

# Trauma – a Burning Fuel for Media Addiction

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“The views expressed are those of the author and do not reflect the official policy of the Department of the Army, the Department of Defense or the U.S. Government.”

# An Addiction Hits Close to Home





I began pondering: What has been going on with kids in the past 10 years or so?

- An alarming increase in aggression
- Increased destruction of property
- Increased negative mood and irritability
- Increased self-harm and suicidality
- Decreased coping skills and resiliency
- Poorer social skills



# Definition of Addiction

Adam Slater (2018)  
*Irresistible*



In Rome being “addicted” meant that you had just been sentenced to slavery.



If you owed someone money and couldn't repay, a judge would sentence you to work as a slave until you could repay the debt.



Addiction later evolved to describe any bond that was difficult to break.



# Disruptive Mood Dysregulation Disorder – Real or a Sign of the Times:

Dunckley 2015 States:

“But what if this ‘*disorder*’ characterized by dysregulation is not some mysterious new plague, but **environmentally related**? If we ask ourselves, ‘What is the biggest change in our children’s environment compared to only one generation ago?’ the answer is not gluten, pesticides, plastics, or food dye, but the **advent of the Internet, cell phones, and wireless communication**. Might DMDD really be a by-product of constant bombardment from electronic screen devices, causing the brain to **short-circuit**? And what if the systematic removal of such screen devices provided much-needed relief, almost immediately?”

Sadly, many  
kids these  
days would  
go left I think:



# Current Trends

In a ten-year span from 1994 to 2003, the diagnosis of bipolar disorder in children increased forty-fold (Moreno et al., 2007).

Childhood psychiatric disorders such as ADHD, autism spectrum disorders, and tic disorders are on the rise (Atladdottir et al., 2007).

Between 1980 and 2007, the diagnosis of ADHD has increased by 800 percent (Dunckley, 2012).

Between 2001 and 2005, ADHD medication prescription rose by 40%.

Mental illness is now the number one reason for disability findings for children, representing half of all claims filed in 2012, compared to just 5 to 6 percent of claims twenty years ago (SSI Annual Statistical Report, 2012).





# Current Trends - continued

Childhood psychosocial and neurodevelopmental issues have increased in lock step with the insidious growth of electronic screen exposure in daily life. Children 2 to 6 spend 2 to 4 hours per day (Rideout et al., 2004).

According to a long-term study by the Kaiser Family Foundation in 2010, children 8 to 18 spend on average 7½ hours per day on some form of screens – a 20% rise from just 5 years earlier (Rideout et al., 2010).

8-10-year-old children spend nearly 8 hours per day on media and older children spend more than 11 hours (AAP, 2013).

71% of children have a TV or Internet device in their room (AAP, 2013).

Teens receive and send on average 3,705 texts per month or about 6 per hour (Rosen, 2012).





# Current Trends – continued

And what about we adults in the room?

Cited in Adam Alder, *Irresistible* (2018)



46 percent of adults say they couldn't bear/fear to be without their smartphones (**Nomophobia**) - some would rather suffer physical injury (Rosenberg and Feder, *Behavioral Addictions*).



In 2008 adults spent on average of **18 minutes** on their phones and in 2015 that rose to **2 hours and 48 minutes** (Rosenberg and Feder, *Behavioral Addictions*).



Up to **59%** of adults say they are dependent on social media and they report that this reliance makes them unhappy (Rosenberg and Feder, *Behavioral Addictions*).



There were an estimated **280 million** smartphone addicts in 2015, which would make the fourth largest country in the world after China, India, and the United States (Rosenberg and Feder, *Behavioral Addictions*).

# And Pornography - How is it?

- **40 million** American people regularly visit porn sites (Webroot, 2019).
- **35%** of all internet downloads are related to pornography (Webroot, 2019).
- **34% of internet users** have experienced unwanted exposure to pornographic content through ads, pop up ads, misdirected links or emails (Webroot, 2019).
- The societal costs of pornography are staggering. The financial cost to business productivity in the U.S. alone is estimated at **\$16.9 Billion annually**; but the human toll, particularly among our youth and in our families, is far greater (Webroot, 2019).
- **One-third** of porn viewers are women (Webroot, 2019).
- Between 2008 and 2011, exposure to porn among boys under the age of 13 jumped from **14% to 49%**. Boys' daily use more than doubled. (Sun et al. 2016)
- In a 2007 University of Alberta study, 429 students ages 13 and 14 from 17 schools across Alberta, Canada were surveyed about how often they accessed sexually explicit media content: **90% of boys** and **70% of girls** reported accessing sexually explicit media on at least one occasion (Betkowski, 2007).

## Part Two:

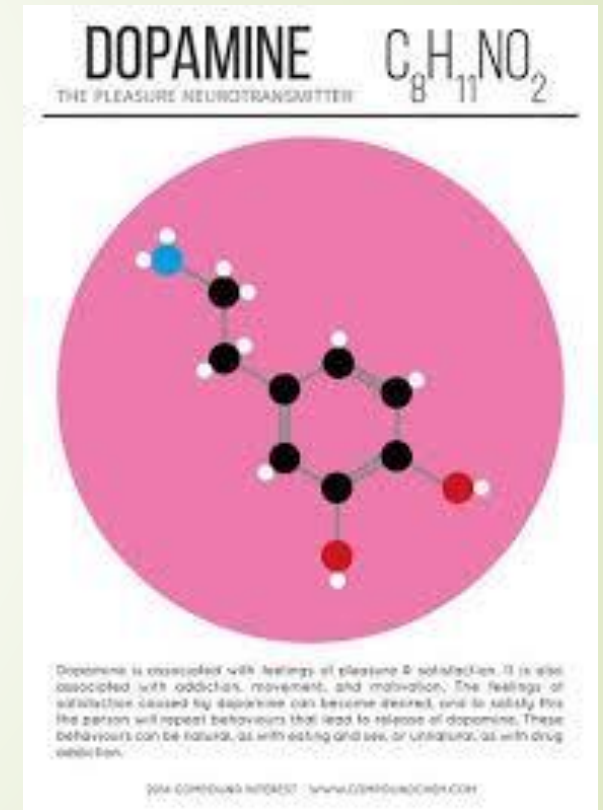
# How the Brain Gets Hooked on Media

Dopamine - guilty as charged



# How the Brain Gets Hooked on Digital Drugs

- As Kardaras(2016) stated in his book, *Glow Kids*, in order to fully understand addiction, we need to understand the **brain's reward system** and the impact of dopamine on that reward pathway.
- Specifically, how much **dopamine** is activated by a substance or behavior is correlated directly with the **addictive potential** of that substance or behavior.
- **Dopamine**, as many of us know, is the “**feel-good**” neurotransmitter that is the most critical and important part of the addiction process. Dopamine was discovered in 1958 by **Arvid Carlsson** and **Niles-Ake Hillarp** at the National Heart Institute of Sweden.





# Functions of Dopamine

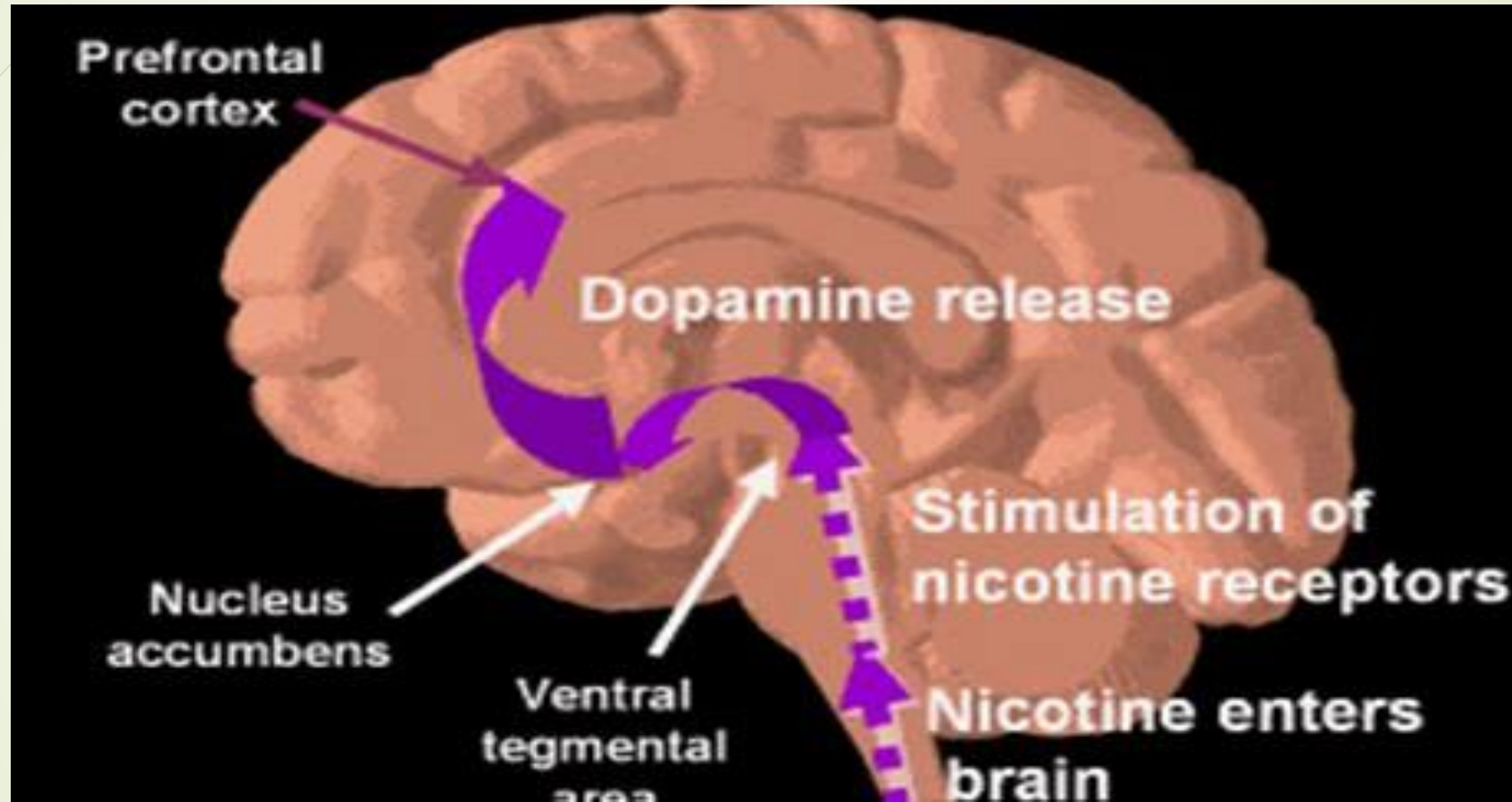
➤ Dr. Susan Weinschenk (2009) noted that **dopamine** is created in various parts of the brain and is critical in several brain functions to include:

- Thinking
- Moving
- Sleeping
- Mood
- Attention
- Motivation
- Seeking and reward



Inspired to watch because of Dopamine

# Dopamine Reward Pathway



The mesolimbic pathway is a collection of dopaminergic (i.e., dopamine-releasing) neurons that project from the ventral tegmental area (VTA) to the ventral striatum, which includes the nucleus accumbens (NAcc) and olfactory tubercle. It is one of the component pathways of the medial forebrain bundle, which is a set of neural pathways that mediate brain stimulation reward.

# More on Dopamine



- ▶ When an individual performs an action that is satisfying to a need or fulfills a desire, dopamine is released into the **nucleus accumbens**, a cluster of nerve cells beneath the cerebral hemispheres that are specifically associated with reward and pleasure. This is also known as the brain's “**pleasure center**.”
- ▶ **Natural dopaminergic activities**, such as eating and sex, usually come after effort and delay and serve a survival function.
- ▶ These are called the “**natural rewards**” as contrasted with addictive chemicals/behaviors (which can hijack the same circuitry).
- ▶ Addictive drugs and behaviors, such as gambling and video gaming, actually offer a **short-circuit** to this process which only ends up flooding the **nucleus accumbens** with dopamine and does not serve any biological function.

# Dopamine vs Endogenous Opioids



- ▶ Although **dopamine** has been referred to as the “**pleasure molecule**,” it is in actuality more about seeking and searching for pleasure, rather than pleasure itself. Dopamine is more involved in drive and motivation to seek.
- ▶ The “final reward” or what we experience as feelings of pleasure, Wilson (2014) writes, involve the release of **endogenous opioids**.
- ▶ You can think of **dopamine** as “**wanting**” and **opioids** as “**liking**.”
- ▶ As psychologist Dr. Weinschenk explains, “Dopamine causes us to **want, desire, seek out and, search**; however, the dopamine system is stronger than the opioid system and we hence seek more than we are as satisfied...” (Weinschenk, 2009).
- ▶ “Addicts want it more but gradually like it less. Addiction might be thought of as “**wanting gone amok**.” (Wilson, 2014).



# BOUGHT AND LIKING THE **BMW** BUT STILL **WANTING** THE **DUCATI** DIAVEL



# Dopamine and DeltaFosB “Keep doing it!”

- Highly salient activities, in this case addiction, lead to the accumulation of **DeltaFosB**, a protein that activates the genes involved with addiction. The molecular changes it potentiates are almost identical for both sexual conditioning and chronic drug use. Specifically, DeltaFosB rewires the brain to **crave IT** whatever **IT** is.
- In a sense, **dopamine** is like the **foreman** on a construction site barking orders and **DeltaFosB** is the **worker** on the site. Dopamine is yelling, “This activity is really important, and you should do it again and again.”
- DeltaFosB is responsible for ensuring that you **remember and repeat** the activity.
- This repeated process produces what is called **sensitization** which is based on the principle, “**Nerve cells that fire together wire together**” as noted by Canadian researcher Donald Hebb in 1949. Repeated activity strengthens cell connections.



# Dopamine and CREB – “Slow it Down, Silver!”

- As the brain recognizes that it needs a rest, it will kick out **CREB** in an effort to slow things down (Wilson, 2014).
- In essence, **DeltaFosB** acts like the **gas pedal** and **CREB** functions as the **brakes**.
- **CREB** specifically **inhibits** dopamine and endogenous opioids in an effort to take the joy out of the binging/addictive behavior or substance so that you can give it a rest.
- This numbed pleasure response that is induced by CREB is often identified as **desensitization** which leads to **tolerance** - the need of increasingly higher doses to achieve the same effect. Tolerance is a key factor in addiction.





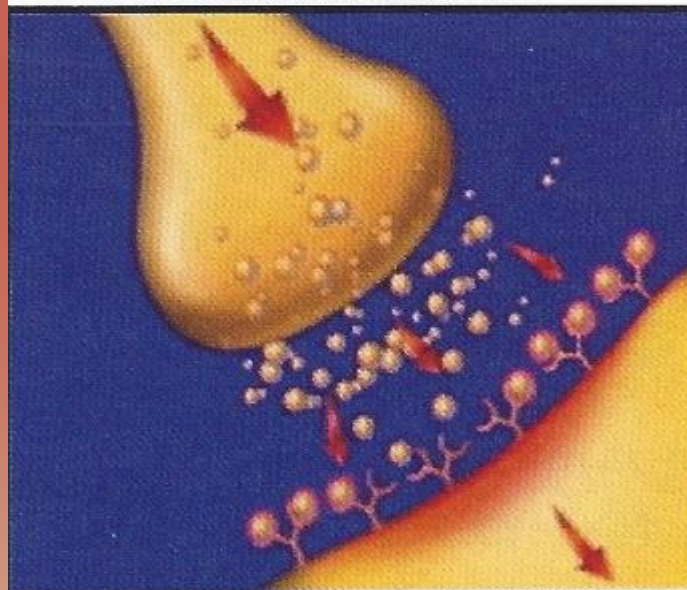
# Dopaminergic Downregulation at the Synaptic Level

**Normal Functioning**



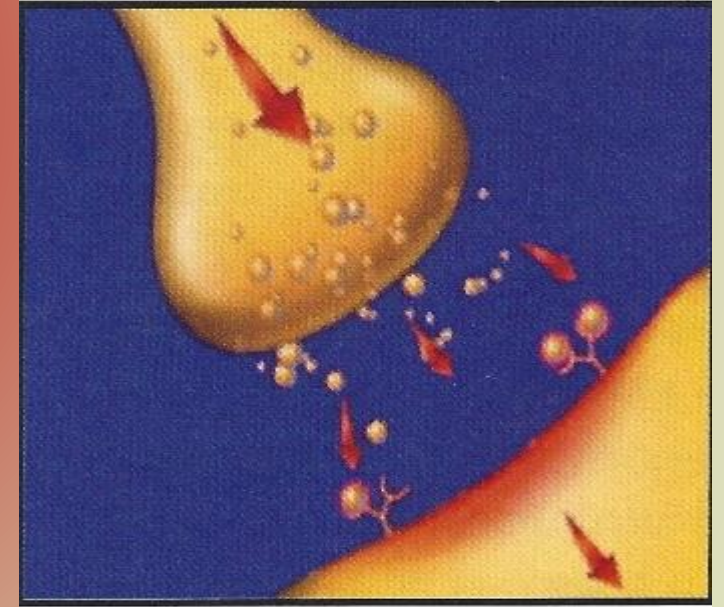
(Adapted from Stuff4Educators.com, 2014)

**Over Stimulation**



(Adapted from Stuff4Educators.com, 2014)

**Desensitization**



(Adapted from Stuff4Educators.com, 2014)





So, we see that chronic overstimulation can lead to two opposite effects:

01

Increased dopamine activity (wanting/seeking it more) –

**sensitization** via **DeltaFosB**

02

Decreased dopamine and opioid activity (liking it/enjoying it less) –

**desensitization** via **CREB**

# The Three C's of Addiction

► Wilson (2014) notes that all addictions, regardless of their differences, result in an established set of “**core brain changes**” which, in turn, present as recognized signs, symptoms, and behaviors such as those listed in the **Three C's**:

1. **Craving and Preoccupation** with obtaining, engaging in or recovering from the use of the substance or behaviors in question.
2. **Loss of Control** in using the substance or of engaging in the behavior and noted by increasing frequency or duration, larger amounts or intensity, and/or increasing the risk and behavior in an effort to obtain the desired effect.
3. **Negative Consequences** in physical, social, occupational, financial, or psychological areas.

# Factoids about Dopamine Increases (Koepp et al., 1998; Guangbheng et al., 2012)

**Chocolate – 50%  
increase**

**Sex – 100% increase**

**Snorting cocaine – 350%**

**Crystal meth – 1,200%**

**Video gaming – 100%**



# Early Attachment



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“In particular, it is the experience of loving and being loved that most closely predicts how we react to the hardships of life; human attachments are the ultimate source of resilience.

— Jonah Lehrer, [A Book About Love](#)

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# Early Attachment



- Attachment is a really big deal and has lifelong implications for all of us. Safe and secure attachment are absolutely necessary for developing healthy and secure relationships, emotional health, and the ability to regulate our emotions.
- Two early pioneers in this field, **Dr. John Bowlby** (1969) and **Dr. Mary Ainsworth** (1973) carved the way to our understanding of attachment and child development theory.
- They **defined attachment** as a deep and enduring emotional bond that leads to connections between us across time and space.
- This attachment is not always mutual and can travel in only one direction. For example, a child can attach to a parent, but the parent does not always attach to the child or vice versa (Kain & Terrell, 2018).

# Attachment – Dr. John Bowlby



- By way of background on Dr. Bowlby, in an interview with Dr. Milton Stenn , Bowlby shared that his career started off in the medical direction. He noted that he was following in his surgeon father's footsteps. His father was a well-known **surgeon in London** and Bowlby explained that his father encouraged him to study medicine at Cambridge.
- Bowlby ended up following his father's suggestion but was not terribly interested in anatomy and natural sciences. However, during his time at **Trinity College**, he became particularly interested in developmental psychology which led him to give up medicine by his third year. When Bowlby left medicine, he accepted a teaching opportunity at a school called **Priory Gates** for six months where he worked with maladjusted children.
- Bowlby stated that the experience at Priory Gates was extremely important to his career in research as he learned that the problems of today should be understood and dealt with at a developmental level (Kanter, 2007).

# Attachment – Dr. Mary Ainsworth

- Bowlby was not the only act in town as he collaborated extensively with Dr. Mary Ainsworth.
- Mary was born in **Glendale Ohio**. When she was 15, she read William McDougall's book, **Character and the Conduct of Life**, which inspired her to pursue psychology.
- While she was teaching at **John Hopkins**, Mary began working on creating a means to measure attachments between mothers and their children.
- It was this that led her to develop her famous **"Strange Situation"** assessment, in which a researcher observes a child's reactions after a mother briefly leaves her child alone in an unfamiliar room.
- The child's reaction after the separation and upon the mother's return, revealed important information about attachment. Based on her observations and research,
- Mary determined that there were **three main styles of attachment**: **secure**, **anxious-avoidant**, and **anxious-resistant**. Since these initial findings, her work has spawned numerous studies into the nature of attachment and the different attachment styles that exist between children and their caregivers (VeryWellMind, 2019)

-GIANTS SERIES-

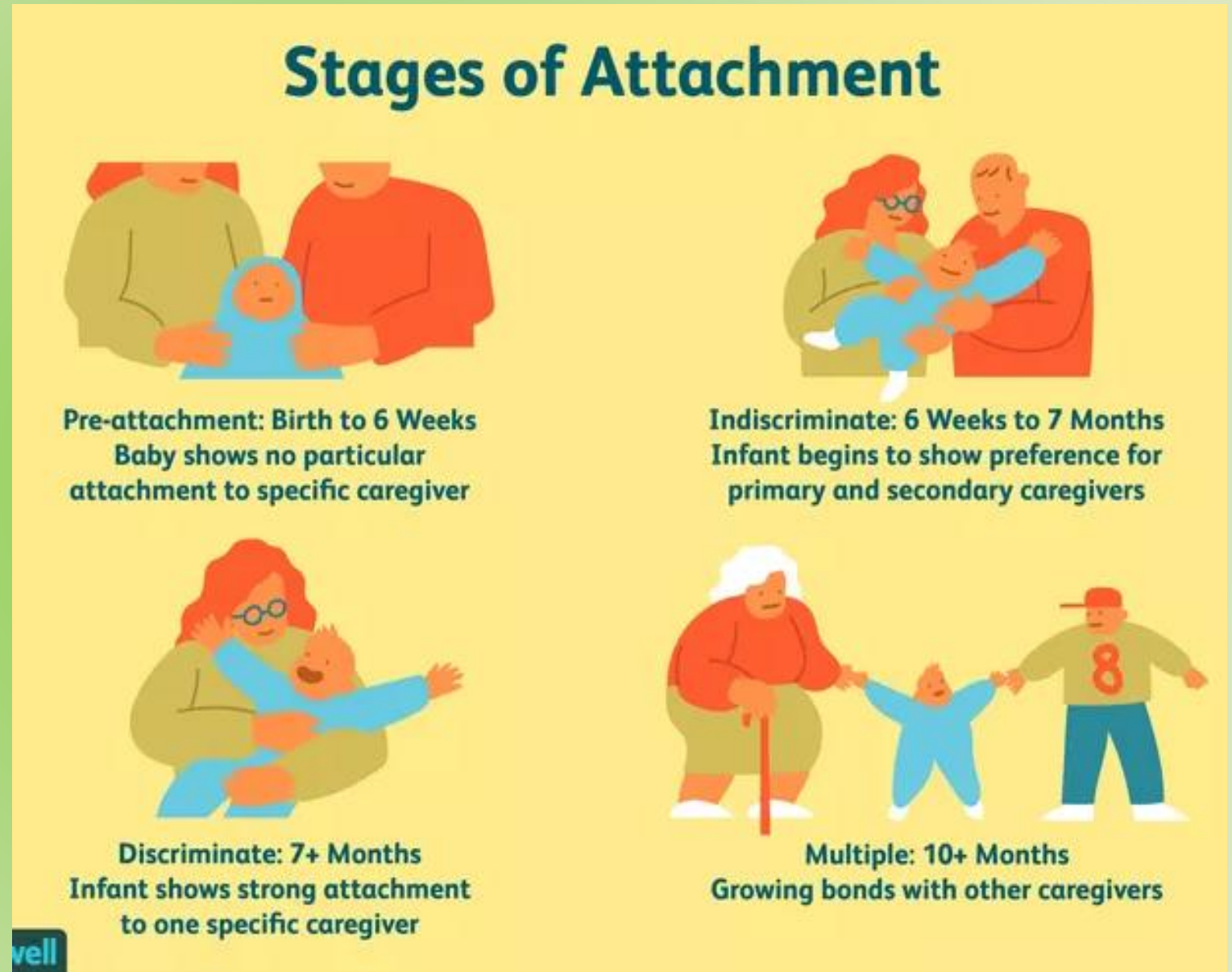
## Mary Ainsworth: ATTACHMENT AND THE GROWTH OF LOVE





# Four Phases of Attachment

- Rudolph Schaffer and Peggy Emerson (1964) analyzed the number of attachment relationships that infants form in a longitudinal study with 60 infants.
- In their study, infants were observed every four weeks during the first year of life, and then once again at 18 months.
- Schaffer and Emerson determined that four distinct phases of attachment emerged:





# Four Phases of Attachment

Rudolph Schaffer and Peggy Emerson (1964)



- **Pre-attachment stage:** From birth to three months, infants do not show any particular attachment to a specific caregiver. The infant's signals, such as crying and fussing, naturally attract the attention of the caregiver and the baby's positive responses encourage the caregiver to remain close" (Schaffer & Emerson, 1964).
- **Indiscriminate attachment:** From around six weeks of age to seven months, infants begin to show preferences for primary and secondary caregivers. During this phase, infants begin to develop a feeling of trust that the caregiver will respond to their needs. While they will still accept care from other people, they become better at distinguishing between familiar and unfamiliar people as they approach seven months of age. They also respond more positively to the primary caregiver" (Schaffer & Emerson, 1964).
- **Discriminate attachment:** At this point, from about seven to eleven months of age, infants show a strong attachment and preference for one specific individual. They will protest when separated from the primary attachment figure (separation anxiety) and begin to display anxiety around strangers (stranger anxiety)" (Schaffer & Emerson, 1964).
- **Multiple attachments:** After approximately nine months of age, children begin to form strong emotional bonds with other caregivers beyond the primary attachment figure. This often includes the father, older siblings, and grandparents" (Schaffer & Emerson, 1964).

# Attachment Styles



As nicely summarized by Lyons-Ruth (1996), the basic the attachment styles culminating from John Bowlby's and Mary Ainsworth's research and the fourth by Drs. Mary Main's and Judith Solomon's (Main & Solomon, 1986) work include:

- Secure
- Avoidant
- Ambivalent
- Disordered

# Attachment Styles Explained



- **Secure attachment:** Secure attachment is marked by **distress when separated from caregivers and joy when the caregiver returns**. Remember, these children feel secure and are able to depend on their adult caregivers. When the adult leaves, the child may be upset but he or she feels assured that the parent or caregiver will return. When frightened, securely attached children will seek comfort from caregivers. These children know their parent or caregiver will provide comfort and reassurance, so they are comfortable seeking them out in times of need” (Lyons-Ruth, 1996).
- **Ambivalent attachment:** Ambivalently attached **children usually don't appear too distressed by the separation, and, upon reunion, actively avoid seeking contact** with their parent, sometimes turning their attention to play objects on the laboratory floor. This attachment style is considered relatively uncommon, affecting an estimated 7 percent to 15 percent of U.S. children. Ambivalent attachment may be a result of poor parental availability. These children cannot depend on their mother (or caregiver) to be there when the child is in need” (Lyons-Ruth, 1996).
- **Avoidant attachment:** Children with an avoidant attachment tend to **avoid parents or caregivers. When offered a choice, these children will show no preference between a caregiver and a complete stranger**. Research has suggested that this attachment style might be a result of abusive or neglectful caregivers. Children who are punished for relying on a caregiver will learn to avoid seeking help in the future” (Lyons-Ruth, 1996).
- **Disorganized attachment:** Children with a disorganized attachment often display a **confusing mix of behavior and may seem disoriented, dazed, or confused**. Children may both avoid or resist the parent. Some researchers believe that the lack of a clear attachment pattern is likely linked to inconsistent behavior from caregivers. In such cases, parents may serve as both a source of comfort and a source of fear, leading to disorganized behavior” (Lyons-Ruth, 1996).



**Mary Ainsworth** and her colleagues reported in 1978 that studies on the three initial attachment classifications revealed:

- 70 percent of American infants have been classified as secure
- 20 percent as avoidant-insecure
- 10 percent as resistant-insecure (Ainsworth et al., 1978).

Kain and Terrell (2018) warn that there are worrying declines in secure attachment and that in more recent research populations, the percentages of secure attachment have declined by **10 percent** (Andreassen et al., 2007).

## Attachment Style Percentages





# Attachment Takeaways

- Studies reveal that Interactions during the **first three years of life can affect cognitive development** and will impact physical, emotional, and mental health of children as they age and develop (Colmer et al., 2011).
- Typically, a **parent's emotional response will serve as a template** for helping their child learn about emotion. As parents model appropriate emotion regulation through conversations or actions, children learn to control/regulate their emotions.
- On the other hand, **insecurely attached children** may learn to mask their emotional distress or exaggerate them in order to gain the parent's attention; therefore, making up for a parent who is not consistently responsive (Laible, 2010).
- This type of maladaptive behavior has devastating consequences, resulting in **poor social skills, emotional dysregulation, depression, anxiety, peer exclusion, social rejection, and/or low self-esteem** (Lewis et al, 2015; Newman, 2017).
- So, it behooves any of us who are young parents to ensure that we are spending lots and lots of time with our infants and children in healthy, safe, and connected ways, particularly early in life to develop secure attachment so they will be able to have joy, fulfilling relationships, and emotional stability.

# Trauma and Adverse Childhood Experiences



**Trauma exposure**, particularly child maltreatment (e.g., neglect, emotional, physical and sexual abuse), has been established as one of the main determinants of emotional dysregulation and is also a known risk factor for psychiatric disorders, especially depression and PTSD (McLaughlin et al., 2012; McLaughlin et al., 2013).

Moreover, several prior studies have shown that trauma exposure is clearly associated with **profound deficits in emotional regulation** across the entire lifespan, including during preschool (Langevin, Hebert, Allard-Dansereau; Bernard-Bonnin, 2016), adolescence (Shields & Cicchetti, 1997; Vettese, Dyer, Li, & Wekerle, 2011) and even adulthood (Briere & Rickards, 2007; Thompson, Hannan, & Miron, 2014; Dunn et al., 2018).

Trauma occurs when we are faced with an experience that **overwhelms our ability to process incoming information** both at the time of that experience and in future situations (Barta, 2018).


**Dr. Michael Barta** suffered from trauma himself as a child which led him to addictions that ultimately landed him in jail and almost destroyed his life. In his book, *TINSA*, he wrote that trauma occurs when our natural defenses are unable to keep us safe from physical, emotional, or mental threats or harm (Barta, 2018).

# Trauma - Adverse Childhood Experiences

- In the mid-1980's, **Dr. Vincent Felitti** noticed a puzzling and paradoxical trend in the obesity clinic he was heading.
- Specifically, many of his participants who were having the **most success in losing weight were dropping out only to gain the weight back**. He interviewed the nearly 300 participants and discovered a surprising pattern: almost all of the dropouts had suffered some form of **childhood trauma** (Kain & Terrell, 2018).
- This initial study grew into a major public health study with Dr. Felitti teaming up with **Dr. Anda** at the Centers for Disease Control (CDC) that continues to this day, involving more than 17,000 individuals.
- This research came to be known as the **Adverse Childhood Experiences (ACE) Study** (Felitti et al., 2014). In this study, people were asked about **ten different types of traumatic events** that happened to them when they were children to include physical and sexual abuse, family problems, and neglect.

**Adverse Childhood Experiences (ACE) Study**

- Dr Vincent Felitti
- Chief of Preventive Medicine at Kaiser Permanente
- Obesity Clinic 1985
- CDC
- [Short Video Introduction to ACE Study](#)



8



# Trauma - Adverse Childhood Experiences

The **ten reference categories** experienced during childhood or adolescence are as below, with their prevalence in parentheses (Felitti and Anda, 2009):

## *Abuse*

- Emotional – recurrent threats, humiliation (11%)
- Physical - beating, not spanking (28%)
- Contact sexual abuse (28% women, 16% men, 22% overall)

## *Household dysfunction*

- Mother treated violently (13%)
- Household member was alcoholic or drug user (27%)
- Household member was imprisoned (6%)
- Household member was chronically depressed, suicidal, mentally ill, or in psychiatric hospital (17%)
- Not raised by both biological parents (23%)

## *Neglect*

- Physical (10%)
- Emotional (15%)



# Trauma - Adverse Childhood Experiences

- Somewhat surprising in the Felitti studies was that **emotional abuse** was more likely to cause depression than any other kind of trauma – even sexual abuse.
- This suggests that the kind of treatment children receive from parents is a tremendously powerful **predictor of positive outcome** and when that **trust is broken**, devastation surely ensues.



# Dr. Michael Barta's Adverse Childhood Experiences

Barta (2018) in his book, *TINSA*, defines ACEs a little differently as summarized below:

- Sexual assault or abuse
- Physical assault or abuse
- Psychological or emotional trauma
- Serious accidents, medical procedures, or illnesses
- Manmade or natural disasters
- Witnessing violence to include domestic abuse
- School violence to include bullying
- Traumatic grief or unwanted separation
- Terrorism or war
- Betrayal by others to include relational trauma



# Big T Trauma and Little t Trauma

The experts in the field divide trauma into two categories:

**Big T trauma:** Traumas that are associated with horrific single events such as natural disasters, terrorism, and war.

**Little t trauma:** Trauma that are smaller in nature such as bullying, neglect, and betrayal.



## Review of Trauma

BIG **T**

- War
- Disasters
- Childhood sexual abuse
- Physical abuse
- Car wreck
- Crime victimization
- Witnessing death
- Domestic violence

*little* **t**

- Emotional abuse
- Neglect
- Failure experiences
- Phobia related experiences
- Losses
- Stress at work or school
- Bullying
- Domestic violence

# ACE Scores and Outcomes

As Dr. Felitti in a 2009 lecture points out, studies reveal many shocking long-term horrible outcomes when we are exposed to ACEs and this raises exponentially according to how many of them, we have been exposed to.

The results indicate that for every category of traumatic experience we have had as a child, we are dramatically more likely to be depressed as an adult.

If we have ACE scores of **4**, we are:

- **260%** more likely to have chronic obstructive pulmonary disease than someone with a score of 0
- **240%** more likely to contract hepatitis, **460%** more likely to experience depression
- **1,220%** more likely to attempt suicide

If we have ACE scores of **6**, we are:

- **Five times** more likely to become depressed as an adult and if we have had

If we have ACE scores of **7**, we are:

- **3,100 %** more likely to attempt suicide as an adult (Felitti et al., 2014; Felitti 2004; Felitti and Anda, 2009; Felitti et al., 1998).

Dr. Felitti offered the following graphs which nicely detail the dramatic impact that ACEs have on our society:



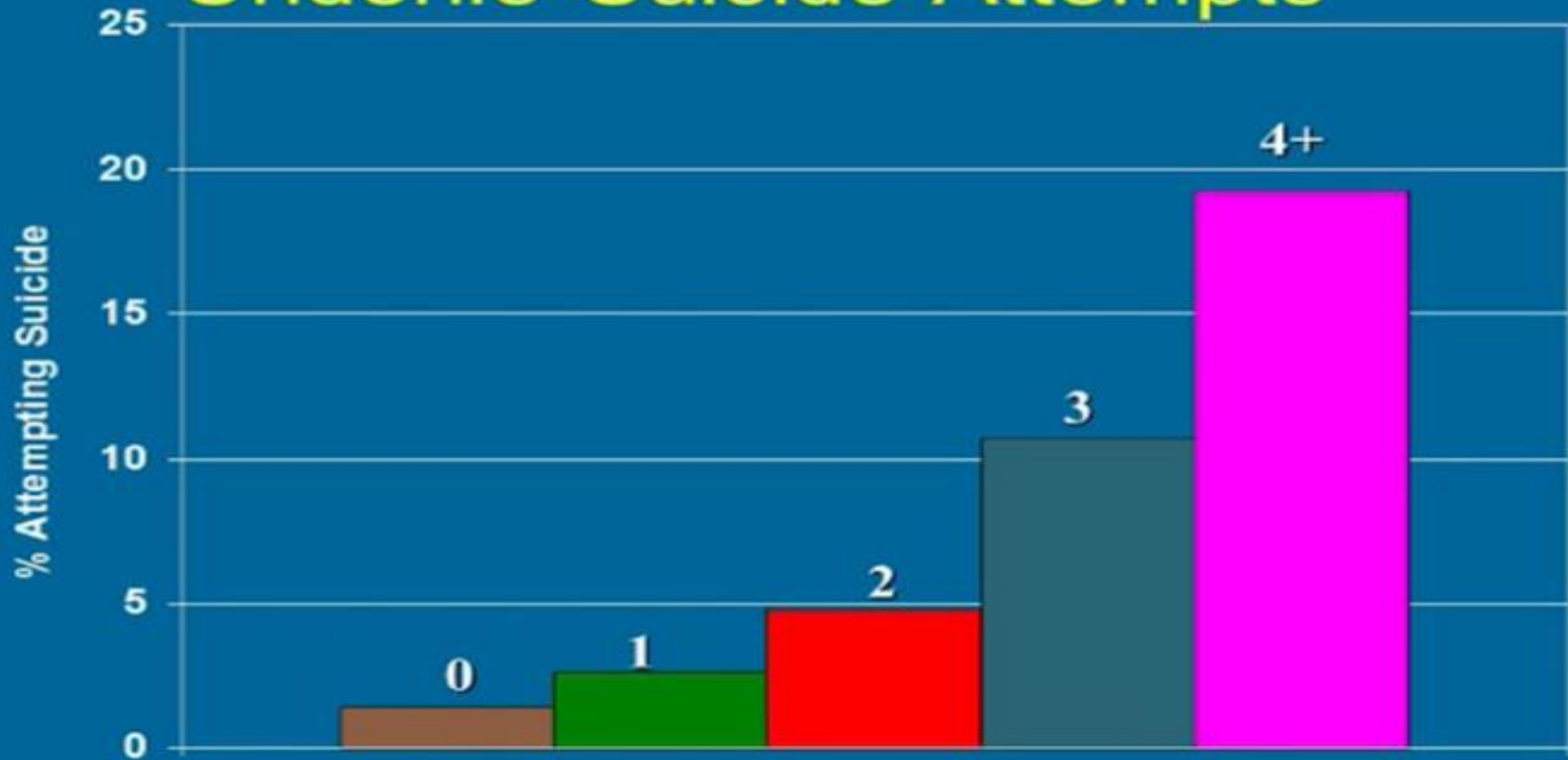


# ACE Score vs Intravenous Drug Use



$p < 0.001$

# Childhood Experiences Underlie Suicide Attempts



# ACEs Increase the Likelihood of Heart Disease\*

- |                      |      |
|----------------------|------|
| • Emotional abuse    | 1.7x |
| • Physical abuse     | 1.5x |
| • Sexual abuse       | 1.4x |
| • Domestic violence  | 1.4x |
| • Mental illness     | 1.4x |
| • Substance abuse    | 1.3x |
| • Household criminal | 1.7x |
| • Emotional neglect  | 1.3x |
| • Physical neglect   | 1.4x |

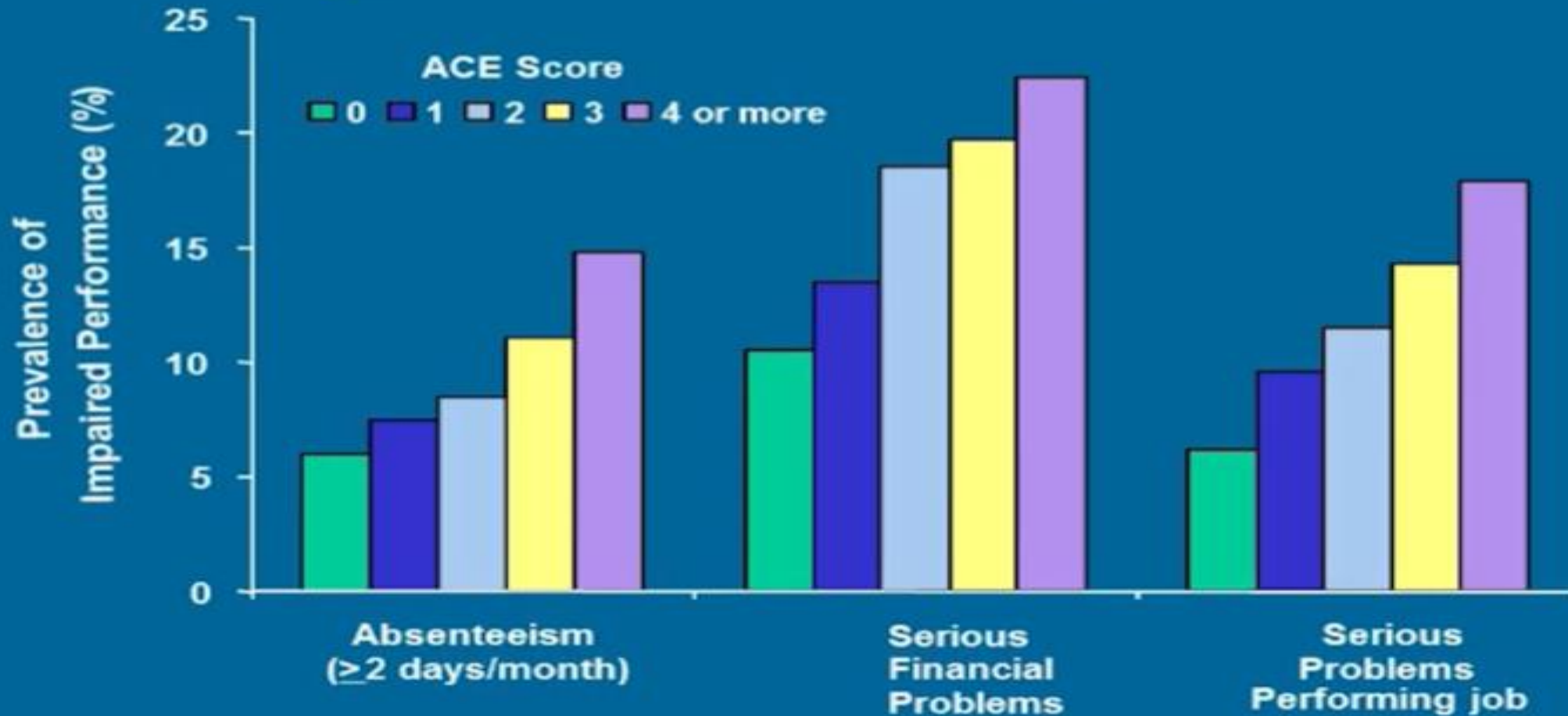


\*After correction for age, race, education, and conventional risk factors like smoking & diabetes.

*Circulation, Sept. 2004*

## Social malfunction:

# ACE Score and Indicators of Impaired Worker Performance

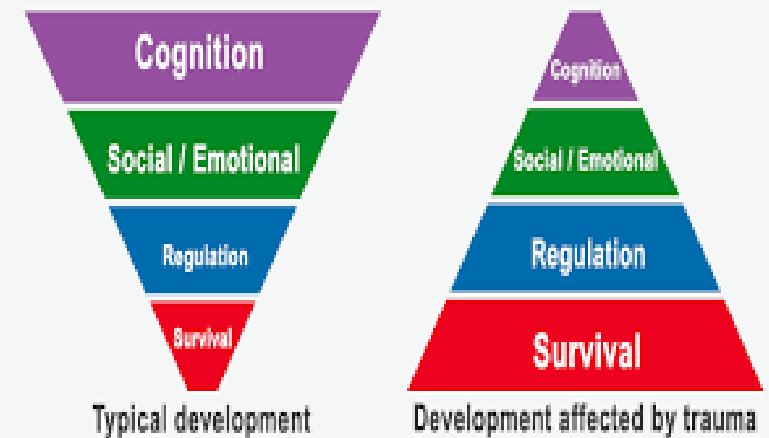




# Trauma's Impact on Social Engagement and Emotional Regulation

- My own clinical experience suggests that the most common forms of trauma are due to a **lack of attunement or connection with parental** or adult figures while growing up.
- As Barta (2015) writes, “These deficiencies are not about bad parenting but about a parent’s inability or diminished ability to respond to the child’s emotional needs. Most parents are doing the best they can with the tools they have, but whether deliberately or inadvertently, the traumas of our childhood can have tremendous impact on our lives (Barta, 2018, p. 17)
- As trauma expert, **Dr. Peter Levine** notes in his book, *Healing Trauma*, “Trauma is much about loss of connection – to ourselves, to our bodies, to our families, to others, and to the world around us. This loss of connection is often hard to recognize because it doesn’t happen all at once. It can happen slowly over time, and we adapt to these subtle changes sometimes without even noticing them.
- These are the hidden effects of trauma, the ones most of us keep to ourselves...Our choices **become limited as we avoid certain, feelings, people, and situations**. The result of a gradual constriction of freedom is the loss of vitality and potential for the fulfilment of our dreams” (Levine, 2008, p. 9).

How trauma affects a child's development



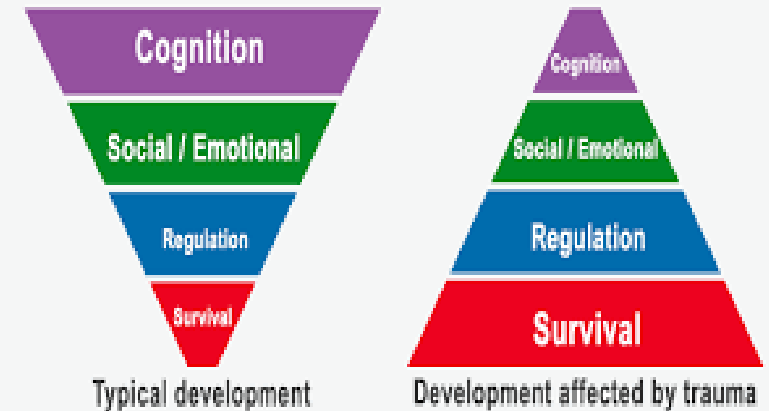
## Trauma's Impact on Social Engagement and Emotional Regulation – con't

➤ Most important to normal development is “**social engagement**” which is the ability to know, understand, regulate, and express emotions in the present moment. Even though everyone is born with a social engagement system (i.e., a neurological system that promotes human connection), we know that early **trauma can disrupt its normal development**.

➤ Anda et al (2018) note, “Early adverse experiences may disrupt the ability to form **long-term attachments in adulthood**. The unsuccessful search for attachment may lead to sexual relations with multiple partners with resultant promiscuity and other issues related to sexuality.”

➤ As a result of **adverse developmental trauma**, the ensuing loss of connection with our inner self, our bodies, others, and the world around us, we are **predisposed to engage in addictive behaviors to relieve the emotional dysregulation that torments us**.

How trauma affects a child's development



# The ACEs Quiz



You might want to take a moment and take the ACE quiz yourself to see where you fall.

For each “yes” answer, add 1. The total number at the end is your cumulative number of ACEs.  
Before your 18th birthday:

- Did a parent or other adult in the household often or very often... Swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt?
- Did a parent or other adult in the household often or very often... Push, grab, slap, or throw something at you? or Ever hit you so hard that you had marks or were injured?
- Did an adult or person at least 5 years older than you ever... Touch or fondle you or have you touch their body in a sexual way? or Attempt or actually have oral, anal, or vaginal intercourse with you?
- Did you often or very often feel that ... No one in your family loved you or thought you were important or special? or Your family didn’t look out for each other, feel close to each other, or support each other?
- Did you often or very often feel that ... You didn’t have enough to eat, had to wear dirty clothes, and had no one to protect you? or Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
- Were your parents ever separated or divorced?
- Was your mother or stepmother:  
Often or very often pushed, grabbed, slapped, or had something thrown at her? or Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard? or Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?
- Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?
- Was a household member depressed or mentally ill, or did a household member attempt suicide
- Did a household member go to prison?

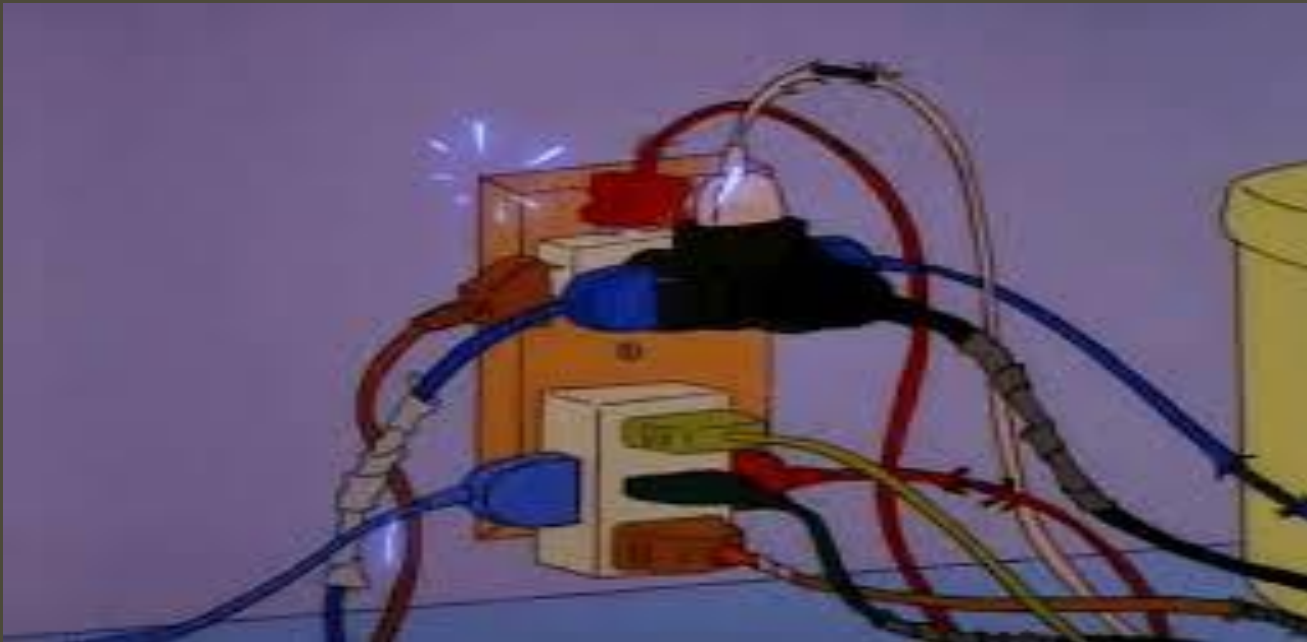
**Total ACE score: \_\_\_\_\_**

# Part Three:

The impact of Media on Your Child's Brain, Body, and Behavior

"I like to play indoors better,  
'cuz that's where all the electrical outlets are."

--Paul, fourth grader in San Diego



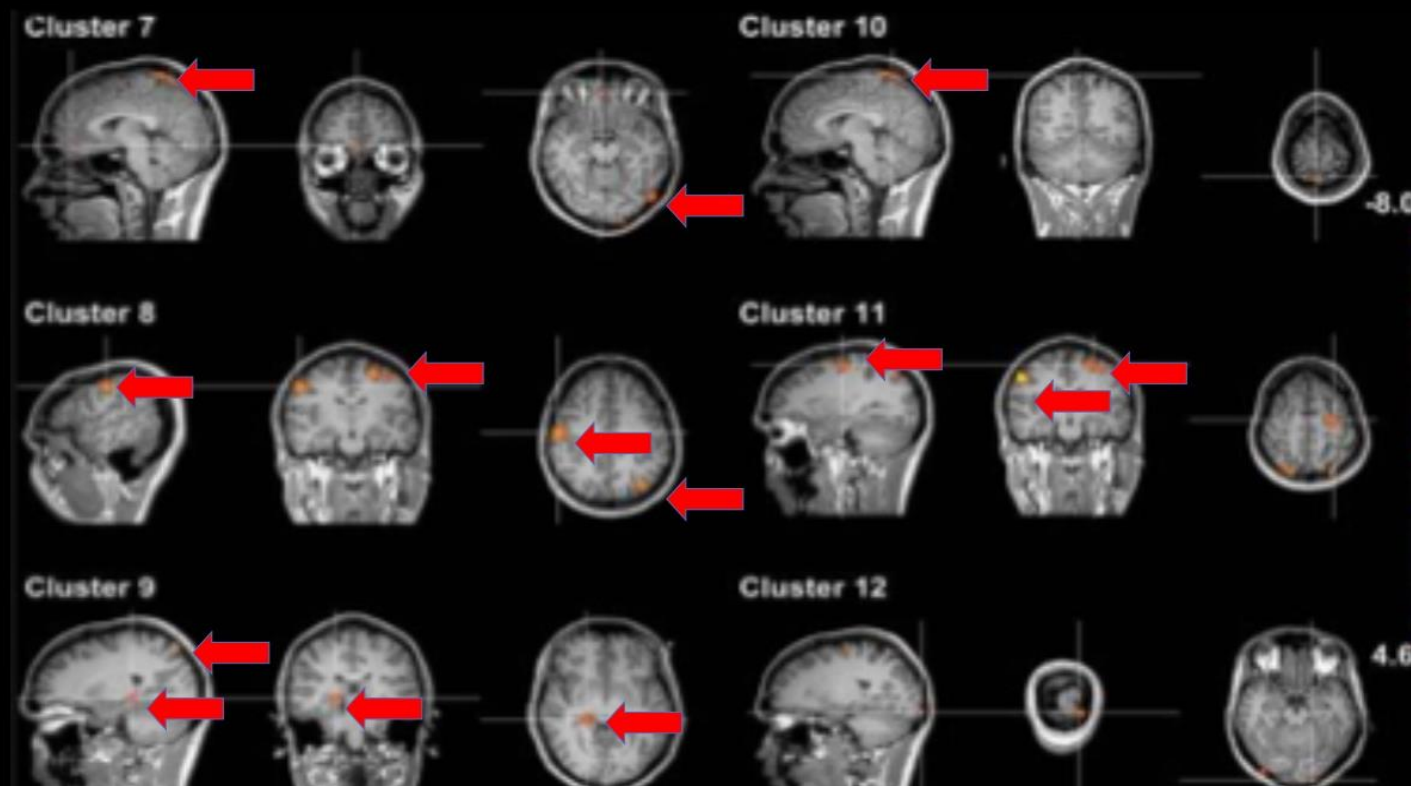


This slide displays areas of brain activity after showing **video game addicts** triggers consisting of video game footage. The areas of activation occur in similar patterns in brains of people addicted to drugs and gambling.

# MRI of “Gaming Brain”

Cerebral Blood Flow Activity of a  
brain after gaming.

## Internet Gaming Disorder



Brain activity and desire for Internet video game play. Compr Psychiatry.  
2011 Jan-Feb;52(1):88-95.

Excessive Media can hijack the “**orienting response**” which helps us assess a threat before we determine to **fight, flee, or freeze** by creating chemical, electrical, and mechanical shifts that end up raising arousal levels (Dunckley, 2015).

01

Stimulation by excessive media can damage **myelin** in neuropathways, most specifically the **oligodendrocytes**, the brain cells that produce cholesterol for proper myelination. (Kardaras, 2016).

02

When myelin is destroyed by overstimulation during key developmental periods, problems such as our ability to **focus, feel empathy**, and/or **discern reality** can all be negatively affected (Kardaras, 2016).



## Impact of Excessive Media on the Brain

# Impact of Excessive Media on the Body

- Excessive media can trigger **Metabolic Syndrome**. Metabolic syndrome is a combination of the following (Dunckley, 2015):
  - High blood pressure
  - Midsection weight gain (spare tire)
  - Abnormal cholesterol levels
  - High fasting blood sugar
- **Metabolic Syndrome** is a serious condition and, if left unchecked, can promote:
  - Diabetes
  - Heart disease
  - Stroke



## In the words of Dr. Andrew Doan:

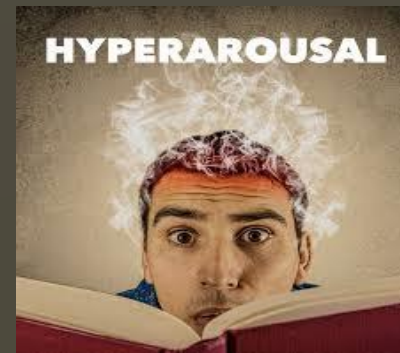
► “I had pain from my clicking finger all the way up to my forearm. And my **cortisol levels** were shot - through my **hypothalamic-adrenal-pituitary axis (HPA)**, so I was getting **fat** because I had all of this **cortisol** floating around. I didn’t exercise, so I was retaining more body fat. And then finally my HPA axis was all dysregulated so I was more prone to **infection** - I had pimples all over my face, I had stretch marks beginning. And then, finally, I got an infection in my armpit!

► So, in addition to the **carpel tunnel**, I had this armpit infection that was streaking down my arm. And on top of that, because my **blood pressure** was going up because of the gaming adrenaline rush - my blood pressure was high, my **cholesterol** was high. And because my blood pressure was high, and I was sitting all of the time, I had hemorrhoids the size of walnuts. - I mean, literally! I was a young man - I was pissed off. Why do I have hemorrhoids like some pregnant women do? We’re talking about bloody, painful hemorrhoids...So I’m convinced that if people are addicted to this thing, **it’s going to ruin their lives**. It almost ruined mine - and it almost ruined my son and almost destroyed his confidence and his opportunities” (Kardaras, 2016).



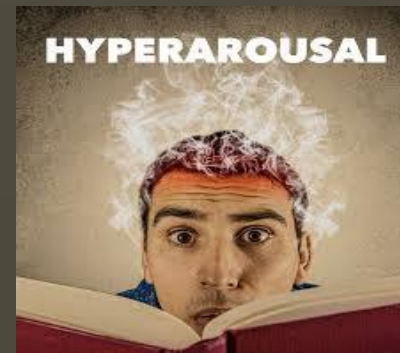
# Impact of Excessive Media on Arousal

- Excessive media consumption sends unnatural and overstimulating messages via the **eyes, brain, and body** to the nervous system which in turn trigger:
  - Fight, freeze, or flee response
  - Electronic Screen Syndrome
  - Poorer ability to manage and handle stress



# Impact of Excessive Media on Arousal

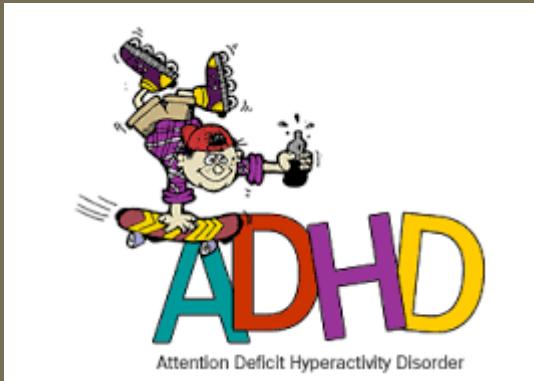
- ▶ Excessive media consumption sends unnatural and overstimulating messages via the **eyes, brain, and body** to the nervous system which in turn trigger:
  - **Fight, freeze, or flee response**
  - **Electronic Screen Syndrome**
  - **Poorer ability to manage and handle stress**



- **Blood Flow Shifts:** When a person is under stress, blood flow to the brain is shunted away from the higher regions of the brain, i.e., the cortex, and directed to the more primitive parts of the brain, i.e., the limbic or old brain in an effort to promote survival.
- **Elevated Cortisol:** Chronically elevated cortisol is associated with obesity, diabetes, hormone imbalance, metabolic syndrome, and high blood pressure as previously noted (Pervanidou et al., 2011).
- **Oxidative Stress:** When the cell's natural defenses are overwhelmed due to excessive stress, the antioxidants or scavengers are depleted, and oxidative stress or excessive free radicals develop. Free radicals **cause inflammation, tissue damage, and decreased efficiency.**

## The Impact of Chronic Hyperarousal





## Impact of Media on Attention - The ADHD Effect

Prefrontal Cortex directs “**executive function**” or the ability to get things done which involves:

- **Planning**
- **Organizing**
- **Revising**
- **Strategizing**
- **Attending to details**
- **Managing time and space**
- **Inhibition of negative behaviors (putting on the brakes)**

Deficits in any one of these areas can have huge impact on the child.



# Impact of Media on Attention - The ADHD Effect - continued



Exposure to video games and television in childhood leads to subsequent attention problems (Kardaras, 2016).



When you see something **exciting**, it is hard to downshift to something **less exciting**.



The more TV a child watches between the ages of **one and three**, the more likely the child is to be diagnosed with ADHD by age **seven** (Kardaras, 2016).



Symptoms of ADHD can be environmentally induced – Microsoft (2015) report: The average attention span has shortened from **12 to 8** seconds in a decade (Turner, 2017).

# Impact of Media on Attention - The ADHD Effect - continued

## Oh, The Temptation THE MARSHMALLOW TEST



Excessive media can degrade Focused or Voluntary Attention as shown in the **Marshmallow Test** (Mischell, 1972).



Follow-up studies on these kids up until age 40 showed that those children who were able to wait the distance, did better on multiple aspects of life (Palladino, 2015):

Higher Scholastic Aptitude Test (SAT) scores

More successful education

Better success at keeping friends

Greater financial success



Dr. John Ratey, Clinical Professor of Psychiatry at Harvard School of Medicine, coined the term, **Acquired Attention Deficit Disorder**.

# Impact of Distracted Parents

Dr. Catherine Steiner noted that many American children first encounter the digital world when they notice their parents are Missing-in-Action.

Penny (7) complains, “I always keep asking her let’s play, let’s play and she’s always texting on her phone.”

Distracted parents produce distracted children because parents can’t focus to teach their kids the necessary attention patterns for success.

Caregivers who appear distracted or whose eyes wander a lot while their children play appear to negatively impact on infants’ burgeoning attention spans (Indiana University, 2016).



# The Impact of Media on Depression



➤ **A.N. Turner (2017)** eloquently writes of his own struggle with depression secondary to media overconsumption:

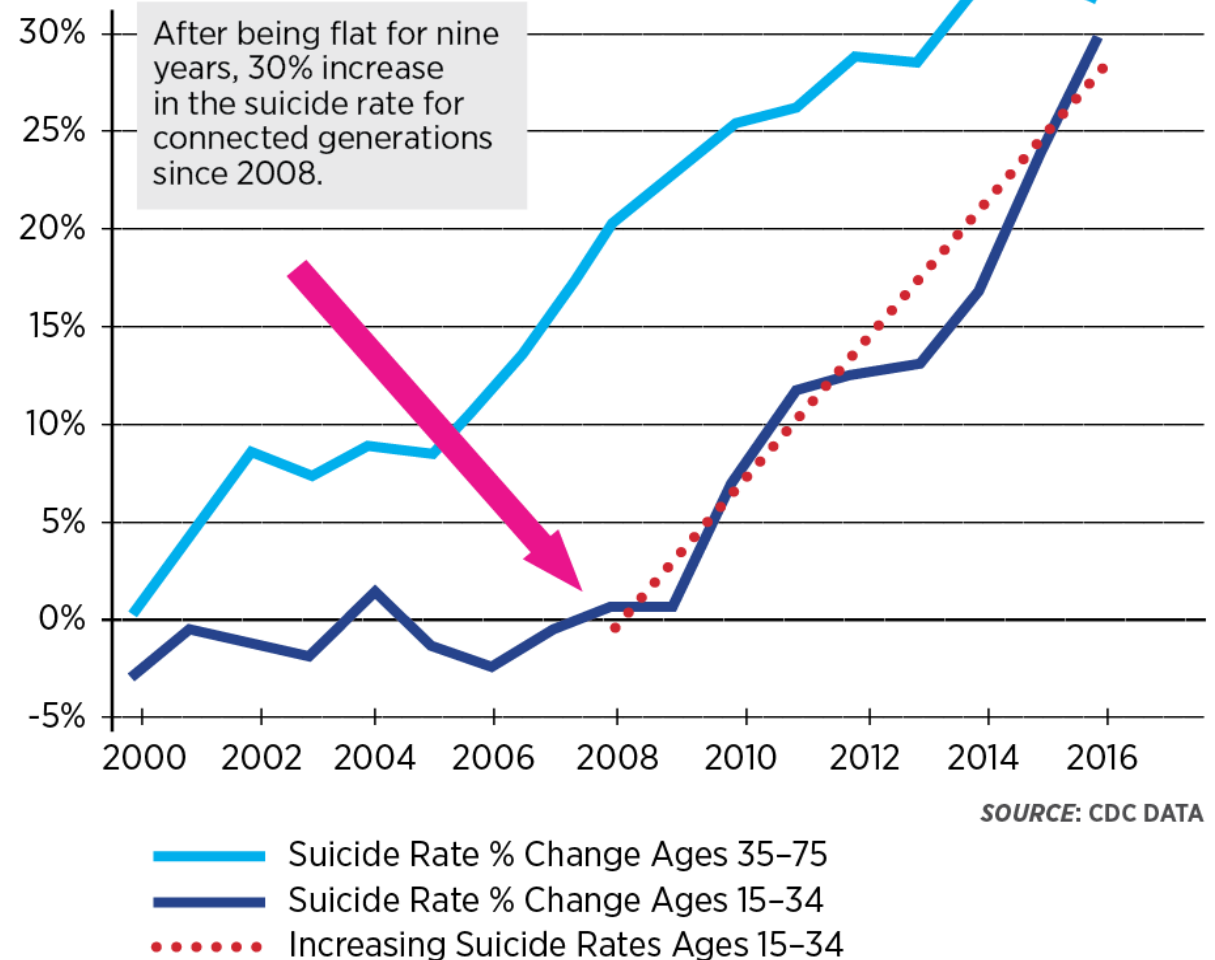
*“My relationship with the Internet was not alleviating feelings of loneliness; it was amplifying my **loneliness**, bringing me to a state of **frustrated depression**. I felt boxed in, unable to breathe, trapped in an inescapable thought bubble of my own f\*ed up, addictive desires. I conditioned myself to need constant stimulation. I couldn’t read, talk, study, or play the piano – all things that I love – because it all seemed too slow, too one-note...I was always tired, yet always racing in a mad frenzy. I couldn’t focus. I was anxious. I was unable to engage in solitude. My thoughts were a jumble. “*





# The Impact of Media on Depression – continued:

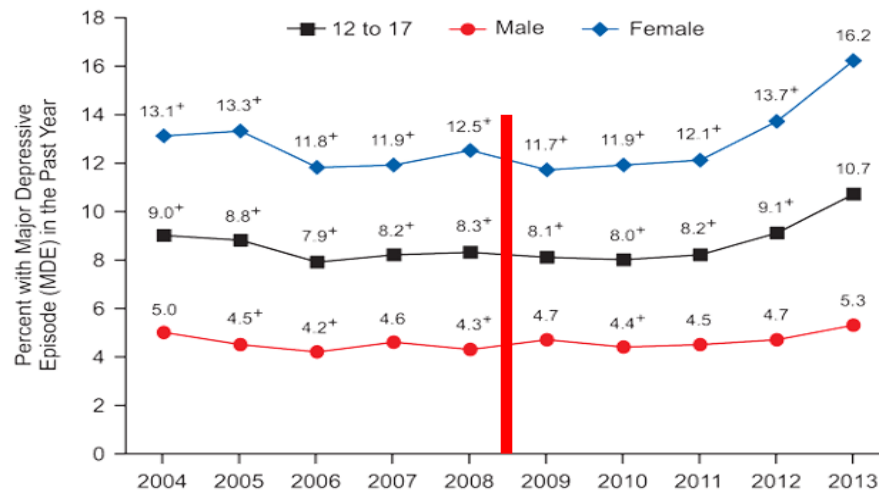
**U.S. Suicide Rates % Change: Comparison of Most Digitally Connected Generations vs. Less Connected 2000–2016.**



# The Impact of Media on Depression – continued:

Shared with permission – Peter Ryan, CAPT, USN (R)

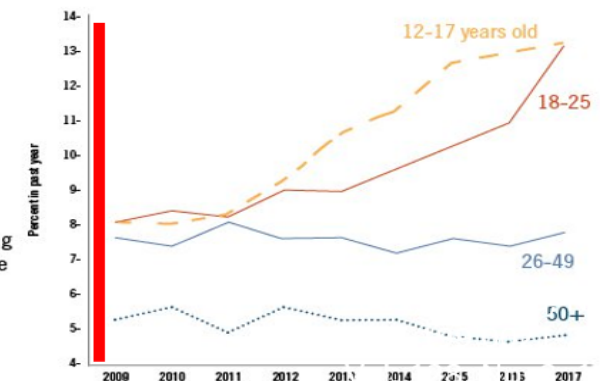
## Teen and Young Adult Depression rising since 2008



Substance Abuse and Mental Health Services Administration (SAMHSA),

### 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.



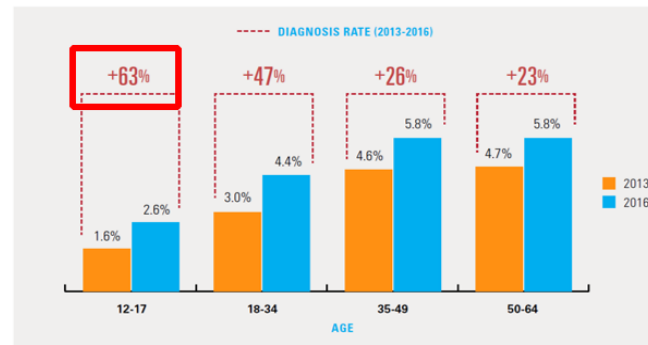
SOURCE: Journal of Abnormal Psychology  
2019, Vol. 128, No. 3, 185–199  
<http://dx.doi.org/10.1037/abn0000410>

# The Impact of Media on Depression – continued:

Shared with permission – Peter Ryan, CAPT, USN (R)

## 2018 Blue Cross and Blue Shield Study

EXHIBIT 3: DIAGNOSIS RATE AND RATE OF CHANGE FOR MAJOR DEPRESSION BY AGE  
(2013 COMPARED TO 2016)



Highest depression rate of growth in the youngest and most connected.

8

"Diagnoses of major depression have risen dramatically by 33 percent since 2013." Additionally, this shows that the young are impacted the most. The report found that diagnoses of major depression are rising fastest among those under age 35. As a result, diagnoses have gone up 47 percent since 2013 among millennials (ages 18–34). Plus, the rate for adolescents (ages 12–17) has risen 63 percent since 2013—47 percent for boys and 65 percent for girls. Therefore, teen depression rates are increasing.



## The Impact of Media on Depression – continued:

Kardaras (2016) cites the following alarming statistics:

- A 2012 Missouri State University study of 216 students revealed that **30 percent** of Internet users showed signs of **depression** and that the depressed kids were more intense web users.
- A 2014 study looked at 2,293 seventh-graders and found that Internet addiction led to **increased depression, hostility, and anxiety**.
- A 2014 study conducted in Pakistan with 300 graduate students found a positive correlation between Internet addiction and **depression and anxiety**.
- A 2006 Korean study involving 1,573 high school students found a correlation between **Internet addiction, depression, and thoughts of suicide**.
- Recently, the term **Facebook Depression** has emerged – namely, the more “friends” one has on Facebook, the higher the likelihood of depressive symptoms (Kardaras, 2016).



# The Impact of Media on Depression – continued

► Case Western Reserve University School of Medicine study found that “**hypernetworkers**” were prone toward (Pederson, 2015):

- Higher rates of depression
- Increase substance abuse
- Poor sleep
- Greater reported stress
- Poor academic performance
- Higher rates of suicide
- 69 percent more likely to have sex
- 60 percent more likely to report four or more sexual partners
- 84 percent more likely to have used illegal drugs
- 94 percent more likely to have been in a physical fight

# The Impact of Media on Psychosis:

- ▶ **Game Transfer Phenomenon:** Gamers transfer elements of the game content, or the interface, into their real lives, usually harmlessly (Griffiths, 2011).
- ▶ In 2007 a Chinese boy poured gasoline on another gamer, lit him on fire, and later stated that he had “lost himself in World of Warcraft” believing that he had become a “**fire mage.**” (Kardaras, 2015)
- ▶ In December 27, 2004, after playing World of Warcraft for 36 hours straight, a 13 y/o Chinese boy **jumped to his death** after leaving a note stating that he wanted to join his heroes (Kardaras, 2015).



# The Impact of Media on Psychosis - continued:

- ▶ Griffiths (2011) notes that video game playing can induce **pseudo-hallucinatory-like experiences**.
- ▶ Two recent single case studies reported rapid onset psychosis after immediate cessation of gaming. Successfully treated with antipsychotics.
- ▶ Dunckley (2015) suggests that **dopamine dysregulation** might be, in part, the underlying mechanism for screen-related psychosis. Medications that increase dopamine such as stimulants are very capable of producing psychosis and, on the other hand, many of the medications used to treat psychosis block dopamine



# The Impact of Media on Aggression:

- A meta-analysis of **381 studies on over 130,000 participants** conducted by Dr. Greenfield (2015) indicated that violent video games significantly **increased aggressive cognition, aggressive behavior, and physical arousal**.
- Dr. Craig Anderson from Iowa State University summarized **130 research studies with more than 130,000 participants** and, likewise, concluded that exposure to violent video games makes for **more aggressive** and **less caring** kids – regardless of age, sex, or culture (Kardaras, 2016).
- Greenfield (2015) noted that gaming is associated with less activity in a region of the brain which is involved in **emotionally charged memory**; namely, the **amygdala**.
- Brain imaging research at the Indiana School of Medicine (2011) found a direct relationship between playing violent video games and quantifiable brain changes involving **“less activation in certain frontal brain regions.”**





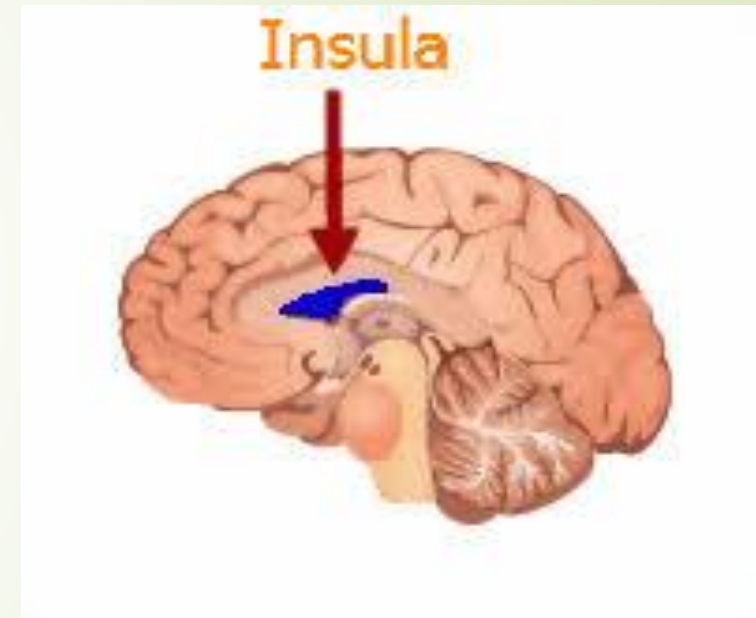
## The Impact of Media on Aggression – continued:

- ▶ We all remember the tragic **Sandy Hook Elementary School** mass shooting involving the infamous 20-year-old **Adam Lanza** on December 14, 2012 (Kardaras, 2016):
  - ▶ Shot **20 innocent children** between the ages of six and seven and six adult staff members
  - ▶ 83,000 online kills and 22,000 head shots
  - ▶ Was obsessed with “World of Warcraft, Combat Arms, Call of Duty, and Modern Warfare 2
  - ▶ “**School Shooter**” on his hard drive



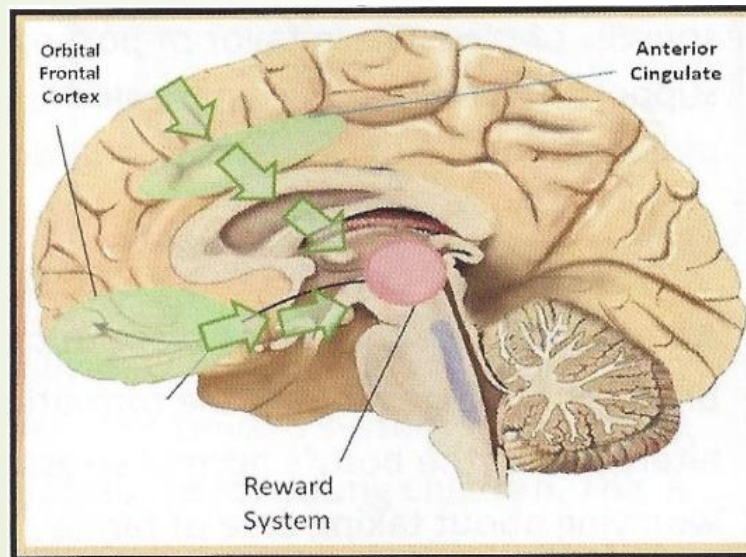
# Impact of Media on Social/Emotional Development:

- ▶ Brain imaging studies indeed indicate that gaming addiction damages the **insula**, an area of the brain that has been specifically involved in **empathy** (Weng, et al., 2012; Suzuki, 2012).
- ▶ Dunckley (2015) notes that the more time a child spends behind a screen, the more **socially anxious** or inept he or she becomes which creates a self-perpetuating spiral in socially anxious children, in particular.

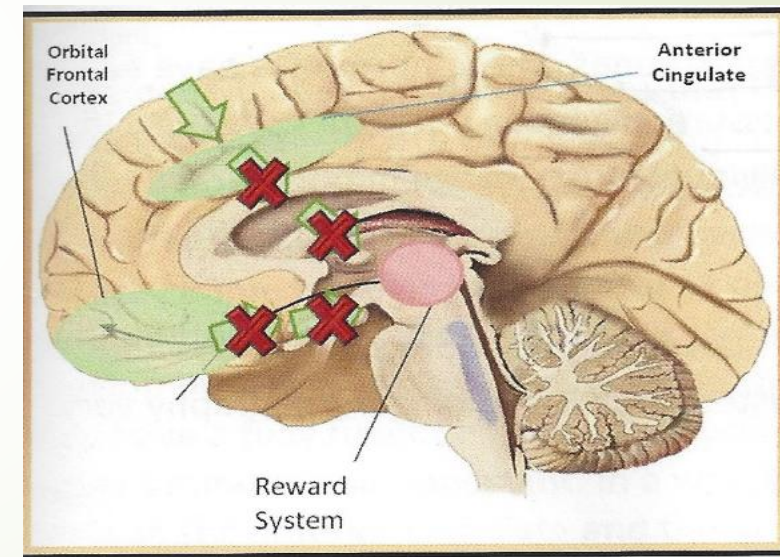


# Impact of Media on Social/Emotional Development:

Two areas of the brain, the **anterior cingulate** and the **orbital frontal cortex**, serve as a protective mechanism to override the reward system's desire for ever increasing dopamine increase. Sadly, hypofrontality involves the rewiring of our brains so that when an impulse to engage in a dopamine-related behavior activated, the brain ends up shutting down its ability to override the reward system. This is the breeding ground for horrible choices and impacts on social development



(Adapted from Study Blue, 2007)



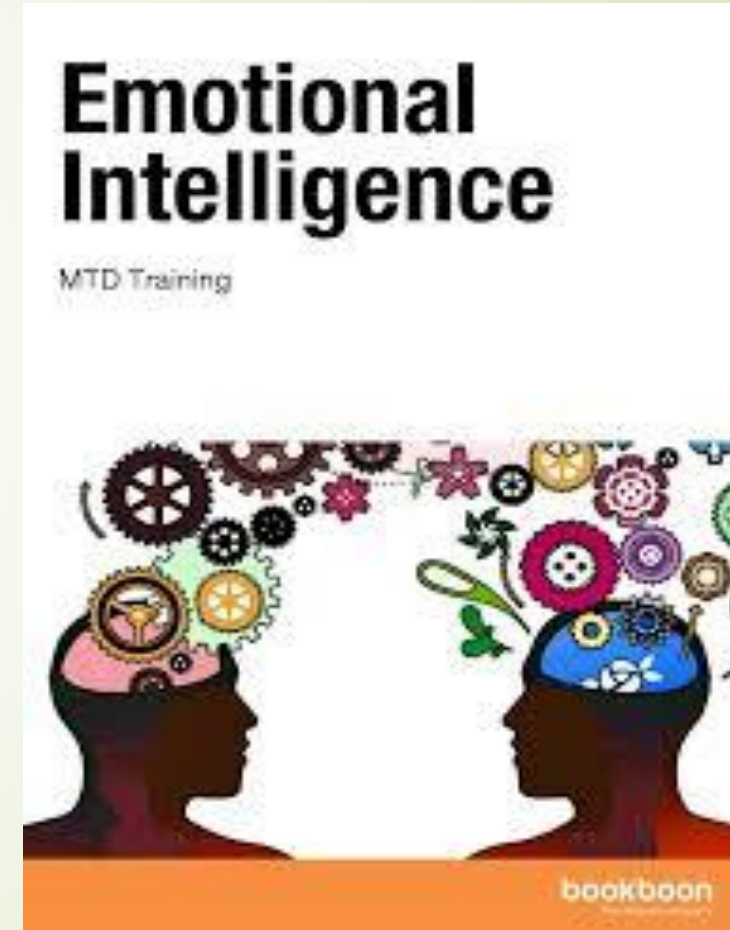
(Adapted from Study Blue, 2007)

# Impact of Media on Social/Emotional Development – continued:

Excessive media impairs Emotional Intelligence (EQ) (Kersting, 2016).

## Goleman's (2016) “Mixed Model” of Emotional Intelligence:

- **Self-Awareness:** The ability to know your own feelings. This means that you are aware of your emotional triggers and have an ability to deal with them.
- **Self-Management:** This involves the ability to keep your emotions in check when they start to ramp up and become problematic or disruptive.
- **Motivation:** Most people are motivated by external/outside events such as money. Emotionally intelligent people are more internally/intrinsically motivated (i.e., internal peace or a sense of pride for doing the right thing).
- **Empathy:** Empathy involves the ability to appreciate and support the feelings of someone else by responding appropriately to their situation and feelings. This will often lead the person to suspend the needs/feelings of oneself in support of the needs/feelings of another.
- **Social Skills:** This involves, among other things, the ability to deal with others in that you are able to find a common ground with other people. It involves the ability to negotiate, problem-solve, and compromise.





## Impact of Media on Social/Emotional Development – continued:

Gray (2015) noted the following trends in college students which are, in part, thought to be a function of excessive media (Kersting, 2016):

- Students are **needier and less resilient**.
- Students are increasingly **afraid to fail**, and they do not take risks. Failure is perceived as catastrophic and totally unacceptable.
- Faculty, especially younger ones, feel **extreme pressure** to give into student wishes in fear of getting low ratings from students.
- Students email faculty about increasingly trivial matters and become demanding about **wanting prompt replies**.

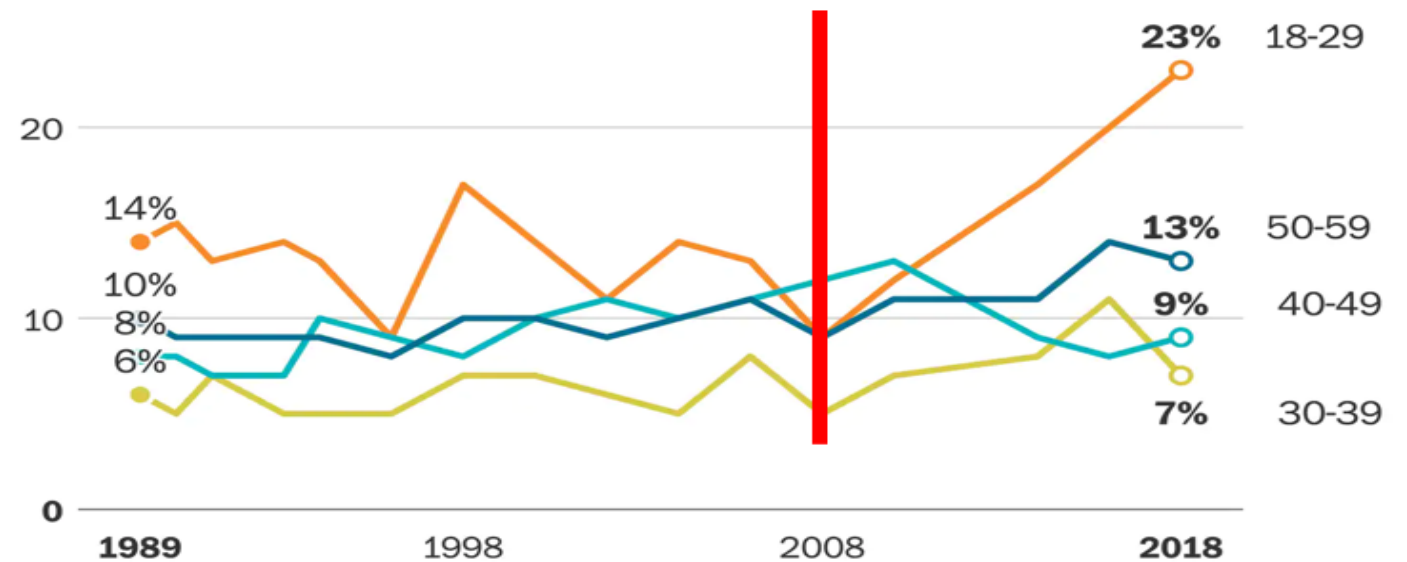


## Impact of Media on Social/Emotional Development – continued:

# Since 2008, Decreasing Numbers of Young Adults Having Sexual Relations

### Lack of sex is driven mainly by the young

Percent reporting no sex in the past year, by age



Note: Rates of no sex among adults over age 60 have consistently hovered around 50 percent and are not shown here.

Source: General Social Survey

THE WASHINGTON POST

Source:

<https://www.washingtonpost.com/business/>

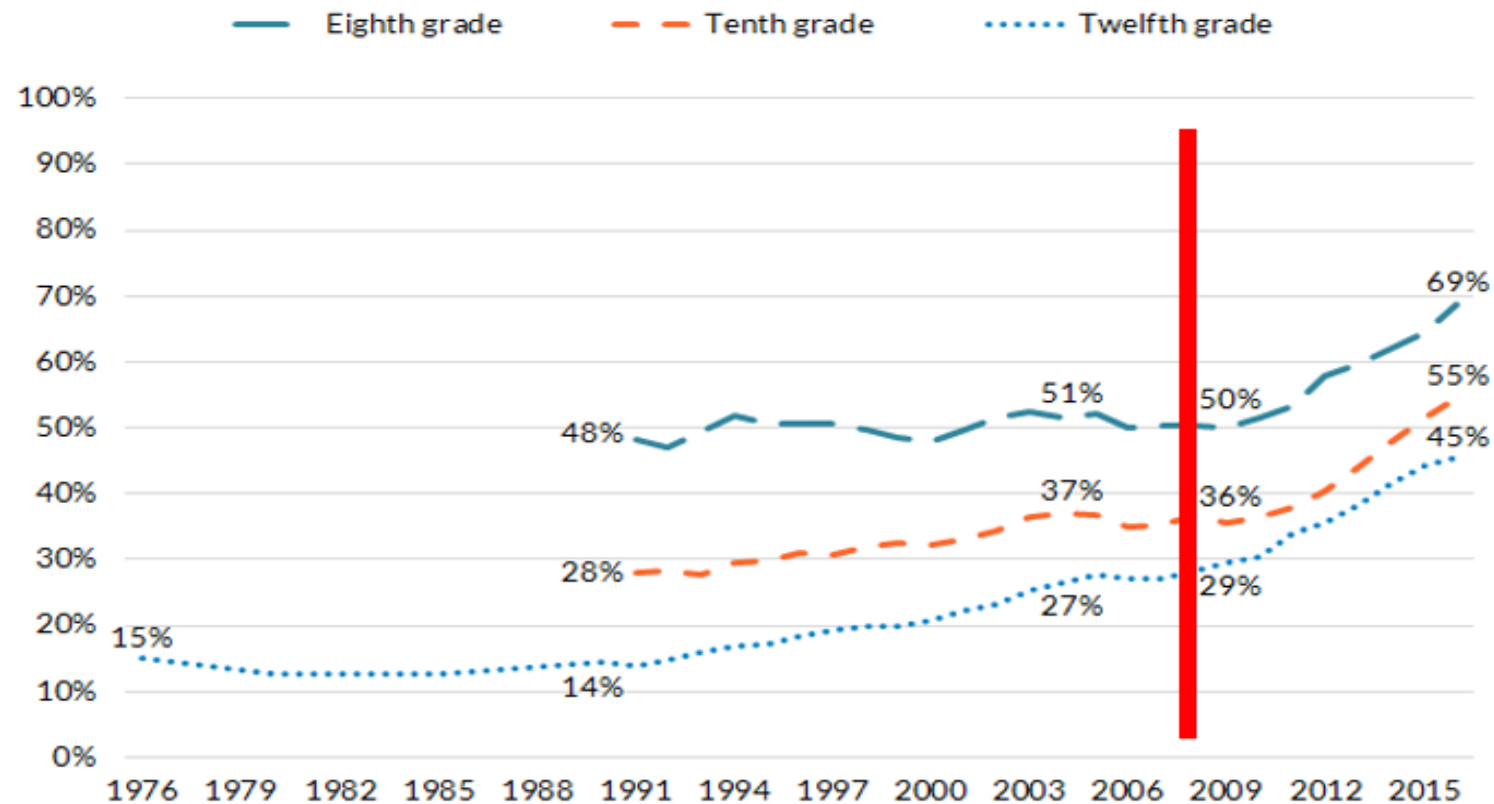
“The share of Americans not having sex has reached a record high”

Mar 29, 2019

# Impact of Media on Social/Emotional Development – continued:

## Teenage Dating

Percentage of Eighth, Tenth, and Twelfth Graders Who Never Date: Selected Years, 1976-2016



Around 2008,  
the % of  
people who  
never dated  
goes up  
precipitously.

Source: Child Trends' original analysis of data from Monitoring the Future: A Continuing Study of American Youth, 1976-2016.

[childtrends.org](http://childtrends.org)

## Impact of Media on Social/Emotional Development - continued:

According to Dr. Twenge (2017) in her new book, *iGen: Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy – and Completely Unprepared for Adulthood*, conducted a meta-analysis of 4 studies involving 11 million young Americans and found that they:

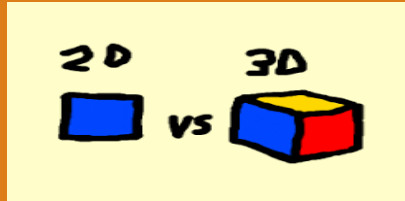
- Are more insecure
- Evidence a significant decline in person-to-person interaction
- Are obsessed with safety
- Are insecure about income and their ability to make it in the world
- Tend to extend their childhood
- Are ill-prepared for adulthood
- Are less happy
- Are more tolerant and less rebellious





# Impact of Media on Social/Emotional Development - continued:

01



Kersting (2016) points out that EQ is not something that we are born with and can only be learned by observing voices, body posture/language, and/or facial expressions. You must have direct **face-to-face 3D** interaction or connection with other people as opposed to **face-to-screen 2D** interaction.

02



Nass (2013) writes that this learning starts at **infancy** and that it is not an easy thing to acquire. It was much easier for previous generations to build a strong EQ because they had so much **more face-to-face interaction.**

# Before and After



Before



Now

# Before and After



Before



Now

# Before and After



Before



Now



# Before and After



Before



Now

# Polyvagal Theory – A New Model



**Jeffrey E. Hansen, Ph.D.**

Center for Connected Living, LLC

The greatest thing then, in all education, is to make our  
nervous system our ally as opposed to our enemy

- William James

"The views expressed are those of the author and do not reflect the official policy of the Department of the Army, the Department of Defense, or the U.S. Government."

# Definition Please

- **Emotional self-regulation or emotion regulation** as defined by Wikipedia “is the ability to respond to the ongoing demands of experience with the range of emotions in a manner that is socially tolerable and sufficiently flexible to permit spontaneous reactions as well as the ability to delay spontaneous reactions as needed.
- Emotion regulation is a complex process that involves initiating, inhibiting, or modulating one's state or behavior in a given situation – for example, the subjective experience (feelings), cognitive responses (thoughts), emotion-related physiological responses (heart rate or hormonal activity), and emotion-related behavior (bodily actions or expressions).
- Functionally, emotion regulation can also refer to processes such as the tendency to focus one's attention on a task and the ability to suppress inappropriate behavior under instruction. Emotion regulation is a highly significant function in human life” (Wikipedia, 2020a).
- As this definition suggests, emotional regulation is a really big deal and involves our thoughts, our bodies, and our feelings



# The Marriage of Triune Brain Theory and Polyvagal Theory



*The greatest thing then, in all education, is to make our nervous system our ally as opposed to our enemy*

*– William James*



# The Marriage of Triune Brain Theory and Polyvagal Theory



- In the last 10 years new and exciting neuroscience has emerged that helps us map out our physical, emotional, and cognitive responses to the world around us and provides us a way through the ensuing tempest within ourselves.
- Dr. Barta (2018) proposes a model that demonstrates how the brain and the nervous system work together to fuel emotional dysregulation. In his model which he calls TINSA (Trauma Induced Sexual Addiction), he pairs some of the greatest minds in neurology and psychology to include:
  - Dr. Stephen Porges' **Polyvagal Theory**
  - Dr. Paul Maclean's **Triune Brain Theory**.

# Triune Brain Theory

- MacLean (2009) proposed that there are three distinct formations in our brain which are used in different situations for everyday survival purposes.
- These specific structures developed sequentially on top of each other at different times during the evolution of the brain for the purposes of giving the organism the ability to survive during that period of time.
- Even though the brain became more advanced and adaptive, the older more primitive structures of the brain still play an especially important role in thought, process, and behavior.

(For my Christian friends who might worry about this model contradicting sensitivities about creationism – not to worry. As explained by Dr. Andy Doan, M.D. Ph.D., ophthalmology surgeon and neuroscience researcher, and paraphrased by me, “God is very efficient, and He included in our more developed brain substructures that He already designed for lower life forms/animals. No need to re-do what was already perfect and efficient”).

## Triune Brain Theory

Lizard Brain	Mammal Brain	Human Brain
Brain stem & cerebellum	Limbic System	Neocortex
Fight or flight	Emotions, memories, habits	Language, abstract thought, imagination, consciousness
Autopilot	Decisions	Reasons, rationalizes



The Triune Brain in Evolution, Paul MacLean, 1960

# Triune Brain Theory

## The Reptilian Brain (or Reptilian Complex):

- As the name suggests, this is the most primitive brain and it developed about 500 million years ago in fish and later reptiles.
- Its roles include sensation, instinctual reaction, breathing, temperature regulation. TINSAs holds that the reptilian complex promotes certain survival functions as well, most specifically, immobilization or freeze.
- We often see lizards, for example, freeze in the face of danger such as a lunch-starved predator in an instinctive reaction that can be life-saving (sadly for the lizard, it doesn't always work, and he sometimes ends up being a snack anyway).

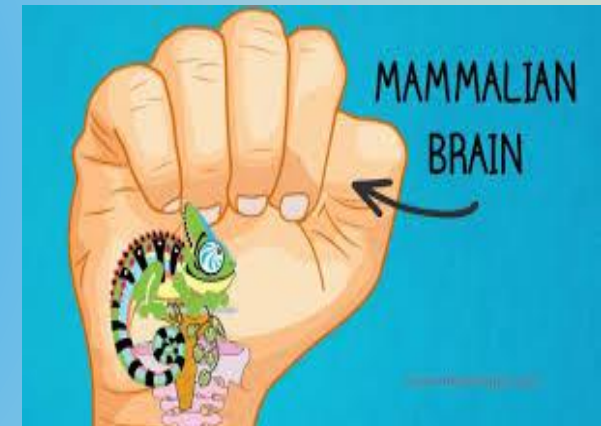




# Triune Brain Theory

## The Mammalian Brain (or Limbic System):

- Later, about 150 million years ago, the limbic system first appeared in small animals.
- This system developed as critters were able to move more freely about as they were now equipped with extremities.
- As such, it often became necessary to either fight off or flee from would-be predators. In addition, the capacity to have memory and emotions developed.
- This enabled the animal to control the body's response to danger and to remember that danger as well as the ability to be vigilant and scan the surrounding environment for potential dangers. Like critters, we often revert to this neurological system when we act instinctively.







# Triune Brain Theory

## The Frontal Lobe (or Neocortex):

- According to Maclean (1990), the frontal lobes came on board only about 2 or 3 million years ago.
- As in the reptilian brain and the limbic system, the purpose of this brain formation is to react to and protect us from danger.
- Unlike our more primitive neighbors, this system reacts **consciously**. Very importantly, there was a need to develop a system that made possible more “civilized” responses to threats and at the same time one that offered the possibility to *connect* to others for safety.
- Therefore, the frontal lobe allows us to access a new way of surviving based on **socialization**. This makes it possible for us to use analysis, logic and decision-making, and this is what specifically separates us from other lower-ordered animals that rely on instincts alone for survival

# Triune Brain Theory – To Bring it Home

- To bring it home, on topside we have the cortical brain consisting of the frontal lobe which is the most recently developed portion of the brain, i.e., **the conscious, thinking brain**.
- At the bottom, we have our subcortical, unconscious brain, which is made up of the **reptilian and limbic complexes** and is directed largely by raw instinct and emotions which often results in immediate knee-jerk reactions that happen in a split second.
- Barta (2018) informs us that, in the best of worlds, we try to lead with our **frontal lobe** and remain socially engaged if something threatening confronts us and in order think our way out of it, smile, and/or stay calm.
- But in times of intense stress or in situations that remind us of past trauma, this survival mechanism is quickly overrun by earlier, more primitive survival strategies of our mammalian/limbic brain and our reptilian brain structures.
- As such, when our **prefrontal cortex** fails us, the **limbic system** takes command and we are then rapidly sent into our fight-or-flight response and if this does not work and we cannot run away or fight our way out of it, the most primitive line of defense is deployed and we simply freeze, become immobilized, or completely collapse. This hijacking process can occur whether the threat is real or merely perceived (Barta, 2018).



# Polyvagal Theory

## Autonomic Nervous System

Sympathetic

Activated, anxiety, fear, terror, anger

Parasympathetic

Ventral Vagal

Connected, calm, safety

Dorsal Vagal

Shut-down, depressed



The autonomic nervous system is our **personal surveillance system**.



In an effort to keep us out of danger, it is always on guard; asking the question, “Is this safe?” Its dedicated goal is to protect us by sensing safety and risk.



It achieves this by listening moment by moment to what is happening in and around our bodies and in the connections we have to others (Dana, 2018).



This listening happens far below awareness and far away from our conscious control.



Dr. Porges, understanding that this is not awareness that comes with perception which is conscious, coined the term **neuroception** to describe the way our autonomic nervous system scans for cues of safety, danger, and life threat, without involving the thinking parts of our brain or the unconscious parts of the brain (Porges, 2017).

# Polyvagal Theory

## The Autonomic Nervous System



Dr. Steve Porges



# Polyvagal Theory

## The Autonomic Nervous System

Briefly stated, our response to threat will move us toward one of **three defensive responses**. Two of which keep us in perpetual defense and one of which moves us toward health and restoration.

- Sympathetic Division: Prepares the body for stressful or emergency situations – fight or flight. The sympathetic nervous system originates in spinal nerves (nerves that arise from the spinal cord) and is our **system of mobilization**. The sympathetic nerves are found in the middle of our backs in the thoracic and lumbar regions of the spinal cord. There are two mobilization systems in our sympathetic nervous system.
  - Sympathetic Adrenal Medullary (SAM): The SAM system is activated very quickly, within **100 milliseconds** and brings up a burst **adrenaline** for a fast response to a stressor. SAM activation triggers a short-term and rapid response to a stressor which is followed by a return to regulation (Dana, 2018).
  - Hypothalamic-Pituitary-Adrenal (HPA) Axis: The HPA axis takes over when the quick, adrenaline surge of energy of the SAM does not resolve the distress. The HPA releases **cortisol** (AKA stress hormone). This release takes longer and is much slower in taking effect, requiring minutes to take effect rather than seconds (Dana, 2018).

- The sympathetic division **increases heart rate** and the force of heart contractions and widens (dilates) the airways to make breathing easier.
- It causes the body to **release stored energy**.
- Muscular strength is increased. This division also causes palms to **sweat**, **pupils to dilate**, and hair to stand on end.
- It **slows body processes** that are less important in emergencies, such as digestion and urination (Merck Manual).
- When we are in this physical state, we can feel emotions such as **fear and/or rage** and, if extremely activated, **absolute terror** (Rothschild, 2017).

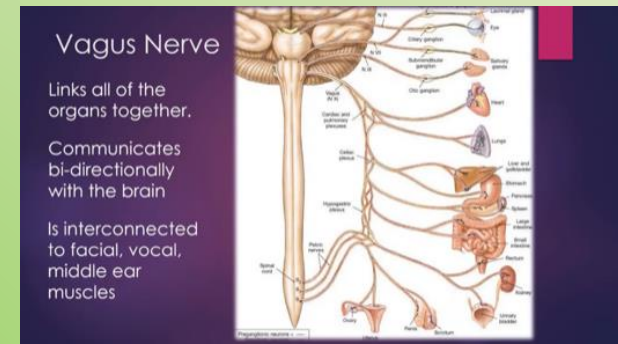
# Polyvagal Theory

## Sympathetic Division



# Polyvagal Theory

## Parasympathetic Division



- The parasympathetic division **conserves and restores calm/homeostasis**. It slows the heart rate and decreases blood pressure. It stimulates the digestive tract to process food and eliminate wastes. Energy from food is processed and used to **restore** and build tissues (Merck Manual).
- Dr. Porges discovered that the parasympathetic division of the Autonomic Nervous System consists of two branches which lead to two different responses.
- The main nerve in the parasympathetic nervous system is the **10th cranial nerve**, aka **vagus nerve**, which is the largest of the 12 cranial nerves and has huge implications for our well-being and health.
- The name vagus comes from the Latin word **vagary** which means **wanderer**, and this nerve is definitely a vagabond.
- The vagus travels downward from the brainstem to the heart and stomach and then back upward to the face and its connection with other cranial nerves.
- This amazing wandering nerve is a mixed nerve which **communicates bidirectionally** between the body and the brain. **80% percent of its fibers are sensory (afferent)** sending information from the body to the brain, and **20% are motor (efferent)**, sending action information from the brain to the body (Dana, 2018).



# Polyvagal Theory - Parasympathetic Division

The vagus nerve has two very distinct branches: **Dorsal vagal nerve** and the **ventral vagal nerve**.

Dorsal Vagal Nerve: Barta (2018) notes that the most primitive form of defense occurs when the dorsal vagal nerve is activated.

- It is not sophisticated in that it is unmyelinated and slow. When activated, the dorsal vagal nerve promotes shutdown, freeze, and collapse
- An example of this shutdown is when a gazelle, for example, is being stalked by a lion and when trapped with no possible way to flee, drops down and appears to be dead.
- This is not a conscious process but is, rather, a very primitive and unconscious one. When we are in this physical state, we can feel emotions such as sadness, depression, grief, shame and/or disgust (Rothschild, 2017).

Ventral Vagal Nerve: Barta (2018) writes that the second response of our parasympathetic nervous system (the first being freeze and collapse as noted above) is responsible for our ability to engage socially and to handle social relationships.

- According to Barta, the social engagement system is controlled by our ventral vagus nerve which is a very smart myelinated nerve with a rapid response time. As such, it allows us to “know” if we are safe enough so we can calm our defenses through a process of “**neuroception**” which, as noted earlier, is translated as the brain’s ability to sense safety.
- This serves not only bonding needs but allows us to shift out of sympathetic arousal and move into parasympathetic calm or to downshift from activation to calm. When we are in this emotional state, we can feel emotions such as calm, pleasure, love, sexual arousal, and “good” grief (Rothschild, 2017).





# Marriage of MacLean's Triune Brain Theory with Porges' Polyvagal Theory

Through the marriage of MacLean's Triune Brain Theory with Porges' Polyvagal Theory, we can explain how each part of the triune brain is correlated with the three responses of the autonomic nervous system (Barta, 2018).

## Sympathetic

Limbic System (Mammalian Brain)

Developed 150 million years ago

Fight or Flight

Unconscious

## Social Engagement (Parasympathetic – Ventral Vagal)

Frontal Lobe (Neocortex)

Developed 2 to 3 million years ago

Ventral Vagal

Present/Safe/Aware

Conscious

## Parasympathetic (Dorsal Vagal)

Reptilian Brain (Reptilian Complex)

Developed 500 million years ago

Freeze

Unconscious

# Polyvagal Theory – The Stream



When we enter into an autonomic state, the information about that state travels up the automatic pathways to the brain where a **story is drafted** to make sense of the embodied experience/sensations.

In other words, the physiological state produced by the autonomic nervous system creates a **psychological story**.

Dana (2020) describes this as a metaphor of a **stream** where we can imagine the flow of experience. At the river's source is neuroception and at the river's mouth is the story. In between **lie perception, autonomic state, feelings, and behavior**. We are accustomed to entering in the river downstream with feeling and behavior, or story being at the fore.

However, **neuroception** takes place at the furthest point upstream. We need to make our way back to the starting point, leaving behind the story, behavior, and feelings in order to identify the state and **bring perception or awareness** to neuroception (Dana, 2020).

This has implications for treatment which we will discuss “downstream” in this paper.

# Polyvagal Theory – Autopilot or the Choice of Connection?

- So, our neurosystem, left on autopilot will, when we are faced with stress and threat, move us to either:
  - (a) **Sympathetic fight or flight** which equates to extreme anxiety, anger, rage, and or terror or to
  - (b) **Dorsal vagal shutdown** which leads to slowing down, withdrawal, and possibly even depression. If these modes of coping become excessive, we are at risk for potentially using maladaptive strategies such as addictions to quell the pain of negative physical symptoms, associated negative emotions, and/or complete withdrawal and possibly self-destructive behavior.
- The best response is to activate our **social engagement system of the ventral vagal pathway** of the parasympathetic branch. In this state, our heart rate is regulated, our breath is full, we take in the faces of friends, and we can tune in to conversations and tune out distracting noises.





The chart below adapted by Dr. Rothschild nicely demonstrates the shifting in body sensations, physiological symptoms, and emotions as we move between autonomic states (Rothschild, 2017).

## ***AUTONOMIC NERVOUS SYSTEM: PRECISION REGULATION***

**\*\* WHAT TO LOOK FOR \*\***

		<b>LETHARGIC</b> Parasympathetic I (PNS I)	<b>CALM</b> Parasympathetic II (PNS II) <i>Ventral Vagus</i>	<b>ACTIVE/ALERT</b> Sympathetic I (SNS I)	<b>FLIGHT/FIGHT</b> Sympathetic II (SNS II)	<b>HYPER FREEZE</b> Sympathetic III (SNS III)	<b>HYPO FREEZE</b> Parasympathetic III (PNS III) <i>Dorsal Vagus Collapse</i>
		 "Normal" Life			 Threat to Life		
<b>PRIMARY STATE</b>		<b>Apathy, Depression</b>	<b>Safe, Clear Thinking, Social Engagement</b>	<b>Alert, Ready to Act</b>	<b>React to Danger</b>	<b>Await Opportunity to Escape</b>	<b>Prepare for Death</b>
<b>AROUSAL</b>		<b>Too Low</b>	<b>Low</b>	<b>Moderate</b>	<b>High</b>	<b>Extreme Overload</b>	<b>Excessive Overwhelm Induces Hypoarousal</b>
<b>MUSCLES</b>		Slack	Relaxed/toned	Toned	Tense	Rigid (deer in the headlights)	Flaccid
<b>RESPIRATION</b>		Shallow	Easy, often into belly	Increasing rate	Fast, often in upper chest	Hyperventilation	Hypo-ventilation
<b>HEART RATE</b>		Slow	Resting	Quicker or more forceful	Quick and/or forceful	Tachycardia (very fast)	Bradycardia (very slow)
<b>BLOOD PRESSURE</b>		Likely low	Normal	On the rise	Elevated	Significantly high	Significantly low
<b>PUPILS, EYES, EYE LIDS</b>		Pupils smaller, lids may be heavy	Pupils smaller, eyes moist, eye lids relaxed	Pupils widening, eyes less moist, eye lids toned	Pupils very dilated, eyes dry, eye lids tensed/raised	Pupils very small or dilated, eyes very dry, lids very tense	Lids drooping, eyes closed or open and fixed
<b>SKIN TONE</b>		Variable	Rosy hue, despite skin color (blood flows to skin)	Less rosy hue, despite skin color (blood flows to skin)	Pale hue, despite skin color (blood flow to muscles)	May be pale and/or flushed	Noticeably pale
<b>HUMIDITY</b>	<b>Skin</b>	Dry	Dry	Increased sweat	Increased sweat, may be cold	Cold sweat	Cold sweat
	<b>Mouth</b>	Variable	Moist	Less moist	Dry	Dry	Dry
<b>HANDS &amp; FEET (TEMPERATURE)</b>		May be warm or cool	Warm	Cool	Cold	Extremes of cold & hot	Cold
<b>DIGESTION</b>		Variable	Increase	Decrease	Stops	Evacuate bowel & bladder	Stopped
<b>EMOTIONS (LIKELY)</b>		Grief, sadness, shame, disgust	Calm, pleasure, love, sexual arousal, "good" grief	Anger, shame, disgust, anxiety, excitement, sexual climax	Rage, fear	Terror, may be dissociation	May be too dissociated to feel anything
<b>CONTACT WITH SELF &amp; OTHERS</b>		Withdrawn	Probable	Possible	Limited	Not likely	Impossible
<b>FRONTAL CORTEX</b>		May or may not be accessible	Should be accessible	Should be accessible	May or may not be accessible	Likely inaccessible	Inaccessible
<b>INTEGRATION</b>		Not likely	Likely	Likely	Not likely	Impossible	Impossible
<b>RECOMMENDED INTERVENTION</b>		<b>Activate, Gently Increase Energy</b>	<b>Continue Therapy Direction</b>	<b>Continue Therapy Direction</b>	<b>Put on Brakes</b>	<b>Slam on Brakes</b>	<b>Medical Emergency CALL PARAMEDICS</b>

The Autonomic Nervous System Precision Regulation Chart is Available for purchase on Amazon for \$8.99 (a very high recommend):

Babette Rothschild (2017) [https://www.amazon.com/Autonomic-Nervous-System-Table-Laminated/dp/039371280X/ref=sr\\_1\\_15?dchild=1&keywords=deb+dana&qid=1590326813&s=books&sr=1-15](https://www.amazon.com/Autonomic-Nervous-System-Table-Laminated/dp/039371280X/ref=sr_1_15?dchild=1&keywords=deb+dana&qid=1590326813&s=books&sr=1-15)



# Polyvagal Theory and Treatment

Now that we have a new understanding of how our autonomic nervous system works, we can use this knowledge to restore to emotional, psychological, and physical health. Never before has a breakthrough in neuroscience offered such a paradigmatic shift of hope.



Neuroception

Perception

State

Feelings

Behavior

Story



# Polyvagal Theory and Treatment

- So, the first step in healing is to move our **neuroception** - what our autonomic nervous system is automatically sensing regarding safety and danger without our awareness to perception to awareness or perception.
- We can then appreciate what our physiological state is causing us to feel emotionally and subsequently **change the behaviors** that we then engage in.
- The ensuing story or narrative we give to this process in an effort to make sense of what we are sensing and feeling, if **positive and healthy**, helps us correct our autonomic state.
- On the other hand, if our **narrative is false**, as it often is (e.g., we often shame and blame ourselves or we catastrophize the situation), then our autonomic state becomes even more activated or shut down and our subsequent emotions become more anxious or depressed, respectively, and we enter into a negative feedback loop, a process that leads to emotional problems/illness and/or physical problems.

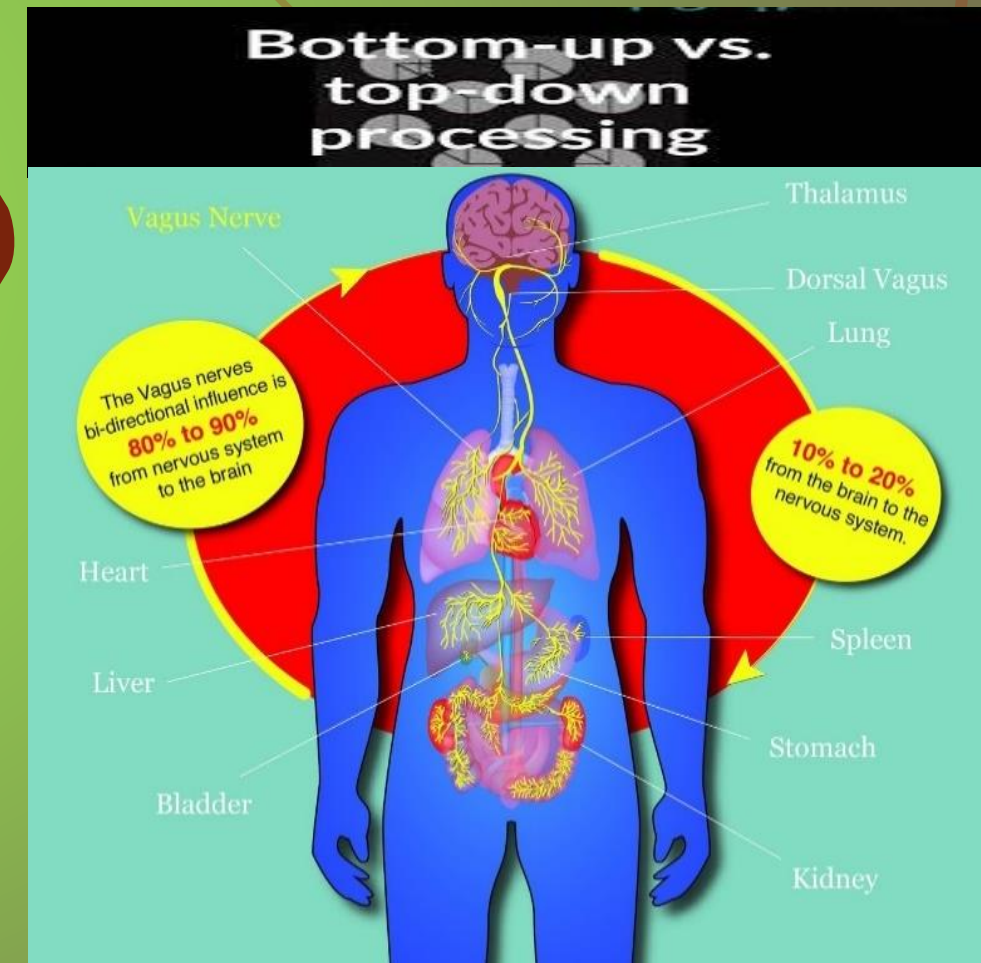


# Polyvagal Theory and Treatment

There are two basic approaches to healing: Bottom up and Top Down:

**Bottom up** entails working with the body more directly. It is important to appreciate that, as previously noted, 80 percent of the fibers in the vagus nerve are sensory in that they go from the organs to the brain and 20 percent are motor in that they travel from the brain to various body organs. (Porges, 2017). This suggests that what our bodies tell us is indeed very important and we must make every effort to listen and heal on that level.

**Top down** strategies which involve our thinking and hopefully more rational brain require a certain level of cognitive development and maturity so very young children may not be able to benefit from this approach (e.g., Cognitive Behavioral Therapy aka CBT).





# Polyvagal Theory and Treatment

THE FOUR 'R's.

As previously noted by Deb Dana, it is in a ventral vagal state and a neuroception of safety that brings the possibility for connection, curiosity, and change. She nicely presents a polyvagal approach which she calls the four R's (the first three are bottom up and the last is bottom down (Dana, 2018):

## The Four R's

- Recognize the autonomic state
- Respect the adaptive survival response
- Regulate or co-regulate in a ventral vagal state
- Re-story





# Polyvagal Theory and Treatment

## Recognize the Autonomic State

I recommend that we make the **Autonomic Nervous System Precision Regulation Chart** our companion as we use it to recognize where we, our children, and/or others are on that continuum. In so doing, we become able to make what is **implicit** (under the table and outside of our awareness) **explicit** (on the table and in our awareness).

We can use the **color codes** to describe for ourselves and for others where we and others are with just one neutral and non-judgmental word.

This is particularly helpful for children as well as this helps to give them a physical and emotional language that connect the mind with the body.

# Polyvagal Theory and Treatment

## Recognize the Autonomic State

If we find ourselves in the **Orange Zone** to **Red Zone**, we are overly activated and are prone to experience:

- Rapid heartrate
- Hyperventilation
- Panic attacks
- Inability to focus or follow through
- Distress in relationships
- Emotions of fear, terror, rage, anger
- Possible health consequences to include heart disease, high cholesterol, high blood pressure, weight gain, memory impairment, headaches, chronic neck shoulder and back tension, stomach problems, and increased vulnerability to illness (lower immune response) (Dana, 2018).

# Polyvagal Theory and Treatment

## Recognize the Autonomic State

If we find ourselves in the **Yellow Zone**, we are under-activated or shutdown and are prone to experience:

- Slow heartrate
- Shallow breathing
- Withdrawal from others
- Emotions of sadness, depression, shame, disgust
- Possible health consequences to include chronic fatigue, fibromyalgia, stomach problems, low blood pressure, type 2 diabetes, and weight gain (Dana, 2018)

# Polyvagal Theory and Treatment

## Recognize the Autonomic State

If we find ourselves in the **Green Zone**, we experience safety and connection and we are prone to experience:

- Regulated heart rate (vagal brake lowers heart rate by 20 beats per minute)
- Breath is full
- Feeling regulated
- We take in the faces of others
- We can “tune in” to conversations and “tune out” distractions
- We can see the “big picture”
- We can connect with the world and the people in it
- Able to reach out to others
- Able to play and take time to enjoy life and others
- Able to be productive in work
- Able to organize and follow-through
- Able to heal emotionally and physically
- Emotions of happiness, joy, love, peace, calm
- Possible health consequences include a healthy heart, regulated blood pressure, a healthy immune system, **decreased vulnerability to illness, good digestion, quality sleep, and an overall sense of well-being** (Dana, 2018)



# Polyvagal Theory and Treatment

## Respect the Adaptive Survival Response



- One of the beautiful aspects of Polyvagal Theory is that it removes **shame** from the equation.
- Dr. Porges kindly states in reference to clients, "I was going to say that depending on the age of my client, but actually, regardless of age, the first thing to convey to the client that they did not do anything wrong... If we want individuals to feel safe, we don't accuse them of doing something wrong or bad. We explain to them how their body responded, how their responses are adaptive, how we need to appreciate this adaptive feature and how the client needs to understand that this adaptive feature is flexible and can change in different contexts."(Porges, 2017, p. 121 - 122).
- So, rather than shaming a woman for shutting down in dorsal vagal freeze when being molested or raped which will only fuel her **shame, guilt, and emotional pain**, we must compassionately inform her that her **autonomic nervous system was brilliant** and that, in reading the cues, immobilized her in a situation where fighting or fleeing could have possibly cost her her life.
- Many a judge have literally ruined survivors of abuse by blaming them for not running or fighting and invalidated their trauma and thus failed to honor their day in court.

# Polyvagal Theory and Treatment

## Regulate or Co-regulate in a Ventral Vagal State



Once we recognize that we are dysregulated and we have pinpointed which **defensive physiological state** we are in and where we are on the emotional regulation continuum (see emotional regulation chart above) i.e., activation or slowing/shutting down, we can take action by using bottom-up self-regulation strategies and co-regulation strategies

As Herman Melville once wrote, ***"We cannot live for ourselves, a thousand fibers connect us."*** Connection is a biological imperative according to Porges (2015).

Our autonomic nervous system longs for **connection** and it is through our biology that we are wired to connect. It is by means of co-regulation that we connect with others and create a shared sense of safety (Dana, 2020).

As specifically defined by Dr Porges, **co-regulation is the mutual regulation of physiological states between individuals.** In life, it occurs first between mother and infant but later extends to friends, partners, co-workers, and groups such as families to name a few (Porges, 2017).

# Polyvagal Theory and Treatment

## Regulate or Co-regulate in a Ventral Vagal State

We humans are **social creatures** and “our nature is to recognize, interact, and form relationships” with others (Cacioppo & Cacioppo, 2014, p. 1).

As we know, babies need to connect for survival and positive co-regulation in low birthweight babies, in particular, leads to heart rate, temperature, and breathing stabilization, more organized sleep, rapid improvement in state regulation, and reduced mortality, severe illness, and infection (Jefferies, 2012).

**Connection is a wired-in biological necessity** and isolation or even the perception of social isolation can lead to a compromised ability to regulate our autonomic state which diminishes our physical and emotional well-being (Porges & Furman, 2011).

We can all appreciate that when we feel alone, we suffer. In a Ted Talk presentation, **Cacioppo** (2013) reported a rather shocking meta-analysis study of over 100,000 participants which found increased risks of dying early due to the following:

1. [Air pollution](#): 5% increased risk of dying early
2. [Obesity](#): 20% risk of dying early
3. [Alcoholism](#): 30% risk of dying early
4. [Loneliness](#): 45% risk of dying early





# Polyvagal Theory and Treatment

## Regulate or Co-regulate in a Ventral Vagal State

So, when we recognize that we are suffering and dysregulated it is very helpful and sometimes lifesaving to **seek safe others**.

Conversely, when we are emotionally regulated ourselves, **we can offer our safe regulation to others**, be they adults or children. This is a particularly important and essential component to good parenting.

We can gift our safe regulation to ourselves and to others by choosing the following strategies below. Remember, through the process of neuroception, others read our cues of safety just as we read theirs.

Quid pro quo, we receive back what we give and vice versa. We would do well to practice these strategies, so they become automatic whenever we move out of the **green zone** and want to return.



# Polyvagal Theory and Treatment

Regulate or Co-regulate in a Ventral Vagal State



Kind eyes: As they say, they eyes are the window of the soul.



Modious voice: Speak with a more melodious voice, full of prosody and life.

# Polyvagal Theory and Treatment

## Regulate or Co-regulate in a Ventral Vagal State



Smiling mouth and eyes: Smile not only with your mouth but with your eyes. Whether or not we are aware, our neuroception scans for congruence between the smiling mouth and smiling eyes. Crow's feet wrinkles are testament to someone who lives a more joyful life. So maybe reconsider that Botox.



Avoid leaning in: Leaning in can be perceived as very threatening. Most of us don't like it when others enter into our personal space, particularly in western cultures, and the end result is typically defensive activation moving us toward fight or flight or less typically, occasional freeze responses.

# Polyvagal Theory and Treatment

## Regulate or Co-regulate in a Ventral Vagal State



Slow and low Breathing: Our lungs are the only internal body organ that we can directly control, and proper breathing has a huge impact on our health. Breathe slowly with exhalations longer than inhalations – breathing out slowly accentuates relaxation and actually can slow our heart rate by 20 beats per minute (vagal brake).



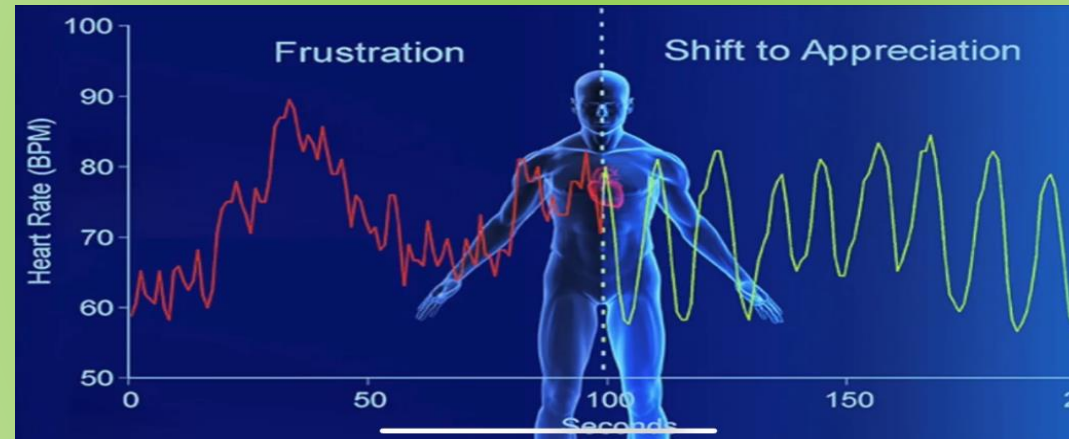
Heartfelt positive emotions: As we breathe, we should try to bring positive emotions such as gratitude, joy, and love, or any positive experience or memory into our heart. The importance of positive emotions in the heart is now supported by the latest neuroscience. The electromagnetic field of the heart can now be measured and extends outward to a distance of about three to five feet as compared to that of the brain which extends only 2 to 4 inches.



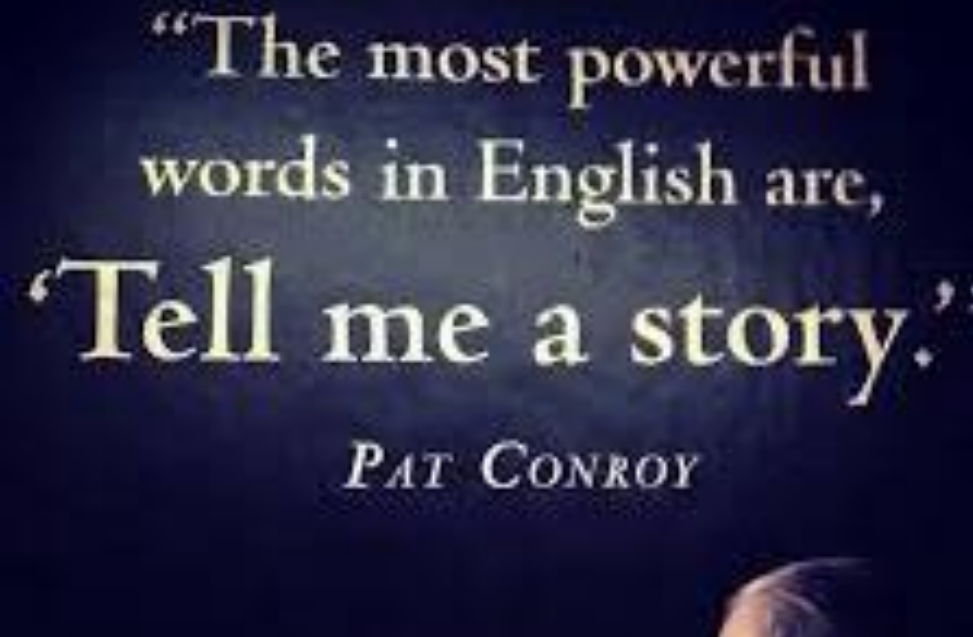
# Polyvagal Theory and Treatment

## Regulate or Co-regulate in a Ventral Vagal State

Heartfelt positive emotions: When we focus on positive emotions, our heart radiates a nicely coherent wave as compared to a dysregulated wave when our emotions are negative. This has impact on not only our emotional and physical health but the health of others (HeartMath Institute, 2020). Moreover, the heart has over **40,000 cells called sensory neurites** which are very similar to the cells in the brain and there is evidence that the heart has a certain capacity for some types of memory as well as a gut level wisdom that guides us (Dispenza & Braden, 2019).







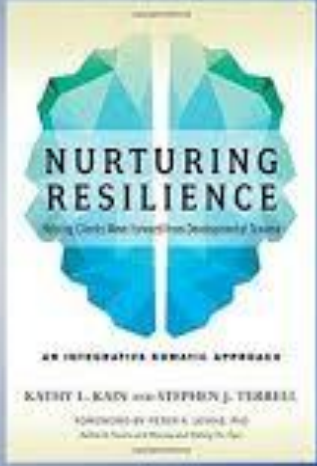
# Polyvagal Theory and Treatment

## Re-story

- Now that we or ourselves and our loved ones are in a more regulated state by use of the bottom-up strategies discussed above, we should be more settled and thus, more able to use **top-down strategies** and correct the **narrative or re-story** the situation, be it a current event or something in our distant past (Dana, 2018, 2020; Kain, 2018). We humans by nature are meaning-making machines, autonomically pulled to the story (Dana, 2020).
- Sadly, our narrative is often negative as there is a **bias toward the negative** (Hanson & Mendius, 2009). Although this tendency to see the negative in our circumstances and in ourselves might have a survival advantage in that we will be vigilant for the tiger, expecting him to eat us when we are in the wild, it works against us when there is no threat.
- Additionally, victims of shock or acute trauma are particularly vulnerable to creating false narratives about themselves and the world around them (Porges, 2017; Dana, 2018, Kain & Terrell, 2018). In a more regulated state, we are safe to possibly do a **Ctrl-Alt-Del or reset** on the old story and rewrite a new or revised version that better reflects our past or current autonomic adventure, one that allows us to accept and appreciate the heroic nature of our autonomic nervous system that enabled us to survive through the pain and/or trauma of the past and embrace the beauty and joy of what we now have and the bright future that lies ahead.

# Polyvagal Theory and Treatment

## Re-story



Monday LIVE! Lecture July 23, 2018 at noon, EDT

Interview with Kathy Kain and Stephen Terrell on their new book: *Nurturing Resilience: Helping Clients Move Forward from Developmental Trauma*. This book is a must read for everyone in our field. Kain and Terrell describe why somatics, or a bodily felt sense approach, is important in healing, especially touch and a deep understanding of the autonomic nervous system.

- As Drs. Kain and Terrell eloquently write, “As our capacity increases, our narratives are likely to change, to include the sense of success at meeting challenges, of developing curiosity, or of a willingness to explore. Eventually, our narratives may also include access to a sense of safety and connection. Rather than *I am constantly afraid and unhappy*, a client will begin to tell himself a different story: *I am stronger than I thought and able to meet challenges with greater balance and success*” (Kain & Terrell, 2018, pgs. 101-192).
- They add, “At the same time, our somatic narratives will begin to change. We may literally experience changes in our symptoms – decreased inflammation, less pain, fewer migraines. Our illness narratives may alter to *include the possibility of being free of pain, free of symptoms that have beleaguered us for most of our lives*” Kain & Terrell, 2018, p 192).