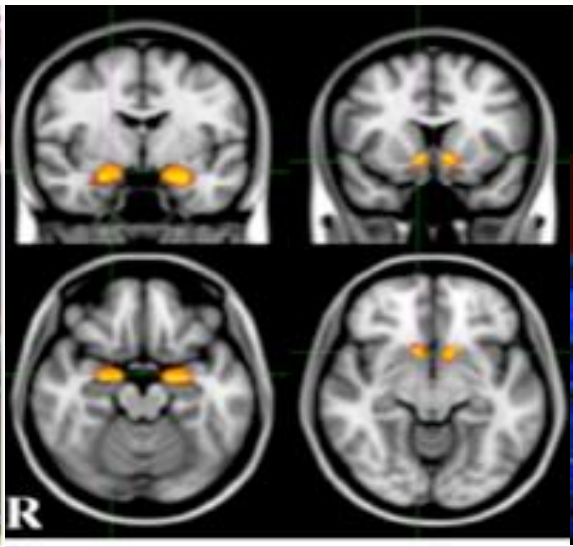


The Developmental Science of Adolescence: Implications for Health, Education, and Social Policy

Ron Dahl

Institute of Human Development
& School of Public Health UC Berkeley

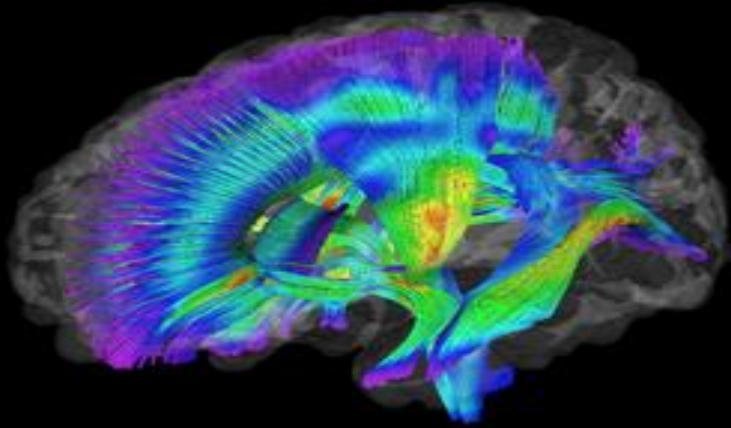


Overview

Just as early brain development is a dynamic period of vulnerabilities and opportunities, ***adolescence represents a second foundational period of rapid growth, dynamic change and a sensitive period of social/emotional learning and identity development***

Rapid progress in understanding these dynamic developmental changes in adolescence is providing ***actionable insights***—in ways that can inform ***innovative strategies for targeted positive impact***

Particularly compelling issue: ***digital technology as increasingly dominant context in which social learning is occurring*** as 1.5 billion adolescents are coming of age (globally) in the next decade



(Integrative) Developmental Science

developmental neuroscience (*integrated with:*) developmental psychology, education, science of learning, genetics, public health, and social, clinical, affective and implementation sciences...



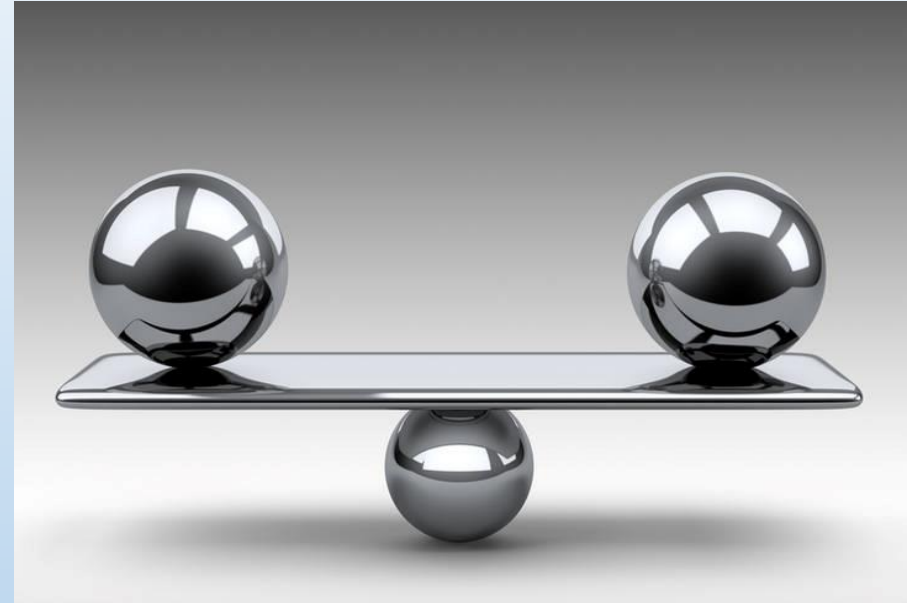
The (Integrative) Developmental Science Adolescence

Leveraging insights to improve real world trajectories (health, education, social, economic)

Particular focus on transition from childhood into adolescence

Focus on pubertal changes in social and affective processing:

window of opportunity relevant to identity development, social value, 'mattering'



Developmental Science of Adolescence:

ONSET OF PUBERTY begins a perfect storm of *interacting* levels of change...

Rapid physical growth; the activation of new drives and motivations;

Sex-specific changes in facial structure, voice, and body characteristics;

Changes in sleep and circadian regulation; metabolic changes;

Wide array of cognitive and affective changes;

Profound changes in social motivations, social context and social roles

Biological/ Neurodevelopment/ Behavioral/ Peer/ Family/ School/ Culture/ Media....

...and figuring out how to relate to the world, and yourself, as a suddenly and mystifyingly sexual being...



Dark Side of Spiraling Interactions: The Health Paradox of Adolescence

Adolescence is (physically) the healthiest period of the lifespan: beyond the frailties of infancy and childhood and prior to adult declines

Improvements in strength, speed, reaction time, reasoning abilities, immune function ...increased resistance to cold, heat, hunger, dehydration, and most types of injury ...

Yet: overall morbidity and mortality rates *increase*
> 200-300% from childhood to late adolescence

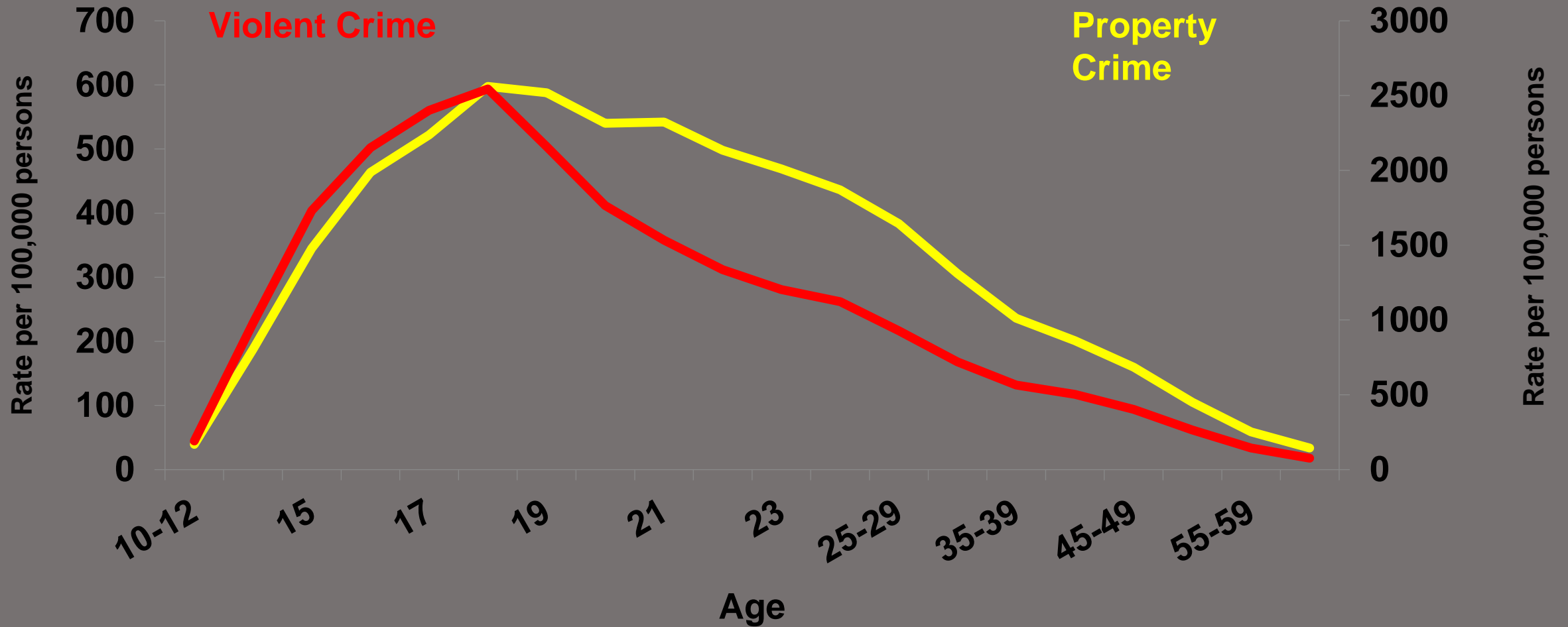
Morbidity & Mortality in Adolescence:

Primary sources of death/disability are related to **problems with control of behavior and emotion**

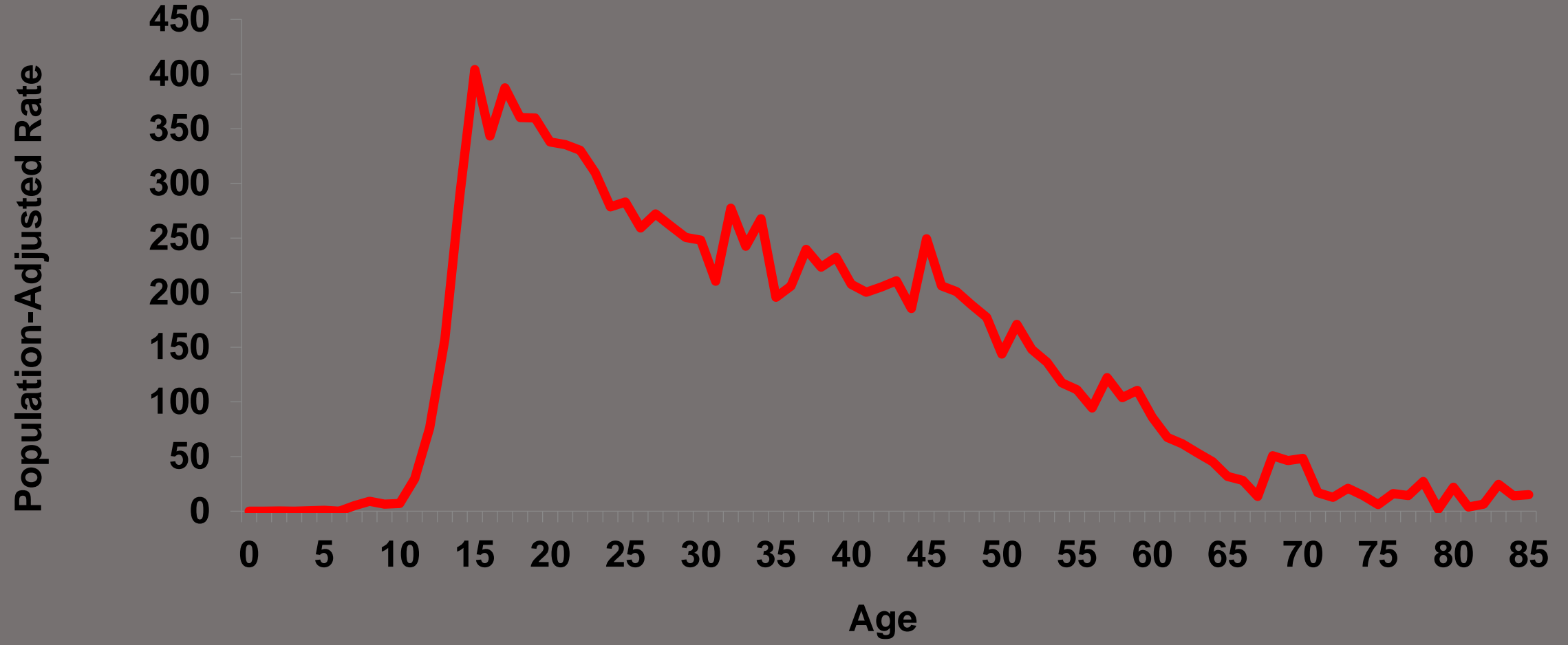
Increasing rates of accidents, suicide, homicide, depression, alcohol & substance use, violence, reckless behaviors, eating disorders, STDs, health problems related to risky sexual behaviors, obesity...



Crime

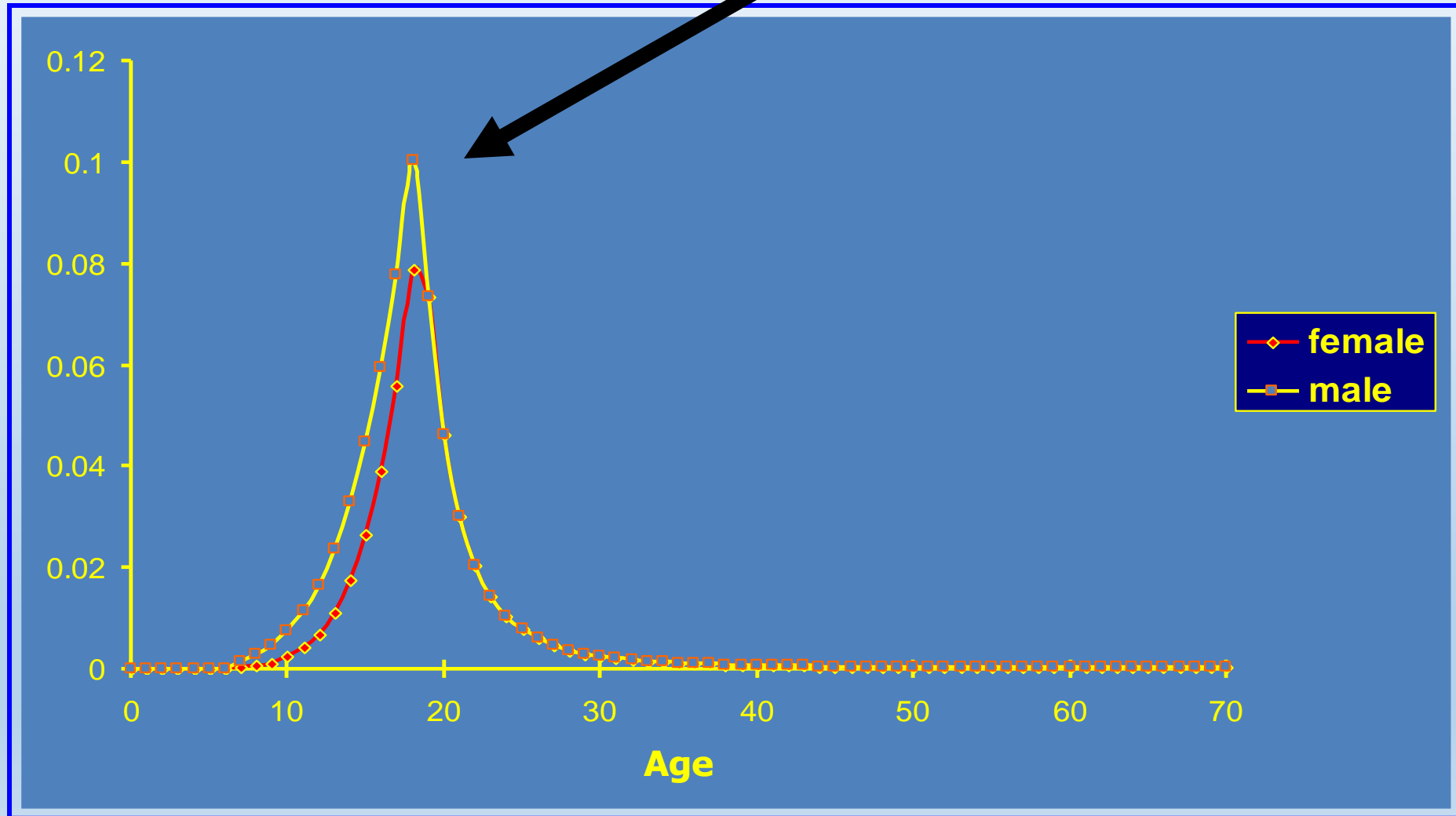


Non-Fatal Self-Inflicted Injuries



Adolescence: an inflection-point in life course trajectory

● **Probability of Smoking Initiation**



Behaviors, habits, and proclivities with long-term health (lifetime) consequences

Inflection point for negative trajectories for health, educational, economic, and social success....

“ 5th grade slump and the 8th grade cliff...”

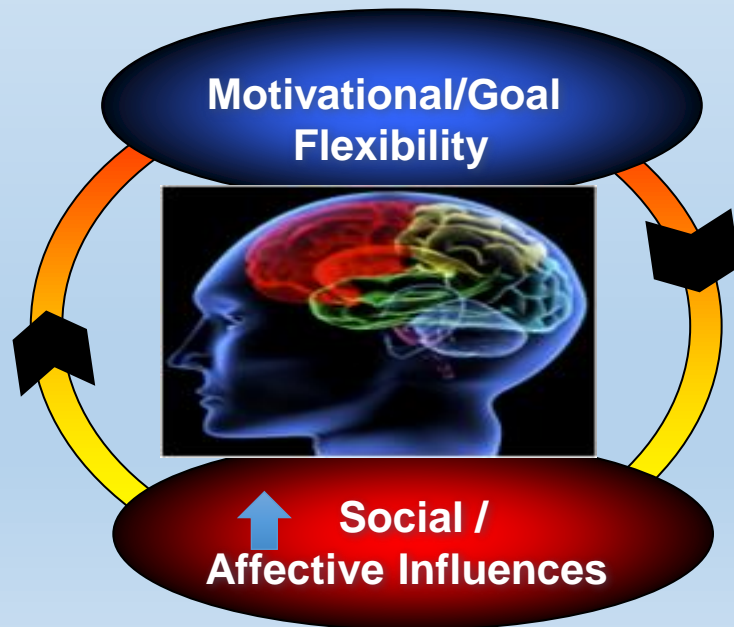


The Light Side: Adolescence as a Perfect Storm of Opportunities

Learning/ Exploration/ Acquiring Knowledge & Skills/ Habits/ Identity formation
Intrinsic Motivations/ Values/ Attitudes/ Heartfelt Goals & Priorities

Transdisciplinary Developmental Science:
unique opportunities for leveraging positive change

Inflection Points: Upward Trajectories



Early Brain Development (first 1000 days):

Enormous Positive Impact: Global focus on women/infants/young children.

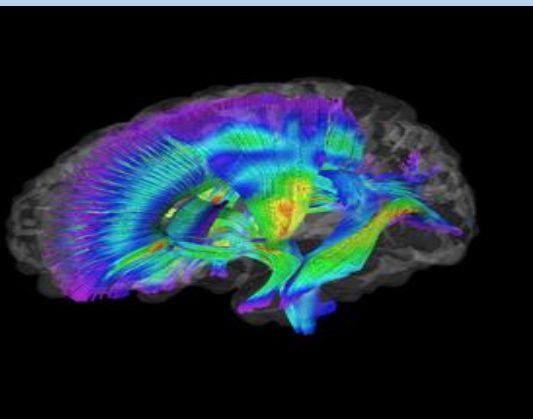
**High-Stakes Pivotal Transition from Childhood into Adolescence
(puberty, ages 10-14) as a second window of opportunity
Balance of Neural Stability and Plasticity**

Transdisciplinary Team Developmental Science:

Deeper understanding of mechanisms, developmental processes, trajectories

Modifiable factors (timing, targets, inflection points)

Matching (early) interventions to optimal developmental windows
(Developmental) Precision Public Health + **AFFECTIVE learning**



nature

International journal of science

Perspective | Published: 21 February 2018

Importance of investing in adolescence from a developmental science perspective

Ronald E. Dahl, Nicholas B. Allen , Linda Wilbrecht & Ahna Ballonoff Suleiman

Nature **554**, 441–450 (22 February 2018) | [Download Citation](#) 

Developing Adolescent Brains

Very well adapted for the tasks and challenges of adolescence

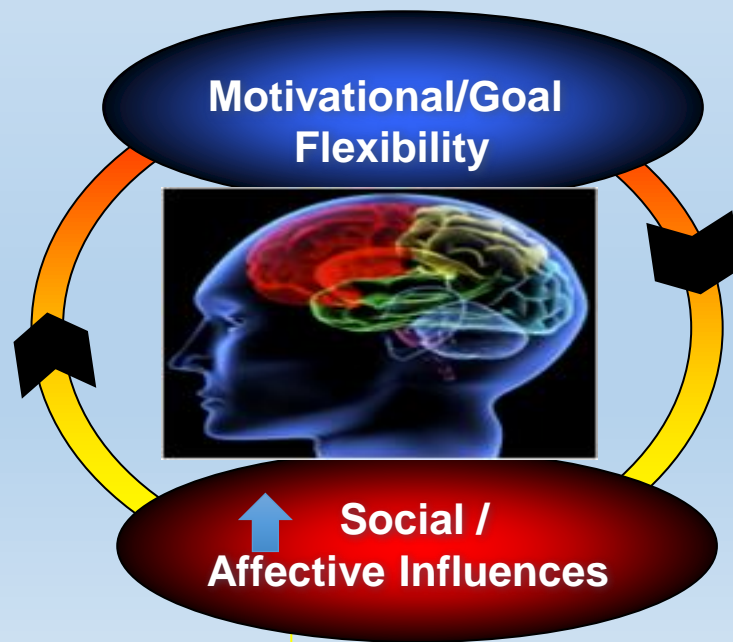
Unique *opportunities* for social, emotional, & motivational learning

Sensation-seeking, social motivation, and **sensitivity to social evaluation.**

Learning to navigate emotionally charged social relationships

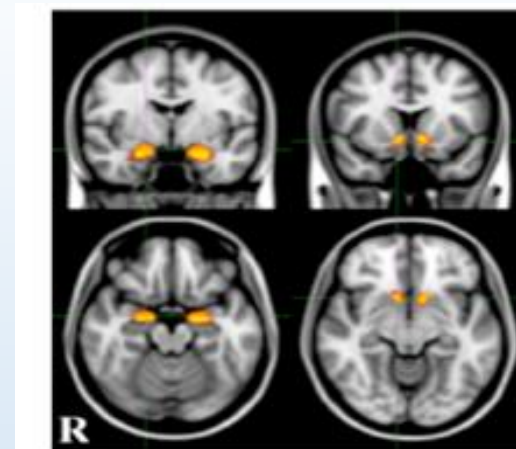
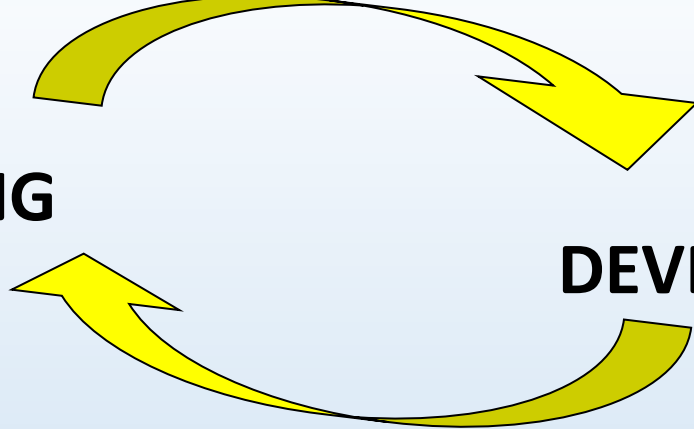
Affective Learning:

- Learning to calibrate complex social and emotional 'valuing' systems
- Learning that underpins *heartfelt goals, priorities...*



LEARNING

BRAIN
DEVELOPMENT

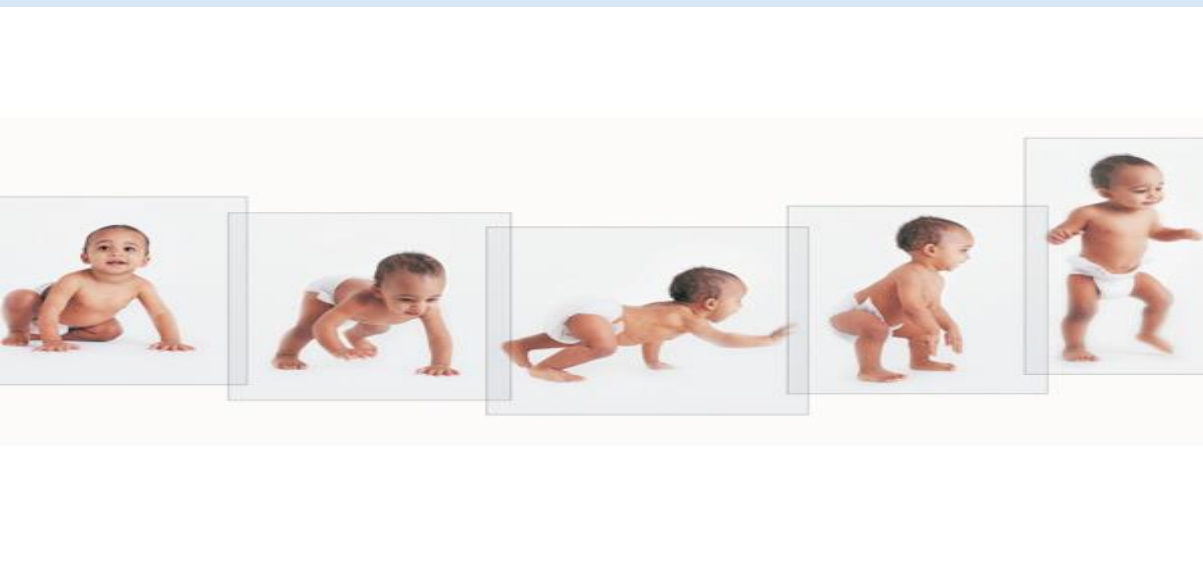


From infancy through adolescence, learning and brain development are inextricably intertwined.

Learning requires information *and* experience. ***The process of receiving, responding to, and interacting with particular kinds of information drives brain development. And vice versa.***

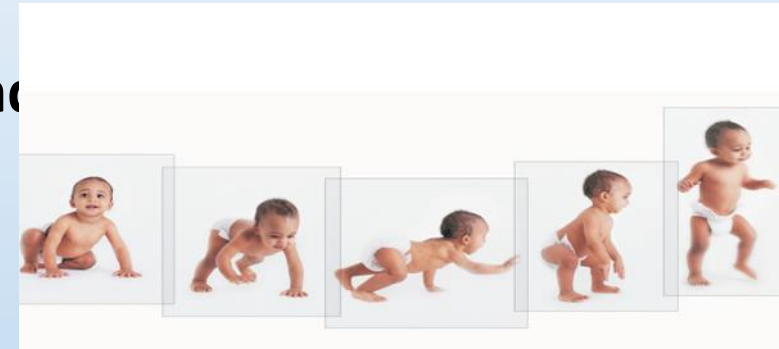
Emphasis on understanding the family, social, economic and cultural contexts that ***actively shape learning and development***

Social Relationships....



How young children learn (expertly) to:
walk, talk, control their eyes, recognize familiar
faces, read emotion in faces: **Practice**

- Toddler learning to walk takes 14,000 steps (46 football fields) and incurs 100 falls per day. ([Adolph et al 2012](#))
- By 2 months, infants have executed more than 2.5 million eye movements ([Johnson et al 2003](#)).
- By 2 years of age: recognizing faces...emotional faces
- **Patterns of neural connection are shaped by:
patterns of behavior—practice, practice, practice**



What is the developing adolescent brain ready and 'wanting' to learn'?



Puberty as a bio-behavioral activation of socio-affective changes

- A natural inclination to like novelty and exploration?
 - Cross species data & evolutionary perspective
 - Individual differences & social context effects
- ***Increased sensation-seeking***
- ***Increased sensitivity to social evaluation (positive and negative)***
- ***Increased motivational salience of prestige, status, respect***
- ***Amplified salience of “social value”***

***I've learned that people will forget what you said,
people will forget what you did,
but people will never forget
how you made them feel.***

—Maya Angelou



***We search on our journeys,
for a self to be,
for other selves to love
and work to do.***

— Frederick Buechner

In adolescence, we are discovering—through a series of trials and errors, successes and failures, and with growing independence—who we are, within a larger ‘adult’ social context.

The *particular* social learning experiences can have a huge impact on our identity development—and our *heartfelt goals & values*



Social, Emotional & Motivational Learning

Social relationships, early-adult identity formation...
self/other (individual and social identity)

PEERS... yes, and...

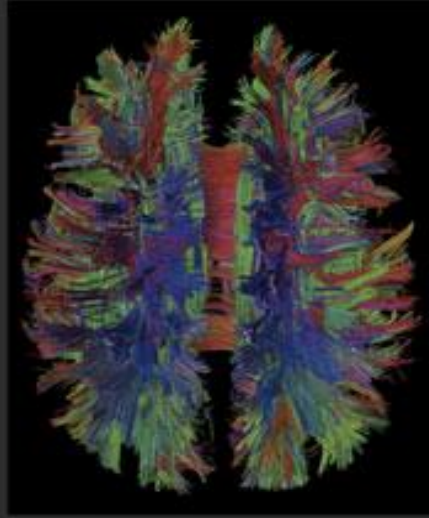
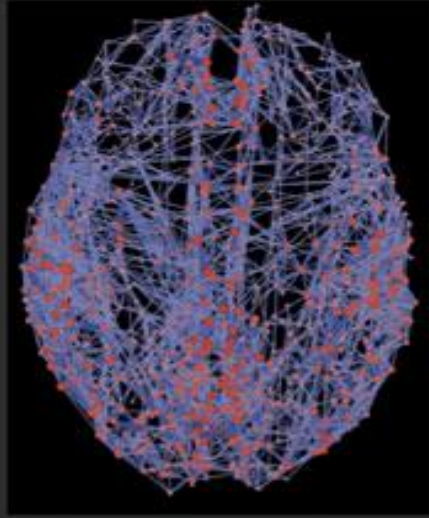
community, culture..

Belonging and feeling valued

Meaning, purpose, valued contributions...



The Human Connectome

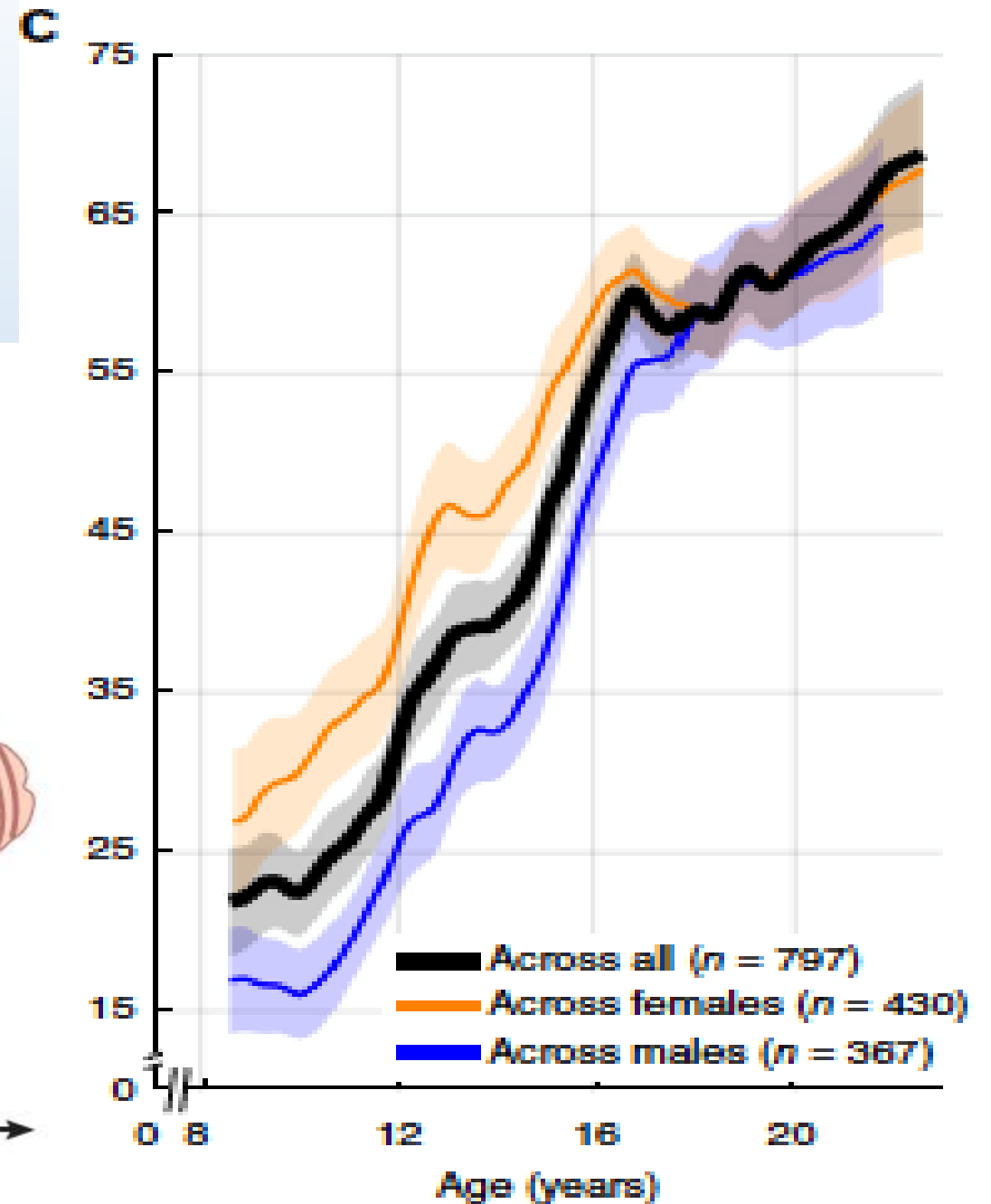
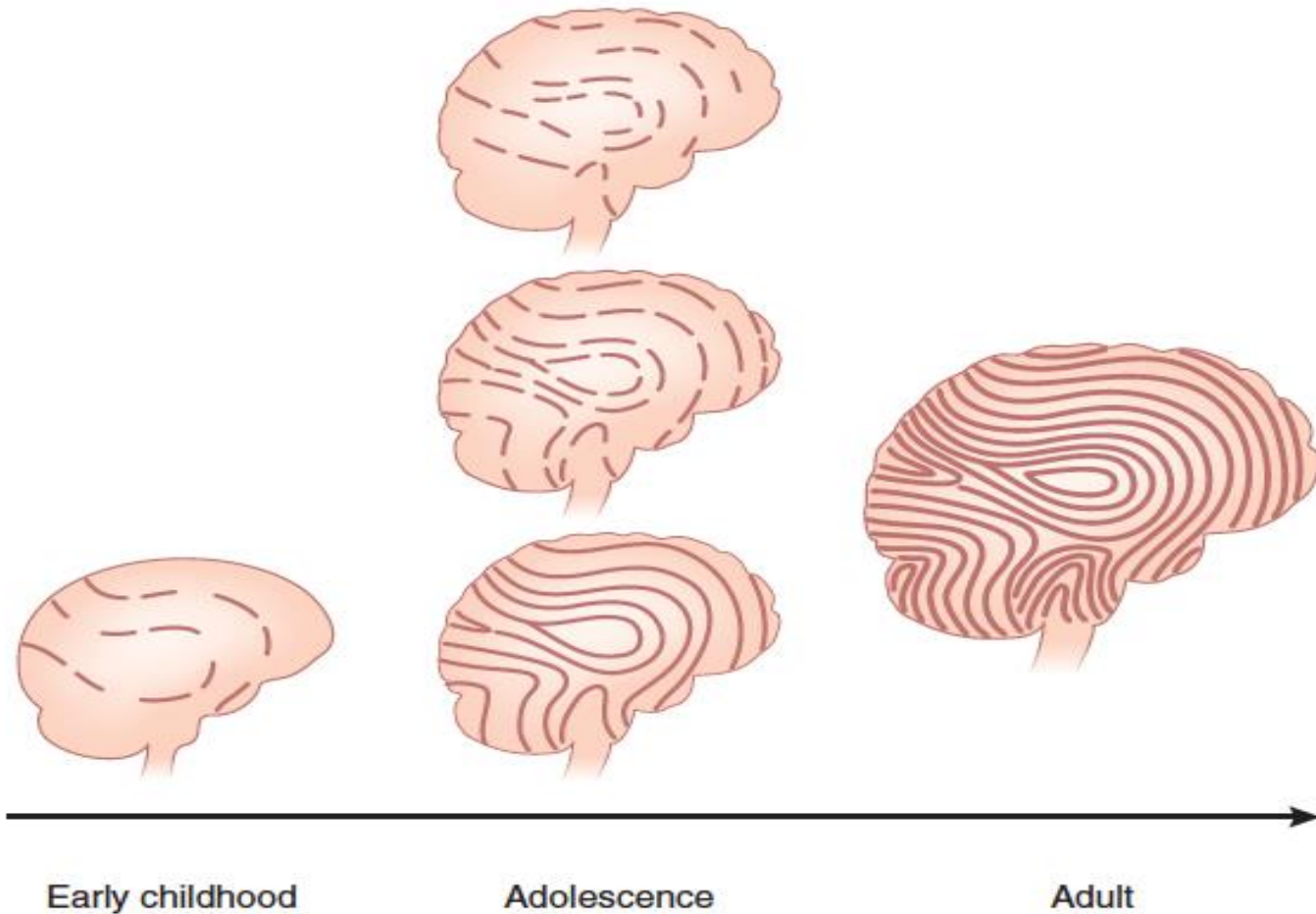


**Connectome—like a fingerprint—
an individualized pattern of
connections that
make us distinct from one
another**



Developing Connectome Distinctiveness

Kaufmann et al 2017 Nature Neuroscience

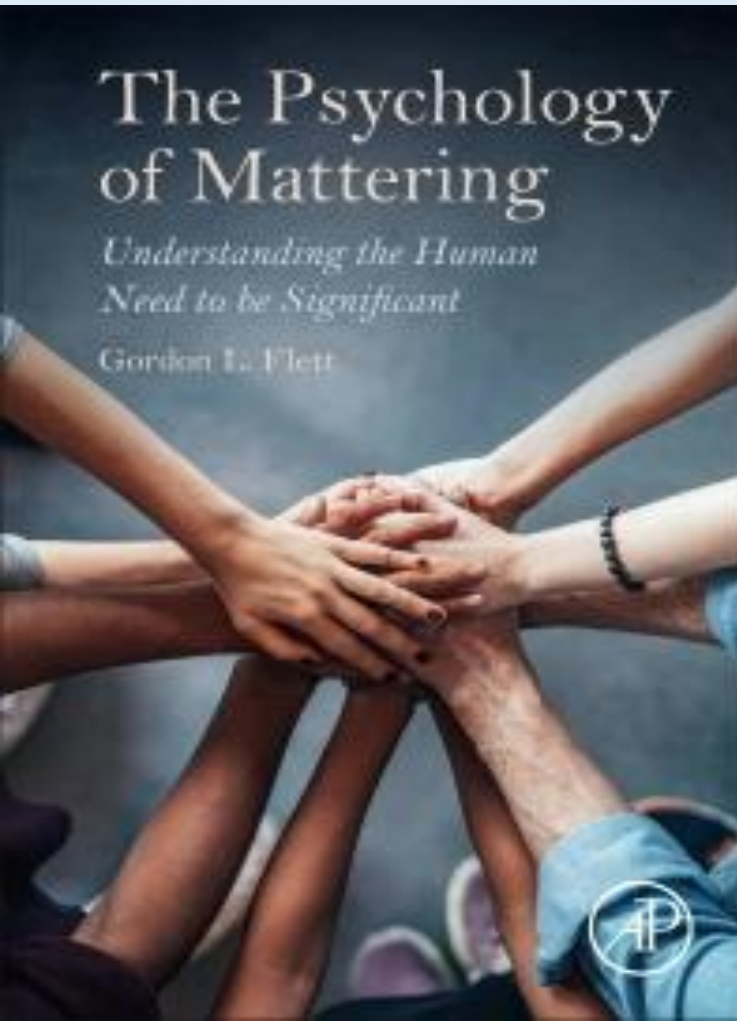


Pubertal changes in sensation-seeking, prestige-seeking, and gaining social value (mattering)

Longer period of social, emotional & identity development
(*acquired* individual differences in heartfelt goals and priorities)



When Mattering (really) Matters: *A Developmental Science Perspective on Social Value Sensitivity in Adolescence*



Sensation & status seeking
Earned prestige and contribution value
Mattering by doing things matter...





A perfect storm? ...of opportunity?

1.5 Billion youth globally,
Many with bleak economic prospects ...
Exploitation of youth...
Radicalization of youth...
Social inequalities increasingly evident..

*Access to all the world's information,
education, social networking...*

Youth as early adopters, innovators.

Youth as soon-to-be parents of next generation

Youth as idealists, caring about making the world
a better place..

Entrepreneurial youth as economic engines...



