The Brain Goes to School

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Neurons: Building Blocks of the Brain

- 100,000,000,000 neurons at birth
- Each has about 10,000 dendrites (branches)
- 1,000,000,000,000,000 possible configurations
- 17% of the neurons are wired at birth
Twin Drivers
Twin Drivers

• Genetics—"hard wiring"
• Experience—"The neurons that fire together wire together."
• "Whatever the brain does a lot of is what the brain gets good at."
Executive Function

Executive Function, Self-Regulation, Self-Discipline, and Grit are often used interchangeably.
Understanding “Executive Function”

- Executive function is seen as foundational for learning, school success and life competency.

- Three Domains
  - Working Memory
  - Inhibitory Controls--cognitive and behavioral
  - Mental or cognitive flexibility (critical for social competence)
Executive Function Behaviors/Skills

- Ability to concentrate, screen out distractions, manage impulses, switch gears, follow directions, take turns, share, self regulate, calm themselves, have cognitive control, make transitions, retain things in working memory, manage multiple streams of information simultaneously, catch errors and fix them, revise plans in light of new information, apply different rules in different situations, persist in face of frustration, think of alternatives.
Why Is Executive Function Taking Center Stage in American Education?

- 5 articles in 1985; 501 in 2005 (Bernstein & Waber, Executive Function in Education, 2007)

- Why the explosion?
  - Foundational for educational success and life competency.
  - Widespread concern about the decline in executive function in America’s children and youth.
Executive Function - Orchestra Conductor
Evidence Based Threats to Development of Executive

- Stress overload  (Paul Tough, Tom Greenspon)
- Sleep Deficits (Mary Carskadon)
- Sedentary Lifestyle  (John Ratey & Charles Hillman)
- Disappearance of Free Play  (Anthony Pellegrini)
- Unregulated and overuse of media/ technology (Clifford Nass & Daniel Willingham)
- Culture of More, Fast, Easy and Fun  (David Walsh)
Threat #1
Stress Overload
Stress--Too Hot, Too Cold or Just Right?

Gauge of Impact of Stress on Learning Performance

- Optimal Learning
- Underperformance

Stress Levels:
- Lower: Sleep, Apathy, Interest, Relaxed Alertness
- Higher: Anxiety, Distress, Chaos

Adapted from Eric Jensen
Early Childhood Toxic Stress
Perfectionism and Stress

- Two faces of perfectionism
- Fear is the common root behind perfectionism.
Addressing Perfectionism

- Create a culture of acceptance.
- Encourage effort and normalize mistakes. (More of effective praise later.)
- Explore the feelings behind the perfectionism. Eg. “What are your greatest fears about school?”
- Be willing to reflect on the example you are setting.
Threat #2
Sleep Deficits
Sleep Deficits

- All age groups (even infants) are not getting enough sleep.
- Sleep deprivation has been linked to moodiness, disinhibition, distractibility, and academic performance.
- "Will power" is a
## Sleep

<table>
<thead>
<tr>
<th>Age</th>
<th>Need</th>
<th>Actual</th>
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<tbody>
<tr>
<td>3-11 Months</td>
<td>14-15 hours</td>
<td>12.7 hours</td>
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<tr>
<td>1-3 Years</td>
<td>12-14 hours</td>
<td>11.7 hours</td>
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<tr>
<td>3-5 Years</td>
<td>11-13 hours</td>
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<tr>
<td>Grades 1-5</td>
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<tr>
<td>Pre-teens</td>
<td>9.5 hours</td>
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<tr>
<td>Teenagers</td>
<td>9.5 hours</td>
<td>7.5 hours</td>
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</tbody>
</table>
Rx for Sleep

- Limit technology before bedtime.
- Make bedrooms tech-free zones
- Start to wind down well before bedtime.
Threat #3
Sedentary Lifestyle
Sedentary Lifestyle Robs Students’ Brains of the Benefits of Exercise
Happy (dopamine)

Stable (seratonin)

Energized (norepinephrin)
THINK BETTER

- Exercise produces “Brain Derived Neurotrophic Factor”
- BDNF
- Sparks production of “Miracle Grow for the Brain”
Importance of Exercise

- Increased exercise leads to improvements in executive function. (Ratey, 2008; Hillman, 2014)

- Only 18% of children 6-11 years and only 8% of teens meet CDC physical activity guidelines for 60 minutes of vigorous activity per day.
Rx: Exercise

- Limit technology overuse.
- CDC recommends 60 minutes of exercise each day.
Threat #4
Disappearance of Free Play
Play: An Endangered Activity

• Importance of free play
  - Imagination
  - Creativity
  - Socialization

• Importance of structured play
  - Cooperation
  - Team work
  - Rule based play
Importance of Free Play

- The Finnish model: 15 minute break every 45 minutes.
- Finland is a perennial leader in international testing.
- Recess and breaks increase focus and attention while reducing behavior problems. (Pellegrini)
Rx: Free Play

- Don’t forget recess.
- Encourage free play.
- Balance organized play with free play.
Threat #5 Misuse and Overuse of Technology
The Apptivity Seat Is Now Marketed for Infants
From Infancy to Potty Training
Media and technology are powerful, neither good nor bad. The benefit or harm depends on how we use them.
Convergence
Media Ecology Then

* Borrowed from Lee Rainie, Pew Internet and American Life, “The Rise of the Networked Individual
Media Ecology Now

Adapted from Tom Wolzien, Sanford C. Bernstein & Co

* Borrowed from Lee Rainie, Pew Internet and American Life, "The Rise of the Networked Individual
53 hours a week is the amount of time tweens and teens spend with media outside of school and homework. (Common Sense Media, 2015)
4.5 hours a day is the amount of time each day teens spend with their smartphones. (Common Sense Media, 2015)
37% of 2-4 year olds have screens in their bedrooms.
(Common Sense Media, 2013)
1/4 of children go online daily at age 3.
(Joan Ganz Cooney Center, 2011)
54% of children feel that their parents check their devices too often. (AVG Technologies, 2015)
Teens and the Internet
(Pew, 2014)

- 78% of teens have cell phones with 67% having smart phones.

- 74% access the Internet via mobile device, (smart phone, tablet, etc.)

- 75% of teens text. Girls average 100 texts/day; boys 50.

- 58% of teens have downloaded apps.

- 4/5 of teens sleep with their cell phones on or near the bed.
Digital Wellness--Avoiding Misuse and Overuse
“One Bad Tweet”

- 40% of college admissions officers check applicants’ online information
- 70% of potential employers now check online information about a candidate.
- 57% of employers are less likely to interview a candidate they can’t find online.
Cyberbullying--
Old Problem, New Tricks
--Access to private space
--Speed of rumor mill
--Depersonalization
--Attacks are permanent
Caution: Cyberbullying

- 14% report being bullied face to face
- 48% report being cyberbullied
Cyberbulling

- 70% of teen users report that their peers are “mostly kind” to each other online.
- 88% of social media using teens have witnessed their peers being cruel to each other online.
- Many more kids have been bullied online than offline.
“Unregulated or Overuse of Technology”
Reward and Seeking Circuits in the Brain: Two Sides of the Coin

“Like” and “want” and two different circuits.

“Liking” is the reward center.

“Wanting” is the seeking center.
Over and Unregulated Technology Use

(Clifford NASS)

- Multi-tasking = unrelated streams of media simultaneously.
- 50% of eight-year-olds have cell phones.
- Tween girls average 2.5 media streams; high => 3;
- 98% of Stanford undergrads use more than 3 “most of the time.”
Attention

Reactive vs. Focused Attention
Tween Multi-taskers

- Decreased retention and more mistakes
- Have trouble blocking extraneous distractions (over developed “reactive attention” and underdeveloped “focused attention”)
- Are more distractible and have trouble transitioning
- They ramble in their writing.
Over and Unregulated Technology Use--Multi-tasking (Daniel Willingham)

- High multi-taskers have worse attentional control.
- What may be happening is that people who like to multi-task like to spread their attention around.
- Multi-tasking always carries a cost. You cannot share attention; you switch attention.
“Continuous Partial Attention”
The more you multitask the worse you get!
Technology Use and Social Skills

- Heavy pre-teen and teenage technology users show a deficit in real world social skills.

- Vicious cycle—as real world social interaction becomes less comfortable there is a tendency to use technology based communication rendering real world interaction less comfortable.
Fostering Technology Wellness

Three pillars for technology wellness.
- Digital literacy
- Digital citizenship
- Digital discipline
Technology Discipline

- Model appropriate technology use.
- Technology curfews. We can’t expect kids to be able to resist.
- Tech-free zones, e.g. dinner table, bedrooms
- Discourage multi-tasking
Want to do better in exams?

- Single task during study.
- Don’t fill in-between times with distraction. eg. Don’t pull out your phone after a class. Leave time for memory consolidation.
- Take notes by hand, not laptop. (Singapore study, 20127)
Disconnected: Screens and Family Interaction

Each hour of background TV reduced 500-1000 spoken words per day between adult and child.  
(Christakis, Archives of Pediatrics, 2009)
Disconnected: Smart Phones and Family Interaction

- Of 55 adult-child groups observed in middle class fast food restaurants 40 adults used smart phones during the meal. (Radesky, Pediatrics, 2014)
- Absorption ranged from intermittent to constant use.
- More use = decreased interaction with child.
- More use = more disruptive child behavior.
- More use = more chastising words from adult.
The New Normal?
Threat #6: Culture of More, Fast, Easy and Fun
“Whoever tells the story defines the culture.”

Dr. David Walsh
Self discipline is twice as strong a predictor of academic success as intelligence.
Self-esteem—the original meaning

William James, 1890

In *The Principles of Psychology*, James defines self-esteem as a set of opinions I have about myself.
The Self-Esteem “Movement”

Nathaniel Branden, 1969
“The Psychology of Self-Esteem”
Self Esteem Myths

• Myth 1. Self Esteem = Feeling Good

• Myth 2. Praise from others and self builds self esteem.

Praise: A Two-Edged Sword

- Praising innate ability leads to risk avoidance.
- Praising effort is more effective.
- Constant praise leads to praise dependency.
Rx: Tips for Praise

- Praise the effort more than the ability.
- Praise should be specific, not generic.
- Praise should be sincere.
- Praise should not be overdone.
Steps to Say Yes to No

- Encourage, don’t coddle.
- Support; don’t rescue.
- Get kids what they need but not everything they want.
- Back up teachers and schools.
Steps to Say Yes to No

- Have clear and high expectations.
- Expect kids to do chores.
- Set and enforce clear limits and consequences.
- Expect kids to volunteer and help others.
We want to stay in conversation with you: www.drdavewalsh.com