



## Technology overuse on child sensory development

**The role of occupational therapy in the future field of balanced technology management, improving child health and enhancing academic performance**

Reminiscing about growing up in the “good old days,” is a memory trip well worth taking when trying to understand the issues facing the children of today. A mere 20 years ago, children used to play outside all day, riding bikes, playing imaginary games and building forts. Masters of creativity, children of the past manufactured their own form of play that didn’t require costly equipment or parental supervision. Historically, children moved, touched and connected with other human beings a lot, and their visual and auditory world was largely nature based and simple. Prior to the explosion of technology, a child’s sensory stimulation was balanced, allowing for adequate development and integration of the senses. As sensory integration is prerequisite to achieving foundation skills for school readiness, adequate sensory development plays a salient role in a child’s ability to pay attention, print and read (1,2). The rapid intrusion of 21st century

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## Special notes

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technologies such as television, video games, movies, internet, iPods and cell phones, has created a sensory world that is vastly different from 20 years ago. The critical factors for child development of movement, touch and human connection have taken a “back burner” to the fast paced, exciting virtual world of technology, with devastating consequences. The expertise of the occupational therapist in the areas of sensory processing and motor development, brings them to the forefront as leaders on the impact of technology overuse on children. This article discusses the intersection between sensory processing and technology overuse, and details how occupational therapists can help parents, health and education professionals practice principles of Balanced Technology Management to ensure optimal child health and academic performance.

### Then and now

In the past, family time was often spent doing chores, and children had expectations to meet on a daily basis, fueling a child's inner drive and motivation to succeed. The dining room table was a central place where families came together to eat and talk about their day, and after dinner time became the epicenter for baking, crafts and homework. Today's families are different. The “big screen” has replaced the dining room table, and reality television has become the new age family. Prevalent overuse of technology is fracturing the very foundation of families and education systems as we know them, and causing a disintegration of core values that long ago were the glue that held families and schools together. Where 100 years ago humans needed to move to survive, they are now under the assumption everyone needs technology to survive. Studies in 2004 by the Kaiser Founda-

tion, and in 2008 by Active Healthy Kids Canada, showed that elementary aged children use on average eight hours per day of combined technology use, with 65% of these children having television's in their bedrooms, and 50% of North American homes having the television on all day (3-5). “Baby TV” now occupies 2.2 hours per day for the 0-2 year old population, and 4.5 hours per day for 3-5 year olds and is causally linked to developmental delays (6-8). This situation has prompted France to ban its broadcasters from airing television shows aimed at children under three years of age (9). Rather than hugging, playing, rough housing, and conversing with their children, parents are increasingly resorting to putting babies in bucket seats and toddlers in strollers in front of blaring televisions. Providing children with the latest video game, television's in the car, and trendy iPods and cell phones, is creating a deep and widening chasm between parent and child.

### The impact of technology overuse on developing children

Children now rely on technology for the majority of their play, grossly limiting challenges to their creativity and imaginations, as well as limiting necessary challenges to their bodies in order to achieve optimal sensory and motor development. Sedentary bodies bombarded with chaotic and intense sensory stimulation, are resulting in delays in attaining child developmental milestones, with subsequent impact on achieving basic foundation skills necessary for literacy (10). Children's developing sensory systems have not evolved biologically to accommodate the sedentary, yet frenzied nature of today's technology. The impact of rapidly advancing technology on the developing child has resulted in increased incidence of physical, psychological and behavior disorders that the health and education systems are just beginning to detect, much less understand. 14% of Canadian children have diagnosed mental health disorders (11). Between 1991 and 1995, prescriptions for psychotropic medications in the 2 – 4 year old toddler population, as well as in children and youth tripled (12-14). 80% of this medication was prescribed by family physicians and pediatricians (15). 15% of Canadian children are developmentally delayed (16), and 15% are obese (17). Media violence has recently been classified as a public health risk due to causal links to child aggression (18). 25% of elementary children have been cyberbullied, and youth who reported being harassed online were eight times more likely to carry a weapon to school in the past 30 days (19). Diagnoses of attention deficit/hyperactivity disorder, autism, coordination disorder, sensory **Continued on page 7**

## Overuse of technology is fracturing the very foundation of families and education systems as we know them, and causing a disintegration of core values that long ago were the glue that held families and schools together.

processing disorder, anxiety, depression, and sleep disorder can be causally linked to technology overuse, and are increasing at an alarming rate (22-26). Infants with low tone, and toddlers failing to reach motor milestones, are frequent visitors to today's pediatric physiotherapy and occupational therapy clinics (27). Hard wired for high speed, the young children of today are entering school struggling with self regulation and attainment of attention skills necessary for learning, eventually becoming significant behavior management problems for teachers in the classroom. Poor motor coordination of the hands and eyes is affecting children's ability to print and read (28), and for the first time in Canadian history, has resulted in a decline in literacy (29). With research now showing access to "green space" reduces attention deficit/hyperactivity disorder (30), and classroom movement improves learning ability (31), an urgent closer look by occupational therapists at the critical sensory and motor requirements for meeting developmental milestones is imperative. Application of research knowledge by occupational therapists regarding the impact of technology overuse on sensory and motor development, would assist in helping parents, teachers and health professionals to better understand the complexities of this issue, and help create effective strategies to manage balanced technology use.

### Critical factors in developmental milestones

- Movement
- Touch
- Human connection

physical, psychological, social and behavioral child development are movement, touch and connection to other humans (32-34). Movement, touch and human connection are forms of essential sensory input, integral for the eventual development of a child's motor and attachment systems. When sensations of movement, touch and connection are deprived, devastating consequences occur. Young children require 3-4 hours per day of physically active, unstructured, rough and tumble play to achieve adequate sensory stimulation to their vestibular, proprioceptive and tactile systems for normal development (35,36). These types of sensory inputs ensure normal development of posture, bilateral coordination, praxis, optimal arousal states and self regulation necessary for achieving foundation skills for eventual school entry.

Many of today's parents perceive outdoor play is 'unsafe', further limiting essential developmental components usually attained in

outdoor rough and tumble play (37). Dr. Ashley Montagu, who has extensively studied the developing tactile sensory system, reports that when infants are deprived of human connection and touch, they fail to thrive and many eventually die (38). Dr. Montagu states that touch deprived infants develop into toddlers who exhibit excessive agitation and anxiety, and may become depressed by early childhood. Although Dr. Montagu reports that the critical period for attachment formation is zero to seven months, connection to the human element is biological need that is present for a whole lifetime. Sustenance of body, mind and spirit is achieved largely through human connection, without which, human physical, psychological and behavior states become grossly impaired.

### Connection to technology is causing disconnection from self, others, nature and spirit

Technology overuse has had a devastating impact not only on children's sensory and motor development, but also on the development of a child's self identify, relationship to others, experience of nature, and sense of spirit. As children are connecting more and more to technology, society has witnessed a pervasive disconnect from self, others, nature and spirit. Self development and identity formation follows the occupational therapy premise that "you are what you do". If all a child "does" is watch television and play video games, then this experience is truly what they become. Little children often are incapable of discerning their sense of self from the "killing machine" seen on violent television, video games and internet. Shy, lonely and in need of a friend, escaping to the virtual world of technology is causing an irreversible worldwide epidemic of psychological disorders in children. Technology is also rapidly destroying what humans crave and love the most...connection with other human beings. Attachment or connection is the formation of a primary bond between the developing infant and parent, and is integral to that developing child's sense of security and safety. Establishing the infant-parent bond is best facilitated by close contact with the primary parent, lots of eye contact, and "I see you" communication. Family overuse of technology is gravely affecting not only early attachment formation, but also impacting negatively on child psychological and behavioral health. It appears that today's families have been pulled into the "virtual dream", where everyone believes that life is something that requires an escape, and technology becomes the "haven". The immediate gratification received from ongoing use of television, videogame and internet technology, appears to have actually replaced the

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desire for human connection. Nature is the "Mother" of all sensory experiences, and serves as an energy "ground" for anxious or hyperactive children. Occupational therapist's training in sensory processing enables them to best describe the many positive sensory aspects of nature. The smell of grass and dirt stimulate the ancient olfactory system, resulting in relaxation and calming. The beautiful images of the sun reflecting off leaves and flowers, is intricately more visually complex, expansive, and therefore potentially interesting than any video game. The tactile experience of wind on a child's face, or the feeling of rough bark when climbing a tree, is rich in sensory information. Proprioceptive input achieved through walking over uneven rocks on the beach, or auditory input from listening to the songs of sea gulls, or even the taste of gritty sand, all are sensory inputs that integrate to eventually help that child respond and adapt to their environment. Last but definitely not least is Spirit, the light in a child's eyes that let's everyone know that child is in an optimal arousal state, tapping into their inner drive, engaging in and performing skills to the best of their ability. Technology overuse may eventually result in "death" of a child's spirit sense, observed by dull, cold eyes; as the windows to the soul simply cease to exist.

## **Sensory and Motor System Imbalance**

Further analysis of the impact of technology overuse on the developing child indicates that while the vestibular, proprioceptive, tactile and attachment systems are under stimulated, the visual and auditory sensory systems are in "overload". This sensory imbalance creates huge problems in overall neurological development, as the brain's anatomy, chemistry and pathways become permanently altered and impaired (39). Young children who are exposed to violence through television and videogames are in a high state of adrenalin and stress, as the body does not know that what they are watching is not real (40). Children who overuse technology have been reported to experience persistent body sensations of overall "shaking", increased breathing and heart rate, and a general state of "unease". Occupational therapist's might describe this state as a persistent hyper-vigilant sensory system, still "on alert" for the oncoming assault from video game characters. The effect of chronic states of high levels of cortisol (a stress hormone) emitted during video game playing on young children's sensory development is largely unknown. In the United States, the American Academies of Pediatrics, Physicians, Psychologists and Psychiatrists have joined with the American Medical Association in classifying media violence as a public health risk (second only to the impact of cigarette smoking on lung cancer), due to the causal correlation with increased child aggression (41). One can't help but wonder if these children who are overexposed to violent media content will go onto develop a form of Post Traumatic Stress Disorder, as a child's body experience may be registering viewed media violence as "reality". While cyberbullying (a new threat to children who use the internet) happens primarily at home, children often act out subsequent aggression in school, creating an escalating and very worrisome situation for school administrations (42). In his book *iBrain*, Dr. Small a neurophysiologist reports that technology's rapid intensity, frequency and duration of visual and auditory stimulation, has been found to result in a "hard wiring" of the child's sensory system for high speed, with subsequent devastating effects on a child's ability to imagine, attend and focus on academic tasks. An example of the detrimental impact of technology on child academic performance could be found in Dr. Dimitri Christakis' research which reports that each hour of television watched daily between the ages of zero and seven years of age, equated to a 10% increase in attention problems by age seven years (43). Another consideration for occupational therapists would be the impact of prolonged visual fixation on a fixed distance, two dimensional screen on oculomotor

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development, which is necessary for eventual printing and reading. With reference to sensory and motor development, there is a vast difference between oculomotor location on a variety of different shaped and sized objects in the near and far distance (such as experienced in outdoor play), as opposed to looking at a fixed distance glowing screen. Online screen reading (as opposed to reading books), has been shown to result in significantly lower levels in reading comprehension, largely due to the “fast factor” noted with screen readers (44). Due to their knowledge of ocular physiology and function needed for printing and reading skill, occupational therapists can help schools to understand the ramifications of technology overuse on academic performance, and assist schools with managing balanced technology use.

## The role of occupational therapy in promoting balanced technology management

Pediatric occupational therapy is truly the salient profession specifically trained to bring together all the developmental components necessary to create a foundation for child health and learning. Occupational therapy scope of practice regarding technology overuse includes the traditional context areas of activities of daily living, education, leisure, play, and social participation. The occupational therapist’s ability to assess specific aspects of a child’s sensory processing and motor development, and the relevant impact on performance skill components, will continue to place this profession in high demand now, and in the immediate future. As technology overuse consultants in both the health and education sectors, occupational therapists can interpret researched based information, perform standardized sensory and motor developmental assessments, and demonstrate excellent observational skills. These unique skills place occupational therapists in a crucial leadership position to help others learn how to balance technology use with what children need to grow and succeed. The American Academy of Pediatrics issued a policy statement in 2001 recommending that children less than two years of age should not use any technology - yet toddlers zero to two years of age average 2.2 hours of TV per day (24)! The Academy further recommends that children older than two years should restrict usage to one hour per day if they have any physical, psychological or behavioral problems, and two hours per day maximum if they don’t, yet parents of elementary children are allowing eight hours per day. It’s important for occupational therapist to bring together parents, teachers and other health professionals to help society “wake up” and see the devastating effects technology overuse is having not only on children’s physical, psychological and behavioral health, but also on their ability to learn and sustain personal and family relationships. Occupational therapy is the profession that is best poised to raise this awareness, by providing programming to help society reverse the effects of technology overuse

on children. Through fostering a sense of self, facilitating healthy relationship formation, using the art of play in an outdoor setting, and bringing forth a child’s inner drive, occupational therapists can reverse this trend to over use technology. Facilitating vestibular, proprioceptive, and tactile sensory stimulation, and limiting visual and auditory sensory overload, the occupational therapist can help families and schools manage a balanced lifestyle. Understanding and promoting healthy attachment between parent and child is already a part of every occupational therapy session. Through building skill and self confidence to promote occupational performance, occupational therapists can help children “unplug” themselves from technology, easing the job of parenting and teaching. Using sensory and motor developmental practice frames of reference, and expert design and implementation of effective interventions, occupational therapists can help parents and teachers understand the profound effects of technology overuse on child development and academic performance. Whether working in school or home settings, the occupational therapist is a future leader in the field of Balanced Technology Management, ensuring every child gets what they need to grow and succeed.

## Conclusion

While technology is an evolving “train” that will continually move forward, the occupational therapist has expert knowledge regarding its detrimental effects. Immediate action taken toward balancing the use of technology with movement, touch and human connection, will work toward sustaining children, families and educational environments. While no one can argue the benefits of advanced technology in today’s world, connection to these devices has resulted in a disconnection from what society should value most, child health and academic excellence. Occupational therapists have the unique qualifications and skills to assess and treat children who overuse technology, to ultimately help bring the technology train back onto a healthy track. Occupational therapists can help create a sustainable future for every child. ■

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**For a list of references and a full biography of Cris, please visit [www.zonein.ca](http://www.zonein.ca).**