

Zone[®] Mixed Signals

Impact of technology on child development, behavior and learning



1

Credentials

- X 2 BSc's in biology and occupational therapy
- 30+ years pediatric occupational therapist
- SIPT certified sensory integration specialist
- > 350 international and national workshops
 - Approved Provider Status for CEU's
- Book author - *irtual Child – The terrifying truth about what technology is doing to children*
- Committee member:
 - Screens in Schools – Children's Screentime Action Network
 - Institute for Digital Media and Child Development

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Goals and Objectives

1. Explore technology usage stats and expert guidelines.
2. Identify 4 critical factors for optimizing child development, behavior, and learning.
3. Evaluate research on impact of technology on children in four domains: physical, social, mental, cognitive.
4. Implement *Balanced Technology Management* strategies in home, school and community environments.
5. Profile a variety of prevention and intervention initiatives.

Research references are located on website zonein.ca under **Fact Sheet** section.

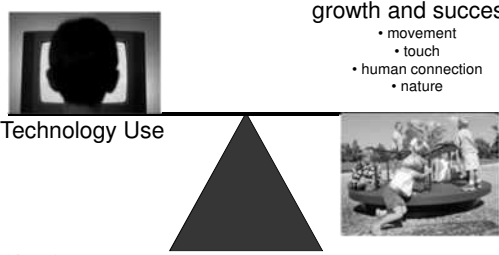
3

Balanced Technology Management

Technology Use

Critical factors for growth and success:

- movement
- touch
- human connection
- nature



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Babies watching 2.5 hours/day

5



Toddlers using 4.5 hours per day

6



Children using 7.5 hours per day

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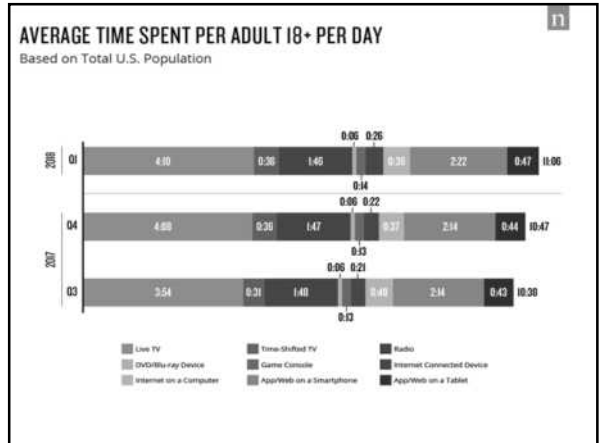
Teens using 9 hours per day

8



Adults using 11 hours per day

9



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40% of adults have screen addictions

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Expert Recommendations

- 0-2 years should not be exposed to ANY technology (including passive watching).
- 3-5 yrs not use more than 1 hour TOTAL screens/day.
- 6-12 yrs not use more than 2 hrs/day.
- 13-18 yrs not more than 3 hrs/day.
- < 6 yrs should not watch ANY violent media content.
- Only 10% of children meet expert guidelines.



American Academy of Pediatrics
2002/13/15/16,
Canadian Pediatric Society 2010/17

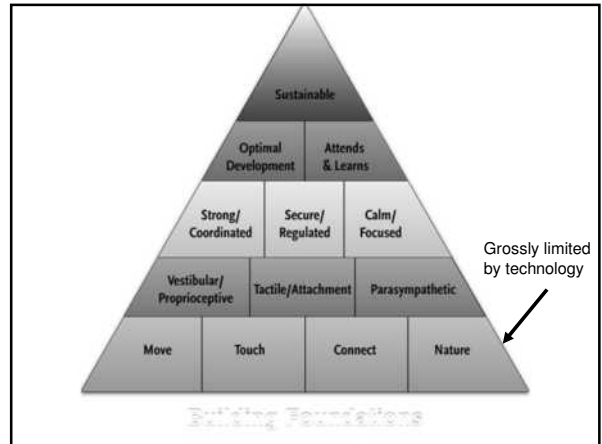
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Epidemic of Child Disorders

- Developmental delay 1 in 3 at school entry.
- Obesity 1 in 4.
- Depression/anxiety 1 in 6.
- Suicide rate doubled over past 5 years in males.
- Autism 1 in 36 for children (1 in 28 for boys).
- Adhd 1 in 5 for boys, 1 in 11 for girls.
- Sleep deprivation 73%.
- Tech addiction 1 in 10 (research), 50% (self-report)
- Learning disabilities 1 in 10.

HELP EDI Mapping 2009/13, WHO 2015, CDC 2020, CMHA 2018, National Sleep Foundation 2017, Gentile 2011, Common Sense Media 2017, BCTF 2016

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Movement

*Give a child a device and they sit;
take it away and they move.*

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Canada Movement Guidelines

GUIDELINES
For optimal health benefits, children and youth (aged 5-17 years) should achieve high levels of physical activity, low levels of sedentary behavior, and sufficient sleep each day. A healthy 24 hours includes:

- < 13% of children meet the *Canadian Movement Guidelines*.
- Effects of sedentary lifestyle costs Canada \$70 billion per/year in healthcare costs.

Canadian Society for Exercise Physiology 2018, National Institute of Health 2018

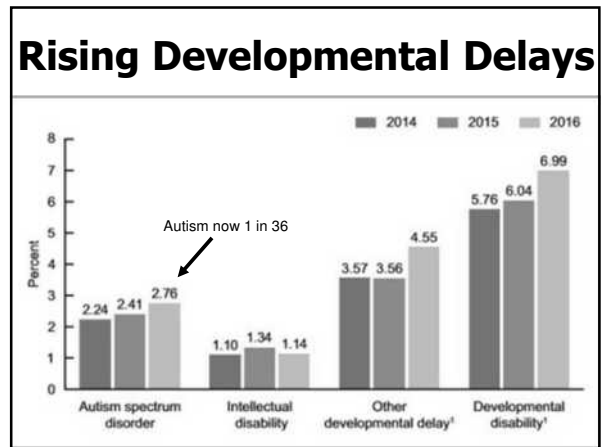
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Brains are Designed to Move

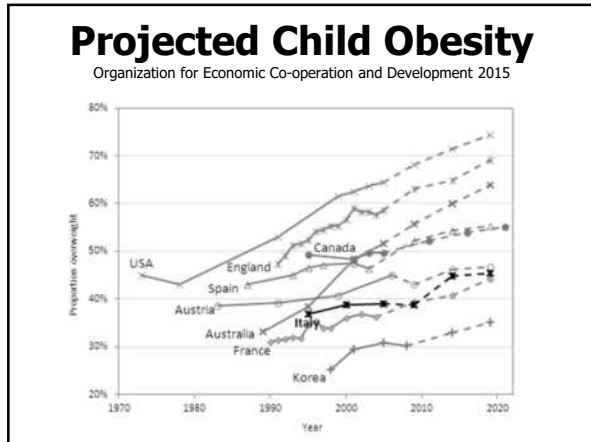
BRAIN AFTER SITTING QUIETLY BRAIN AFTER 20 MINUTE WALK

Research/scan compliments of Dr. Chuck Hillman University of Illinois

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Touch

Device use deprives children of touch.

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Touch

Counteracts sympathetic charge

- Skin is the largest and oldest organ in the body; 20 sq. ft. in adults, 12% total body weight.
- Touch lowers cortisol, adrenalin, regurgitation, promotes development.
- When the need for touch isn't satisfied, abnormal behavior will result.

Bigelow 2006, Montagu 1978

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Anxiety and Depression 2007 - 2015

- Teens who use > 7 hours total screens/day have double the rate of anxiety and depression.
- From 2007 to 2015 suicide rates doubled for females and increased by 30% for males.
- From 2008 to 2015 involuntary psychiatric hospital admissions in Ontario **rose 90%**.

Twenge, 2018, Canada Mental Health Assoc. 2018

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Smart Phone Dependency Predicts Loneliness/Depression

(we give iPhones to infants/toddlers)!

Article in Press

Short-Term Longitudinal Relationships Between Smartphone Use/Dependency and Psychological Well-Being Among Late Adolescents

Matthew A. Lapierre, Ph.D., Fenglei Zhao, M.A., Benjamin E. Custer, M.A.
Department of Communication, University of Arizona, Tucson, Arizona

JOURNAL OF ADOLESCENT HEALTH

Results
Among the 348 participants (23.9% male, mean [standard deviation] age at wave 1 = 18.11 [1.76] years, 58.9% response rate), longitudinal path models revealed that wave 1 smartphone dependency predicted loneliness ($\beta = .08$, standard error [SE] = .05, $p = .042$) and depression symptoms ($\beta = .11$, SE = .05, $p = .010$) at wave 2. Loneliness at wave 1 predicted depression symptoms at wave 2 ($\beta = .21$, SE = .05, $p < .001$), and smartphone use at wave 1 predicted smartphone dependency at wave 2 ($\beta = .38$, SE = .05, $p < .001$).

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Child and youth mental health in Canada

10% to 20% of Canadian children and youth may develop a mental disorder

Mental disorders among all ages accounted for 13% of the global burden of disease

Has hospital use for mental disorders changed?

How many youth received medication for mental disorders?

1 in 11 youth* were dispensed a mood/anxiety or antipsychotic medication

The most commonly prescribed antipsychotic medication was dispensed to youth almost exclusively at dosages below the recommended range for treating schizophrenia and bipolar disorders.

* 13% (27,052) of youth living in British Columbia, Saskatchewan and Manitoba were dispensed at least one medication considered to be a mood or antipsychotic disorder. This number is 1 in 11 adolescents in 2017-2018.

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Connection


The origin of child mental wellness

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Co-Regulation 1st Self Regulation 2nd

- 0 – 2 weeks critical for primary attachment formation
- Infant must achieve attachment with primary parent to ensure survival
- Job of parent is to meet all needs of infant 1st two weeks
- Only then, can infant relax, and begin to self regulate

Crittenden 2008



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Attachment Benefits

- Attachment is a biological need without which we die.
- Failure of attachment is #1 causal factor for mental illness.
- Children aren't born mentally ill, we make them that way through abuse, neglect, trauma.
- Attachment is the foundation for all relational behavior.
- Parents role model healthy relationships (or not).

Montagu 1978, Insel 2001, Waddell 2007, Houtrow 2014, Crittenden 2015



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Detachment and Addiction

- Detached parents model tech addiction.
 - Boys – video games, porn.
 - Girls – social media, Netflix.
- For the first time ever children have addictions; enormous costs to health and education.
- Studies show 1 in 11 children between ages 8 -18 years have a tech addiction.
- 50% of teens report addiction.

Flores 2009, Gentile 2011, Common Sense Media 2018



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Nature


When did nature become unsafe?

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Nature Benefits

- Backpackers scored 50 percent better on a creativity test after spending 4 days in nature screen-free.
- Students showed improved cognitive memory and affect (anxiety) after 50 min. rural walk.
- 20 min per day access to 'green space' significantly reduces adhd and improves attention and behavior.

Strayer 2012, Bratman 2015, Faber-Taylor 2004




Penelakut School Nature Trail 2019

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Reassessing Recess

- PE teachers are gone.
- Balls and equipment are often locked away.
- Student recess management easier with screens.
- Bullying happens when kids are bored.
- Students need challenge.
- Risk reduces injuries!
(see *No Rule Schools*)



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Double Down on Recess

Rules	Results
<ul style="list-style-type: none"> • No longer than one hour in classroom. • Everyday an outside day. • Lots of "loose parts" as fixed equipment gets boring • 3 recesses: <ul style="list-style-type: none"> • Instructional recess: everyone goes out, organized sports. • Traditional recess: 15 min. eat, 15 min. outside. • Free time recess: all ok 	<ul style="list-style-type: none"> • Attention improved. • Behavior improved. • Aggression reduced. • Less homework. • Grades increased. • Less need for classroom body/brain breaks. <p style="font-size: small;">Paul McKay, principal Quebec Elem School, CBC Radio <i>The Current</i> Feb. 27, 2019</p>

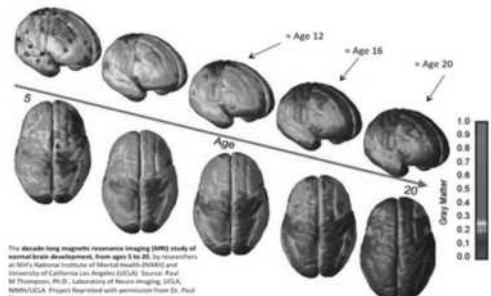
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Impact of Technology on Child Development Research

Physical Social Mental Academic

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Rapid Pruning 0 - 12 Years



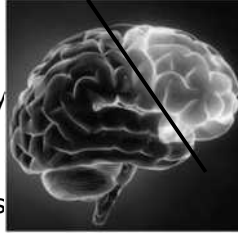
The decade-long magnetic resonance imaging (MRI) study of accelerated brain development, from ages 0 to 20, by researchers at MIT's National Institute of Mental Health (NIMH) and University of California Los Angeles (UCLA). Source: Paul M. Thompson, Ph.D., Laboratory of Neuro Imaging (LNI), NIMH/UCLA. Project supported with permission from Dr. Paul Thompson.

Brain Hard Wired by Age 20

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Brain Atrophy

- Mindless content doesn't require frontal lobe processing.
- Pruning tracks to frontal lobe results in brain atrophy
- At death, only 30% of neurons are left.
- Impacts executive functions of attention, learning, impulsivity...



Christakis TED TALK 2011, Small G 2008, Lin F 2011, Weng 2012, 2013, Dunckley 2014

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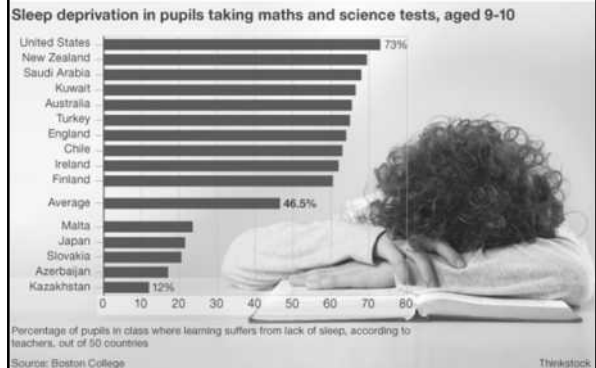
Physical Development

Technology is a restraint



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73% Children Sleep Deprived



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Wifi & Cancer Research

- WHO categorized WiFi as a possible Group 2B carcinogen.
- Experimental animal studies by NIH/NTP show tumors at 2 yrs.
- Epidemiology studies show:
 - acoustic neuromas and brain gliomas in cell phone users after 20 years.
 - sperm DNA fragmentation and decreased sperm motility in laptop users at 20 years.
- Incidence studies show marked increase in cancer:
 - 1 in 2 people will get cancer and 1 in 4 adults will die from cancer in our lifetime.
 - 25% increase in teen cancers past 30 yrs



WHO 2011, National Toxicology Program 2016/18, Pall 2013, Emre 2010, Khurana 2009, Avendano 2011, Hardell 2013, Burkhamer 2017, Canadian Cancer Society 2018

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Social Development

Asocial, antisocial

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Video Games → Aggression

Video game overuse (> 1-2 hrs/day teens) results in:

- increased activity in amygdala
- increased visual/auditory hypersensitivity
- decreased activity in frontal lobes

Media violence exposure is the salient causal factor for rise in child/youth aggression. American Academy of Pediatrics in 2009 categorized media violence as a Public Health Risk.

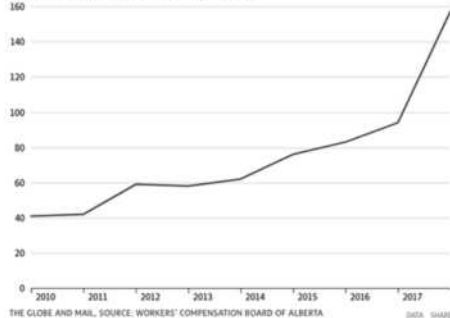
Anderson 2010 (meta-analysis), Doan 2015, Markman 2010, Huessman 2013



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Student Aggression

DARREN CALABRESE/THE GLOBE AND MAIL
Worker's compensation claims of student violence against Alberta teaching assistants



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Game Transfer Phenomenon

Video Game → Real Life

1. Altered perceptions:
 - 77% with eyes closed
 - 31% with eyes open
 2. Actions and behaviors:
 - 58% said something from a VG unintentionally
 3. Automatic mental processes:
 - 63% still in VG mind-set
 - 43% mixed up VG with RL
3. Ortiz de Gortari & Griffiths 2016



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GTP – Closer to Home

Rocky Rambo Wei Nam Kam – 29 yrs

- Played 10-12 hours per day violent video games.
- Stabbed victim > 100 times; when asked why....
- "Characters in the game don't scream; if they don't die, you just keep hitting the button".



Dianna Mah-Jones, Richard Jones

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Mental Development

Isolated, neglected, impulsive, attention deficit, bullied, addicted



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Mental Illness

- One in six children between ages 8-18 yrs. have a mental illness diagnosis.
- One in 11 children are addicted to video games, porn, or social media.
- Need to disconnect and reconnect.
- Unplugging children improves health and behavior!

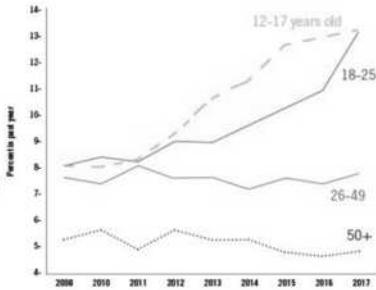


CMHA 2018, CDC 2019, Gentile D 2011, Rowan 2010, Numata-Uematsu 2018

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Teen Depression

STUDENT DEPRESSION ON THE RISE



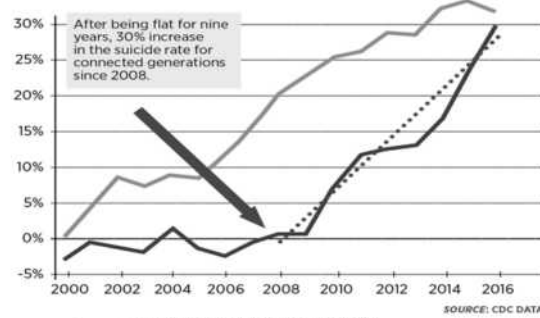
An analysis of a federal survey shows increasing rates of teen and young adult respondents reporting a major depressive episode in the last 12 months. Rates have stayed more consistent among older adults.

SOURCE: Journal of Abnormal Psychology

EDUCATION WEEK

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U.S. Suicide Rates % Change: Comparison of Most Digitally Connected Generations vs. Less Connected 2000-2016.



After being flat for nine years, 30% increase in the suicide rate for connected generations since 2008.

SOURCE: CDC DATA

- Suicide Rate % Change Ages 35-75
- Suicide Rate % Change Ages 15-34
- Increasing Suicide Rates Ages 15-34

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The Great Social Divide

<p>MALES Videogames, Porn <i>Heavily researched</i></p> <p>Desire competence.</p> <p>36% U.S. and 48% Canadian 18-30 year old males live with their parents; not working; not in school.</p> <p>Stats Canada 2012, U.S. Census Bureau 2012</p>	<p>FEMALES Social Media <i>Poverty of research</i></p> <p>Desire social acceptance.</p> <p>Canadian Association of Mental Health reports >50% of teen girls report significant depression and anxiety; cited social media as causal factor.</p> <p>CAMH 2018</p>
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1 in 4 Children/Youth Have Problematic Cell Phone Use

BMC Part of Springer Nature

BMC Psychiatry

Home About Articles Submission Guidelines

Research article | Open Access | Open Peer Review | Published: 29 November 2019

Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: a systematic review, meta-analysis and GRADE of the evidence

Samantha Soho, Phillipa Bees, Bethany Wildridge, Nicola J. Kalk & Ben Carter

BMC Psychiatry 19, Article number: 356 (2019) | Cite this article

7923 Accesses | 1932 Altmetric | Metrics

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ICD – 11 Gaming Disorder

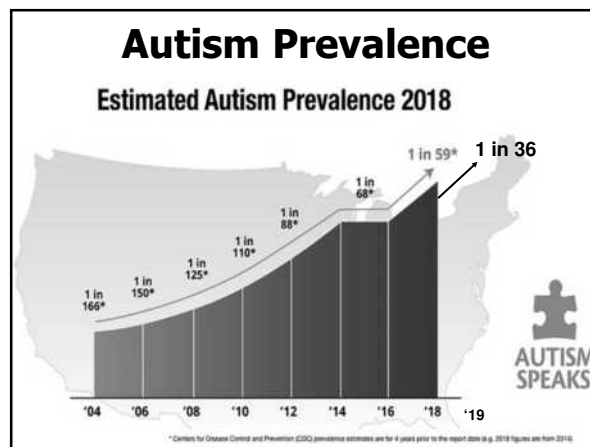
WHO's International Classification of Diseases

A pattern of gaming behaviour characterized by:

1. Impaired control over gaming.
2. Increasing priority given to gaming over other activities.
3. Continuation or escalation of gaming despite negative consequences.
4. Significant life problems (personal, family, social, education, occupational).

Pontes 2019

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Detachment and Autism

- Critical period for socialization 6-18 mo.
- Increased screen time (phone, tablet)...combined with decreased parent connection...
- ...results in increased incidence of autism and oppositional defiance.

Heffler 2015, Chonchaiya 2011/15, Jones 2013

Still Face Experiment Youtube 2 min.

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'Virtual Autism' Research

- 2017 study showed > 4 hours screens/day 0-3 years causes syndrome similar to autism.
- 2018 case report shows autism reversed with screen removal.
- Autism now termed "epidemic".
- By 2025 autism will be 1 in 2 for males, 1 in 5 females.

Zamfir 2017, Numata-Uematsu 2018, CDC 2018, MIT 2015

Figure 2. The picture of the mother's face that the patients drew when we asked them to draw his mother's face. The picture that he drew at his first visit (A), and after two months with no exposure to screen (B)

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Cognitive Development


Attention deficit, learning impaired



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Sponge' Blobs'

- 9 minute exposure to Spongebob cartoon resulted in a significant reduction in executive function in 4 year old children:
 - Decreased memory
 - Decreased attention
 - Increased distractibility
- Fast paced, violent cartoons as harmful as video games.

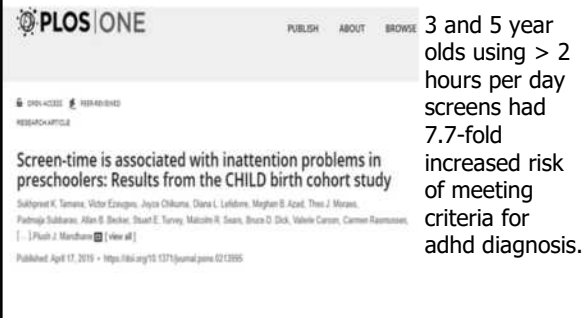


Christakis 2011, Gentile D 2009

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Inattention

If can't pay attention, can't learn




3 and 5 year olds using > 2 hours per day screens had 7.7-fold increased risk of meeting criteria for adhd diagnosis.

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Screen vs. Paper Reading

Meta-analysis

- 2008-2018 review of 33 studies on screen vs. paper reading.
- Paper reading showed increased reading comprehension, metacognition, and efficiency.
- Brain connectivity is increased by time spent reading books and decreased by length of exposure to screen-based media.




Clinton 2019, Wolfe 2018, Horowitz-Kraus 2017

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EdTech Cannot Achieve Foundations for Literacy

- Printing
 - Foundation for reading.
 - *If we're still doing it, better be teaching it!*
- Math
 - 3D spatial concepts
- Reading
 - Slow = comprehension
 - Slow = memory
 - Slow = critical thinking

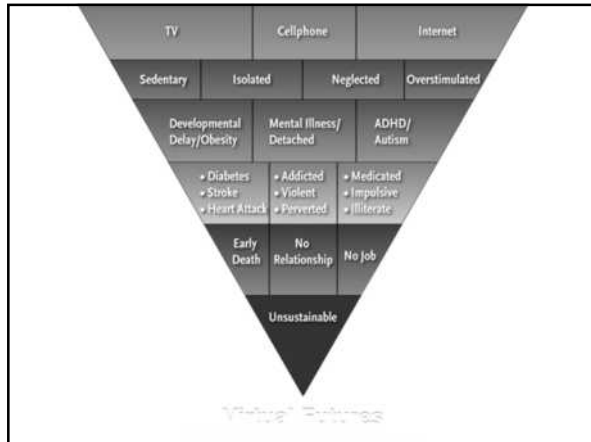


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Build Biliterate Brain

- Early years ages 0-5; no screens
 - Build language and motor areas of brain
- Primary grd K-3; no screens
 - Establish literacy foundations
 - Printing precursor to reading
 - 3D spatial concepts for math
- Elementary grd 4-8
 - Use screen media to enhance teaching
- High school grd 9-12
 - Expand into media literacy programs

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School Initiatives

Classroom, Gym, Playground

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Raise the Tech Question


What does technology actually 'do'?

<p>Where is the evidence that technology is...</p> <ul style="list-style-type: none"> Educational? Promotes literacy? Improves motor skill? Long term success? Safe? Productive? 	<p>Risk vs. Benefit</p> <p>Risks: sedentary, overstimulating, isolating, anxiety provoking, addictive, factoid based, passive, displaces basics, socially detached</p> <p>Benefits: easy, cheap, effortless, entertaining, occupies time</p>
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Use Only Evidence-Based Educational Content

- Prohibit all entertainment content.
- Ensure educational tech research is evidenced-based, not 'industry-driven'.
- Don't use tech as a reward.
- Switch from 'tech breaks' to 'body breaks'.



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5 Step School 'General' Plan


1. Educate - provide information, ask/answer questions; students/teachers can't do what they don't know.
2. Quantify - usage rates and content (Tech Screen, tracker apps); compare to expert guidelines.
3. Red Flags - identify problems; adhd, autism, addiction, severe behavior, aggression, violence.
4. Tech Rules – determine goals for everyone: duration, content, device, age; make goals relevant to severity of problem.
5. Get Help – talk with parents, counsellors, behavior consultants, pastors, RCMP.

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Virginia House Bill 817

Passed Jan. 7, 2020

DOE works with DOH and medical professionals to develop and implement health and safety best practices for use of digital devices in school no later than June '22.



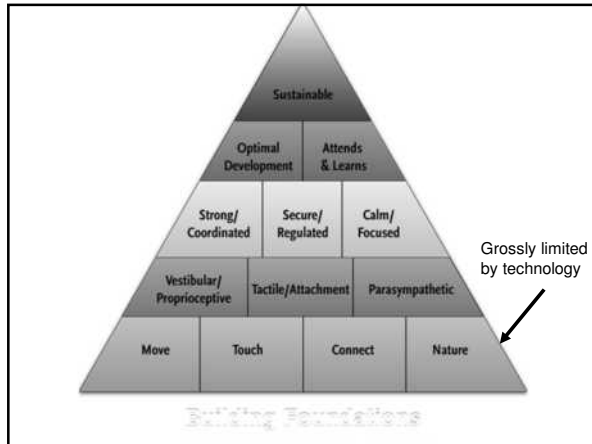
Our kids need to be healthy and safe around school technology.

AT SCHOOL AND AT HOME!

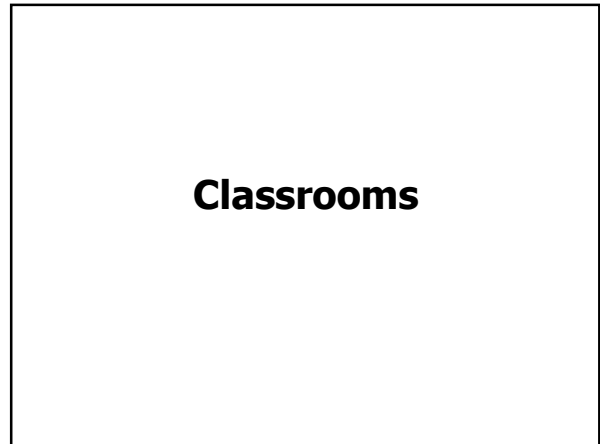
WHY HB 817?

HOW KIDS ARE AT RISK

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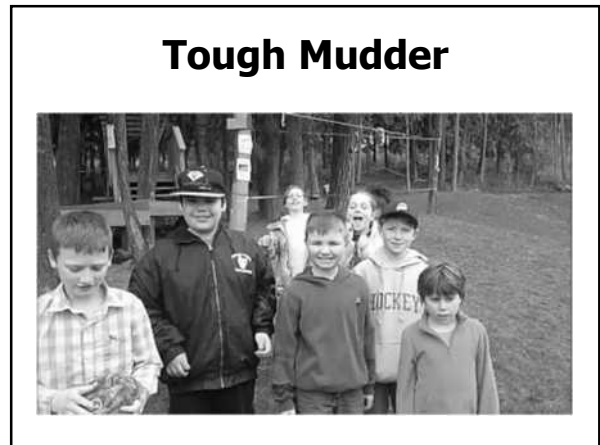


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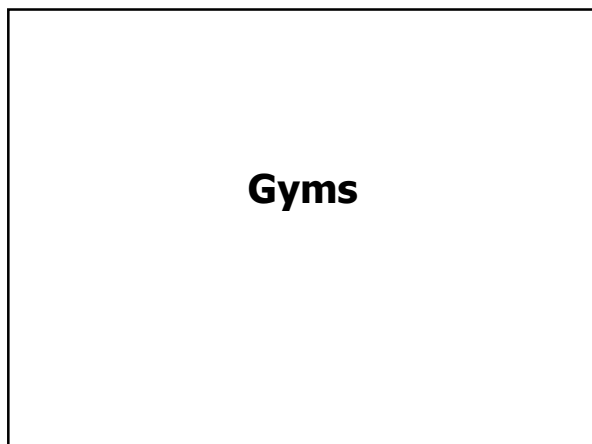
Movement Benefits

- Cardiovascular
- Obesity/diabetes
- Stroke/heart attack
- Builds strong core
- Motor coordination
- Right/left
- Upper/lower
- Eye/hand for printing
- Eye/eye for reading
- Spatial for math
- Attention/learning
- Mental health Ratey 2008

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Crash-N-Bump

- Early intervention initiative in First Nations communities.
- Enhancing sensory, motor, and attachment development.
- 8 stations: earth, mountain, river, ocean, lake, sun, earth, and store.
- One full day per week of rough-n-tumble play!

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Convert Classroom to Gym



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Hallways

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Sensory Path

Roland Elementary School, Manitoba



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Hall Relay Races

Cedar Grove Elementary, Gibsons BC



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Playgrounds

The epicentre for child development and learning

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Recess is a Regulation Tool



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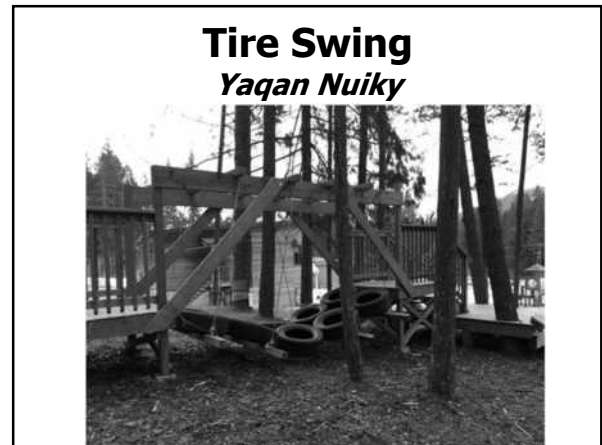
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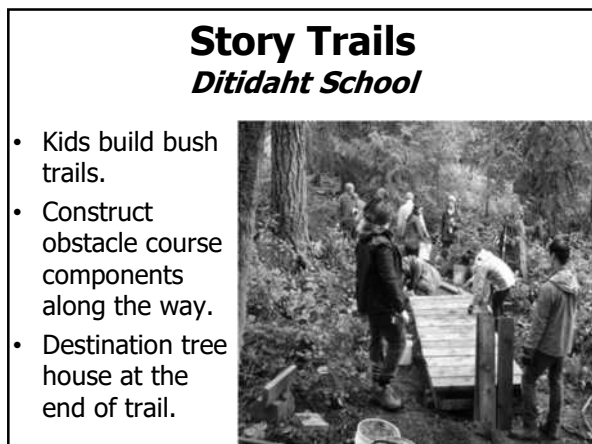
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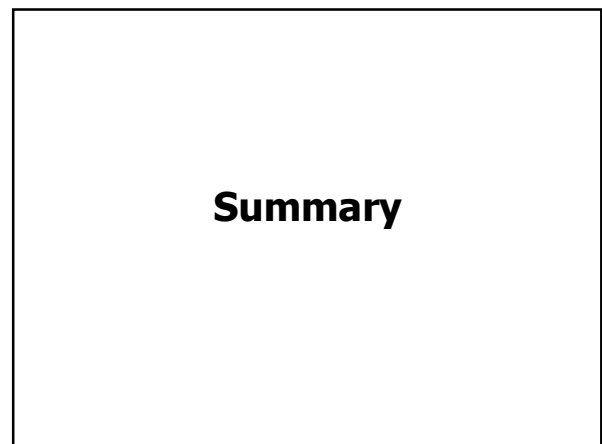
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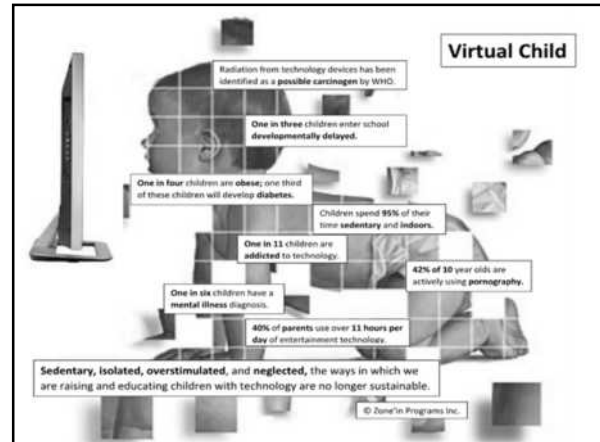
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Technology and Children Tip of the "Tectonic" Iceberg



- Health and education systems haven't even begun to detect, much less understand the profound ramifications of child technology overuse.
- Secondary effects are yet to come.
- Need to proceed with caution.

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Website www.zonein.ca

- Research Fact Sheet
- Newsletter
- Blog - movingtolearn.ca
- Free Handouts
- Book Reviews
- Tech Addiction Resources
- Video/Audio Clips
- Media Kit
- Slide shows
- Balanced Technology Management
- Parents, teachers, health providers, gov't, research, technology production corporations
- Child Health Policy Initiatives
- Unplug – Don't Drug
- Creating Sustainable Futures
- Linking Corporations to Communities

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