

Leveraging what we've Learned from Brain Research to Help Every Child Succeed



Adele Diamond, PhD, FRSC
Canada Research Chair Professor of
Developmental Cognitive Neuroscience
University of British Columbia (UBC)
adele.diamond@ubc.ca

**What abilities and skills
will our children need to
be successful in the
21st century?**



What will it likely take to be successful in the 21st century?

1) Creative Problem-solving

- Coming up with new ideas, hypotheses and Inventions.
- If one way of solving a problem isn't working, how else might we succeed here?
Can we think outside the box to come up with a way of attacking this no one else has considered before?

2) Flexibility

- Seeing opportunities and seizing them:
I was planning to do X, but an amazing opportunity has arisen to do Y, do I have the flexibility to take advantage of serendipity?
- My opinion was X, but now that I see this new information, I'm able to change my opinion.
- Being able & willing to change course when it seems you were wrong

An example of poor cognitive flexibility:

When one door closes, another door opens;
but we often look so long and so regretfully upon the closed door,
that we do not see the ones which open for us.

- Alexander Graham Bell

3) Self-control

Having the self-control to resist temptations and not act impulsively -- be able to:

- think before you speak or act -- give a considered response instead of an impulsive one
- not over-indulge or indulge in the wrong things
- resist saying something socially inappropriate (or hurtful)
- resist ‘tit for tat’ (hurting someone because that person hurt you)
- resist jumping to an interpretation of what something meant or why it was done

4) Discipline / Perseverance

Having the discipline to stay on task...

- seeing it through to completion despite unexpected problems, some aspects being boring or perhaps frustratingly difficult, & tempted by lots of things far more fun
- continuing to work at something though the reward may be a long time in coming

ALL of the above are

“Executive Functions”

or rely on them



The 3 core Executive Functions are:

- **Cognitive Flexibility**
(including being able to switch perspectives & see things in a new light)
- **Inhibitory Control**
(which includes self-control & discipline)
- **Working Memory**

Higher-order Executive Functions are:

- Problem-solving
- Reasoning
- Planning

Inhibitory control includes being able to

(1) stay focused despite distraction

SELECTIVE or FOCUSED ATTENTION

(2) stay on task (& complete task)

though tempted not to - **DISCIPLINE**

(3) inhibit acting impulsively & instead
make a more considered response (not
putting your foot in your mouth, not
hitting, not drinking too much, dieting)

SELF-CONTROL

Inhibitory control predicts
academic performance in
the earliest elementary
grades through university
better than does IQ.

Children with less inhibitory control (i.e., children who were less persistent, more impulsive, and had poorer attention regulation) as adults 30 years later have...

- worse health
- earn less
- and commit more crimes

**than those with better inhibitory control as young children,
controlling for IQ, gender, social class, & home lives & family circumstances growing up
across diverse measures of inhibitory control.**

That's based on a study of 1,000 children born in the same city in the same year followed for 32 years with a 96% retention rate.

by Terrie Moffitt et al. (2011)

Proceedings of the Nat'l Academy of Sci.

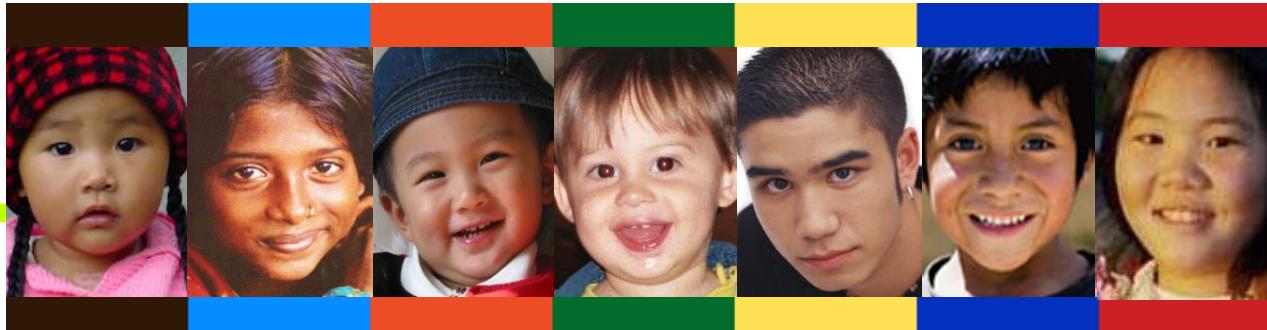
Interventions that achieve even small improvements in [inhibitory control] for individuals could shift the entire distribution of outcomes in a beneficial direction and yield large improvements in health, wealth, and crime rate for a nation.”

(b) Working Memory:

Holding information in mind
and mentally working with it



Working memory is critical for making sense of anything that unfolds over time, for that always requires holding in mind what happened earlier & relating that to what is happening now.



- relating one idea to another
- relating what you read (or learned / heard) earlier to what you are reading (learning / hearing) now
- mental math calculations
- understanding cause and effect
- remembering multi-step instructions & executing them in the correct order

Reasoning would not be possible without working memory, for reasoning requires holding bits of information in mind and seeing how they relate. Working memory enables us to consider the past and possible future in making plans and decisions.

(c) COGNITIVE FLEXIBILITY

being able to easily & quickly switch perspectives or the focus of attention,

flexibly adjusting to changed demands or priorities,

being able to think outside the box.

For example, try to think of as many uses for a TABLE as you can.

What are all the things you might use a table for?



A table might be used to write on or to eat food on.

It might be turned on its side and used to keep a door closed or used as a shield against bullets or snowballs.

You could get under it to hide or to keep dry.

You could cut it up for firewood.

How can we stop ourselves from getting really upset when a child misbehaves? What we usually get upset about is the intent we think is behind an action.

Could use Cognitive Flexibility to re-frame:

A child might be acting in the most awful manner because he has been terribly hurt and is afraid of being hurt again, so he will push you away before you have a chance to reject him or he will test you to see if you are *really* someone he can feel safe with.

If we see the misbehavior as coming from hurt, we can react completely differently.

“Executive Functions”
depend on Prefrontal
Cortex and the other
neural regions with which
it is interconnected.



**Nowhere is the importance of
social, emotional, and physical
health for cognitive health more
evident than with PFC & EFs.**

**EFs are the first to suffer, and
suffer disproportionately, if we are
lonely, sad, stressed, sleep-
deprived, or not physically fit.**

To show the EFs they are capable of, to achieve the academic outcomes of which they are capable, children need to

- feel joyful and relaxed (not stressed)
- feel they are in a supportive community they can count on, and
- their bodies need to be fit and healthy.



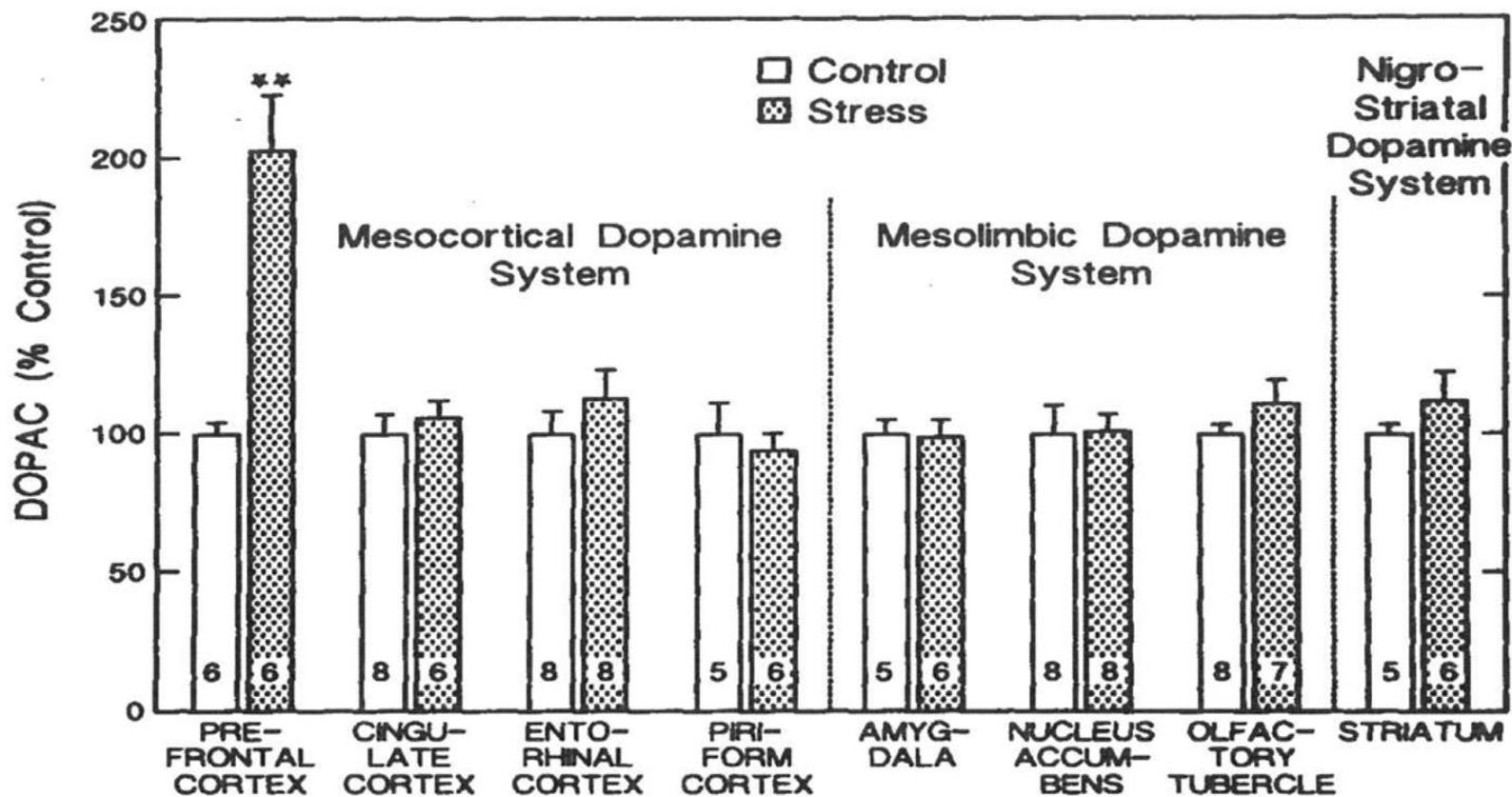
**Our brains work better
when we are not in a
stressed emotional state.**

Amy Arnsten, 1998
The biology of being frazzled
Science

This is *particularly* true for PFC & EFs.

Stress and Prefrontal Cortex

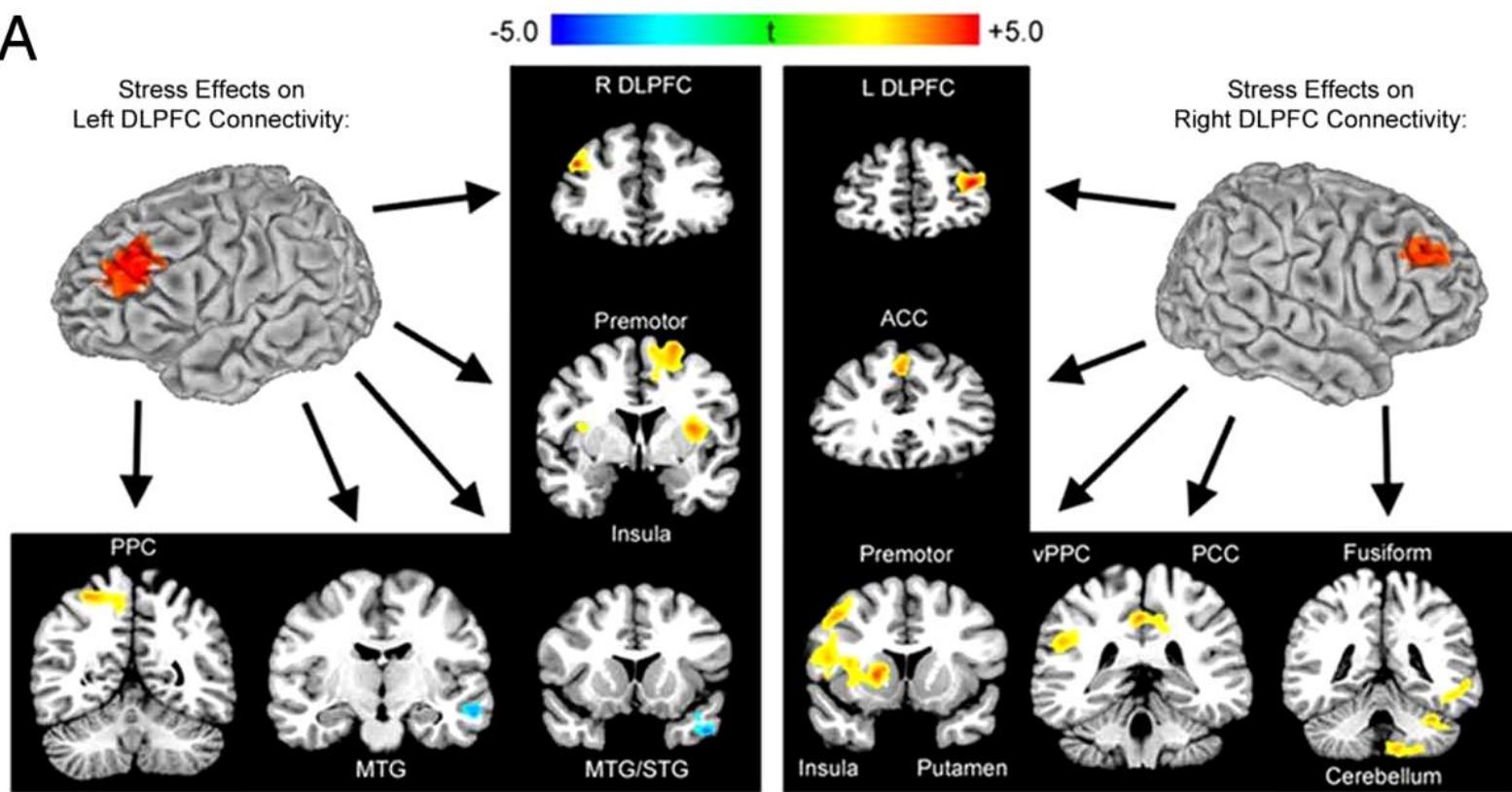
Even mild stress increases DA release in PFC but not elsewhere in the brain



(Roth et al., 1988)

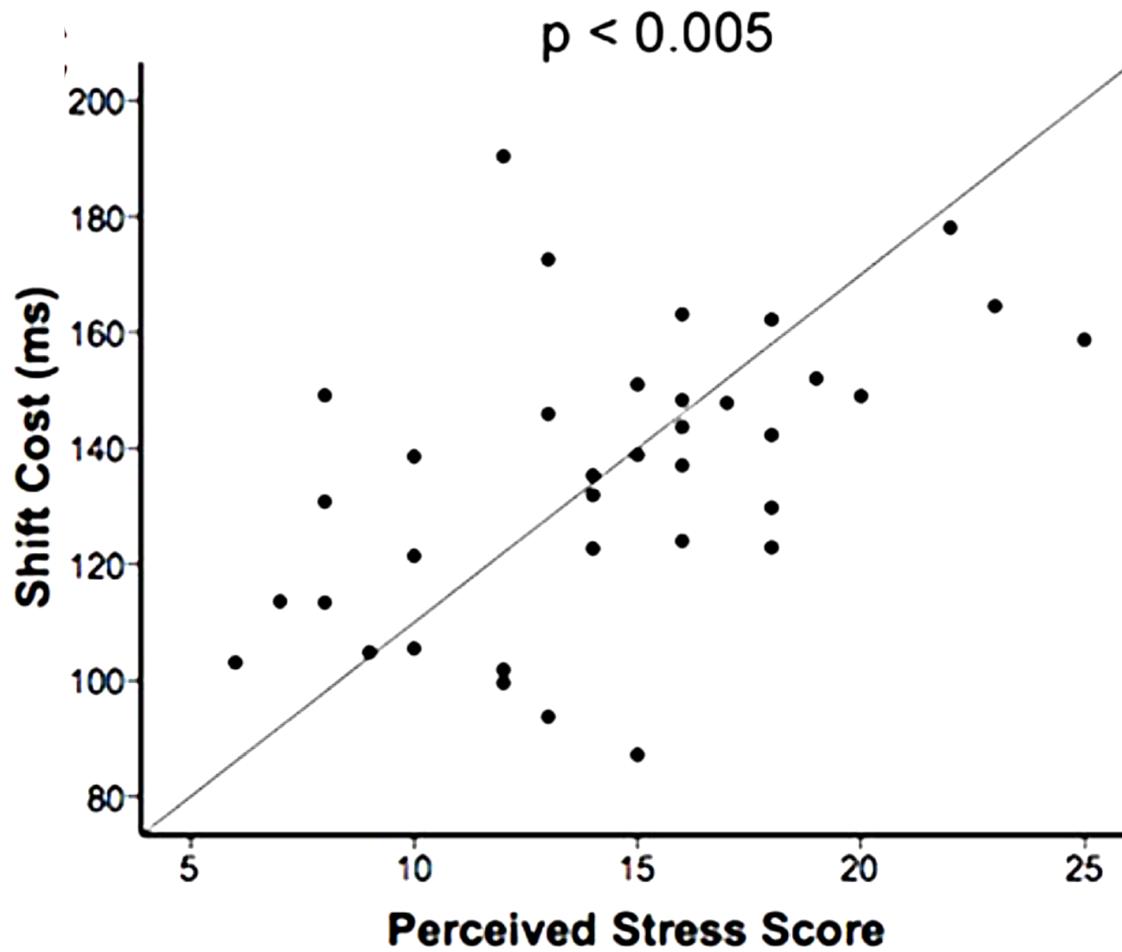
Stress impairs EFs and can cause anyone to look as if he or she has an EF impairment when that's not the case.

(You may have noticed that when stressed you cannot think as clearly or exercise as good self-control.)

A

In college students, one month of stress in preparation for a major exam disrupts prefrontal cortex functional connectivity.

Stress decreases coupling between left DL-PFC and right DL-PFC, and between DL-PFC and premotor cortex, the ACC, the insula, posterior parietal cortex (PPC), and the cerebellum.



Stress impairs their attention shifting (shifting between attending to color or motion).

Liston et al. (2009) *PNAS*

When we are sad we're worse at filtering out irrelevant information (i.e., worse at selective attention).

Desseilles et al., 2009
von Hecker & Meiser, 2005

When we are happy we are better at selective attention.

Gable & Harmon-Jones, 2008

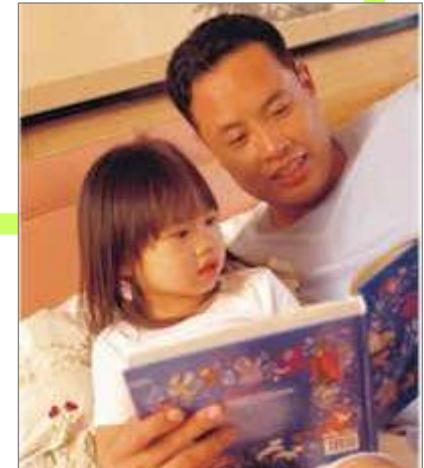
People show more creativity when they are happy

THE most heavily researched predictor of creativity in social psychology is mood.

The most robust finding is that a happy mood leads to greater creativity (Ashby et al. 1999). It enables people to work more flexibly (Murray et al. 1990) & to see potential relatedness among unusual & atypical members of categories (Isen et al. 1985, 1987).

Hirt et al. 2008: 214

If you're stressed,
you cannot be the
parent you want to be.



If you're stressed,
your children will pick on it.
It will cause them to feel
stressed.

And if they're stressed, their
EFs will suffer & therefore
their school performance will
suffer.

You're not perfect.

You're going to make mistakes.



That's OK.

You don't need to be perfect.

Besides, no one ever is.



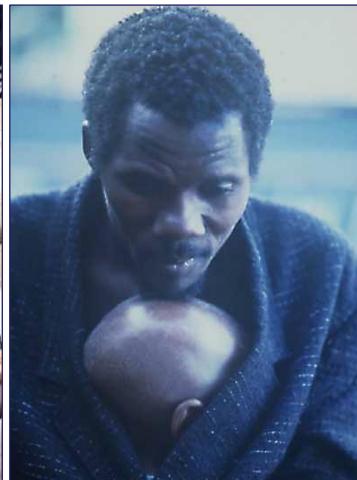
I can guarantee 100% that
worrying about whether that
you're not the perfect parent
will NOT improve your parenting
– it will only make it worse.



RELAX

Imperfect ≠ Worthless

Your humanity is more
important than your
knowledge or skill or doing
the textbook-perfect thing.



Jerome Frank conducted a study comparing several different forms of psychotherapy to one another.

He concluded:

“A totally untrained therapist who exercises a great capacity to love will achieve psychotherapeutic results equal to the best.”

Results of a poll by the British Medical Journal:

The majority of respondents said:

“A good doctor, is first and foremost, a good human being.”

Your caring -- your openness to truly listen; being there for your child when he or she needs you -- is more important than your knowledge or skill.



The spirit rather than the technique.

Who do you prefer to hear -- the musician who plays from the heart or the musician with absolutely perfect technique but no heart?

You can do the textbook-perfect thing, but if it doesn't come from the right place, it will not have the desired result. You can mess up, but if it comes from the right place, it will be all right.

Relax: Your ability to love your children, and be genuinely present for them, is what is most important.

**The most powerful way to
communicate to our children that we
care about them is to listen to them.**

Truly listen.

Give them our time and our attention.

**The quality of our listening, rather
than the wisdom of our words, is often
what has the most impact.**

“Children who are truly loved...know themselves to be valued. This knowledge is worth more than any gold.

“The principal form that love takes is giving of your time, and truly listening. When something is of value to us we spend time with it. When we love our children, we give them our time.... True listening, total concentration on the other, is always a manifestation of love.

-- Scott Peck, *The Road Less Traveled*

“Your willingness to listen is the best possible concrete evidence of your esteem that you can give your child. There is no better and ultimately no other way to teach your children that they are valuable people than by valuing them.

When children know that they are valued... they feel valuable....This feeling of being valuable is the cornerstone of discipline because when one considers oneself valuable one will take care of oneself in all ways that are necessary. Self-discipline is self-caring.”

-- Scott Peck, *The Road Less Traveled*

“Perhaps the most important thing we ever give each other is our attention. And especially if it's given from the heart...”

“Listening is the oldest and perhaps the most powerful tool of healing.”

-- Dr. Rachel Naomi Remen

“The greatest gift
I can conceive of
having
from anyone
is
to be seen by them,
heard by them,
to be understood.”

-- Virginia Satir



**It's important is to be heard /
understood –
and to be liked anyway**



When a child is speaking, just listen. When we interrupt to try to show we understand, we move the focus of attention to ourselves.

Because we care, we are tempted to want to do ‘more’ than ‘just’ listen. But what a child needs most is for us to listen. Truly listen.



Parents' & teachers' "work is more like that of a midwife....When the baby is born, there is no question to whom it belongs....Lao Tzu says that when the sage is at work, people will say 'they did it themselves.' This is empowerment."

(Johanson & Kurtz)

Don't rush to try to problem-solve or suggest solutions.

When we try to fix others, we focus on what's wrong with them, instead of trusting their strengths and potential.

Listen. Let the solutions emerge from the child.

Fire

What makes a fire burn
is space between the logs,
a breathing space.
Too much of a good thing,
too many logs
packed in too tight
can douse the flames
almost as surely
as a pail of water would.

So building fires
requires attention
to the spaces in between,
as much as to the wood.

When we are able to build
open spaces
in the same way
we have learned
to pile on the logs,
then we can come to see how
it is fuel, and absence of the fuel
together, that make fire possible.

We only need to lay a log
lightly from time to time.

A fire
grows
simply because the space is there,
with openings
in which the flame
that knows just how it wants to burn
can find its way. - Judy Brown

When a child doesn't feel
understood, little things can
become big issues.

Dan Siegel and Hartzell:
Parenting from the Inside Out (2004)

In Gottman's studies, if the wife felt she was being heard the marriage was essentially divorce-proof.

Gottman JM & Levenson RW. (1999). Rebound from marital conflict and divorce prediction. *Family Process*. 38(3):287-92.

“Differences must be grasped, even if no problems are solved. One of the reasons empathy works so well is because it does not require a solution. It requires only understanding.”

John Medina, *Brain Rules for Baby*

We bring with us issues from our own past that impair our ability to listen. Experiences that are not fully processed may create unresolved and leftover issues that influence how we react to our children. These issues can easily get triggered in the parent-child relationship. At these times, we're not acting like the parent we want to be and are often left wondering why parenting sometimes seems to "bring out the worst in us.

Siegel & Hartzell (2004)

When we have an unresolved issue...we're not really listening to our children because our own internal experiences are being so noisy that's all we can hear.

We are no longer making thoughtful choices about how we want to parent or teach, but are reacting on the basis of experiences in our past.

Siegel & Hartzell (2004)

The major insight of Mary Main et al. (1985): the direct intergenerational transmission of relationship patterns, while relatively common, is NOT inevitable.

Some parents who experienced abusive or rejecting relationships growing up have children who are securely attached to them.

What distinguished that group of parents, from other parents with similarly unfortunate childhoods whose own children were insecurely attached, was their ability to discuss adverse childhood experiences with

emotional openness, coherence, and reflective insight.

They seemed to have come to terms with what had happened to them, and had gained an understanding why their parents had behaved as they did.

Inge Bretherton

Outcome of secure vs. insecure attachment:

It's better to be securely attached.

But outcome is AS GOOD for those insecurely attached IF they have organized their attachment experience into a coherent story.

Zeigarnik Effect: the mind
keeps working on things that
aren't complete.

Coming to an understanding
allows closure.

Zeigarnik, 1967

One way to get closure is to write. Writing forces a degree of structure and organization of one's thoughts. When writing, the thinking process has to slow down.

The act of repeatedly telling about your experience results in both an organization of the event and a summarizing of it. Over days, the description of the event is gradually shortened and summarized.

Constructing stories -- day by day, as you write, the episode takes on shape as a coherent story.

Any type of event is less overwhelming and easier to think about once it is summarized.

Once organized, events are often smaller and easier to deal with.

If you can get people to talk or write about their problems, their psychological and physical health improves.

--- James Pennebaker,
*Opening Up: The Healing Power
of Expressing Emotions*



Putting Feelings Into Words Produces Therapeutic Effects on the Brain

When you put feelings into words, you increase activation in prefrontal cortex and that produces a reduced response in the amygdala.



PFC  Stress

a

Affect Label



SCARED

ANGRY

b

Affect Match



c

Observe Affect



d

Gender Label



SAMUEL

HELEN

e

Gender Match



f

Shape Match



Amygdala activation went up in ALL conditions when an angry or fearful face was shown, but ONLY in the one condition (a) where subjects had to assign a verbal label to the emotion, did amygdala activation GO DOWN.

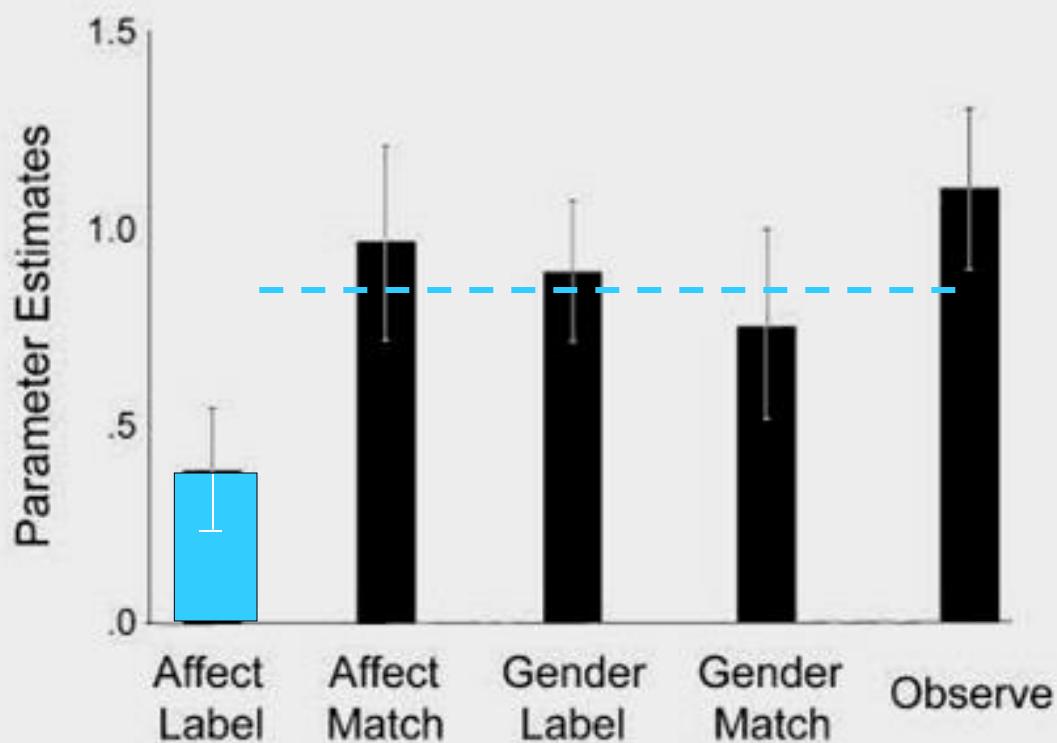
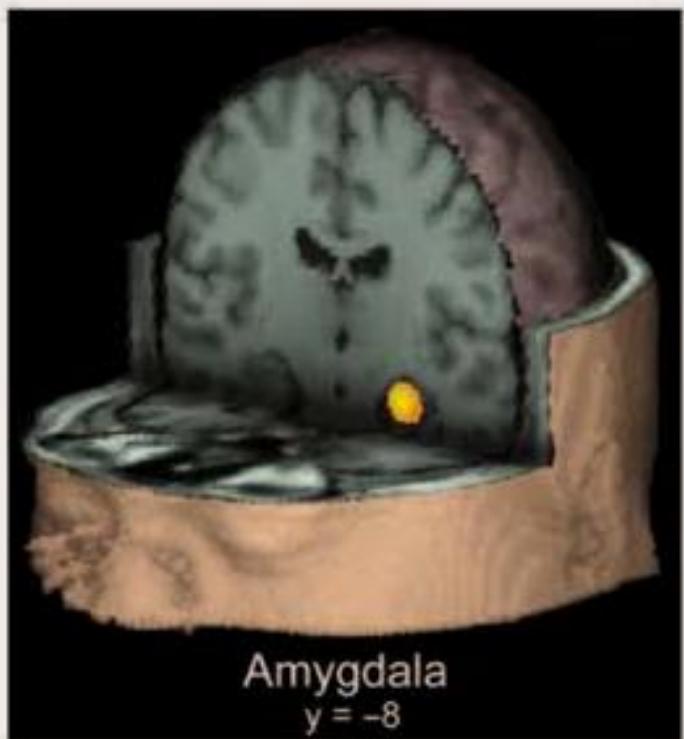
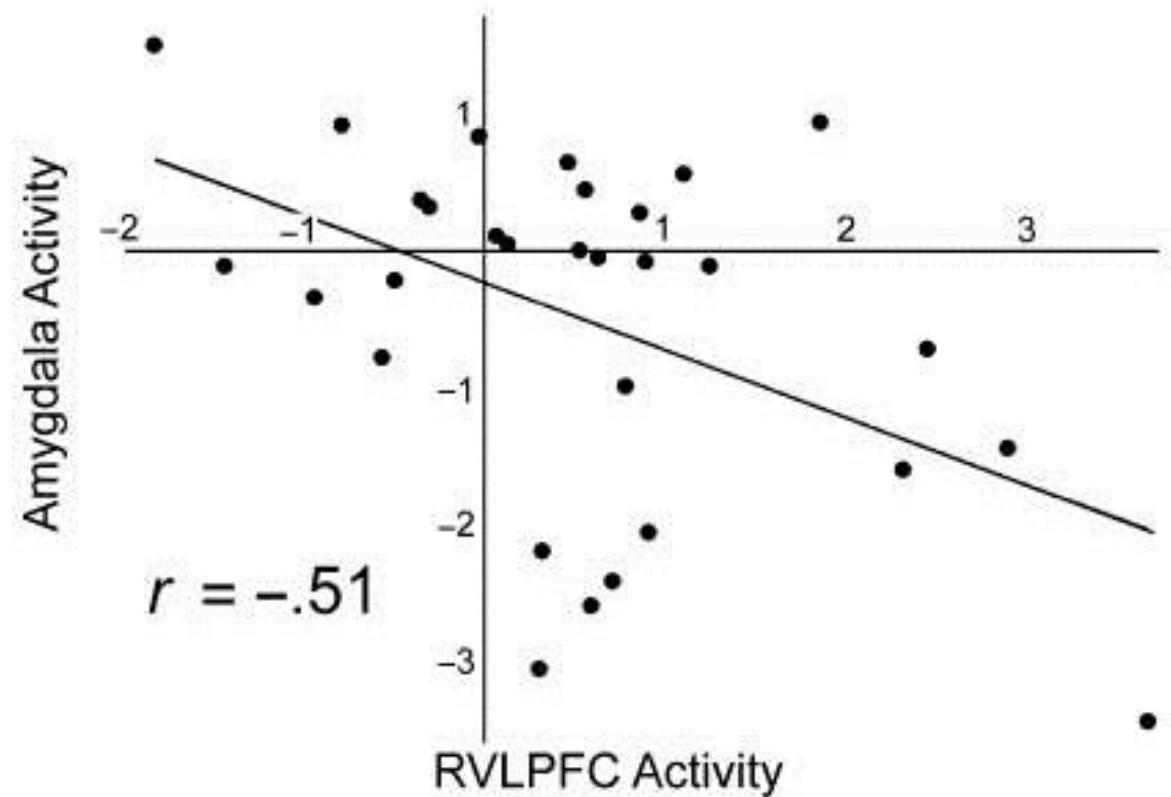
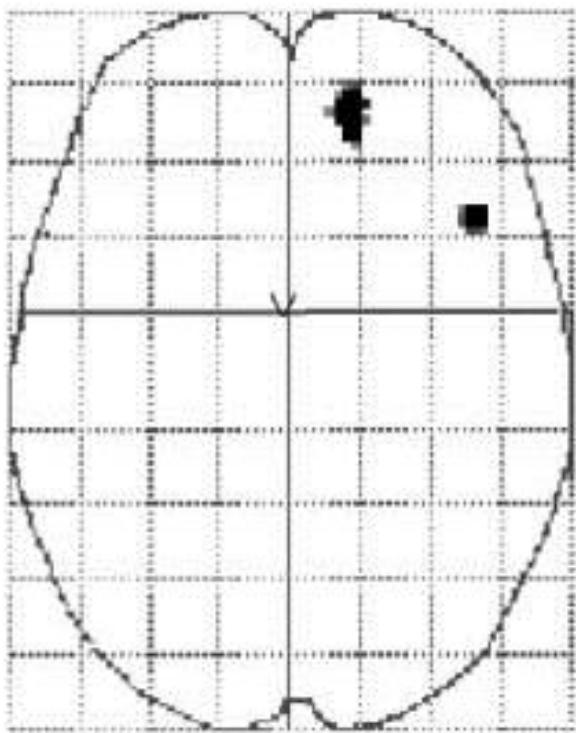


Fig. 2. Parameter estimates of activity during five conditions (relative to activity in the shape-match control condition) in an amygdala region of interest (ROI). The ROI was identified by comparing activity in the observe condition and activity in the shape-match condition. The illustration on the left shows an axial slice indicating the extent of the ROI.

Matt Lieberman et al., 2007

Inverse Relation between Activation in PFC and the Amygdala in the Lieberman et al. study

(When activation in PFC goes up, activation in the amygdala goes down.)



Translating an emotional experience into language, talking or writing about, alters the way it is represented and understood in our mind and our brain (gets prefrontal cortex more involved).



Pets can reduce stress



The presence of a dog in the classroom reduces stress and helps children perform better.

Gee, N. R., Church, M. T., & Altobelli, C. L. (2010). Preschoolers make fewer errors on an object categorization task in the presence of a dog. *Anthrozoös*, 23, 223-230.

Gee, N. R., Crist, E. N., & Carr, D. N. (2010). Preschool children require fewer instructional prompts to perform a memory task in the presence of a dog. *Anthrozoös*, 23, 173-184.

Gee, N. R., Harris, S. L., & Johnson, K. L. (2007). The role of therapy dogs in speed and accuracy to complete motor skills tasks for preschool children. *Anthrozoös*, 20, 375-386.

Beetz, A., Julius, H., Turner, D., & Kotrschal, K. (2012). Effects of social support by a dog on stress modulation in male children with insecure attachment. *Frontiers in Psychology*, 3.

Beetz, A., Kotrschal, K., Turner, D. C., Hediger, K., Uvnäs-Moberg, K., & Julius, H. (2011). The effect of a real dog, toy dog and friendly person on insecurely attached children during a stressful task: An exploratory study. *Anthrozoös*, 24, 349-368.

Pets teach us about gentleness, patience, & never holding a grudge



**Animals love us unconditionally,
ask little in return, & don't even
require eye contact.**



**Many children are so
terrified of making a
mistake that they're
afraid to try anything new.**



We need to let them know
that it is okay to make a
mistake; everyone makes
mistakes.

The only alternative is to
stay with what you already
know, to stop growing.



**Anyone who has never
made a mistake has never
tried anything new.**

- Albert Einstein



**Children need to feel safe
...to push the limits of what they know,
...to venture into the unknown,
...to take the risk of making a mistake or of
being wrong.**

**Children cannot relax if they're
worried you might embarrass them.**

**“No matter if he does it wrong – do
not correct him or he will retire into
his shell.”**

-- Maria Montessori

When a toddler falls while trying to learn to walk, we don't say he gets a 'D'; we say, "Don't worry; I know you're going to be able to do this."



**Communicate loud and clear
the faith and expectation that
your child will succeed --
maybe not in this or not -- but
'you'll find your niche'**



Powerful Role of Expectations (by others AND yourself) and Attitude

**Pygmalion in the Classroom -- powerful
role of expectations Robert Rosenthal**

**Stereotype threat - female performance on
math exams Claude Steele**

**“Treat people as if they
were what they ought to be
and you help them become
what they are capable of
being.”**

– Johann W. van Goethe

**Children need to believe in themselves.
They need to have confidence that they
will succeed.**

Two routes to that:

- **They need to feel you believe in them -
that you fully expect them to succeed.**
- **&**
- **They need do-able challenges. We need
to give children the opportunity to do
things that enable them to see for
themselves that they are capable.**

Children need opportunities to do things that enable them *to see for themselves* that they are capable: do-able challenges.

(research studies by Duckworth, 2010; Lewis & Goldberg, 1969; White, 1960)

Pride and self-confidence (and joy) come from seeing yourself succeed at something that you know is not easy -- even in the youngest infants.

**We are not just intellects,
we have emotions
we have social needs
& we have bodies**

Our brains work better when we are not feeling lonely or socially isolated.

Loneliness: Human Nature and the Need for Social Connection

2008

a book by John Cacioppo & William Patrick

This is *particularly* true for PFC & EFs.



Roy Baumeister et al. (2002, *Journal of Personality and Social Psychology*)

- One group of subjects were told beforehand they'd have close relationships throughout their lives;
- another group was told the opposite;
- a third group was told unrelated bad news.

On simple memorization questions, the groups were comparable.

On sections involving logical reasoning (EF), subjects told they'd be lonely performed much worse.

Campbell et al. (2006) found that during math tests there was Prefrontal Cortex worked less efficiently among participants who felt isolated.

**We are not just intellects,
we have emotions
we have social needs
& we have bodies**



You need your sleep.





Lack of sleep will produce deficits in EF skills, and cause someone to look as if he or she has an EF impairment, like ADHD.



Our brains work better when our bodies are physically fit.

Nature Reviews Neuroscience (January 2008)

“Be Smart, Exercise Your Heart:
Exercise Effects on Brain and Cognition”
Charles Hillman, Kirk Erickson & Art Kramer

“There is little doubt that leading a sedentary life
is bad for our cognitive health.”

This is *particularly* true for PFC & EFs.



Nature Reviews Neuroscience (January 2008)

“Be Smart, Exercise Your Heart:
Exercise Effects on Brain and Cognition”

Charles Hillman, Kirk Erickson & Art Kramer

Evidence shows that physical activity (especially aerobic exercise) robustly improves cognition and brain function. In particular, the frontal lobe and the executive functions that depend on it show the largest benefit from improved fitness.

The positive effects of aerobic physical activity on cognition and brain function are evident at the molecular, cellular, systems, and behavioral level.

and there have been many more review papers since 2008 including:

Streiner, D. L. (2009). The effects of exercise programs on cognition in older adults: A review. *Clinical Journal of Sport Medicine*, 19(5), 438.

Tseng, C. N., Gau, B. S., & Lou, M. F. (2011). The effectiveness of exercise on improving cognitive function in older people: A systematic review. *The Journal of Nursing Research*, 19(2), 119-130.

Voss, M. W., Nagamatsu, L. S., Liu-Ambrose, T. , & Kramer, A. F. (2011). Exercise, brain, and cognition across the lifespan. *Journal of Applied Physiology*, 111(5), 1505-1513.

The brain doesn't recognize the same sharp division between cognitive and motor function that we impose in our thinking.

The SAME or substantially overlapping brain systems subserve BOTH cognitive and motor function.



For example, the pre-Supplementary Motor Area (SMA) is important for sequential tasks,

whether they are sequential motor tasks or

sequential numerical, verbal, or spatial cognitive tasks.

Hanakawa et al., 2002

Motor development and cognitive development appear to be fundamentally intertwined.

Diamond, A. (2000)



Close interrelation of motor development and cognitive development and of the cerebellum and prefrontal cortex.

Child Development, 71, 44-56

When cognitive development
is perturbed,

as in a neurodevelopmental
disorder,

motor development is often
adversely affected as well.



For example.....

At least half of all children with ADHD have poor motor coordination & fit the diagnosis for developmental coordination disorder.

At least half of all children with developmental coordination disorder have ADHD.

Similarly for dyslexia, autism, and other disorders.



Science asked me to write a review of all interventions shown to improve EFs in young children

Diamond, A. & Lee, K.

(2011)

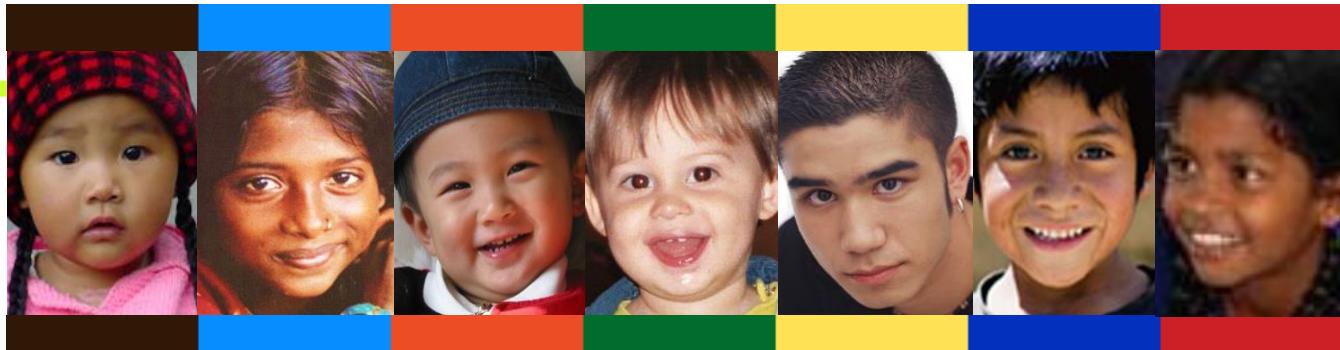
Interventions shown to Aid
Executive Function Development
in Children 4-12 Years Old

Science, vol. 333

accompanying online tables

Diverse activities including computer training, aerobics, martial arts, yoga, mindfulness, & school curricula have all been shown to improve children's executive functions.

Exercise alone appears not to be as effective in improving EFs in children as exercise-plus-character-development (traditional martial arts) or exercise-plus-mindfulness (yoga).



Lakes & Hoyt (2004) randomly assigned children in grades K thru 5 (roughly 5-11 years-old) by homeroom class to Tae-Kwon-Do martial arts ($N = 105$) or standard physical education ($N = 102$).

Children who had been assigned to Tae-Kwon-Do training showed greater gains than children in standard phys. ed. on all dimensions of EFs studied (e.g., cognitive [distractible —focused] and affective [quitting —persevering] - subtests of the Response to Challenge Scale). This generalized to multiple contexts and was found on multiple measures. They also improved more on mental math (which requires working memory).

**Traditional martial arts
emphasize self-control,
discipline (inhibitory control),
and character development.**

In a study with adolescent juvenile delinquents (Trulson, 1986), one group was assigned to traditional Tae-Kwon-Do (emphasizing qualities such as respect, humility, responsibility, perseverance, honor as well as physical conditioning). Another group was assigned to modern martial arts (martial arts as a competitive sport).

Those in traditional Tae-Kwon-Do showed less aggression and anxiety and improved in social ability and self-esteem.

Those in modern martial arts showed *more* juvenile delinquency and aggressiveness, and decreased self-esteem and social ability.

**Whether EF gains are
seen depends on the
way an activity is done.**



A few principles hold
across all programs.

Such as:



**EFs need to be
continually challenged
to see improvements -
not just used, but
challenged.**

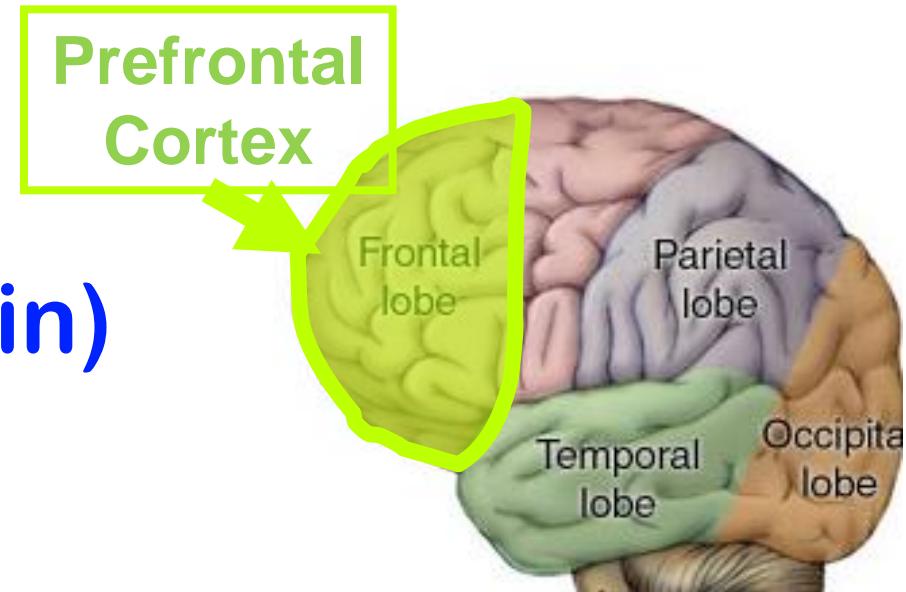
Groups assigned to the same program, but without difficulty increasing, do not show EF gains.

Setting aside a time to work on EFs is less effective than working on EFs as part & parcel of everything you do.

The Importance of Repeated Practice

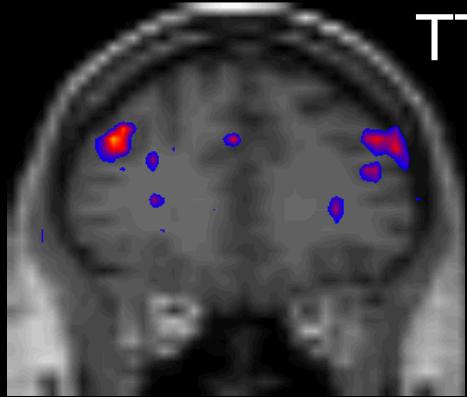
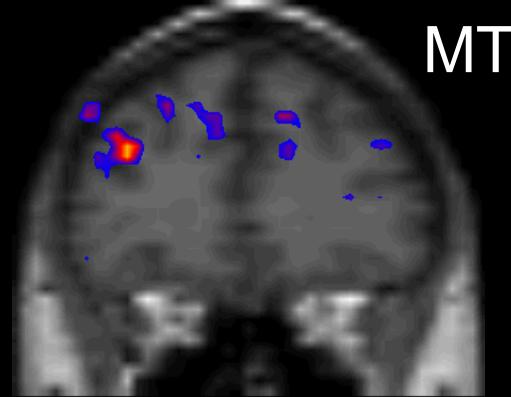
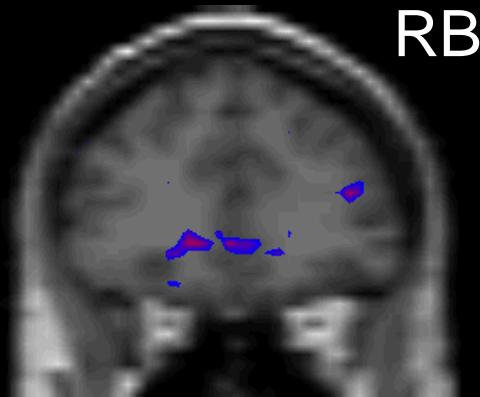
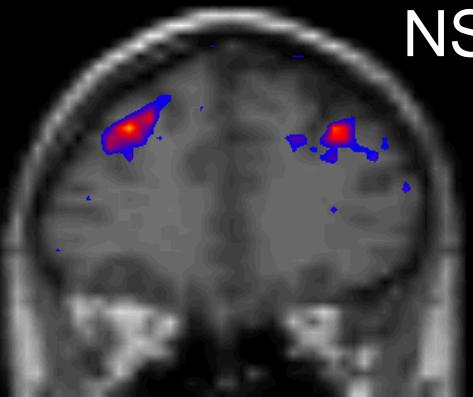
Whether EF gains are seen depends on the amount of time spent practicing, working on these skills, pushing oneself to improve.

Prefrontal cortex
(what I specialize in)
is over-rated.

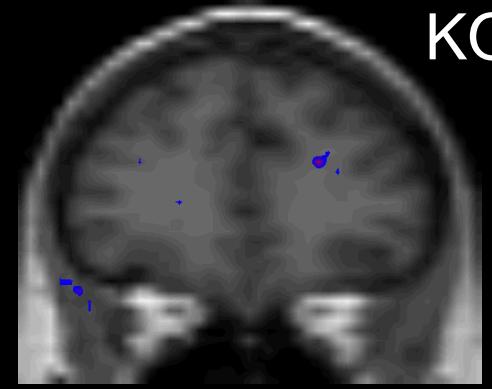
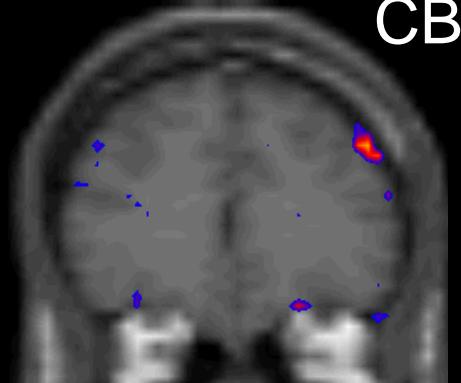
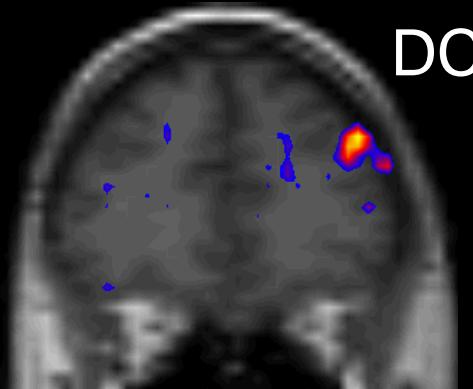
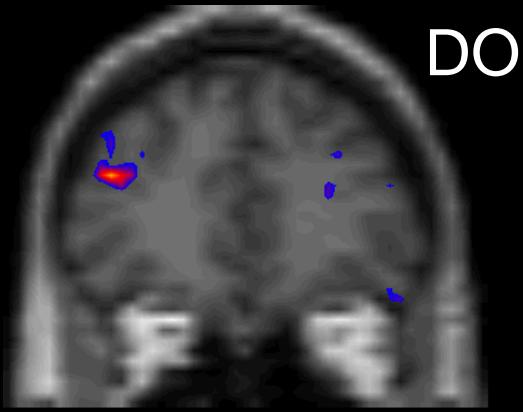


To learn something new, we need
prefrontal cortex.

But after something is no longer
new, persons who perform best
recruit prefrontal cortex *least*.



The DLPFC
Slice for
8 Individuals



When something is new, those who recruit PFC most, usually perform best.

(Duncan & Owen 2000, Poldrack et al. 2005)

**But when you are really good at it,
you are NOT using PFC.**

(Chein & Schneider 2005, Garavan et al. 2000,
Landau et al. 2007, Milham et al. 2003, Miller et
al. 2003)

Older brain regions have had far longer to perfect their functioning; they can subserve task performance ever so much more efficiently than can prefrontal cortex (PFC).

A child may know intellectually (at the level of PFC) that he shouldn't hit another, but in the heat of the moment if that knowledge has not become automatic (passed on from PFC to subcortical regions) the child hit another (though if asked, he knows he shouldn't do that).

knowing what one should do

vs.

2nd nature (automatic)

(i.e., NOT dependent on PFC)

The only way something becomes automatic (becomes passed off from PFC) is through action, repeated action.

Nothing else will do.

**“We are what we repeatedly do.
Excellence, then, is not an act, but a habit.**

We don’t act rightly because we have virtue or excellence, but we rather have these because we have acted rightly; these virtues are formed in a person by doing the actions;
we are what we repeatedly do.”

Aristotle, *Ethica Nicomachea*, 4th century BC

**How can someone practice
a skill he or she is not yet
capable of performing?**

The answer: Scaffolds

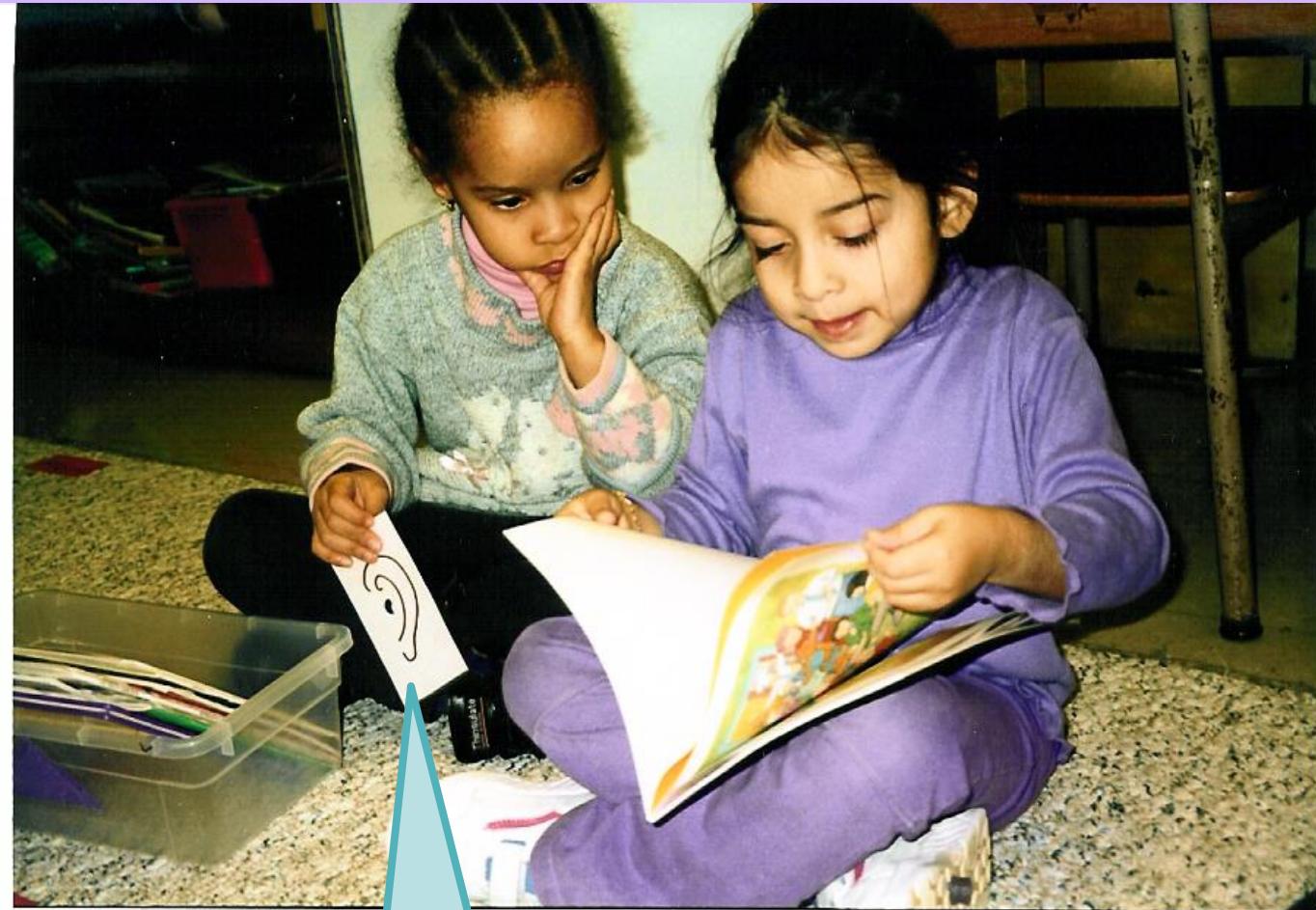


Scaffolds enable children to practice skills they would not otherwise be able to practice.





Buddy Reading



a scaffold

The Importance of ...Action for Learning

...Learn through Doing



Hands-on Learning

We evolved to be able to learn to help us act, to help us do what we needed to do.

If information is not relevant for action, we don't pay attention in the same way (hence the difference in route memory for the driver, versus the passenger, of a car).

You learn something when you NEED it for something you want to DO.

**(My son teaching me to program
the VCR)**

**The same is true when we teach
children in school. They need
opportunities to concretely
apply what they are taught.**

**We all know this, so why is
so much of schooling still
didactic instruction by the
teacher, rather than active
and hands on?**

The ancillary benefits of children being able to work on their own or in pairs or in small groups is that teachers can then give each child individual attention:

to observe, to listen, & to teach
(provide individual instruction)

And each child can progress at his or her own pace.

Almost any activity can be the way in, can be the means for disciplining the mind and enhancing resilience.

MANY activities not yet studied might well improve EFs.



It all depends on the spirit in which an activity is presented, the way one does the activity, and the amount of time spent doing it, pushing oneself to do better. The most important element is probably that the child really want to do it, so s/he will spend a lot of time at it. It's the discipline, the practice, that produces the benefits.

Might as well have children
do something they can put
their heart and soul into.

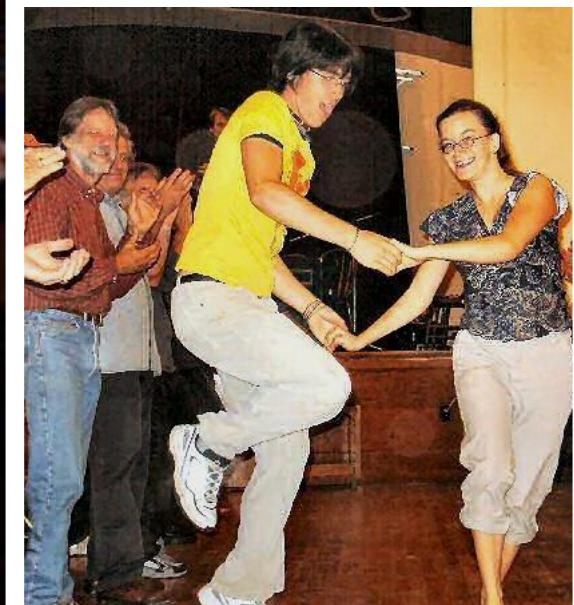






El Sistema Orchestra







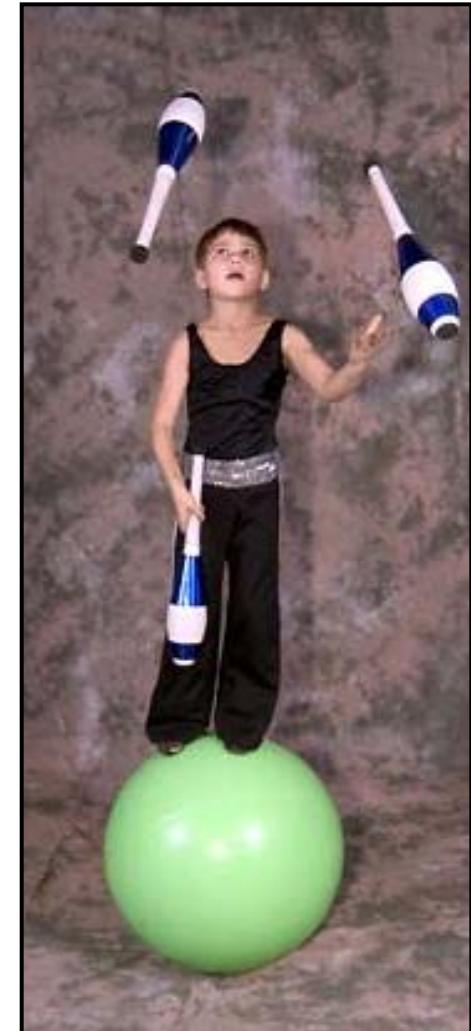
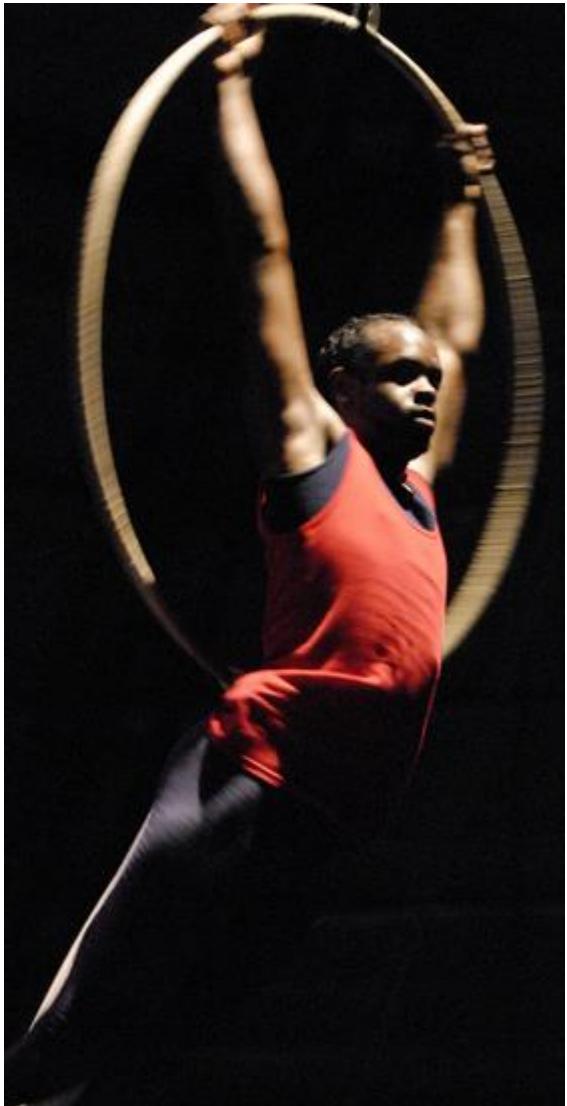
National Dance Institute



Provided free. It takes *all* children (even those in wheelchairs). Has reached over half a million children in some of the poorest areas.



Circus Arts





could be caring for an animal....





SERVICE ACTIVITIES

activities where the children are working to help
their community or people elsewhere

a goal larger than oneself --

helping children in Haiti, helping a
local family whose home burned
down, lobbying to get a new
playground for the neighborhood

**These are acts of caring and generosity,
They require forethought , planning, and
perseverance even in the face of setbacks,
creativity and flexibility when unexpected
obstacles or opportunities arise, and
putting into use what they've learned in school.**

**Each is a member of a group working toward
an important shared goal.**



For 10's of 1,000's of years, across *all* cultures, storytelling, dance, art, & play have been part of the human condition.

People in *all* cultures made music, sang, danced, and played games. There are good reasons why those activities have lasted so long and been found so ubiquitously.

Music-making, singing, dance, and play address our physical, cognitive, emotional, and social needs.

They

- challenge our executive functions,
- make us happy & proud,
- address our social needs, &
- help our bodies develop

Because they challenge EFs directly,
and indirectly support EFs by
increasing joy,
a sense of belonging, &
physical exercise,

I predict they should improve EFs.

(and we're hoping to get funding to test my prediction for
El Sistema Orchestra & for social, communal dance)

It has been shown repeatedly that aerobic exercise improves prefrontal cortex functioning and EFs.

I **predict** that social, communal dance should have an even greater beneficial effect because besides including aerobic exercise it also challenges EFs directly & addresses our social needs.

Dancing Makes You Smarter

Verghese et al. (2003) examined the relation between leisure-time cognitive activity or physical activity on the incidence of dementia. At the study's outset all participants were at least 75 years and dementia-free. Five years later.....

- **Reading or doing crossword puzzles was associated with 35% reduced risk of dementia.**
- **Almost none of the physical activities offered protection against dementia – except dance.**
- **Dance conferred the greatest risk reduction of any activity studied, cognitive or physical – a whopping 76% reduced risk of dementia.**

Circus

challenges one's executive functions;
have to concentrate & *stay focused*



Circus

builds community, learn to cooperate &
to trust others not to let you get hurt



Circus

develops physical skills (fitness, balance, coordination, strength, flexibility)



**Doing circus arts brings kids JOY
and builds their confidence, & sense of self-efficacy. They learn that with effort they
can succeed. (fail, then succeed, iteratively)**





**Children learn a work ethic
To get good you have to practice,
practice, practice.**

**And that through effort what
looked impossible becomes
possible, even easy.**

to recap:

'Executive Functions' are
needed for the top-down control
of behavior in the service of a
goal.

EFs are needed whenever going
'on automatic' would be
insufficient or detrimental.

Executive Functions (reasoning, creative problem-solving, self-control, discipline, attentional control) are critically important for school success throughout all the school years.

Improving EFs improves Academic Outcomes

“Brain-based” does NOT mean immutable or unchangeable.

Experience and activity change the brain.

**EFs depend on the brain --
but they can be improved
by the proper activities**



- The importance of repeated practice.

The only way something becomes automatic (becomes passed off from PFC) is through practice, repeated practice.

Nothing else will do.

“We are what we repeatedly do.”

Aristotle

- Scaffolds can help someone practice a skill that he or she could not perform unaided.

We are not just intellects,
we also have emotions
social needs
& bodies.



The different parts of the human being are fundamentally interrelated.

Each part (cognitive, spiritual, social, emotional, & physical) probably develops best when no part is neglected.

Diamond, 2000

Our brains work better, and we have better EFs, when

- **we're not stressed or sad**
- **we're not feeling lonely or isolated**
- **we're physically fit**



If we ignore that a child is stressed, lonely, or not healthy because of poor nutrition, lack of sleep or lack of exercise those unmet needs will work against achievement of our academic goals for our children.

LISTEN

- Children need to feel understood and heard.
- They need to feel loved - that you care about them.
- Slow down & take time to listen with your undivided, complete attention. Don't rush to try to problem-solve or suggest solutions.
Listen. Let the solutions emerge from the child. When we try to fix others, we focus on what's wrong with them, instead of trusting their strengths and potential.

RELAX

- You don't have to be perfect, & worrying about it won't help.
- You are going to make mistakes & that's okay.
- It's okay to be wrong. Imperfect ≠ worthless.
- If you're stressed you can't be the parent you want to be.
- If you're stressed, your children will be stressed.

- What nourishes the human spirit may also be best for Executive Functions.
Perhaps we can learn something from the traditional practices of people across many cultures & 1,000's of years.
- The arts, play, and physical activity may be critical for achieving the outcomes we all want for our children.

*thank you for
your attention*





Claudia Paige David Cecil Joel Kaye Adele Holly Jeanette Rose



Kiera

Eva

Yvette

Sarah

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