"Teen Brain Is My Name & Risk Is My Game"

2019 Meth & Substance Abuse Conference

Ramkota Hotel & Conference Center
Casper, Wyoming

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Science's Bottom Line:

Humans CANNOT Behave, Listen, Focus, Concentrate, Remember, Learn, Develop, Think Rationally, Self-Regulate, Become Resilient, Be Patient, Be Courteous, Recover from Trauma or other Behavioral Health Problems, or Stay Psychologically or Physically Healthy until they can ***FIRST*** feel

CALM.

NIH: 2001, 2004, 2009, 2011, 2014, 2017.

And…

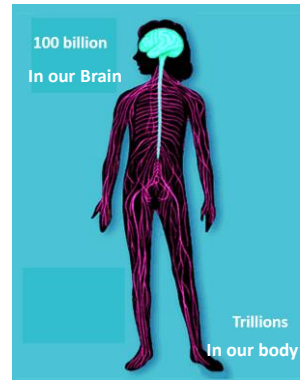
NEVER . . . in the history of calming down has anyone ever calmed down by being told to calm down.

And…we know that…

Teaching people what not to do DOES NOT teach them what to do.

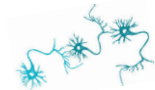
"NOT never equals WHAT."

Our Brain



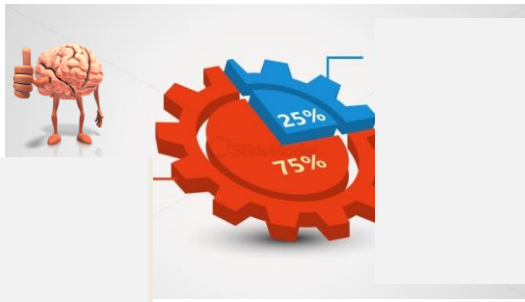
When we are born, we start out with about 100 billion nerve cells – called ***neurons*** - in our brain…

..and trillions in the rest of our body.



Networks of neurons do **EVERYTHING…**

At birth, only 25% of a child's NEURAL NETWORKS ARE pre-*programmed*, *pre-networked*, pre-*developed*.



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What can newborns do? (Only the 25% that is pre-wired/ networked at birth.)

Everything they cannot do (75%) has to be BUILT/developed!

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Humans learn & develop by:

Repeated & Consistent

- Exploration
- Observation
- Patterns
- Guided Experience

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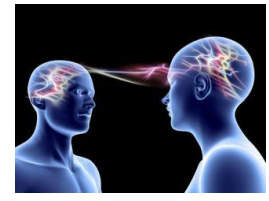
Automatic Way "in":



Mirror Neurons

"Observer Neurons"

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Anything that is modeled

Mirror Neurons

"is automatically stored…"

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If it is repeated consistently

a pattern is likely to form.

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It takes at *least 25* years to build/develop a BASIC BRAIN.

DNA & Experience Partner in the Building

DNA = Nature:
Architect (Plan) and Contractor (Schedule)

DNA *Hard-Wires* AUTOMATICS:

- Temperament = Sensitivity to Distressful Experiences
- Fight, Flight, Freeze Reactions
- Then turns-on/off sections of neurons on a schedule

Materials:
Nerve Cells (Neurons)

At birth, our brain has 100 billion Neurons.

Only 25% are *"pre-wired".*

75% are "waiting" for EXPERIENCE

Builders = Nurture
Parents, Teachers, et.al.

POSITIVE stimulation & CALMING interactions BUILD!

A lack of Positive Stimulation places learning/development ON HOLD, i.e., there is DEVELOPMENT DISRUPTION.

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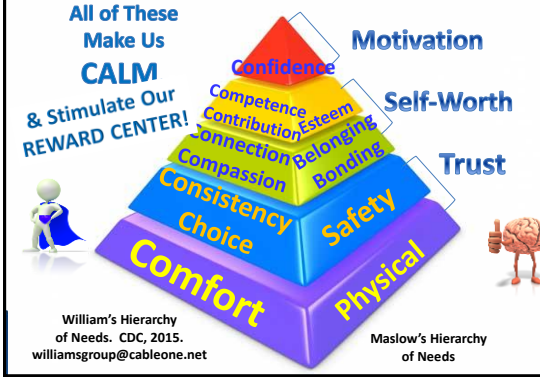
NURTURING MEANS OUR BASIC NEEDS MUST ARE MET:

All of These Make Us **CALM** & Stimulate Our REWARD CENTER!



William's Hierarchy of Needs. CDC, 2015. williamsgroup@cableone.net

Maslow's Hierarchy of Needs

How did we know?

We assessed his/her

BEHAVIOR.

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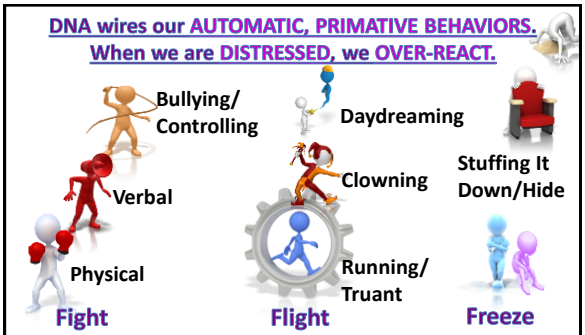
DNA wires our AUTOMATIC, PRIMATIVE BEHAVIORS. When we are DISTRESSED, we OVER-REACT.



FEAR – Discomfort – Distress – Anxiety – Trauma
(Frustration, Anger, Helplessness, Hopelessness….)

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But…that's not all…

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Temperament…

OUR AUTOMATIC SENSITIVITY TO DISTRESS….

Our temperament, which is pre-wired by DNA, ***is obvious at birth…***

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Temperament = Pre-Wired Sensitivity to Distress, i.e., to our Needs NOT being met.

SAME Situation:	Mellow	Sensitive	Highly-Sensitive	Hyper-Sensitive
Different AUTO Reactions				
FIGHT	Concerned/ Frustrated	Worried/ Weary	Anxious/ "Snarky"	Angry Hateful/ Hurtful
FLIGHT	Rides It Out	Daydreams for Escape	Absent & "Sent Out"	Truant & Runs Away
FREEZE	Quiet & Pensive	Hesitating Halting	Hunkering Hiding	Shutdown Self-Harm

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Hunger, fatigue, being upset "cranks it up"…

Mello → "Sensitive" → Highly Sensitive → Hyper-Sensitive

Concerned/ Frustrated | Worried/ Weary | Anxious/ "Snarky" | Angry Hateful/ Hurtful*

Harmful

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Adolescent Development

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Adolescence =
Ages 10 to 20

IT IS DIFFERENT FROM **Puberty .**

Robert Sapolsky

Adolescence =
massive changes to the BRAIN
and
reproductive system.

Puberty =
changes in the reproductive system
(including changes in appearance and functioning of the body).
Puberty is one part of Adolescence…

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Adolescents are:

Brilliant & Bored!

Brainless & Bewildered!

Stressed-Out & at MASSIVE RISK!

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Multiply by 10….

Because youth are all c… their brai… …cts the …-fold when you …nk about a 10-20 year old's brain…

Teens are far more sensitive to distress…

X10

Dr. Robert Sapolsky, Stanford University

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Now research shows that…

both chronic stress & frequent periods of normal to moderate stress *appear to be particularly damaging to YOUNG BRAINS …*

We have added new stressors & taken away many supports.

National Research Council, 2009 and National Science Foundation, 2010.

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The Teen "Reset" Button

….Massive Changes in the BRAIN!

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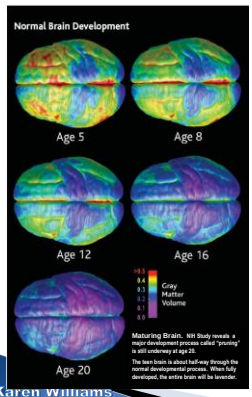

It takes a MINIMUM of 25 years to build a BASIC BRAIN.

The adolescent brain is about HALFWAY there…

when the thinking part "starts over"!

National Institutes of Health, 2004

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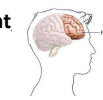
Pre-Frontal Cortex (PFC): Rational Thought
Executive Functions & Self-Regulation
TWO MAJOR STAGES of DEVELOPMENT



As Toddlerhood begins, DNA switches "on" neurons in the PFC…

As Adolescence begins DNA begins a massive PFC pruning (removal) - PLUS opening of new PFC neural territory.

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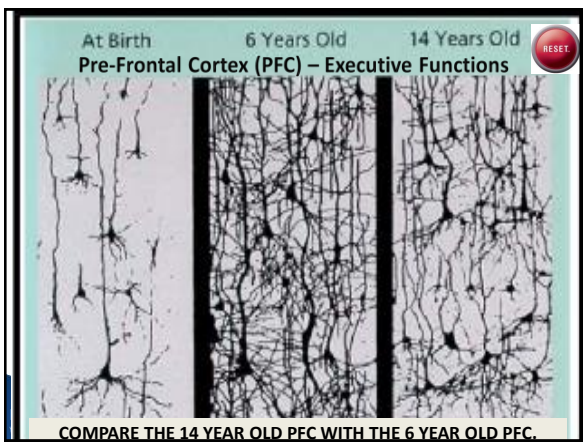
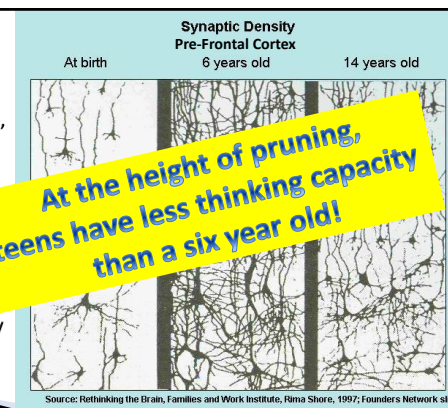


COMPARE THE 14 YEAR OLD PFC WITH THE 6 YEAR OLD PFC.

One major example of "pruning" Is during Adolescence, when Childhood's *Concrete Thinkin* Is removed s *Abstract Thinking* can be built/ developed.



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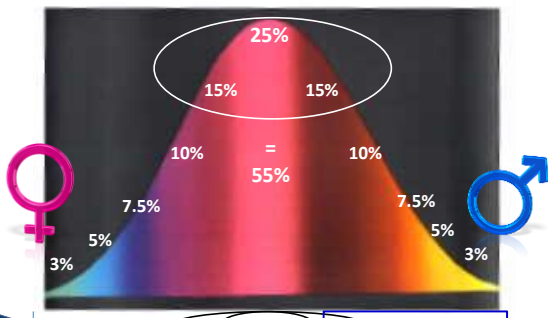
The Peak of the Adolescent "Pruning"



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Massive Pruning of Childhood Neurons: THEY CANNOT…

- Connect past experience with present action
- Focus on multiple streams of informati… s at the same time, learn to use co…
- Filter distr…
- De…
- Ove…
- Rem…
- Mana…
- Switch… as needed
- Plan and organize
- Strategize rationally

Does not build without guided experience, coaching & support.

Prefrontal cortex

Parts of their PFCs are MISSING & must be rebuilt differently!

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MUST BUILD NEW EXECUTIVE FUNCTIONS:

- Self-Directed Attention/Focus/ & Concentration
- Learning from Experience & Applying to Different Situations
- Behavioral Cause and Effect
- Forethought
- Abstract R…
- Plan…
- Beha…
- Risk M…
- Stress …
- Negotia… ompromise

Pre-Frontal Cortex (PFC)

…n Solving:
…l Cues
…nal
…tive
…onses
…ding Negative Social Consequences or Situations
- Sensitivity to Penalties & Consequences

Does not build without guided experience, coaching & support.

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They have trouble with CAUSE & EFFECT…

They are starting o…

…put… …eces together!

Does not build without guided experience, coaching & support.

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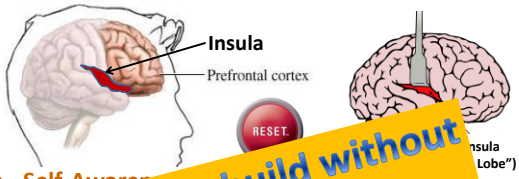
New Territories Open for ABSTRACTS:



- Self-Aware…
- Em…
- Tho…
- Fair…
- Inter… …gment

NEW… …ed up for development and …standing of these abstracts ideas.

Does not build without guided experience, coaching & support.

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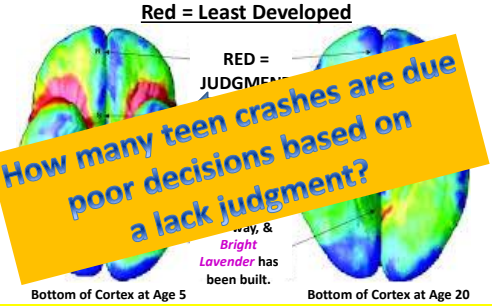
The underside of the cortex at Ages 5 and 20.

Red = Least Developed



Bottom of Cortex at Age 5

Bottom of Cortex at Age 20

How many teen crashes are due poor decisions based on a lack judgment?

When it comes to judgment, age 20 is not even half-way built!

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When this pruning and opening of new neural territory begins, teens become *tall toddlers!*

This phase can last from 6 months to two years…

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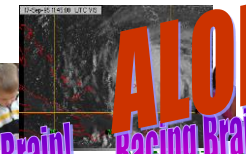
Teens & Toddlers Display Very Similar Behaviors.
The same part of the brain (PFC) is under duress.

Starting Out
Learning to Control Body & Behavior

Over
Learning to [illegible] Surges & Surges"



Racing Brain!
Exploration!
Brainless
with strangers
in SCHOOL.

ALONE!
Racing Brain!
Exploration!
Brainless Again!
Hormones!

24 years

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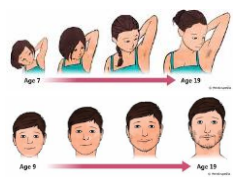
Adolescence = Double Whammy!

"Massive Brain Changes"

The parts of the brain in charge of *listening, thinking, making decisions, empathy, patience, etc. are removed… so new experiences can wire the brain for adulthood. This creates enormous distress.*

PLUS…Puberty:

REPRODUCTIVE HORMONES create new *Emotional Sensitivity* to everything… making it harder to deal with any level of distress.



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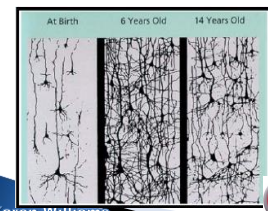
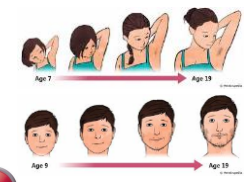
Outside of disease and injury, these two major developmental events, are the most distressful that an individual will ever encounter in his/her life.

Brain Pruning and Reorganization PLUS Puberty.





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Teens wake up one day and the adults in their lives are either frustrated, impatient, or angry with them - - or - - all three- - all of the time!

Teens have no idea their behavior has changed.

Among the first things that adolescents lose in the massive brain pruning process are

self-awareness & judgment!

…and they think adults have lost their minds!

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Oh…yes…

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Half of Our Teens' are totally STRESSED OUT!

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For adolescents under the same distress…

the dose of the
Distress Hormone Cortisol
is 2 to 5 times
MORE than that of adults
& it stays
2 to 5 times LONGER!

This helps explain why distress can be so damaging to teen brains…..and why they trouble "calming down" after a distressful episode.

Dr. Russell Romeo, Rockefeller University

Karen Williams
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Teens can be overwhelmed by "Family Adversity".

- Poverty
- Hunger/Food Insecurity
- Homelessness
- Sofa-Surfing
- Foster Care
- Family Separations
- Blended Families
- Custody Sharing
- Bullying
- Family/Community Violence
- Child Neglect/Abuse
- Sexual Abuse
- Substance Abusing Parent/Sibling
- Parent w/Life-threatening Illness
- Parent/Sibling in Prison/Jail
- Military Deployments
- Deportations

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When they are upset, teens have a distorted "feedback system".

- They are super-sensitive to OTHERS' Body Language
- They see a "concerned face" as an angry face.
- They are super-sensitive to OTHERS' voice intonations.

Dr. Russell Romeo, Rockefeller Univ.

Everything is **MAGNIFIED.**

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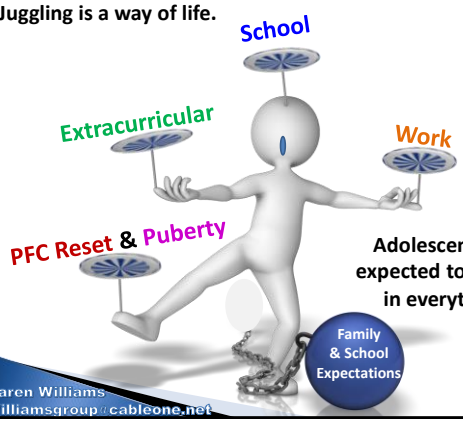
Juggling is a way of life.



Adolescents are expected to do well in everything.

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Exhaustion reigns…

Adolescents are expected just "get over it" and "get on with it!"

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And…

lack of sleep just adds to the Stress…

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Just like Todd!

The Cortisol "…" is 3-5…

At wakeup…Expect them to be snarky & less "able".

…a teenager at 7:00 am is like waking an adult at 4:00 am.

…p properly.

National Sleep Foundation

National Adolescent and Young Adult Health Information Center (2014).

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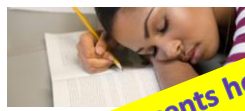

Teaching adolescents how to fall asleep at night is vital…

The evening Mel… …lescents is …n adults.

Sleep… …tion often triggers the *starvation* … in… …ay.

Sle… …for …g and storing long-term memories. Lack of sleep lowers the brain's capacity to learn new things.

But…starting in childhood is best!

Dye, 2000.

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There Is Some GOOD News!

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Adolescents are also "WIRED" so they can *complete all this new development on schedule.*

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Teens have "Cat-Like" Physical Reflexes…

They count waaaay too much on these to save them.

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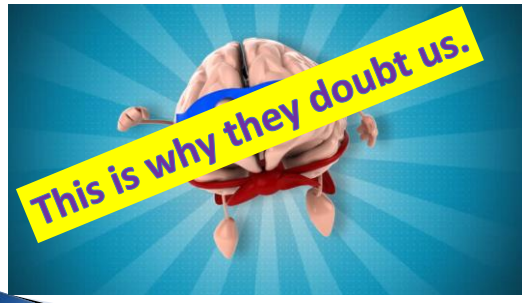
Teens' brains process NEW information 50-80 times faster than adults!



This is why they doubt us.

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Teens are driven by INNOVATION!

Adults are repositories of the current way - - or old way…

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Teens' brains are PRE-WIRED for Technology

The can use new technology IMMEDIATELY…. while we are still reading the Instructions!

It …at can go as fast as teens' brains …the few things they get to control.

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But…that's not all…

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Teens have 3 NEW drives….

Power!

If we don't meet their need for these drives,

Gangs and Terrorists will….

…rtnership!

This is an OPPORTUNITY!

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Why are teens so much more at risk for drug use?

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Adolescents are under significant stress just being teenagers!

CANNOT DELAY GRATIFICATION = INCREASES RISKS

- Always seeking to meet IMMEDIATE NEEDS
  - Now!
  - Make it go away!
  - Make it stop!
  - Anything that works!
  - Don't Care About Tomorrow
  - YOLO!
  - Fatalistic!!
  - Exhausted
  - No "real jollies" – fakes are available
  - No stress management/coping skills!

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There are more receptors in children's and adolescents' brains than in adults' brains, increasing the exposure of their brains to all psychoactive substances.

They are 5 times more at risk for addiction than adults.

Medications affect them differently.

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Adolescents' neurons react more strongly to psychoactive chemicals than adults.

If it feels good…
if It relieves pain…
if it comforts me…
it owns me!

The adolescent brain craves comfort & control.
If they don't have the skills to trigger their own, they will use fakes - -
no matter the risks or consequences.

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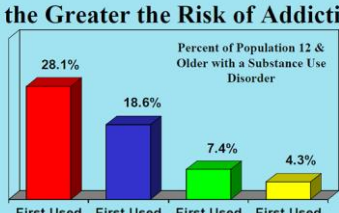
Adolescent Substance Abuse:
America's #1 Public Health Problem

The Earlier Teens Use Any Substance, the Greater the Risk of Addiction



Source: CASA analysis of the *National Household Survey on Drug Use and Health* (NSDUH), 2009.

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Alcohol, Development & Addiction

The risk for developing alcoholism increases the younger a person starts using.

Age of Alcohol Use	% Develop	FH (%)
≤ 13	26%	57%
14-15	32%	48%
16-17	21%	35%
18-19	13%	22%
20	9%	16%
≥ 21	7%	16%

Coincides with the peak of pruning in the adolescent brain.

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At no time in life is the dri… ving for Dopamine, An… phins,

These are the CALMING, Joy/Bliss Producing, & Pain Relieving Bio-chemicals that STRESSED TEENS CRAVE…

…ain during …LESCENCE…Ages 10-20

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"Dr. Dopa" Dopamine

Dr. Dopa's *FIRST AID* KIT:

Endorphins = *Body's Morphine*

- ***PAIN KILLER***
- ***Physical & Psychological Pain***

"Endora"

Anandamide = *Body's THC*

- ***BLISS CHEMICAL***
- ***Feelings of Calm & Wellbeing***
- ***Calms Digestion/Gut & Elimination***

"Ananda"

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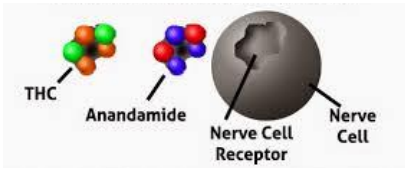
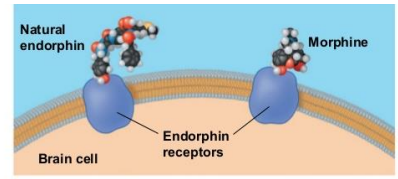
Marijuana's THC molecule **mimics** our natural ***Anandamide.***



Anandamide produces a feeling of calm, wellbeing, and "bliss".

We can build Anandamide by Belly Breathing, Smiling, Laughing, Music, Gratitude, Generosity, etc.

Morphine molecule **mimics** our body's natural ***Endorphin.***



Our endorphins are body's pain killers.

We build endorphins when we are active and moving, exercising, laughing heartily, & deep belly breathing.

Addictive drugs "hijack" the Dopamine/Reward Circuit

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All drugs of abuse target the Reward/Pleasure Center, i.e., they hi-jack the DOPAMINE system.

Includes Morphine, Heroin, Oxycodone, etc.

Includes Benzodiazepines, Barbiturates, Alcohol & Marijuana

Includes Caffeine & Nicotine Marijuana

They all "fake" Comfort & Control.

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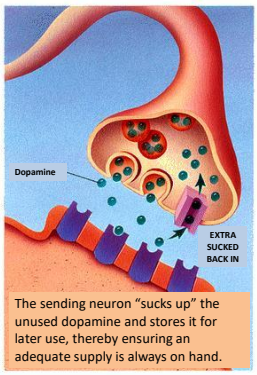
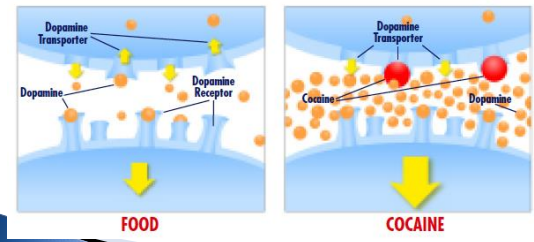
Chemical fakes disrupt the natural dopamine processes.



The sending neuron "sucks up" the unused dopamine and stores it for later use, thereby ensuring an adequate supply is always on hand.

All drugs of abuse cause a Dopamine "Rush of Relief" - - like hearty laughter does. They all use the Reward/Pleasure Circuit, i.e. they hijack the Dopamine pathway.



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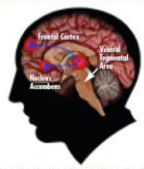
NIDA, 2007

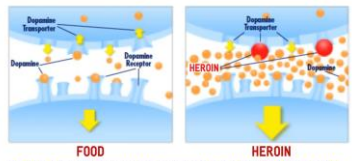
Drugs of Abuse Such as Heroin Target the Brain's Pleasure Center

Brain reward (dopamine) pathways



These brain circuits are important for natural rewards such as food, music and sex.

Drugs of abuse increase dopamine.



Typically, dopamine increases in response to natural rewards such as food. When heroin is taken, however, dopamine increases are exaggerated, and communication is altered.

The "rush" of stress and physical and psychological pain relief are so intense that if a person does not have ways of achieving stress and pain relief on his/her own, the risk for abuse and addiction is high.

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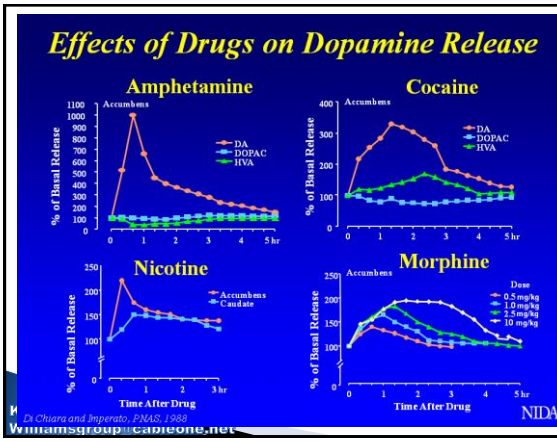
Effects of Drugs on Dopamine Release



Di Chiara and Imperato, PNAS, 1988

NIDA

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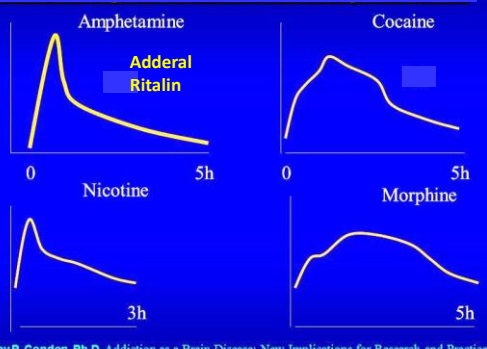
Effects of Drugs on Dopamine Levels



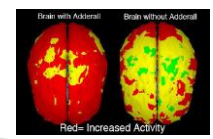
Timothy P. Condon, Ph.D. Addiction as a Brain Disease: New Implications for Research and Practice
Connecticut Statewide Addiction Medicine/Psychiatry Grand Rounds September 20, 2001
Source: Di Chiara and Imperato

NIDA

Adderall & Ritalin = Amphetamines

Trigger and Piggyback on the Dopamine Pathway which triggers an increase in focused attention, concentration, short-term and working memory…

But, as the Dopamine supplies are "tapped out", it takes more Adderall/Ritalin to trigger/trick the Reward Circuit, and dependence begins.



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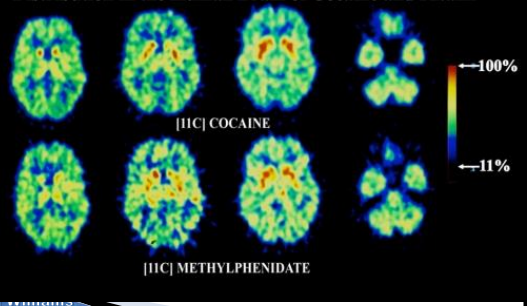
Stimulants (Ritalin, Adderall) Act like Cocaine Directly in the Dopamine Cells

Distribution in the Human Brain of Cocaine and Ritalin



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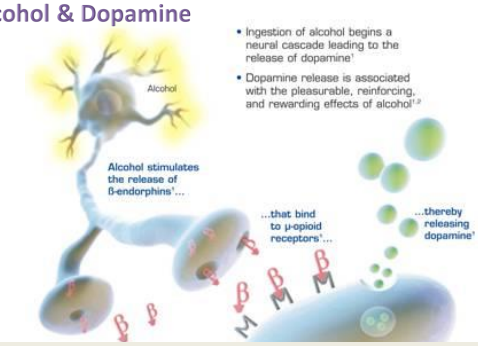
Alcohol & Dopamine



- Ingestion of alcohol begins a neural cascade leading to the release of dopamine[1]
- Dopamine release is associated with the pleasurable, reinforcing, and rewarding effects of alcohol[1,2]

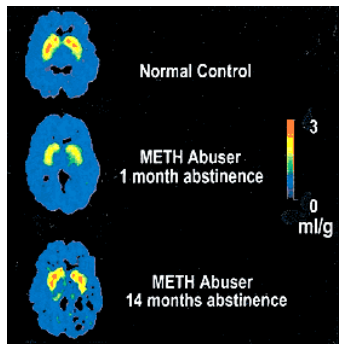
Unlike other drugs of abuse, alcohol is also a food ("empty calories"). It is metabolized & affects the digestive system.

William

Recovery = Dopamine Returns…

It takes time for the bio-chemical system to heal.

It is so difficult to recover when the craving never stops.



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Adult Adolescents

It takes at least 25 years to build a basic brain…

One can get older WITHOUT MATURING…

We all know 35-65 year-olds that act like 13, 14, 15, 16 year-olds…

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Adolescence is about building maturity and preparing for the "launch into adulthood".

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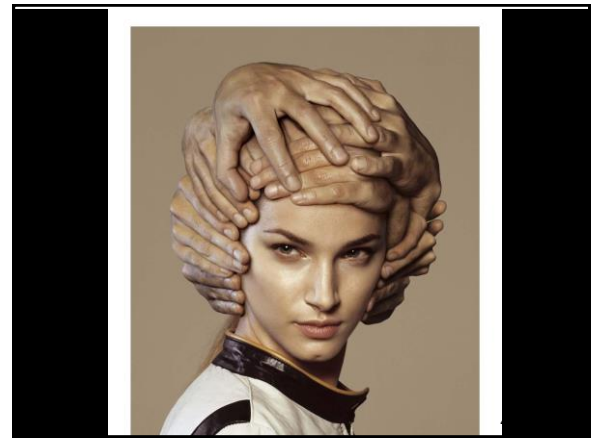

"Teens & Compassion" are seldom in the same sentence!

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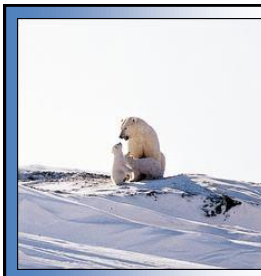
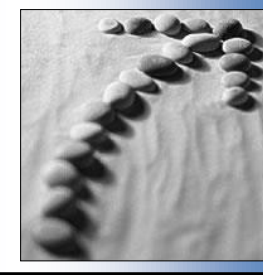
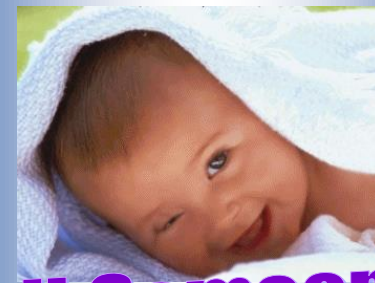


Guidance



Direction

Trust



Tell Someone!

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Workshop Content Sources Include:

- National Institutes of Health (NIH)
- National Center of Biotechnical Information (NCBI) –Scans
- National Research Council (NRC)
- Centers for Disease Control & Prevention (CDC) –
- Health & Human Services – Children's Bureau
- Substance Abuse & Mental Health Services Administration
- National Center for Child Traumatic Stress (NCCTS)
- Harvard's Center on the Developing Child (HCDC)
- Daniel Siegel: The Developing Mind & Brain Storm
- Tim Hollister: Not So Fast
- Jenson & Nutt: The Teenage Brain

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