in violent video games encourages aggressive behavior and a reduction in empathy, mediated by the processes of desensitization and normalization of sexual violence in particular.<sup>54-56</sup>

Social media and other online interactive activities (such as gaming) have their own specific effects on adolescent development. The interactive nature of social networking sites may skew perception of self and others. Victimization of bullying – whether in real life or digitally – results in poor adjustment and greater rates of depression.<sup>57</sup> The movement of bullying behavior from the “in real life” (IRL) arena to the virtual world can result in even greater mood dysregulation and lower resilience among affected youth, mediated by a number of risk factors, including the amount of time spent engaged in online exchanges.<sup>57</sup> Increased rates of substance abuse and suicidality have been associated with cyberbullying, including some highly publicized cases.<sup>57</sup> Some studies have shown that engagement in social networking, particularly of a sexual nature, predicts poor body image and poor sexual satisfaction.<sup>58</sup> The anonymity of the Internet also makes youth who engage in online interactivity vulnerable to sexual predators and exploitation, especially among a subset of the population.<sup>57, 59</sup>

## Benefits of Media

The preponderance of media in our society is unavoidable and not exclusively negative. The impact of television watching on learning by young children is directly dependent upon the quality of the program. Vocabulary rates can grow the most if watching interactive programs where the characters talk directly to the child viewer to actively elicit their participation.<sup>23</sup> Researchers attribute this to expressive language encouragement. Programs with strong storybook-like structures with continuous narratives also are beneficial for language development in preschoolers. Repetition and high song volume also can help with language development in toddlers.

The concept of a “flipped classroom” (flippedclassroom.org) may enhance learning in young people, teaching them the skills to access, curate and assess the information available, and facilitate lifelong learning.<sup>60</sup> Engagement with video games may increase visuospatial cognitive capacity, and has the potential to enhance other aspects of adolescent brain development.<sup>61, 62</sup> Some suggest that violent video games provide an outlet for aggression, reducing the tendency to engage in violence in real life.<sup>3, 61</sup> Social media may enable an otherwise shy or marginalized youth the opportunity to participate in social exchanges, increasing connectivity and social competence.<sup>57, 60, 63</sup> Networking platforms may also provide a valuable vehicle for effective community-building and health information delivery to young people, especially those who are marginalized or isolated.<sup>64-66</sup>



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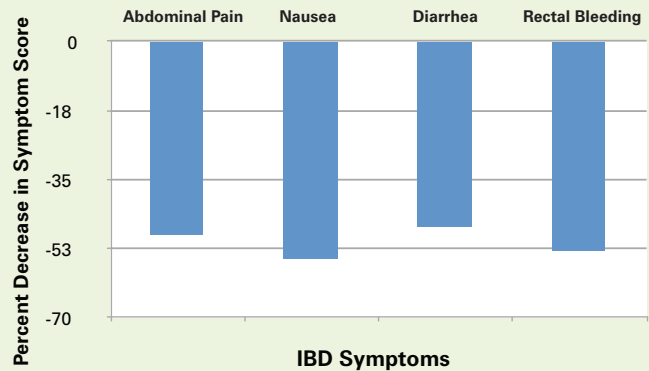
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## Recommendations

Parents appear to be the greatest mediator of both the time spent engaging with screen-based activities in children, as well as its impact on development.<sup>63, 67</sup> Both parental modeling (i.e., time spent by a parent in front of a screen) and parental regulation of quantity and location of “screen time” seem to influence time spent by youth.<sup>67</sup> Awareness by parents of the content of the media consumed may also have a favourable impact on the effects on their child. Relying on industry ratings may be insufficient as movie ratings do not effectively reflect all content.<sup>49</sup> Parental influence and encouragement towards healthier food selections have been shown to mitigate the harmful effect of media on dietary self-regulation.<sup>12</sup>

Media literacy strategies help youth interpret what they see and reduce the translation of exposure into negative behavior. Actively co-viewing media with a young child is recommended, followed by a discussion of what was watched to help integrate the learning is ideal, rather than using the media passively as a babysitter.<sup>68</sup> Passively co-viewing media with adolescents is also insufficient; in fact, this can have the effect of endorsing potentially harmful messages received by youth, resulting in *increased* fear or engagement in risky behaviours.<sup>20,52</sup> Limiting and curating consumption of media content, paired with active discussion of what is ultimately seen may have a positive influence on the impact of media.<sup>52</sup> An awareness of the potential impacts of social media on adolescent mental health is important in order for parents to engage in discussions with their children on healthy strategies of online communication.<sup>57</sup>

The range of screen-based activities has been associated with varying effects on development. Encouraging positive behaviours such as engaging in learning and connecting with others, while discouraging passive and uncritical media consumption may be valuable.<sup>60,63</sup> Simple strategies may effectively reduce the amount of time youth spend engaged with electronic media, such as eating meals as a family, encouraging physical activity (also impacted by parental modelling), reducing the number of televisions in the home and completely removing devices from children’s rooms.<sup>24,9</sup> With appropriate modelling and firm daily rhythms, children can learn to appreciate the importance of real interactions and relationships while being “unplugged” from media, while benefitting from opportunities that they offer. 🍌

KEY FACTS:
Children and youth engage in the use of digital/media devices to an unprecedented degree
The use of electronic media has both potentially harmful and beneficial effects
Caregivers should discourage any media use in children under two years
Caregivers should model responsible use of media, and balance with other activities such as connecting in real life (IRL) and engaging in physical activity
Caregivers should regulate the amount of screen time in which children engage
Children should not use electronic devices in their bedrooms
Caregivers should “curate” the content of media consumed by their children, and discuss what is seen whenever possible
Electronics should be turned off during meal times to facilitate mindful eating behaviours, healthier food choices and engagement with other individuals
Unstructured play and IRL activities are more developmentally valuable for the brain than any type of media

## About the Authors

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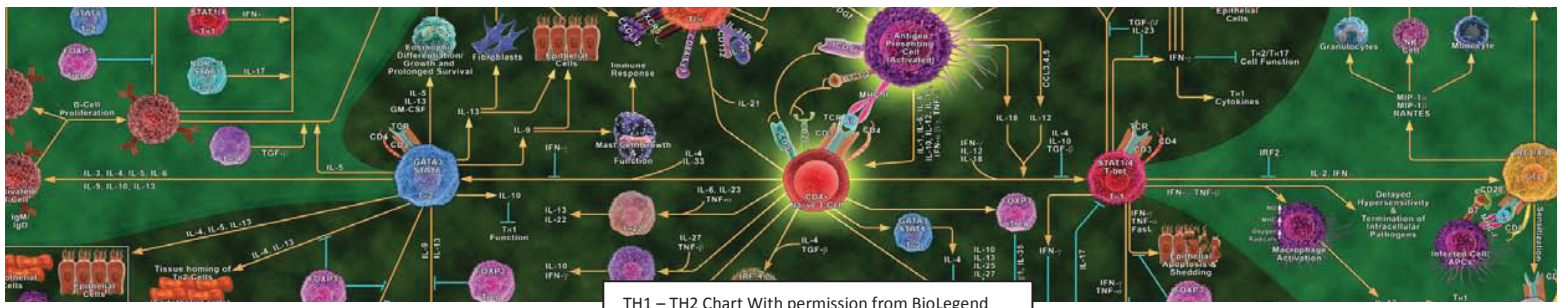
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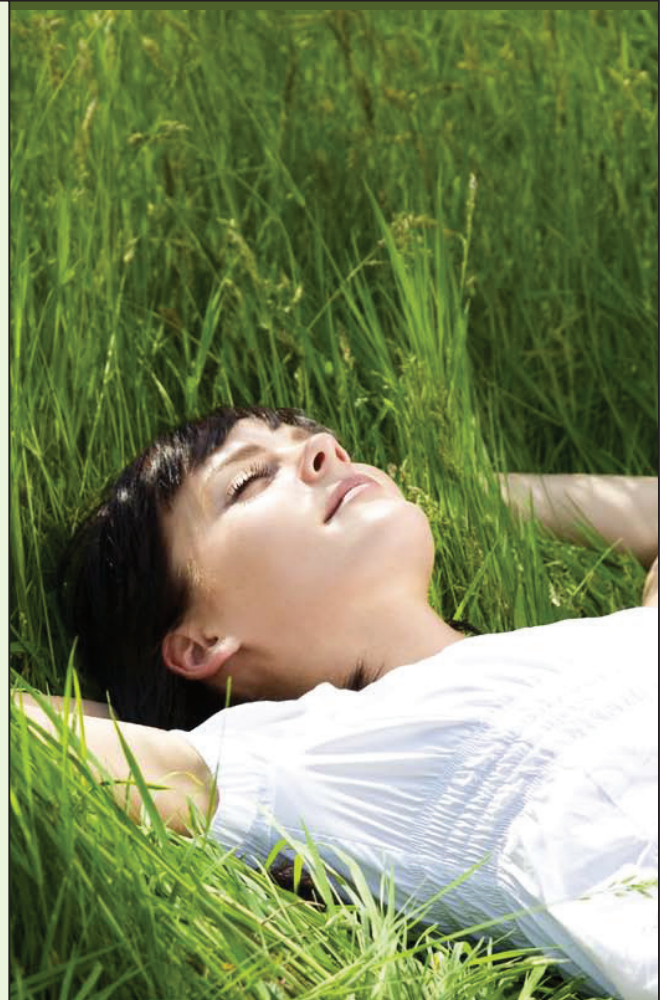
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# Online Pornography: Problematic Patterns of Usage and Clinical Consequences

**Dr. Jacqueline Cooper, ND**

Emerging research over the past decade has linked frequent use of online pornography to the development of numerous symptoms and health conditions. Pornography, defined here as 'sexually explicit media intended to arouse the audience', has been in existence for centuries. However, the health issues associated with pornography are new, and stem specifically from the use of online, high-speed Internet porn.

Unprecedented access to high-speed Internet has dramatically increased the accessibility, affordability and anonymity of viewing pornography.<sup>1</sup> The result, pornography usage is now a mainstream activity. One report, conducted in the US, found 66% of men and 41% of women watch pornography on a monthly basis.<sup>1</sup> A Danish study that surveyed 688 young adults aged 18-30 years old (316 men, 372 women) found that 28.8% of men and 11.4% of women polled watch online pornography 1-2 times a week, while 38% of men and 6.9% of women reported they typically use pornography 3 or more times per week.<sup>2</sup> This is a dramatic increase that brings with it many implications for both sexual practices and health.

The clinical symptoms that are being correlated with regular use of Internet pornography include difficulties with concentration, lowered self-esteem, anxiety, lack of motivation, lowered libido, anorgasmia (inability to reach orgasm) and erectile dysfunction (ED).<sup>1,4,5,6</sup> As health care providers, it is important for naturopathic doctors to be educated on the prevalence of online pornography usage and its consequences. A high risk demographic that demands particularly attention is the teenage population. Due to the unique attributes of the adolescent brain, teens are exceptionally vulnerable to developing problematic usage patterns and exhibiting symptoms from such use.<sup>4,7,8</sup> Understanding the issue is imperative so that patients can be adequately assessed, as well as educated in a preventative manner about the risks of usage.

## Pornography Access

Up until the past twenty years, pornographic material was limited to 2-D magazine pictures and X-rated VHS or DVD films. While these materials were certainly available, there were some barriers

to accessibility. The introduction of high speed Internet has brought with it unprecedented access to a limitless supply of free pornographic material that can be viewed with complete anonymity. The prevalence of pornography on the Internet is extensive, and while exact statistics are difficult to come by, estimates project approximately 12% of all websites contain pornographic content.<sup>5</sup> More astounding, is that some studies report as high as 25% of all search engine requests are for pornography.<sup>5</sup> Even when not actively sought out, exposure to pornographic images online is common. A report by the American Psychiatric Association, cites a study by the Kaiser Family Foundation conducted in 2001 which found 70% of teens aged 15-17 years had encountered pornography unintentionally while surfing online for homework or other activities.<sup>5</sup> 23% of those polled reported this happening "somewhat or very often."<sup>5</sup> This statistic should not undermine the fact that most viewings of online pornography are intentional. It is simply meant to highlight the fact that pornography exposure online is so prevalent that it can occur even when not directly sought.

Another influencing factor in the high incidence of online pornography use has to do with the widespread adoption of the smart phone. Never in history has a form of technology been adopted by the masses so quickly. Smart phones have made Internet access both discreet and ubiquitous. Essentially, this provides users with an inconsumable amount of porn which is never more than a finger tap away. Mobile access via smart phones also makes it nearly impossible for a parent to effectively monitor their child's or adolescent's online activities.

## Pornography-Induced Symptoms

The impact of digital Internet pornography on health was first recognized due to the high prevalence of men presenting to health practitioners with "unexplainable" erectile dysfunction. Many of these men were in their early 20s, a demographic that is not typically affected with ED. A commonality among these men was their frequent usage of high speed Internet pornography. They were advised to abstain from viewing pornography and masturbating for a period of time. In doing so, the men noticed improvements in their symptoms that increased the longer they abstained. They also noticed other "seemingly unrelated" symptoms pertaining to mood and concentration also improve with abstinence.<sup>9,10</sup>

While no safe level of exposure has been determined, increased frequency and duration of use put individuals at greater risk for developing pornography-induced symptoms. Through research, it



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has been determined that a number of other factors influence the likelihood of developing health issues. The age of the viewer and the emotional drivers for viewing also contribute to the onset of symptoms.<sup>4</sup> Research indicates that much of pornography-induced symptoms are as a result a rewiring within the brain, particularly within the limbic system and so adolescents are at increased risk due to the greater plasticity of their still developing brains.<sup>1,11,12</sup> Individuals who are predisposed to mood disorders are also seen as being at higher risk for developing symptoms.<sup>1</sup>

While much of the research has been done on heterosexual males, females are also negatively impacted by repeated exposure to online pornography. Poor self-esteem and issues with body image are common for females who have repeated exposure to pornography.<sup>1,13</sup> A greater proportion of females report feeling disturbed by pornography they have come across inadvertently on the Internet (35% of females compared to 6% of males).<sup>1</sup> Some of this discrepancy is likely due to the prevalence of 'hard-core' pornography online, which is degrading to women and portrays varying degrees of violence. Repeated viewing (by both sexes) has been correlated with the sexual objectification of women. Sexual objectification demeans a woman's worth, and equates her value to her ability to provide sexual pleasure. The consequences to a woman's self-esteem and identity when exposed to this type of messaging are incredibly detrimental. Even women who do not watch pornography are affected by the trend. Increasingly, they report that their partners request sexual activities that follow the scripting of online pornography — this can include rough sex, anal sex and sex with multiple partners. Overall in the context of partnerships, consumption of online pornography is correlated with decreased levels of sexual satisfaction.<sup>1</sup>

Sexuality is complex and existing research has only begun to scratch the surface with respect to the issue at hand. Some of the symptoms that have been associated with online pornography use include the following:<sup>1,5,13-17</sup>

- Brain fog, impaired concentration, ADD/ADHD
- Lethargy, lack of motivation
- Lowered self-esteem, social anxiety
- Emotional numbness, depression
- Apathy, aversion towards sexual intimacy with real partner
- Anorgasmia, delayed ejaculation
- Chronic erectile dysfunction
- Sexual objectification of individuals
- Increased sexual aggression
- Escalation to pornography that does not match original tastes or sexual orientation

## Mechanisms for Development of Symptoms

Research on the link between pornography and the development of symptoms relates to the neuroplasticity of the brain and the impact of supernormal stimuli.<sup>18</sup> The reward circuit, also referred to as the limbic system, is the primary site within the brain that is affected by online pornography.<sup>10,19</sup> The reward circuit is also the area of the brain involved with addictions, both to substances and behaviours. The evolutionary function of the reward system is to help motivate an individual to perform actions that promote survival and/or propagation of one's genes.<sup>10,18</sup> Seeking sex is an adaptive behavior promoted by the reward system. While viewing Internet pornography is far different than engaging in physical intimacy, it activates many of the same brain centres.<sup>10,18,19</sup> The primary components of the reward circuit that are affected by online pornography are the prefrontal cortex, the nucleus accumbens and the ventral tegmental area.<sup>10,18,19</sup> It is in these areas where the neural rewiring takes place, eventually leading to the development of pathological symptoms.

Neuroplasticity, with respect to the reward circuit, is influenced by a number of factors. Dopamine is the neurotransmitter associated with arousal, surging in anticipation of something occurring. When dopamine rises, it causes a release of DeltaFosB. DeltaFosB is integral to the formation of mind maps that link sounds, sights, sensations, memories and emotions to the activation of the reward center, thereby developing sensory associations with a desired outcome.<sup>6,10</sup> This process is referred to as sensitization. It represents a classic Pavlovian response, 'nerves that fire together, wire together'. Sensitization is a physiological component of situational triggers that elicit cravings — a fundamental aspect of all addictions.<sup>1,19</sup> The release of opioids occurs when the desired object/activity is consumed or achieved, making opioids the neurotransmitters that deliver sensations of happiness and satiation. It is important to note that the anticipation of pleasure will often override the sense of being satiated.<sup>9</sup> This plays an important role in the pathology of Internet pornography usage. Novelty increases the release of dopamine.<sup>10,20</sup> The potent stimulatory effect of novelty, with respect to variety of sexual partners, is known as the Coolidge effect.<sup>10,16</sup> This effect has been found to be true in both humans and animals. In animal studies, what is consistently observed is that the time it takes for a male to reach climax increases exponentially when he repeatedly mates with the same female. However, if he has access to multiple female partners, the time to reach climax when mating with each new partner will increase only marginally.<sup>10</sup> The positive feedback from the reward circuit is so strong, that a male will often continue to perform sexually, ignoring other bodily cues for food or water, until he reaches a point of exhaustion. This powerful driver does not present problems for humans as the social conditions rarely provide access to a steady stream of willing sexual partners within confined windows of time. However, in the context of viewing pornography online, there is an unending source of novel stimulation, part of what qualifies it as a supernormal stimulus.<sup>18</sup>



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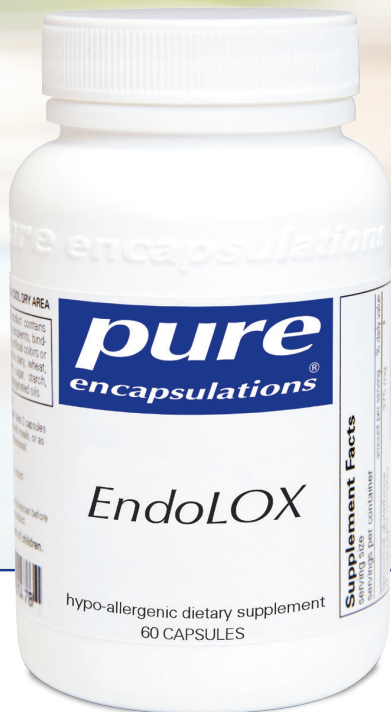
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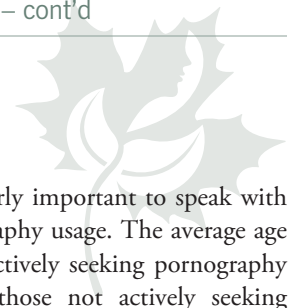


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From an evolutionary perspective the reward circuit is designed to encourage the pursuit of high fat, high sugar foods and opportunities for sexual reproduction.<sup>10,18</sup> The release of dopamine drives the seeking behavior which is reinforced by the increase of opioids upon receiving food and sex. Many exogenous substances such as alcohol, nicotine, amphetamines, cocaine and heroin act as stimulants on the reward circuit. Online pornography, however, along with 'junk food' (synthesized foods that are unnaturally high in calories, sugars, sodium, and/or fat, without significant levels of vitamins and minerals), falls into the category of supernormal stimuli.<sup>18</sup> A supernormal stimulus is "an exaggerated version of a stimulus to which there is an existing response tendency, or any stimulus that elicits a response more strongly than the stimulus for which it evolved."<sup>18</sup> The reward circuit evolved to encourage individuals to seek and acquire food and sex. Therefore, the brain is primed to have an amplified response when triggered by these stimuli. However, junk food and online pornography are not natural stimulants. Both have been artificially created, providing an intensity of stimulation that is not naturally encountered. In the case of online pornography, its consumption is not hindered by limitations that moderate the usage of other potentially addictive substances or behaviors. For example, drugs, alcohol, and even food, have a financial cost associated with their procurement.

Unlike other substances that can be abused, there is no finite amount of porn online. A user has an endless supply as long as they have a connection. As mentioned previously, with the advent of smart phones and easy access to free WiFi, videos can be downloaded or streamed from almost anywhere. There are mechanisms for creating firewalls and blocking certain sites. However, many schools and parents find that youths are sufficiently tech savvy that these attempts are often futile.

Another difference between the consumption of online pornography in comparison with other substances is the lack of protective mechanisms the body has for limiting the volume ingested. Nausea and vomiting are common compensatory actions that occur in an attempt to prevent the body from being overburdened with a substance or excessive amount of food. After consuming a certain amount of alcohol a person will lose consciousness, thereby bringing an end to the binge episode. Even for sex addicts, there are natural limitations in that they need to seek willing partners. There are no parallel limits to how much visual stimulation a person can consume in the form of online pornography. In the extreme stages of addiction, a user can have multiple browsers open at once, viewing an endless supply of novel stimuli for hours on end.

Unlike many other addictive behaviors such as cutting, binge eating or trichotillomania (pulling out of one's own hair), problematic porn habits have no visibly obvious physical ramifications that may call a caregiver's attention to the matter. This makes it ever more important that we, as primary health practitioners, are aware of possible physical and psychological symptoms that may arise as a result of problematic online porn usage.

## High Risk Population

When assessing patients, it is particularly important to speak with adolescents about their online pornography usage. The average age in Canada for male youths to begin actively seeking pornography online is 12 years old.<sup>20</sup> Even for those not actively seeking pornography, many come across it inadvertently while using the Internet for other purposes.<sup>4,5</sup> Adolescent use carries with it an increased cause for concern because there is a critical window of brain development that occurs during adolescence. The teenage brain is distinctly unique from both the child and adult brain. The anatomical and biochemical distinctions make teens particularly susceptible to developing behavioral or substance addictions.<sup>7,16</sup>

One of the most relevant attributes of the adolescent brain is the heightened activity of the reward circuit. The reward circuit in the teenage brain is far more active than the adult brain, some studies show 2-4 times as much.<sup>7,16,20</sup> Greater surges of dopamine, increased sensitivity of dopamine receptors and higher levels of DeltaFosB all contribute to the overall greater activation of the adolescent brain in comparison to the adult brain.<sup>19</sup> Activity in the reward circuit typically peaks during the mid-teens.<sup>7,8,20</sup> This increases novelty and thrill-seeking behaviors.<sup>7</sup> This activity is occurring at a time where the frontal cortex, which governs impulse control, remains immature. The frontal cortex is not fully developed until approximately 25 years old.<sup>7</sup> This combination of factors primes the adolescent brain, increasing its susceptibility for developing an addiction to substances and/or behaviors that elicit activation of the reward circuit.<sup>1,7,20</sup> Internet pornography, as described above, is a supernormal stimulus.<sup>17</sup> This combination sets adolescents up for greater rates of usage and thus, greater implications on their health. It also explains why young men in their 20s, exposed to online pornography through their adolescence, require a greater duration of time refraining from pornography to experience a remittance of symptoms, in comparison to men in their 50s.<sup>9,19</sup> Middle-aged men have typically used Internet pornography for longer, and yet, despite having a more aged vascular system, and in many cases a lesser state of health, recover faster than younger men.<sup>10,20</sup> Typically, middle-aged men who abstained from pornography and masturbation for 90 days experienced a full recovery of erectile function, along with many other positive cognitive and emotional developments.<sup>10,20</sup> Younger men in their 20s who had utilized online pornography through their adolescence, in many cases, required double the time or more abstaining from pornography and masturbation in order to see a full recovery of function.

## Clinical Implications for NDs as Primary Health Care Providers

When determining if a patient's use of Internet pornography is contributing to their symptoms, it is important for the practitioner to remember that viewership exists on a spectrum and does not need to be a full blown addiction to contribute to clinical symptomatology.

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**QUESTIONS TO ASSESS WHETHER OR NOT ONLINE PORNOGRAPHY USAGE IS PROBLEMATIC:**

- Do you watch pornography online?
- On average do you spend more than 5 hours a week on the internet viewing pornography?
- Do you ever feel like you should watch less or stop altogether?
- Do you ever have multiple windows open at once when you are viewing?
- Has viewing pornography ever had a negative impact on your relationships?
- Do you ever find yourself looking forward to your next opportunity to watch porn?
- Do you watch pornography during the day while at work or school?
- Have you found your tastes in what you like to watch changing over time?
- Do you ever have difficulties reaching orgasm with your partner?
- Do you ever feel disgusted about what you viewed after climaxing?

If a patient answers yes to a number of the questions above, it is likely that their patterns surrounding pornography usage are having a detrimental effect on their health, or could in the future if left unchecked.

The most important element in the treatment plan of pornography-induced symptoms is a period of abstinence from both masturbation and watching online pornography. Abstaining from both is important because, even if an individual is not actively watching porn online, they can visually recall clips from images they have watched in the past, thus maintaining the integrity of the neural networks formed.

When online pornography usage reaches the stage of a full blown addiction, abstinence will likely not be sufficient to re-establish balance and reverse symptomatology. Recent studies confirm that the development of behavioral addictions share the same fundamental mechanisms and neural pathways as drug addictions.<sup>1</sup> Therefore, if the pattern around viewing pornography has reached full blown addiction status, a naturopathic treatment approach will largely mirror the approach taken to resolving substance addictions. Supportive counseling that encourages maintaining a period of abstinence should be supported by other modalities such as acupuncture, clinical nutrient therapies, homeopathic remedies and botanical supplements (particularly nervines which nourish and restore balance to the nervous system).

## Conclusion

Given the implications for health, a comprehensive naturopathic assessment should include questions about use of online pornography. Asking about use not only helps to identify patients with problematic

consumption, but for those who do not have problematic patterns of usage, it provides an opportunity for preventative education. Most patients do not expect to be asked about pornography usage at their doctor's office. After asking if they use Internet pornography, it is important and beneficial to explain the rationale for asking. Most people have no idea of the potential health repercussions from regular viewing of high speed Internet pornography. Providing a brief synopsis of the issues and symptoms that have been correlated with regular viewing neutralizes the charge of the subject, and often elicits more frank disclosures from the patient.

Brain function and sexuality are two realms of health that require a far greater amount of research to achieve a more comprehensive understanding of their activities and how they intersect. The clinical consequences of Internet pornography are examples of how sexual practices can have a significant impact on an individual's health. In the case of online pornography, there are numerous adverse effects, which this article has highlighted. However, the research reviewed represents only the tip of the iceberg. It would certainly be to the benefit of naturopathic doctors and their patients to stay abreast of the clinical implications of emerging research within these areas. 🌟

## About the Author

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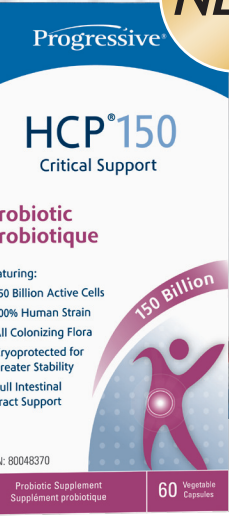
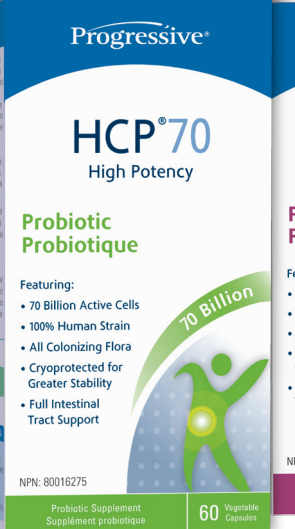
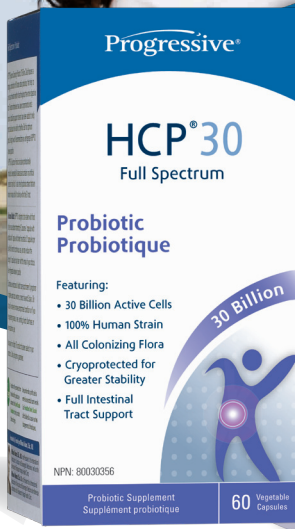
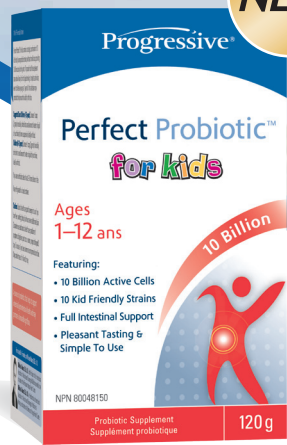
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# Physical-Health Impacts of Prolonged Screen Use in Children and Adolescents

Dr. Iva Lloyd, ND, RPP



The present era of computers, smartphones, iPads and video games is impacting our health. Musculoskeletal conditions, sleep disturbances, changes in vision and behaviour, are being correlated with prolonged use. Of greatest concern is that effects on children's and adolescents' physical health due to prolonged device use, seems to be greater than that of adults. The smaller the electronic device being used and the more frequent the usage, the greater the impact.<sup>1</sup>

The present era of computers, smartphones, iPads and video games is impacting our health. Musculoskeletal conditions, sleep disturbances, changes in vision and behaviour, are being correlated with prolonged use. Of greatest concern is that effects on children's and adolescents' physical health due to prolonged device use, seems to be greater than that of adults. The smaller the electronic device being used and the more frequent the usage, the greater the impact.<sup>1</sup>

Children and adolescents use computers differently than do adults; children and adolescents show a greater tendency to spend hours fixated on video games or texting and are also more likely to ignore uncomfortable postures, symptoms of overuse and computer glare.<sup>2</sup> Although musculoskeletal (MSK) complaints, sleep disturbances, headaches and vision changes are common in all age groups, the recent rise of these complaints in younger populations deserves attention and further investigation.

## iPosture

The term "iPosture" is being used to describe the stooped body shape adopted by those texting, emailing or playing games on small electronic devices, such as iPad or Smartphones.<sup>3</sup> "iPosture", also referred to as "iHunch", is a syndrome associated with excessive time hunched over mobile electronic devices and is associated with an increased risk for back pain and other physical symptoms. There is even a device called iPosture, which is an intuitive electronic device that automatically sense when the body slouches and alerts the user with brief vibrations in order to assist in correcting posture.<sup>4</sup>

Normal sleep duration is seven to eight hours per night.<sup>5</sup> What is alarming is that almost all age groups are tending to spend as much time in front of a personal computer, laptop or tablet screen as they do asleep in bed. A survey by the British Chiropractic Association found that 73 percent of children aged between 11 and 16 spent between one and six hours looking at a laptop, tablet or computer. The typical young adult spends 8.83 hours a day in front of a screen and older individuals spend an average of 6.64 hours a day on electronic devices.<sup>6</sup>

With the tremendous amount of time that individuals spend on electronic devices it is not surprising that prolonged use is resulting in symptoms. For example, the statistics for back pain are staggering: 84 percent of 18- to 24-year-olds have admitted to suffering back pain in the past twelve months.<sup>3</sup>

The cumulative effects of repetitive stressful movements or postures, such as those associated with computer use, are associated with a physical injury syndrome referred to as cumulative trauma disorders (CTD). This disorders affects the hands, wrists, shoulder and neck resulting in symptoms such as carpal tunnel syndrome, neck tension or headaches.<sup>7</sup> Until recently CTD was only associated with adults, but with the increased usage of computer-related activities in children and adolescents it is becoming more common in these younger age groups. A survey conducted on 212 children, between the ages of 11 and 16, found that 73 percent of children spend between one and six hours looking at a laptop, tablet or computer.<sup>7</sup> Thirty-seven percent of those reported having eye discomfort, thirty-one percent had fatigue, thirty percent wrist pain, nineteen percent head pain and 15 percent back pain.<sup>7</sup> In another study conducted in 2001 of 152, 6<sup>th</sup> grade students more than half the children reported musculoskeletal discomfort.<sup>1</sup> Back pain and eye pain were the most closely correlated with increased usage.<sup>7</sup>

The most consistent factor associated with iPosture is the amount of time spent on a computer or electronic device.<sup>8</sup> Other factors contributing to the new phenomenon of iPosture include:

- Rounding of the shoulders, bringing wrists together, and a forward neck posture which makes the chest contract.
- Specific computer activities, such as using a joystick or playing non-educational games were significantly predictive of physical discomfort and had a higher association with changes in posture.
- Corresponding lack of exercise resulting in undeveloped back and core abdominal muscles. A healthy upright posture requires adequate muscle tone.<sup>8</sup>



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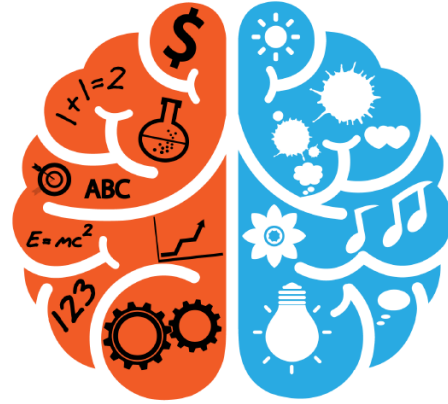
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There are a number of multivariant risk factors associated with computer use and the risk of musculoskeletal symptoms in children. Factors such as gender, age, TV exposure, computer anxiety, sustained attention, socio-economic status and somatic complaints, such as headache and stomach pains, were all found to effect the likelihood of musculoskeletal symptoms in children.<sup>9</sup> There is growing research to support the need for computer use in children to be managed more closely.<sup>9</sup>

#### GUIDELINES FOR COMPUTER USE IN CHILDREN:<sup>10</sup>

- Children should be encouraged to use computers for moderate amounts of time (2-3 days a week for an hour or two per day)
- Children's use of computers should include non-violent action-based computer games as well as educational games
- The use of computers should not displace social or physical activities and should instead be arranged to provide opportunities for social engagement with peers and family members and physical activities, ideally outside
- The use of computers should involve content with pro-social and non-violent themes
- Any unexplained symptoms warrant medical/naturopathic attention

## Link Between Computer Use and Behavioural Changes

The link between computer use and behaviour changes appears to be related to duration of use and posture during use. In this context, the adage “structure governs function” is proving to be true.

Working on larger computer systems, such as a laptop, allows a person to adopt a “high-power pose” with their shoulders square and their chest open. Smaller devices results in a “low-power pose” with the chest contracted. Research conducted by Harvard School Working Group illustrated that high-power poses increased the feeling of power, raised pain threshold and improved job performance. There was also a corresponding increase in testosterone and cortisol.<sup>11</sup> Although participants working on smaller devices behaved less aggressively, there is a concern that working on smaller devices, which result in a collapsed chest, are more strongly associated with feelings of depression and lack of self-confidence.<sup>11</sup> Exploring the emotional impact of smaller electronic devices on users is an area that warrants further investigation.

In a study of 212 adolescents, parents reported that their child's computer use was associated with them having reduced activity and exercise (35.2%), social withdrawal (24.6%), aggression (16.5%), hyperactivity (15.2%) and depression (8.5%).<sup>7</sup> Many other studies show linkages between behavioural change and changes in posture as a result of computer use.

A study conducted in October 2013 of 4747 college students showed some of the subjects had psychological symptoms positively

correlated with duration of screen time and poor sleep quality, such as anxiety (16.3%), depression (15.9%) and psychopathological symptoms (17.3%). The study noted that low physical activity and high screen-time were independently and interactively associated with increased risks of mental health problems and poor sleep quality.<sup>12</sup> In a study of 126 young adolescents it was found that higher levels of depression were strongly associated with prolonged TV watching and electronic-device use.<sup>13</sup> The same study found that implementing household rules around duration and content was beneficial in reducing depression in young adolescents.

Research also indicates that psychological changes, such as aggression, social isolation and addiction are associated with the type and degree of musculoskeletal discomfort<sup>7</sup> and with the type of posture that an individual has while engaged on electronic devices.<sup>11</sup>

## Sleep Disturbances

Adolescents tend to spend a prolonged amount of time, both during the day and before bed, on electronic devices. Both daytime and bedtime use is associated with increased risk of short sleep duration, long sleep onset latency and increased sleep deficiency.<sup>14,15</sup> In 2014 a cross-sectional survey of 3,067 eighth-graders compared Internet use to somatic complaints, including backache, overweight, headaches, musculoskeletal pain, sleep problems and sight problems. The most significant issue noted was chronic sleep problems.<sup>16</sup>

Adolescents that own a smartphone are more likely to call/send messages and spend time online before bed. This behaviour is more common with smartphone technology than with conventional mobile phones.<sup>17</sup> The use of electronic media in bed is association with decreased sleep duration and with increased risk of sleep difficulties. This change in sleep behaviour was also associated with an increased risk of depressive symptoms.<sup>17</sup>

A survey conducted with 532 students aged 18-39 years indicated a positive association between insomnia and computer usage for playing, web-surfing, texting and Internet reading. Those same behaviours were also associated with lack of energy in the morning.<sup>18</sup>

## Headaches

Headaches are commonly associated with extended periods of time spent using computers/video games, especially if fixed on a given task. The causes of the headaches may be associated with eyestrain, lack of sleep, postural changes or dehydration.

In 2005/2006 a study of 31,022 adolescents looked at the association between screen-based activity and physical complaints such as backache and headache. The research indicated that the accumulated time spent on computer use, computer gaming and TV viewing was strongly associated with the frequency and severity of backache and headache. Although the results of this study did not find any difference between genders,<sup>19</sup> another study of high-school



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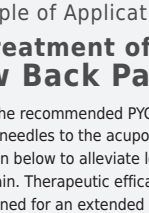
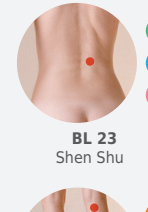
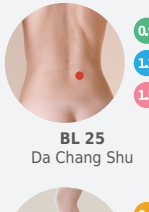

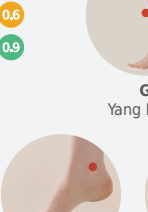

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students indicated that headaches were more commonly associated with females who spent a lot of time on a computer.<sup>20</sup>

One research study looked at postural angles as a predictor of upper quadrant musculoskeletal pain (UQMP), including headaches. Tenth-grade high-school students, with no previous UQMP, were assessed using 3D Posture Analysis as they engaged in desktop computer activities over a six month period of time, then followed up one year later. Posture was reported as five upper quadrant angles (head flexion, neck flexion; craniocervical angle, trunk flexion and head lateral bending). The degree of UQMP and psychosocial factors were determined using the Computer Usage Questionnaire, the Beck Depression Inventory and the Multidimensional Anxiety Scale for Children. Over 34 percent of the students complained of seated-related UQMP during the follow-up period. The highest degree of pain was associated with increased head flexion (HF). The pain score increased 0.22 points per 1° increase in head flexion.<sup>21</sup>

## Other Physical Conditions

Computer and electronic device use affects the physical, cognitive and social development of children and adolescents. Whether that impact is positive or negative depends on the duration of time that children spend on these devices, the activities they engage in and the posture and ergonomics that they have while using these devices. Some of the research links extended time on these devices to obesity as computer usage is displacing exercise and other more physical activities.<sup>22</sup> Yet the research between the current obesity rates and time spent engaged in sedentary behaviours such as watching TV, computer use or playing video games is controversial; most research shows an inverse relationship, but the results are not conclusive or consistent across studies.<sup>23</sup>

Research linking MSK conditions such as carpal tunnel syndrome and tendonitis are variable. There is speculation that there would be a positive link between repeated use and activities such as texting, but the results between various studies are inconclusive.<sup>24</sup> There is agreement in the literature that both of these areas warrant further study.

## Computer Vision Syndrome

Extensive time on a computer can lead to a number of symptoms of eyestrain including eye discomfort, fatigue, blurred vision and headaches and dry eyes. The factors that contribute to eye strain and computer vision syndrome include prolonged time spent staring at a screen or monitor, poor lighting, computer glare and poor ergonomics.<sup>25</sup>

Children are at greater risk when they are engaged in enjoyable tasks, such as playing video games, as there is a tendency to engage with great concentration, for many hours without few or no breaks. Prolonged activity without a significant break can cause the eyes to lock into a particular distance resulting in accommodative

problems. Focused concentration results in a lack of blinking which can result in dryness of the eyes and overall eye irritation.<sup>26</sup>

Children are more adaptable than adults. They are more likely to ignore computer glare and an uncomfortable viewing position and hence, are more likely to end up with eyestrain. Whether due to blurred vision or uncorrected hyperopia, eyestrain should be addressed as it can lead to long-term vision problems.<sup>25</sup>

### RECOMMENDATIONS TO REDUCE COMPUTER VISION SYNDROME<sup>27, 28</sup>

- For regular computer users, at least an annual eye examination. If necessary, include refractive correction and/or eye exercises to correct for accommodation concerns.
- Reduce the amount of time on the computer.
- Ensure frequent breaks. At least a ten-minute break for every hour on the computer. During the break, it is best to stretch and move around and to look at something beyond the point where any focusing is required, in order to give the eyes a rest.
- The computer monitor and the keyboard should be positioned and adjusted according to child's body parameters. The screen should not be positioned at too high a level in the child's field of view; the chair should not be positioned at too low a level and the desk not at too high a level. An adjustable chair is a good solution. A foot stool may be necessary to support the child's feet.
- Windows or other light sources could create glare on the screen. When this occurs, the desk or the computer screen should be turned to another direction.
- In some cases, a dimmer light is preferred instead of the bright overhead light.

## Ergonomics

The importance of proper ergonomics when engaged in computer activities, unfortunately, is primarily associated with adults. To-date there is little recognition or appreciation for the importance of addressing the ergonomic considerations of children and adolescents as it relates to computer use.

The average family has three computers in their home and generally does not have furniture specifically designed for computer use.<sup>1</sup> Most computer workstations are arranged for adult use. Therefore, a child using a computer on a typical office desk often must look up further than an adult. Since the most efficient viewing angle is slightly downward, about 15 degrees, problems with binocular vision can occur. In addition, children may have difficulty reaching the keyboard or placing their feet on the floor, causing arm, neck or back discomfort.



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Although not researched extensively, having furniture designed for the computer and touch typing was associated with less musculoskeletal discomfort.<sup>1</sup> Ensuring proper ergonomics, both at home and in the classroom can help reducing head flexion angles and postural changes among computing children and adolescents.<sup>21</sup>

Working on smaller computerized devices causes another set of problems as users are often hunched over their device resulting in the iHunch posture (a collapsed chest and other contracted body postures). The lack of back support, the contortions of the hands and wrists and the repetitive movements are problematic. Addressing the ergonomic factors of computerized devices for children and adolescents is overdue.<sup>20</sup>

### TIPS FOR HEALTHY USE OF MOBILE DEVICES<sup>3</sup>

- Show children and adolescents how to sit comfortably and with good posture, with back supported and two feet on the floor.
- Place a beanbag or pillow on the child's lap, so he or she can rest their arms on the beanbag and support their tablet or portable gaming device in a comfortable position, enabling them to see the device and use it without hunching forward
- Check on your children every half hour to make sure they are sitting comfortably without being hunched forward.
- Schedule breaks from screen-time at least every hour.
- Schedule screen-free exercise times, encouraging games and active play so that core strength muscles are used and strengthened.
- Use a separate, synchronized keyboard when typing on the tablet, with the screen propped up so it can be seen without craning your neck.
- Discourage the use of electronic devices before bedtime. Electronic devices should not be kept in the bedroom. They should definitely not be put under a pillow or beside the head of someone who is sleeping.
- There are a number of devices designed to improve posture including iPosture<sup>20</sup> and LUMOlif. Both of these electronic devices vibrate when the user slouches in order to provide them with feedback and allow them to correct their posture.

As computer and electronic device use is ubiquitous in the everyday lives of most of our patients, it is important for naturopathic doctors to assess the musculoskeletal, sleep, vision and physical effects that excessive computer use may be having on the health of children and adolescent patients. Educating parents and patients on proper ergonomics and the need for non-sedentary activities is becoming increasingly important. As a naturopathic doctor, I am greatly concerned about the long-term impact of these physical changes occurring so early on in life. 🌱

## About the Author

**Iva Lloyd, ND** is a naturopathic doctor, board certified polarity practitioner and educator and reiki master. In 2002 she founded Naturopathic Foundations, health care clinic with four naturopathic doctors. In 2011 she established [www.ndhealthfacts.org](http://www.ndhealthfacts.org) a website that focuses on identifying the causes of diseases and the natural treatment options available.

Dr. Lloyd is the author of four books: *Building a Successful Naturopathic Practice*, *Messages from the Body, a guide to the Energetics of health*, *The Energetics of Health, a naturopathic assessment and History of Naturopathic Medicine, a Canadian perspective*. She teaches part-time at the Canadian College of Naturopathic Medicine, writes for various journals and magazines and gives seminars on naturopathic assessment, the psychological aspects of health and disease, and the energetics of health. She is editor-in-chief of the *Vital Link* – the journal for the CAND and sits on the editorial boards for the *Natural Medicine Journal* and the *International Journal of Naturopathic Medicine*. She is Past-Chair of the Canadian Association of Naturopathic Doctors and in 2014 she became the Interim President of the World Naturopathic Federation.

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*"Been taking your product for over three years now. 1 pack a day. After having several bowel resections for Crohn's, being hospitalized for 6 months my doctor recommended trying this before going down other drug treatment paths again. So far I have been in remission with no problems and no other drugs. I recommend this product along with a good diet. This has made a big difference in my life. Crohn's is finally something that doesn't affect my day to day life."*

P.G. – Guelph

*"This product has brought me back to life many times. About 10 years ago, I was hospitalized with C. difficile colitis, IV drugs, antibiotics all made me sicker and sicker as months went by and I finally tried VSL from a GI doctor in Toronto...I slowly started to get better. Since then whenever I have to use antibiotics or have a flare with my Crohn's, I use a month or two until I'm back, its always in my fridge. Keep making it!"*

Elisa

For more testimonials from real VSL#3 patients, go to [www.vsl3.ca](http://www.vsl3.ca)

Available at Shoppers Drug Mart, other pharmacies and health food stores.



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