# The Latest Findings on ADHD—Especially Girls and Women

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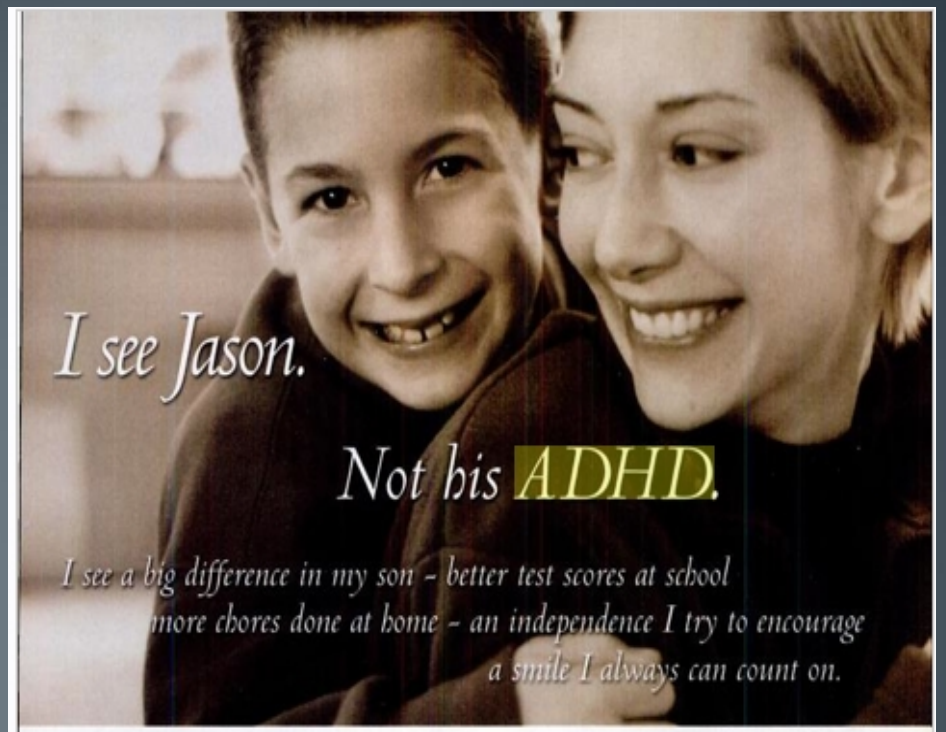
The Help Group
October 13, 2017

# Controversies/Myths

- **How** many times have you heard…
  - **Everyone's diagnosed these days**
  - **It's all about bad schools…or permissive parents**
  - **Medications poison children's minds…we should never use them for behavior control**
- Aim: Explore myths and replace with facts
  - **Still, when the topic is kids/adults who 'misbehave'—and when there are no objective markers (as with all mental disorders)—there will always be controversy**
- Start with ads, and fair use--




If your child has been diagnosed with ADHD, talk to your doctor about your choices of medication.
Medical studies support the unique benefits of **CONCERTA®**

- ☑ **96% of patients did not report loss of appetite or sleep**
- ☑ **Higher scores when solving math problems and an overall improved classroom focus**
- ☑ **Fewer conflicts among adolescents with family members and friends**
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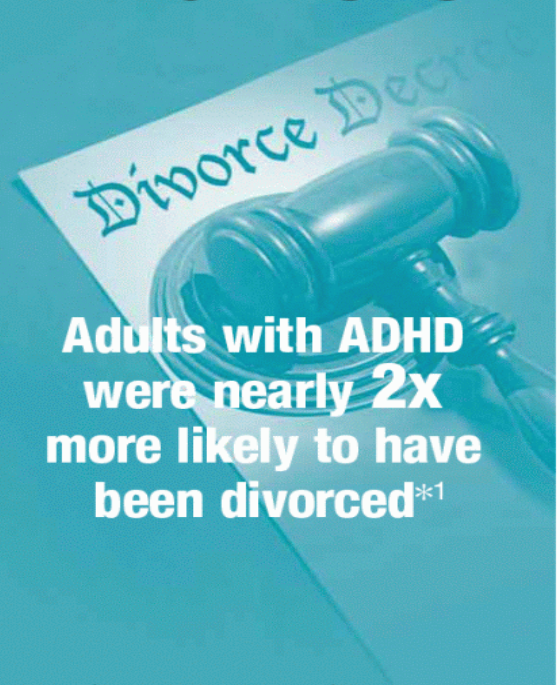
# BROKEN PROMISES




**Adults with ADHD were nearly 2x more likely to have been divorced*1**

**The consequences may be serious.**
**Screen for ADHD.**

Find out more at
**www.consequencesofadhd.com**
and download patient support materials,
coupons, and adult screening tools.

*Results from a population survey of 500 ADHD adults and 501 gender- and age-matched non-ADHD adults which investigated characteristics of ADHD and its impact on education, employment, socialization, and personal outlook.

Reference: 1. Biederman J, Faraone SV, Spencer TJ, et al. Functional impairments in adults with self-reports of diagnosed ADHD: a controlled study of 1001 adults in the community. *J Clin Psychiatry*. 2006;67:524-540.

Shire

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...your ADHD Support Company™

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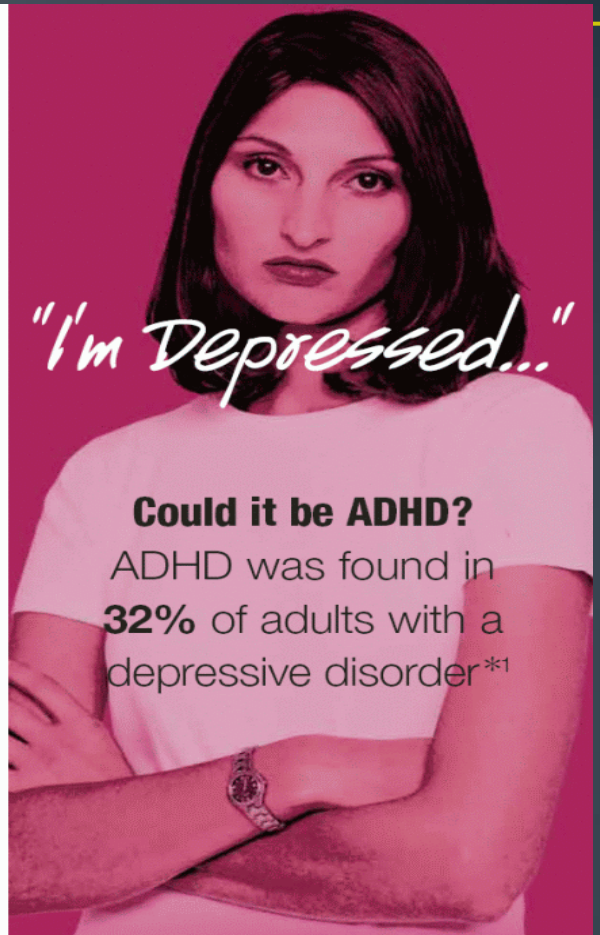


**Could it be ADHD?**
ADHD was found in
**32%** of adults with a
depressive disorder*1

**Look for ADHD in patients who present with depression.**

Visit **www.depressionandadhd.com**
for patient education kits
and adult screening tools.

*From a retrospective survey assessing the prevalence, comorbidity, and impairment of adult ADHD in 3199 adults, age 18 to 44. Depressive disorder includes major depressive disorder and dysthymia.

Reference 1. Kessler RC, Adler L, Barkley R, et al. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. *Am J Psychiatry*. 2006;163:716-723.

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# How's it defined?

- Two main domains of behaviors/symptoms
  - Inattention/Disorganization
  - Hyperactivity/Impulsivity
- Nine symptoms in each domain
  - Developmentally extreme and impairing levels, not explained by clear medical issues or severe deprivation, may warrant diagnosis
- Diagnosis of types/presentations:
  - Inattentive
  - Hyperactive/Impulsive
  - Combined

# Impairment

- Academic (school failure)/Vocational
  - $100 billion/year  (youth) indirect costs (justice, sp. ed, SUD)
  - $200 billion annually (adults) indirect costs (job problems)
- Social/peer (most peer-rejected condition)
- Family (reciprocal chains of bidirectional influences)
- Accidental injury (across the age span)

# Key Issues

- Clearly a syndrome, not a disorder: No single cause
- Sex differences: 2.5 or 3:1
  - Generally true for all neurodevelopmental conditions
  - By adulthood, closer to 1:1, even in general population
- Remarkably consistent prevalence, worldwide
  - In nations with compulsory education
  - Exceptions: US, Israel (stay tuned)

# DSM-5 vs. RDoC

- DSM-5 changes:
  - Neurodevelopmental disorder
  - Types (Inattentive, HI, Combined) now 'presentations'
  - Adult examples of most symptoms (and only 5 symptoms per domain)
  - Age of onset of impairing symptoms: < 12 years, not < 7
  - **Each successive edition of DSM has loosened criteria somewhat
    - One reason for "ADHD explosion"
- NIMH Research Domains Criteria
  - Dimensional, multiple levels (genes to culture)
  - Search for underlying mechanisms
- Moral: Disorders don't fit into neat 'boxes'
  - Everyone on a spectrum

# Nature of ADHD: Models

- *Key: Huge variability among/within individuals with ADHD
  - Inconsistency a major theme

- 1. “Attention” models

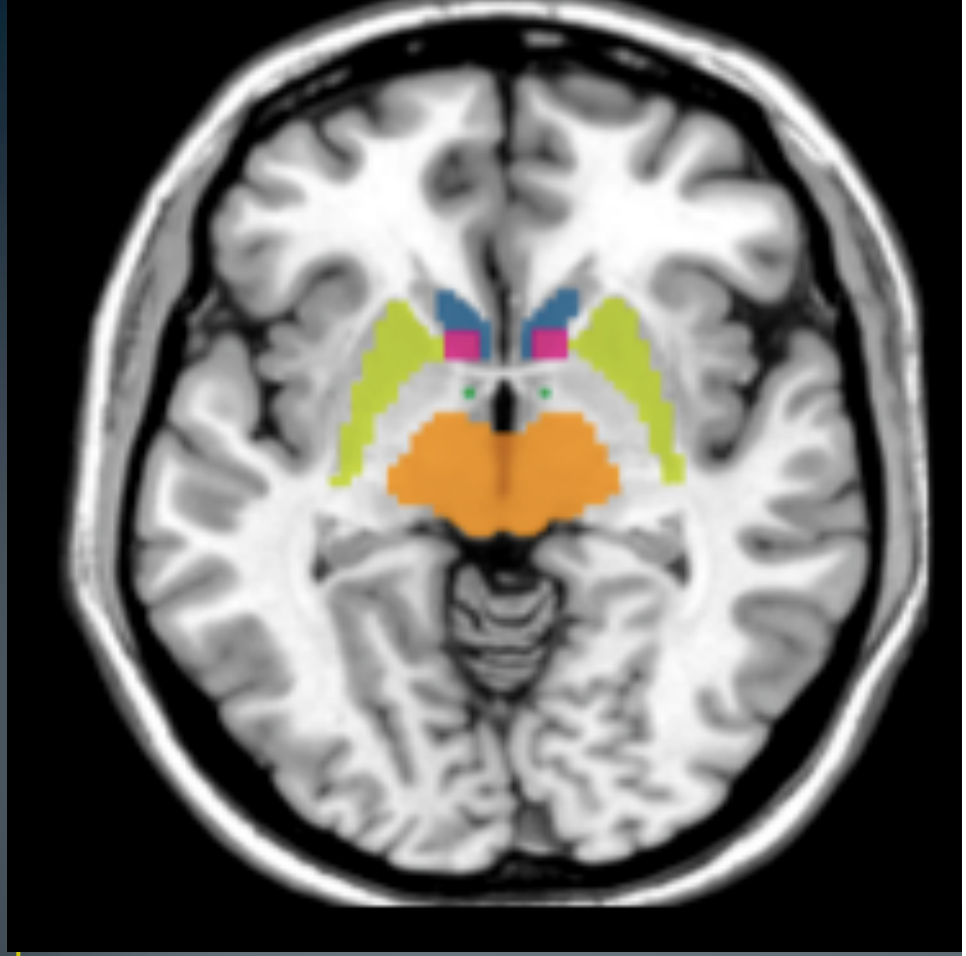
  - But which form(s) of attention?
    - Sustained/selective/capacity
  - And ADHD is less about ‘deficient attention’ than ‘dysregulated’ attention
    - E.g., video games/hyperfocus?

# Models/Mechanisms #2

- 2. “EF” models:
  - Executive functions include
    - Planning
    - Interference control
    - Working memory
    - Error correction
  - Major issue: Not specific to ADHD; some who have ‘real’ ADHD do not show major EF deficits

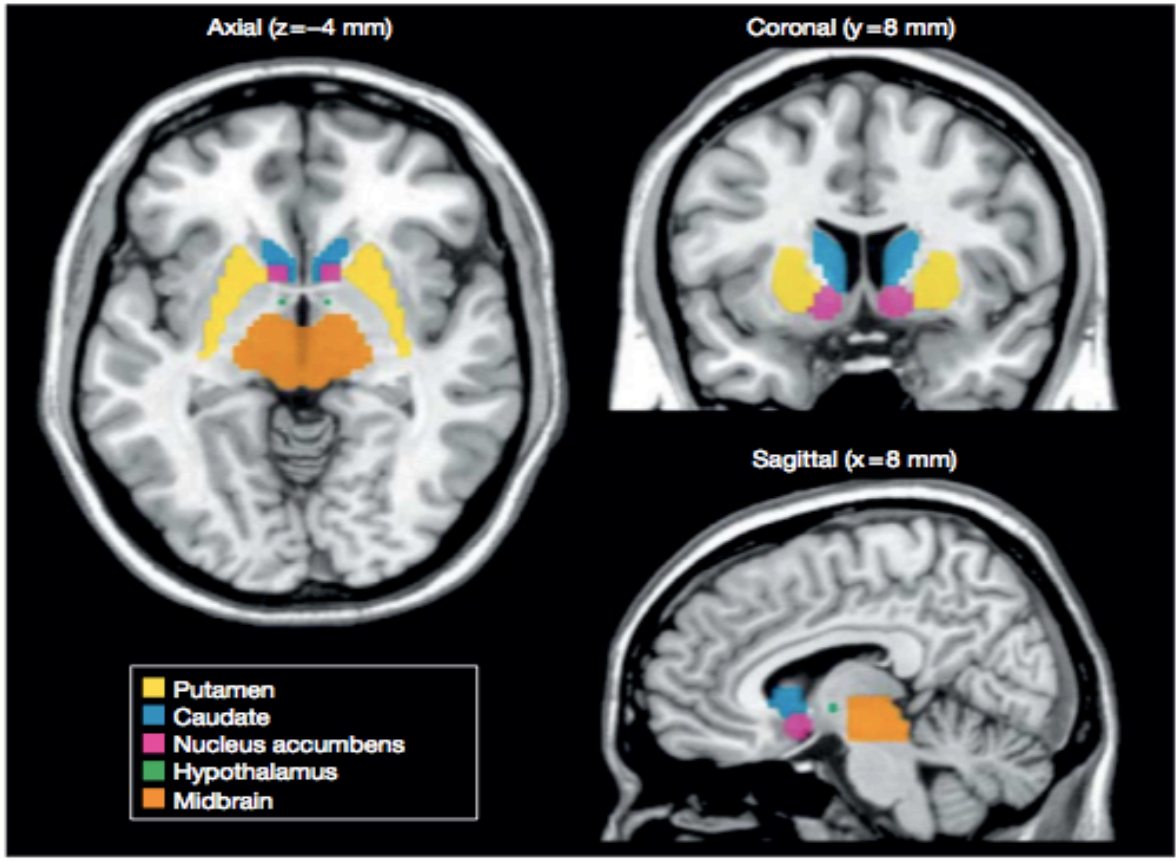
# Models/Mechanisms #3

- 3. “Inhibition” models
  - Barkley’s theory
  - But is response inhibition actually an EF?
- 4. “Motivation” models: Reward undersensitivity; delay aversion
  - See Volkow et al. (2009): large medication-naïve adult sample, PET scans



Transporter PET Image

**Figure 1.** Regions of Interest Used to Extract the $D_2$ / $D_3$ Receptor and Dopamine Transporter Measures

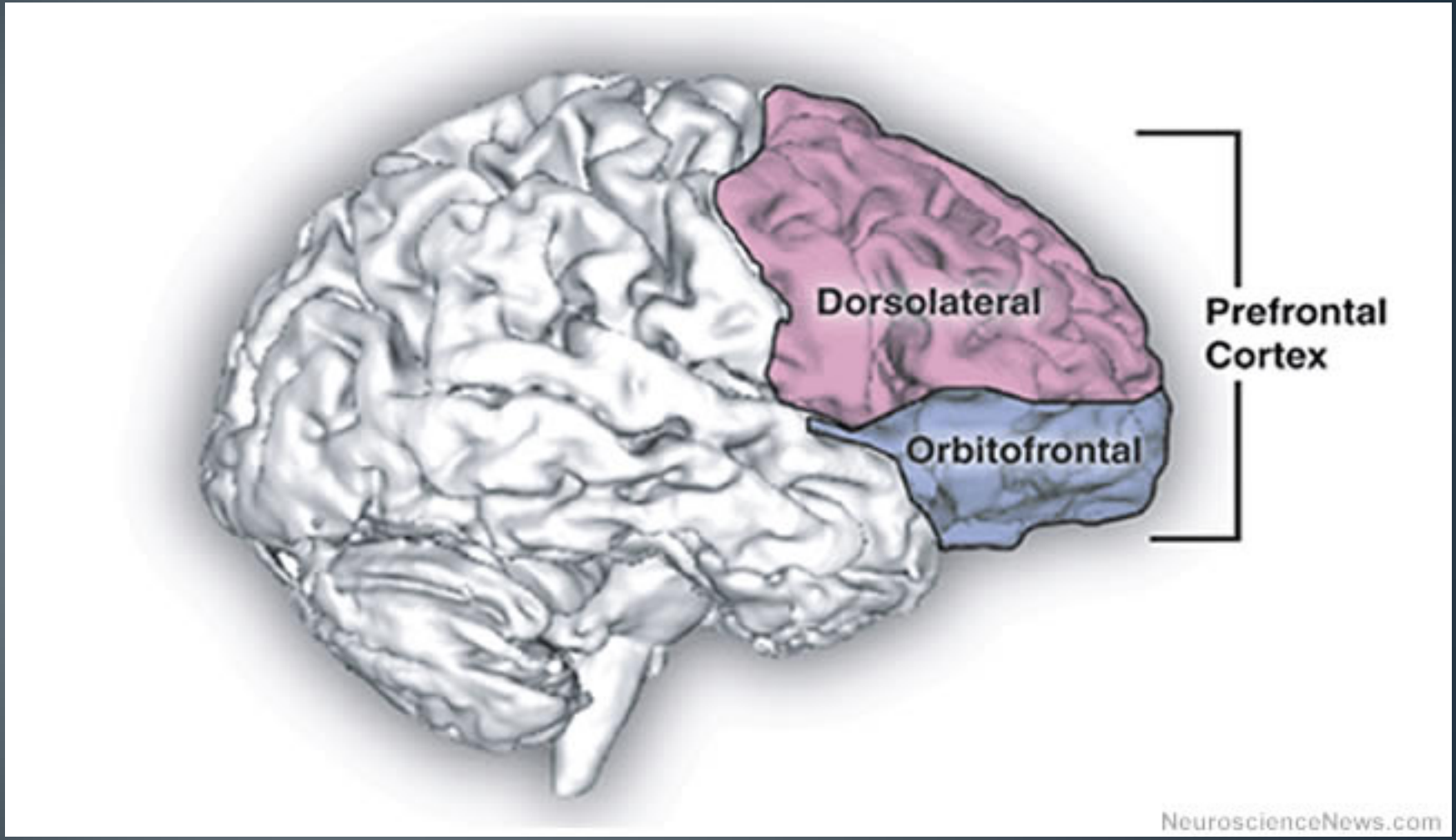



The regions of interest for the midbrain are obtained in several planes, and the shadow is projected to the axial image shown in the figure, which explains why the third ventricle is covered by the region. The x coordinate maps the left-right position; the y coordinate, the anterior-posterior position; and the z coordinate, the superior-inferior position

| | | | | | |
|---|---|---|---|---|---|
| Dopamine transporter | | | | | |
| Accumbens (Motivation) | .71 (0.16) | 0.63 (0.11) | 0.59 | 0.03 to 0.13 | .004 |
| Caudate (Attention) | .66 (0.23) | 0.53 (0.19) | 0.62 | 0.04 to 0.22 | .003 |
| Midbrain | 0.16 (0.10) | 0.09 (0.11) | 0.66 | 0.03 to 0.12 | <.001 |
| Hypothalamic region | –0.01 (0.10) | –0.05 (0.12) | 0.36 | –0.01 to 0.09 | .08 |

# Combination Models

- For example, Sonuga-Barke et al. (2010):
  - Top-down executive control
  - Bottom-up delay aversion
  - Time management
- ADHD clearly implicates multiple brain regions and paths for different facets of symptomatology

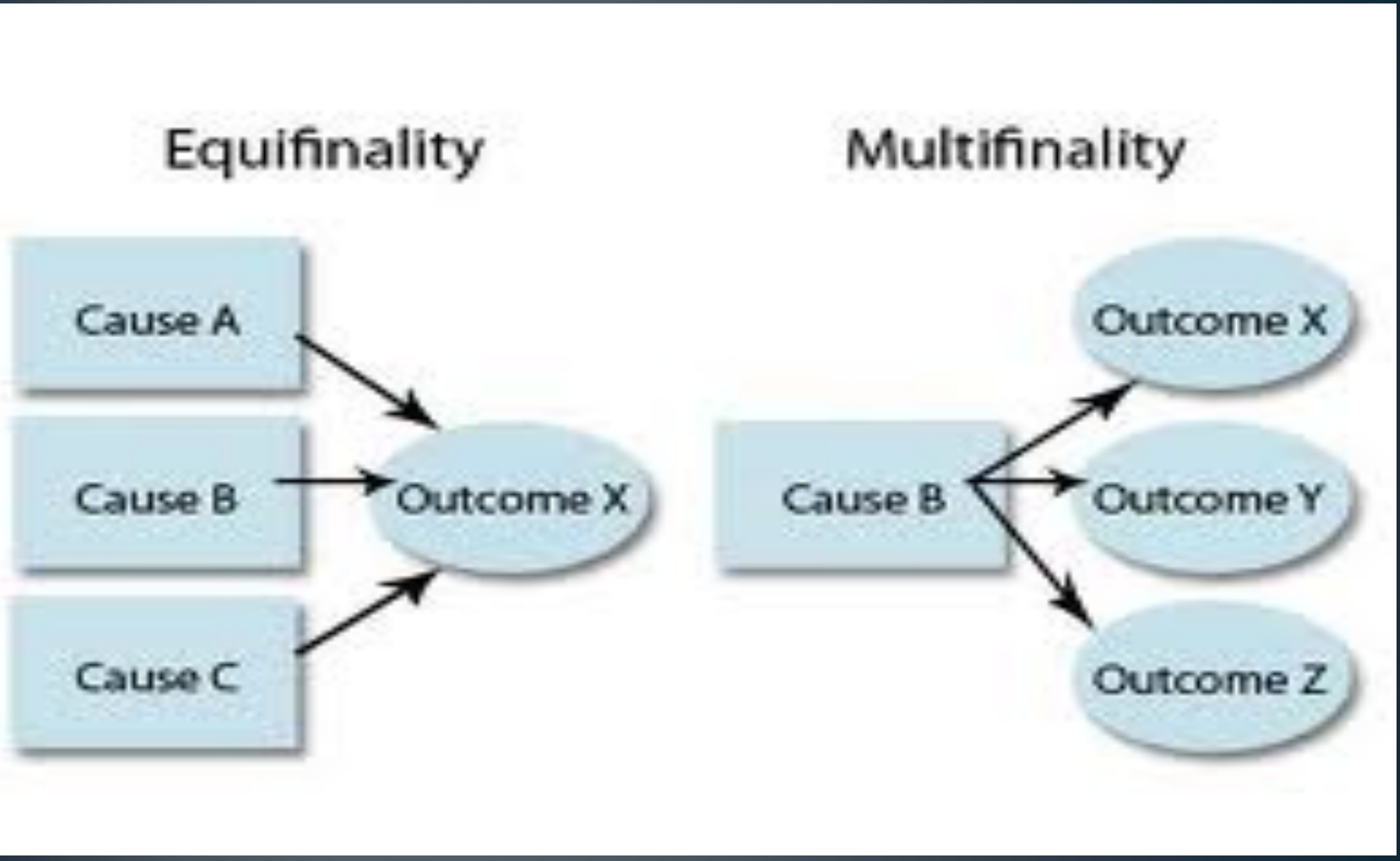

Dorsolateral
Orbitofrontal
Prefrontal
Cortex
NeuroscienceNews.com

# Neural profiles

- Key research: Shaw et al. (2006, 2007, 2009, 2012)
  - Delayed patterns of cortical thickening/thinning in ADHD vs. comparison samples, longitudinally
  - Roughly 3+ year delay for ADHD groups: Immaturity come to life
  - Immaturity persists; thickness correlated with symptoms
- Functional: Frontal-striatal paths
  - Until recently: must 'scan' during active cognitive performance
  - Default mode: reliable differences when S's not 'doing anything'; more 'intrusions' into task performance in ADHD
    - ADHD "occurs" within multiple brain areas and tracts

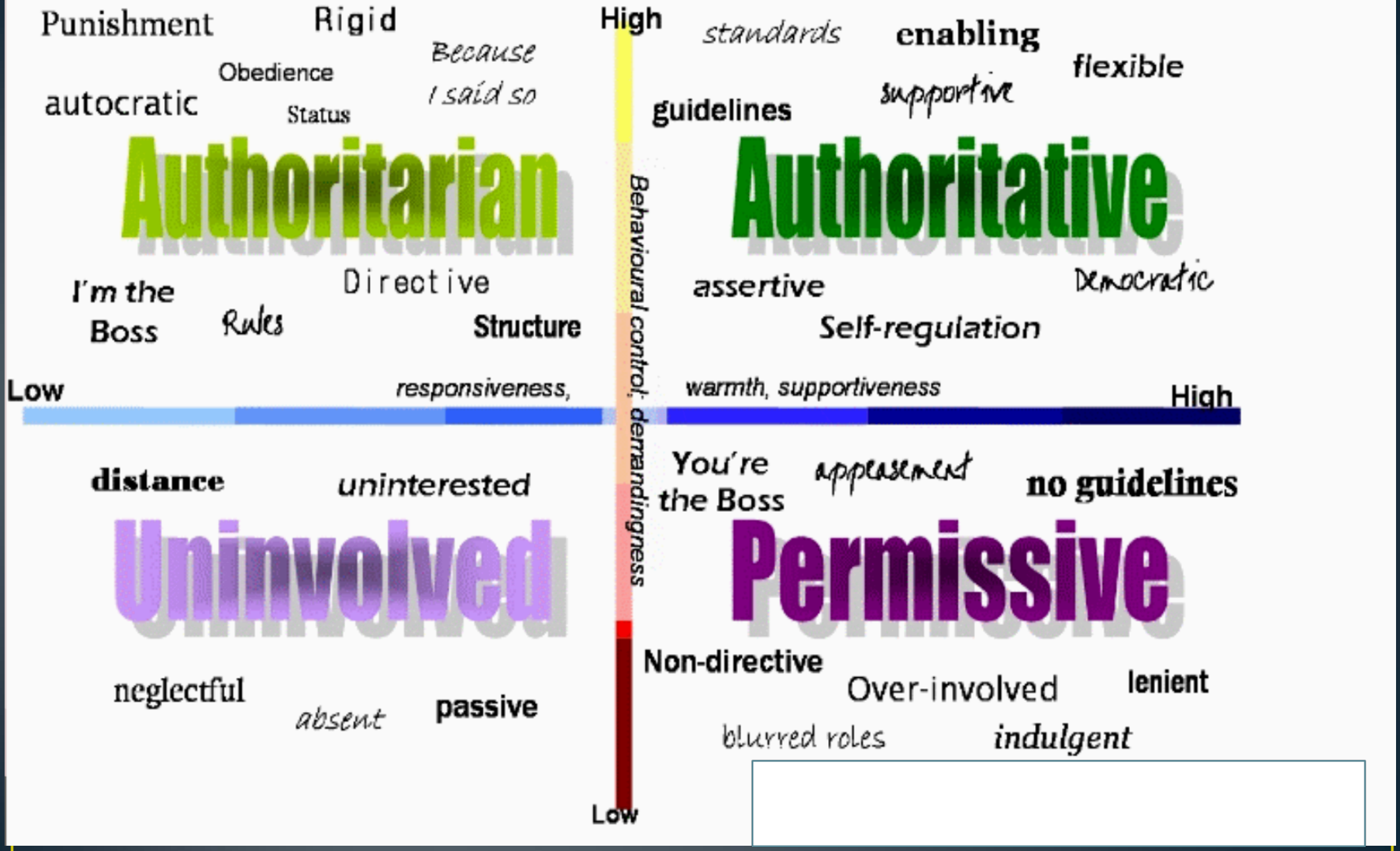
# ADHD: Etiology

- Heritability and Genes:
  - $H^2$ of ADHD near .8
    - Such figures pertain to parent report of symptoms; but shared method variance/DZ twin contrast effects
    - Teacher ratings: Lower figures (still moderate to high)
  - So, assumption that ADHD is 'fixed' and largely immutable
    - I.e., "parenting can't matter"; parents as shepherds
    - Misreading of heritability
- Other risk factors: Low birthweight, fetal alcohol, environmental toxins (e.g., lead, perhaps pesticides)


Equifinality
Cause A
Cause B
Cause C
Outcome X
Multifinality
Cause B
Outcome X
Outcome Y
Outcome Z

# Ultimate cause—or at least, the factor that 'reveals' ADHD?

- The "real" trigger for ADHD has to be compulsory education (same as for LD)
  - Certainly, 'attention' or 'impulse control' genes have been around for the history of our species, but extremes not salient until we made children sit and learn to read
  - Entirely possible to posit genetic, neurobiological, AND cultural forces as responsible
  - Many forms of mental disorder: 'mismatch' between vulnerability and current context


Punishment
Rigid
Obedience
Because
I said so
autocratic
Status
Authoritarian
I'm the Boss
Directive
Rules
Structure
High
standards
enabling
flexible
supportive
guidelines
Authoritative
assertive
Democratic
Self-regulation
Behavioural control; demandingness
Low
responsiveness,
warmth, supportiveness
High
distance
uninterested
Uninvolved
neglectful
absent
passive
You're the Boss
appeasement
no guidelines
Permissive
Non-directive
Over-involved
lenient
blurred roles
indulgent
Low

# Parenting Influences on Positive Peer Status
# Hinshaw, Zupan, et al. (1997)

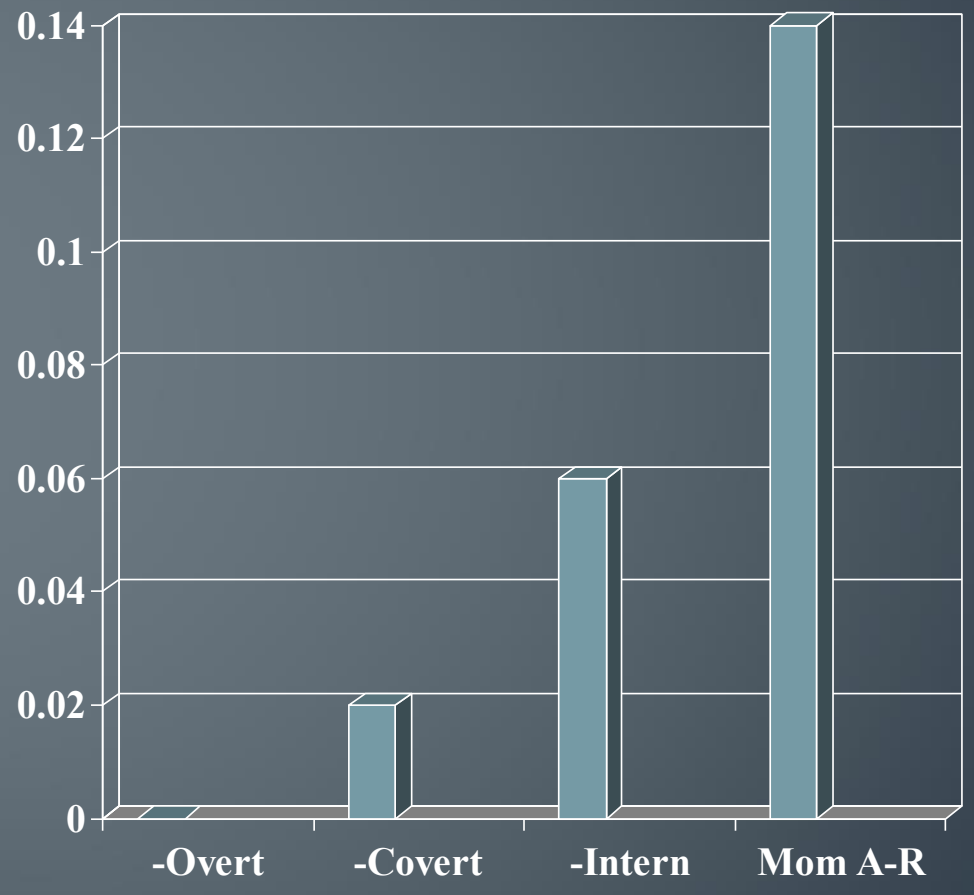
- Aim: Predict peer acceptance from parenting
  - Ideas About Parenting (Heming et al., 1989)
  - 3 factors = Authoritarian, Authoritative, Permissive

- Authoritative Factor: 15 items
  - *Warmth, Limits, Autonomy Encouragement--e.g.,*
    - "I encourage my child to be independent of me"
    - "I expect a great deal of my child"
    - "I have clear, definite ideas about childrearing"
    - "Raising a child is more pleasure than work"
    - "When I am angry with my child, I let him know"
    - "I reason with my child regarding misbehavior"

# Findings

- Mothers of ADHD boys: lower on Authoritative (ES = .75)
  - Yet variance in ADHD group equivalent to comparison group's
- Tested predictive power of parenting factors, observed overt and covert behavior, and internalizing score (CDI, observed withdrawal) via hierarchical regressions
  - Neither Authoritarian nor Permissive beliefs predicted peer nominations, but Authoritative beliefs did so (beta = .3), even with diagnostic group controlled
- Moderation: strong prediction (B > .4 in ADHD group)
  - But near zero in comparisons

# Explained Variance--Positive Nominations



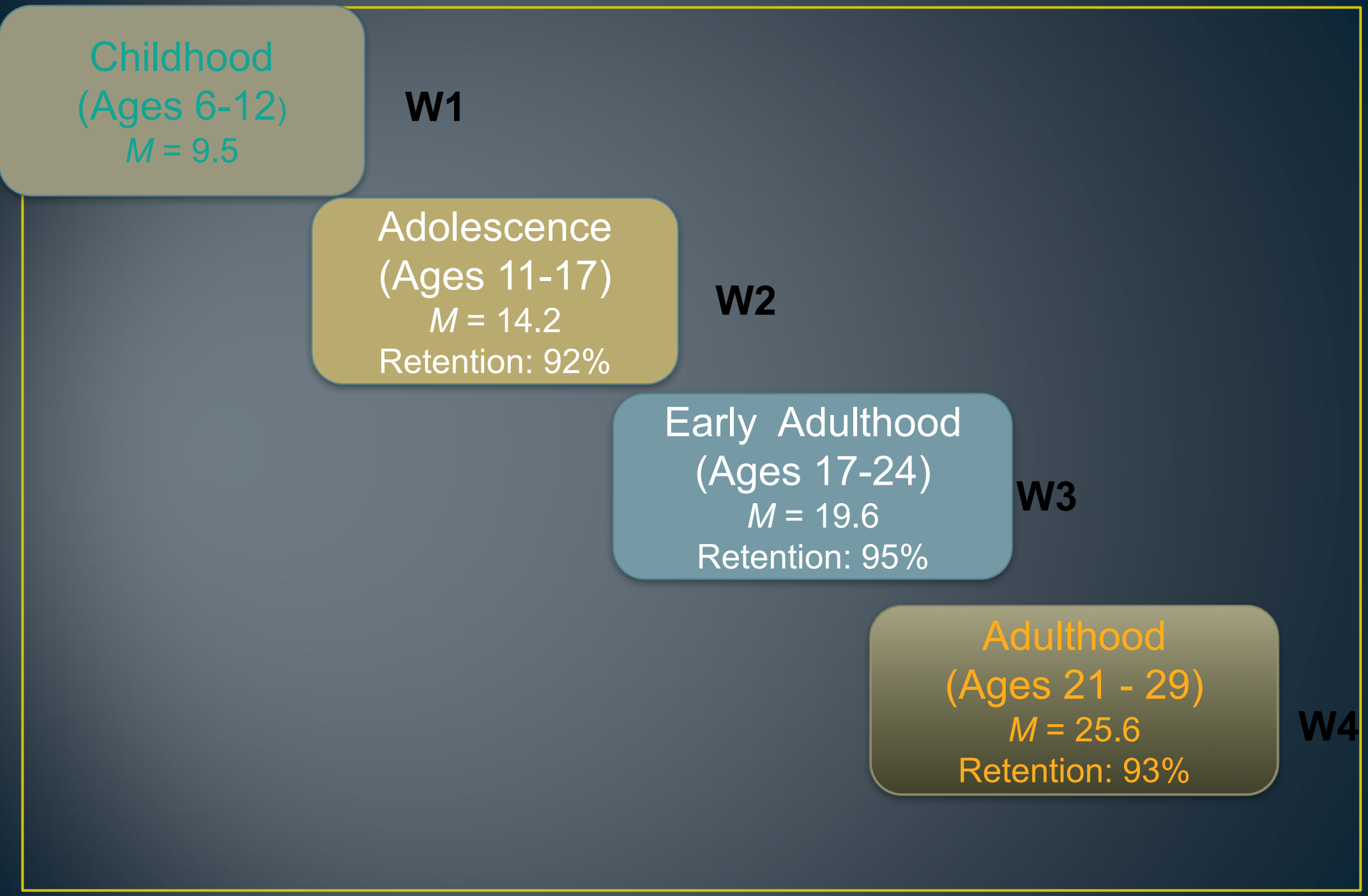
# Important Findings
## Harold et al. (2013a, 2013b)

- Adoption study in UK
  - Controls for biological relatedness
- Even in adoptive families, kids' levels of ADHD elicit overcontrolling parenting from parents
- AND, levels of harshness predict further ADHD symptoms, over time
- It's not all in the genes!

# ADHD in Girls and Women

- 1990s: Try to ascertain a large, diverse, viable female sample
  - Group matched comparison sample
- Assess carefully/summer programs
  - Told families at outset that we wanted to study their daughters for the rest of their lives
- Our sample (BGALS):
  - Largest in existence of preadolescent girls with ADHD (140, with 88 matched comparison girls)
  - Baseline: marked impairments across symptoms, impairments, neuropsych measures

See Hinshaw (2002), *Journal of Consulting and Clinical Psychology*


Childhood
(Ages 6-12)
M = 9.5
W1
Adolescence
(Ages 11-17)
M = 14.2
Retention: 92%
W2
Early Adulthood
(Ages 17-24)
M = 19.6
Retention: 95%
W3
Adulthood
(Ages 21 - 29)
M = 25.6
Retention: 93%
W4

# BGALS Follow-ups

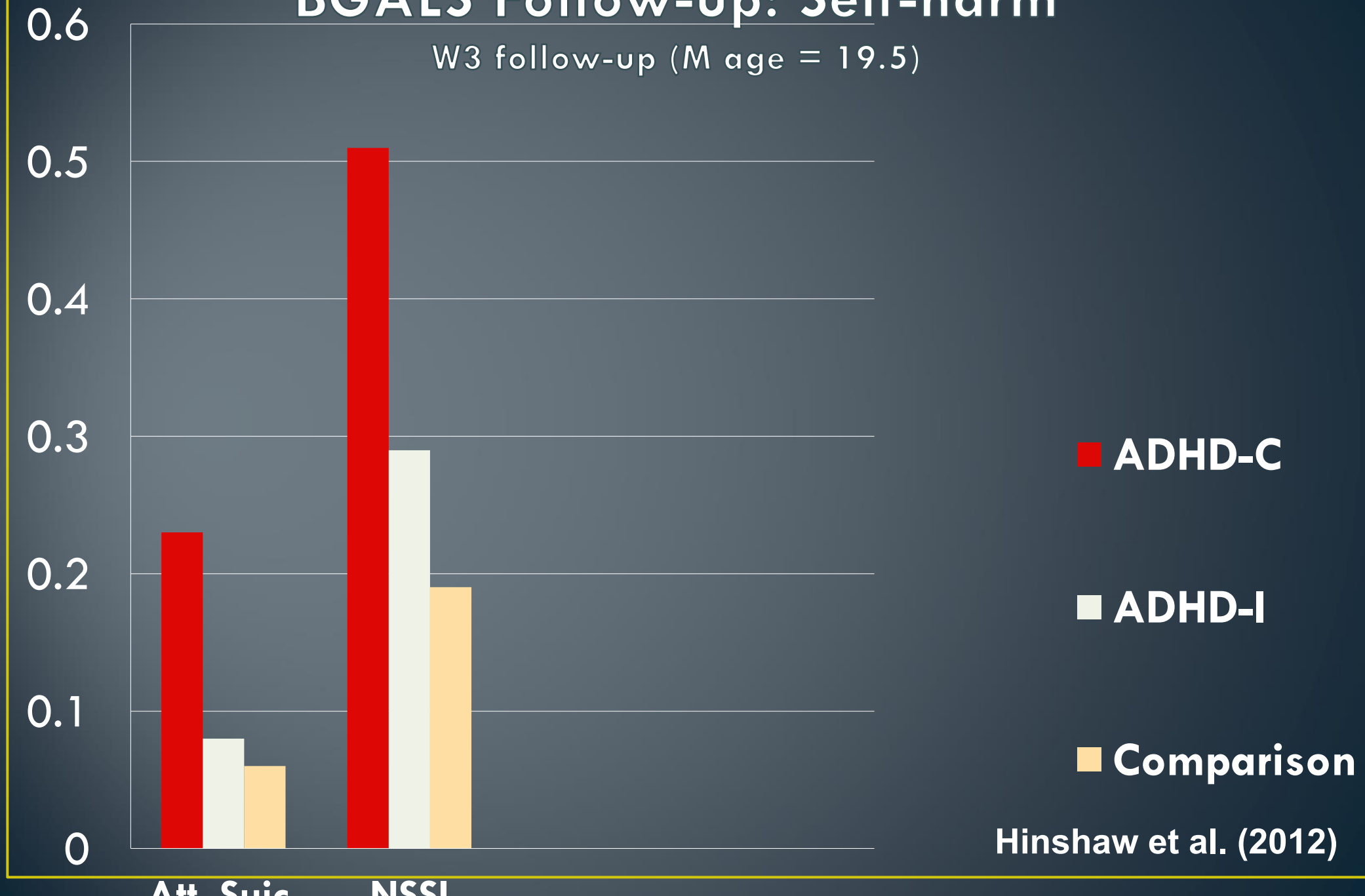
## Hinshaw et al. (2006), Hinshaw et al. (*JCCP*, 2012)

- **Adolescence:**
  - All domains reveal that impairments maintained
  - E.g., academic/social/comorbidities/self-perceptions/parenting/EF
- **Early adulthood:**
  - Keep most measures the same, BUT expand into developmentally salient domains, too
  - Impairments still pronounced, but NOT re: substance abuse
- **Mid-late 20s:**
  - Still, significant and medium/large effect sizes for ADHD vs. comps
  - Few effects of baseline subtype/presentation:
    - Exceptions: antisocial behavior, peer rejection
  - Even for neuropsychological /EF measures:
    - NO effects of type/presentation, with tiny ESs
  - All analyses: rigorous adjustment for baseline SES, even IQ

# Heterotypic Continuity: Self-harm as outcome

- **Suicidal behavior: intent is to die**
  - Suicidal ideation (common)
  - Suicide attempt (rarer)
- **Non-suicidal self-injurious behavior (NSSI)**
  - No express intent to die, but to express (or ease) intense psychological pain
  - Linked to poor emotion regulation
  - Wide range—cuticles to cutting/burning
- **Yet many suicide attempters have history of NSSI**
  - NSSI stronger predictor of suicide attempts than previous attempts
  - NSSI may be lethal

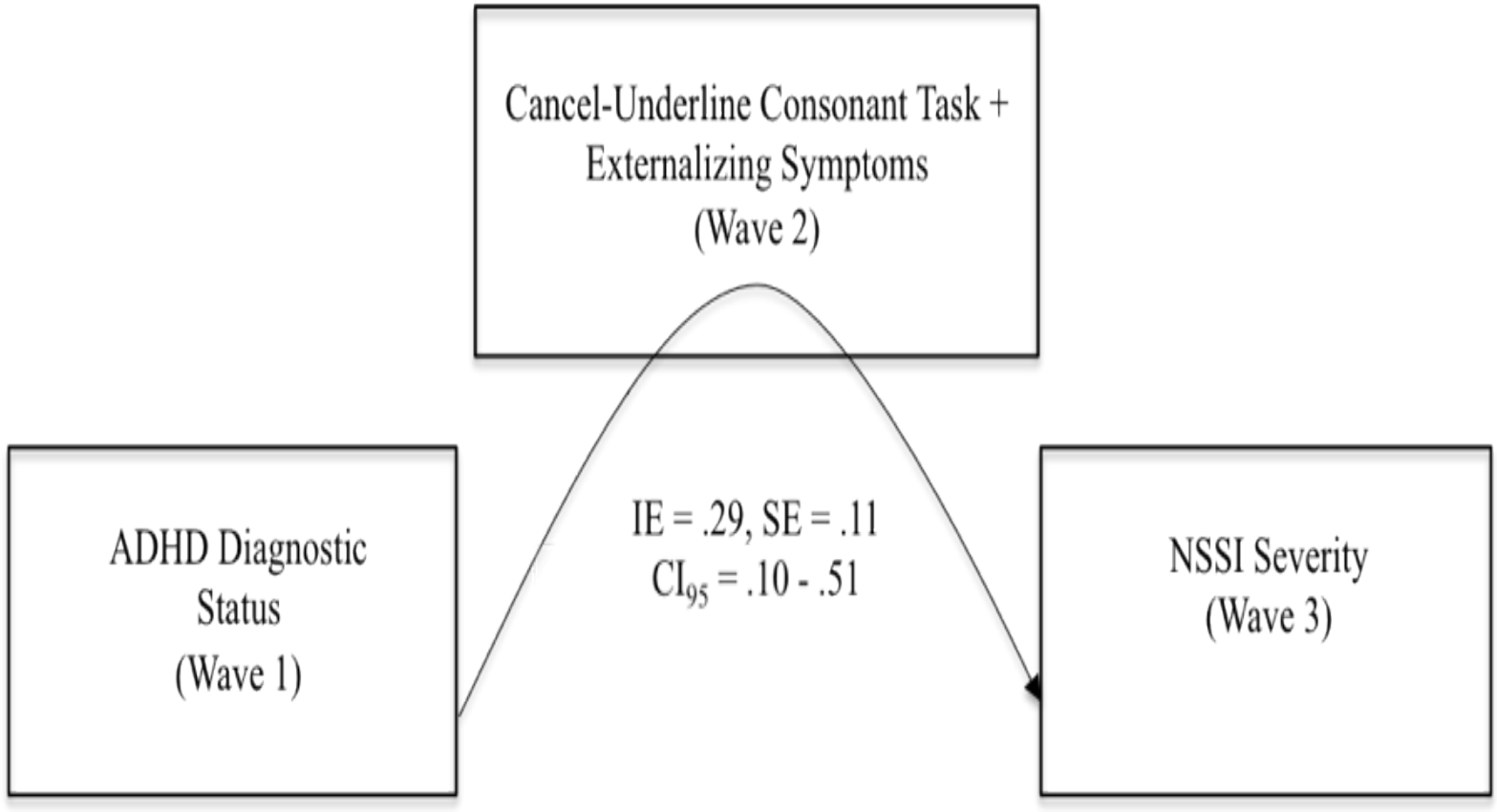
# BGALS Follow-up: Self-harm




Hinshaw et al. (2012)

# Important finding, but why?

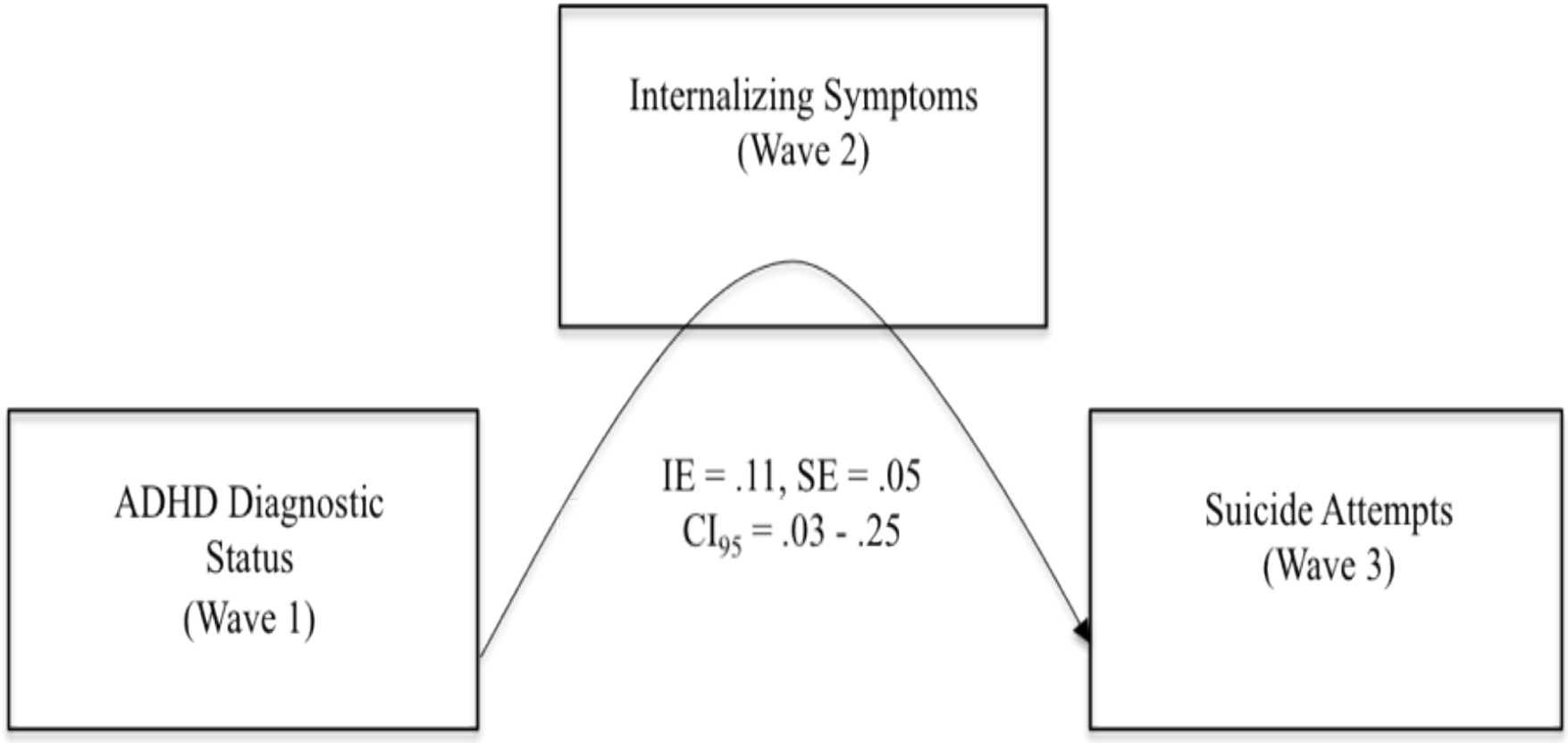
- Mediator is a variable or process that happens in between the predictor and the outcome…and that explains why the outcome happened
- We examined Wave 2 (adolescent) mediators of the ADHD to Self-harm predictive association




# MEDIATION: WAVE 1 ADHD STATUS TO WAVE 3 NSSI

Data represent indirect effect and standard errors using 10,000 bootstrap samples to obtain bias-corrected and accelerated 95% confidence intervals.

Swanson, Owens, & Hinshaw (2014), *Journal of Child Psychology and Psychiatry*




# MEDIATION: WAVE 1 ADHD STATUS TO WAVE 3 SUICIDE ATTEMPTS

Data represent indirect effect and standard errors using 10,000 bootstrap samples to obtain bias-corrected and accelerated 95% confidence intervals

Swanson, Owens, & Hinshaw (2014), *Journal of Child Psychology and Psychiatry*

# Meza, Owens, & Hinshaw (2016)

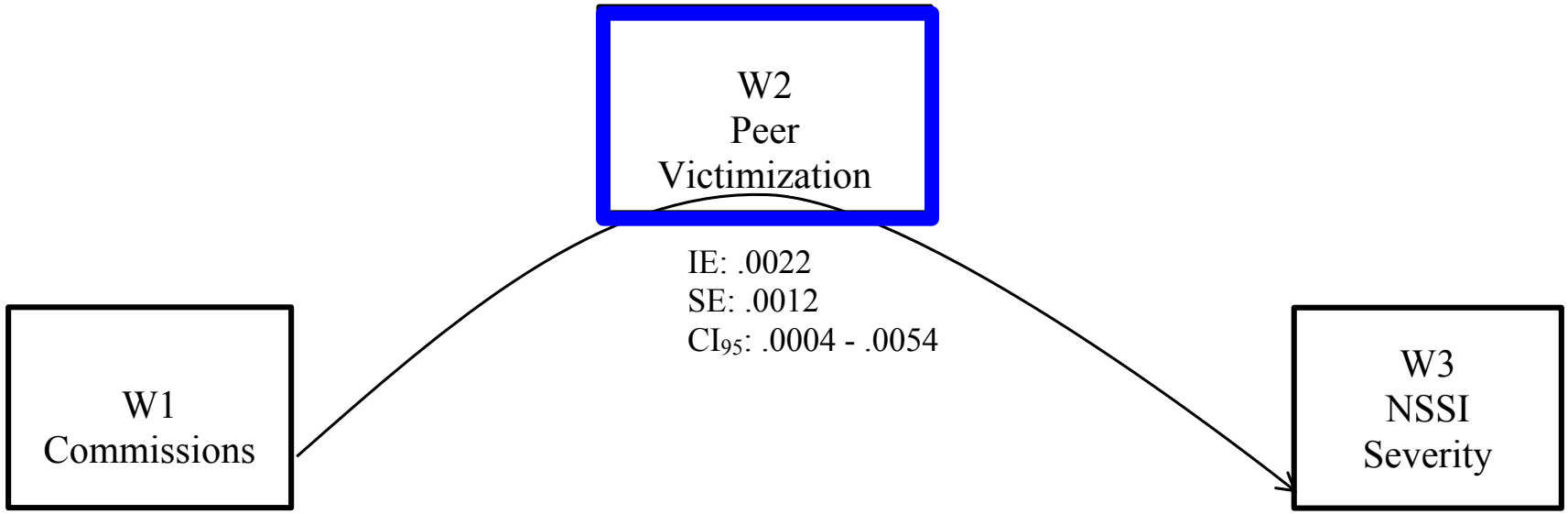



**Figure 3.** The relationship between W1 Commissions and W3 NSSI was partially mediated by W2 Peer Victimization over and above: WISC Full-Scale IQ, mother's education, household income, and age at W3. Data represent indirect effect and standard errors using 10,000 bootstrap samples to obtain bias-corrected and accelerated 95% confidence intervals.

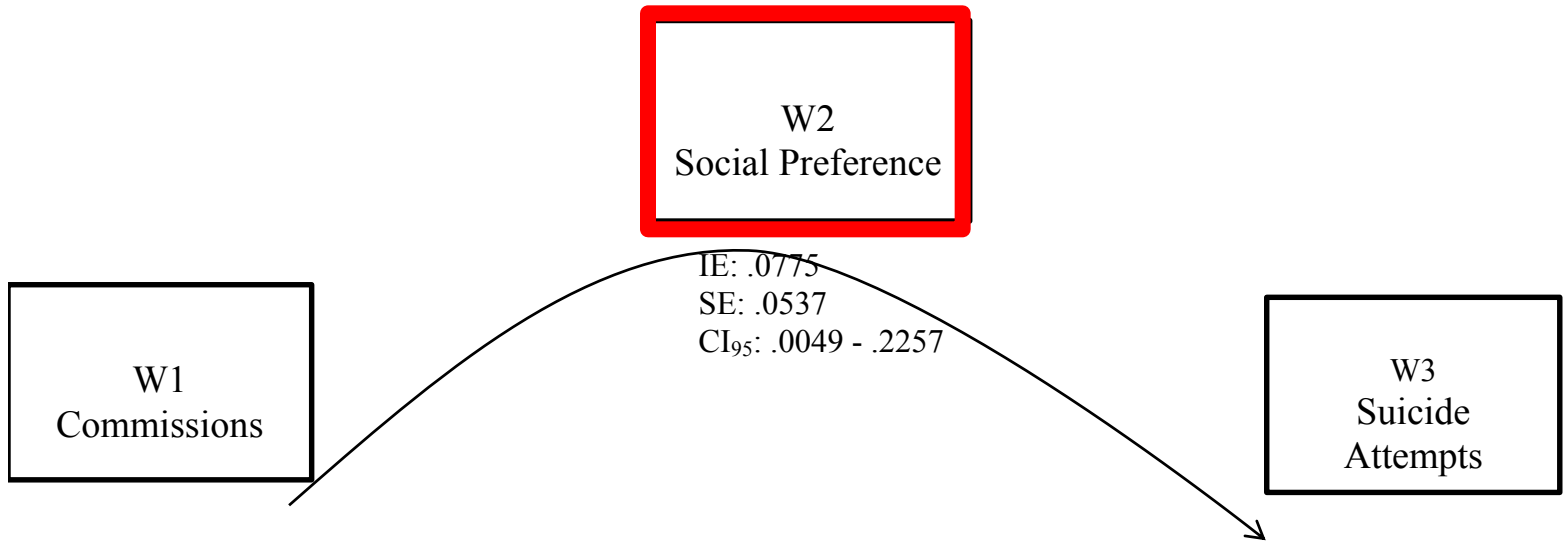



**Figure 2.** The relationship between W1 Commissions and W3 Suicide Attempts (y/n) was partially mediated by W2 social preference scores over and above: WISC Full-Scale IQ, mother's education, household income, and age at W3. Data represent indirect effect and standard errors using 10,000 bootstrap samples to obtain bias-corrected and accelerated 95% confidence intervals.

# Trauma and peer relationships?

- Guendelman et al. (2016, *Devel. and Psychopathology*):
  - Physical abuse, sexual abuse, and/or neglect higher in ADHD than comparison girls
  - Within ADHD group, the maltreated subgroup more likely to show depression and suicide attempts (not externalizing behavior)
  - COMBINATION OF EARLY IMPULSIVITY AND MALTREATMENT PREDICTS SUICIDE ATTEMPT RATE OF OVER ONE-THIRD
- Girls with ADHD likely to be victims of intimate partner violence by early adulthood (Guendelman et al., 2016b)

# By Wave 4 (mid-late 20s)

## Owens, Zalecki, Gillette, & Hinshaw, *JCCP* (2017)

- **Unplanned pregnancy rates:**
  - **Comparison : 10%**
  - **ADHD: > 40%**
  - **REGARDLESS of persistence of ADHD symptoms across time**
- **Fewer years of education/far lower achievement scores**
  - **Again, regardless of persistence of ADHD symptoms over time**
  - **But other outcomes (e.g., self-injury, comorbidity, global impairment) are related to ADHD symptom persistence**
- **Owens & Hinshaw (2016, *Development and Psychopathology*)**
  - **Early cognitive vulnerability predicts adult comorbidity through adolescent  poor self-control/delay of gratification and low achievement**

# Tidal Wave/ADHD Explosion

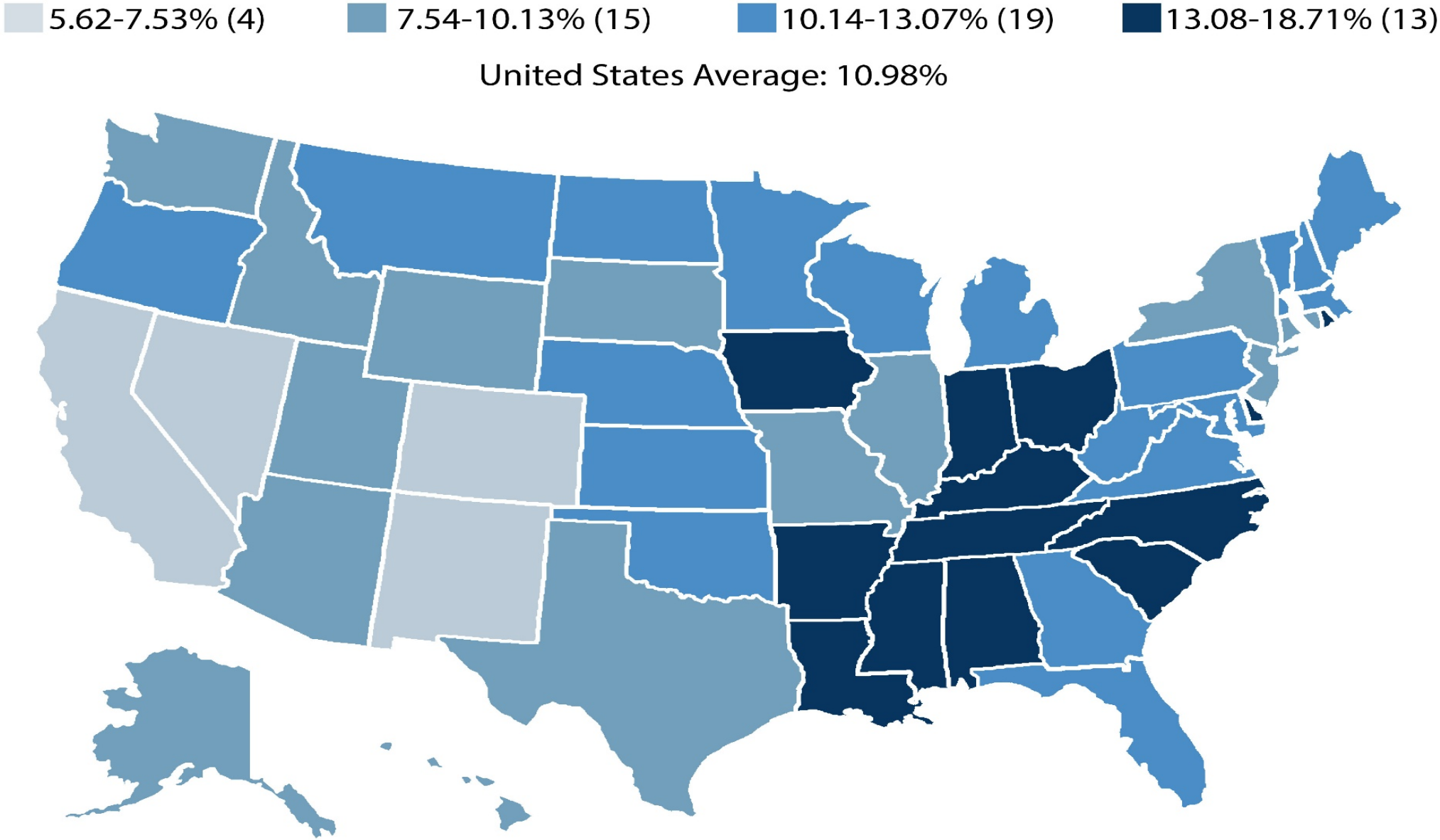
National Survey of Children's Health (Visser et al., 2014)
*Journal of the American Academy of Child & Adolescent Psychiatry*

- **Parent-reported ADHD 'ever diagnosed'**
  - **2003: 7.8%**
  - **2007: 9.5%**
  - **2012: 11.0%**
    - **41% INCREASE IN 9 YEARS, for all 4-17 year-olds**
  - **Low-income rates now = middle-class; Black = White**
    - **Hispanic lower (but fast growing)**
- **Medication rates higher, too:**
  - **Just under 70% of those 'currently diagnosed 'now receive medication**
  - **Largest medication increases: adolescents, adults**

# Earlier Explosions: 1990s

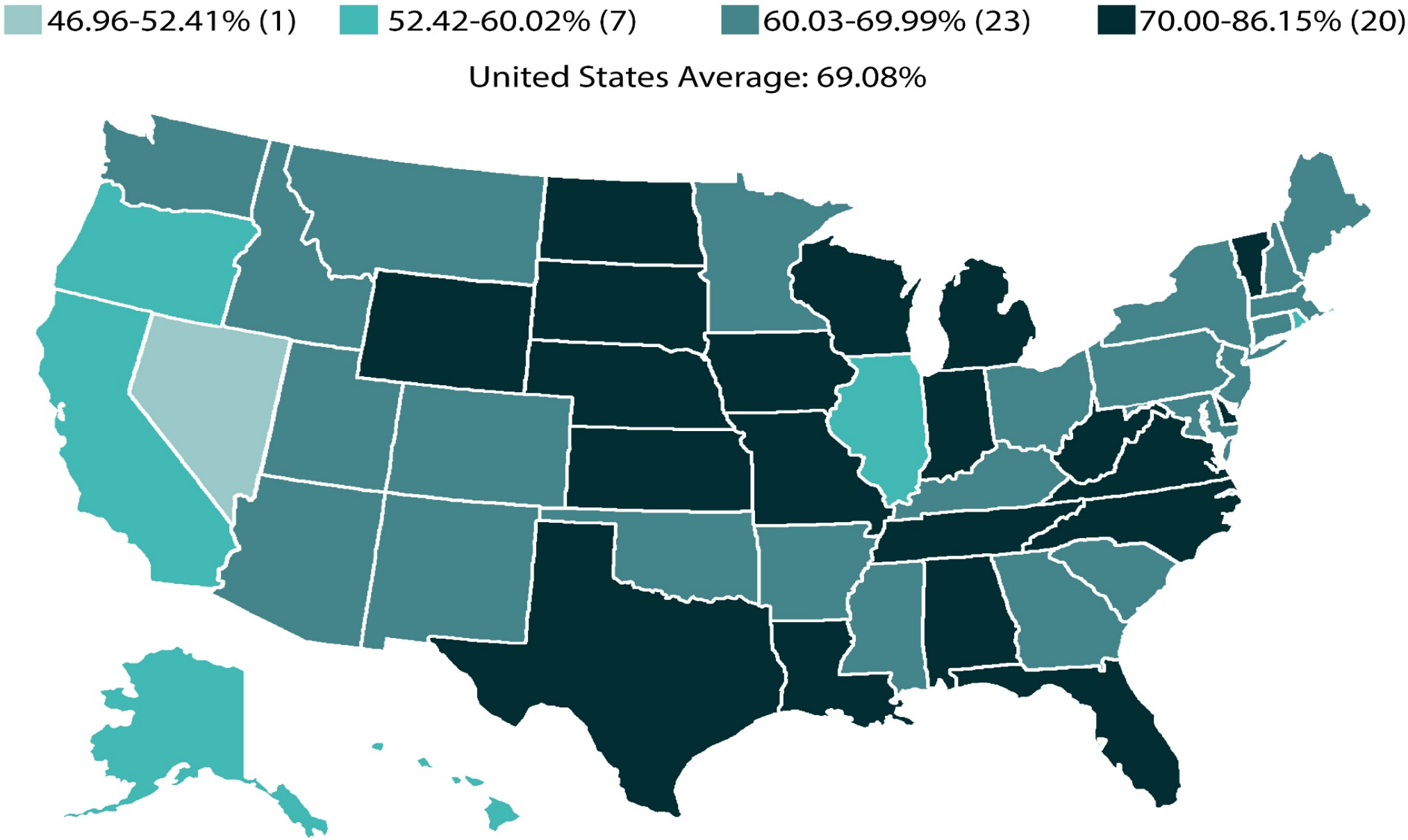
- Policy shifts:
  - IDEA: ADHD as OHI
  - Medicaid: authorizes ADHD
  - SSI: ADHD (with other impairment) can qualify
- Late 1990s: FDA changes regulations on DTC ads
- 2000: Concerta (first effective long-acting form)
- More and more LBW babies survive
  - Distinguish *TRUE PREVALENCE from DIAGNOSED PREVALENCE*

# Diagnostic Prevalence:




Source: 2011-2012 NSCH, Children Aged 4-17

# Medication Rate Given Current Diagnosis:




Source: 2011-2012 NSCH, Children Aged 4-17

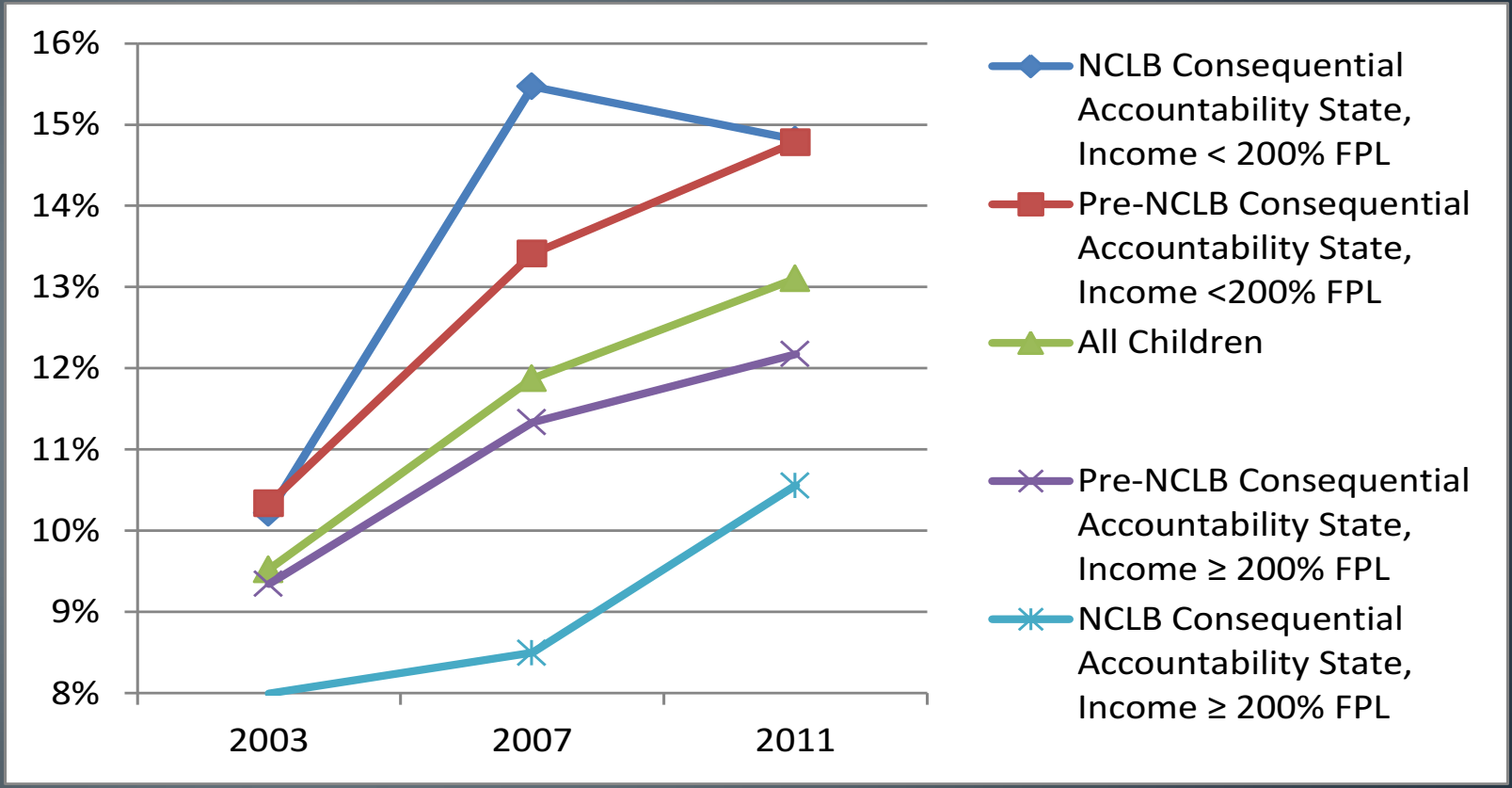
# What does *not* explain variation

- **Demographics**
  - Hispanic population clearly higher in California, and traditionally the lowest rates of diagnosis
  - Eliminated a little of the CA-NC difference but not most
  - **Hispanic rates growing FAST, esp. in California
- **Rates of health-care providers**
  - Explains other disorders, but not here
- **State "culture"**
  - May explain some regional differences (not state diffs.)

# **Consequential accountability

- 1970s-80s: public school reforms "input focused"
  - Reduce class size, pay teachers more, etc.
- Results not consistent; shift in 1990s to "output focused"
  - I.e., incentivize test score improvements per se
- Consequential accountability—districts get 'noted' or even cut off from funds, unless test scores go up
  - 30 states implement such laws <2000
- Then, becomes law of the land for all states with No Child Left Behind (takes effect 2002-3)

# Consequential accountability introduced via NCLB was associated with higher ADHD diagnostic prevalence increases among low-income children aged 8-13 from 2003-2007, but there was no association from 2007-2011 (unadjusted results)




District of Columbia is included within the 21 No Child Left Behind consequential accountability states.
NCLB: No Child Left Behind; FPL: Federal poverty level
N=24,982 (2003), 22,467 (2007), 24,426 (2011)
Sources: 2003, 2007, and 2011 National Survey of Children's Health

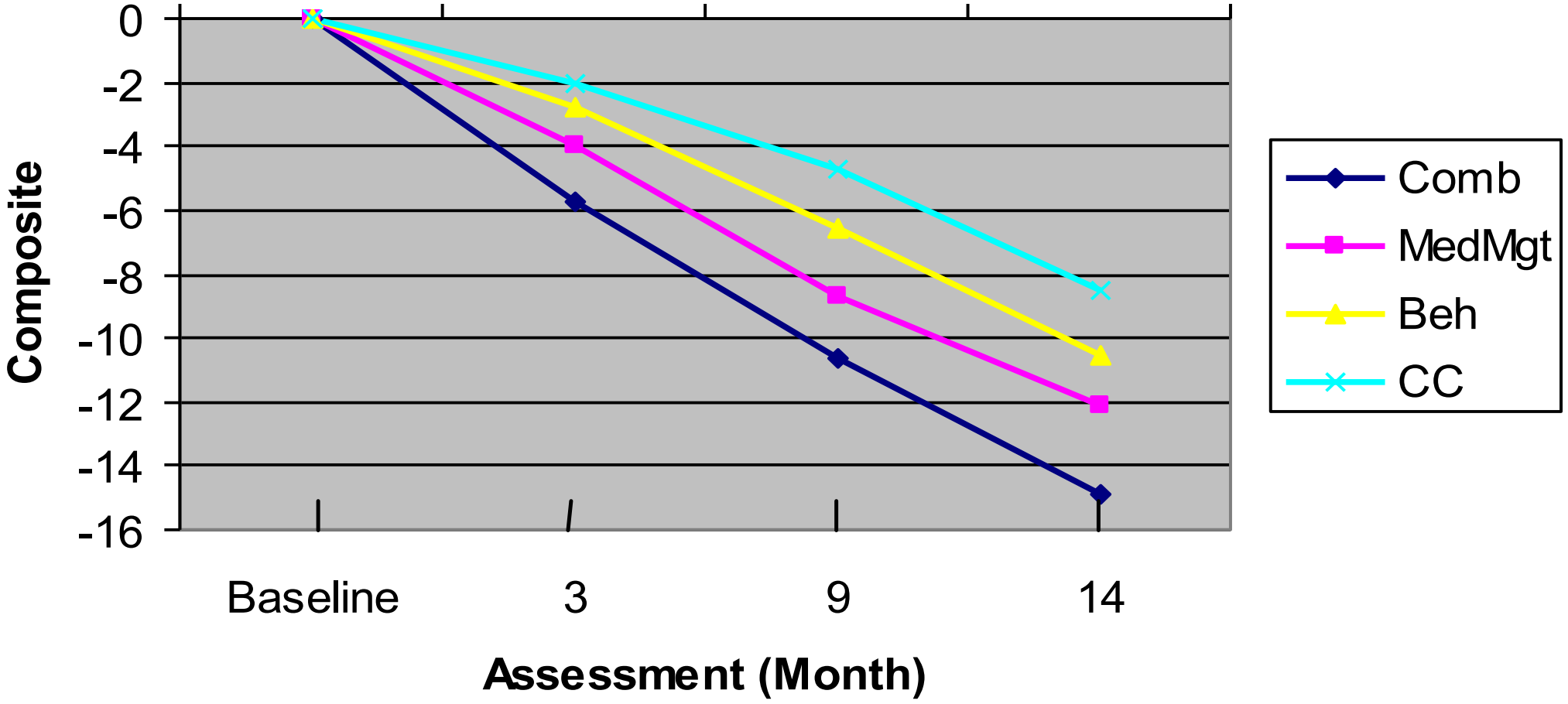
# "Unintended effect"

- Accountability laws encourage ADHD diagnosis for at least two reasons:
  - #1: Diagnosis may lead to treatment, which may help boost achievement test scores
    - Scheffler et al. (2009), Zoega et al. (2012)
  - #2: In some states/districts, diagnosed youth are excluded from the district's average test score!
    - Gaming the system, although NCLB eventually outlaws this
- Why poorest kids? NCLB targets Title I schools

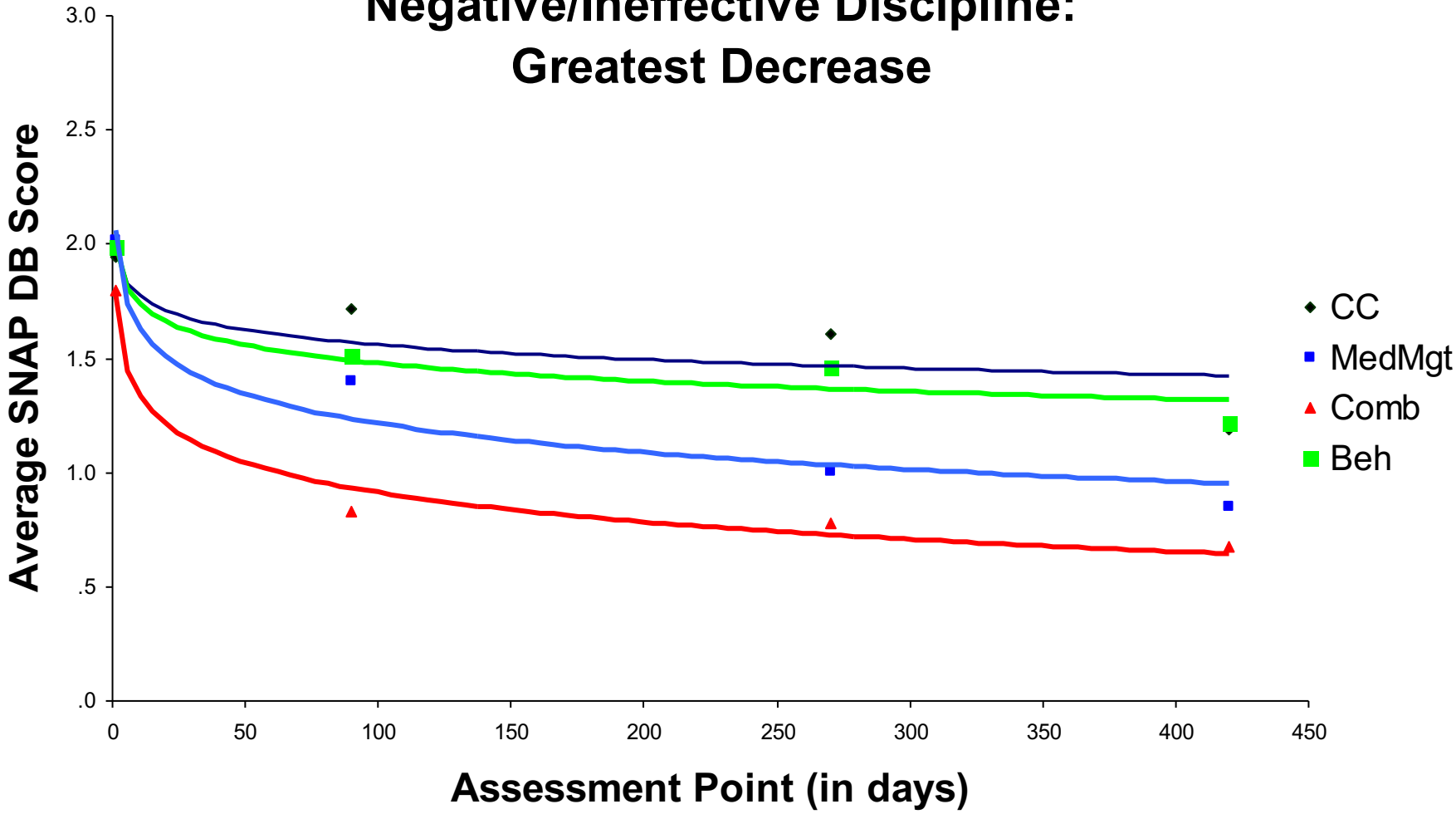
# Main culprit-- Quick and dirty assessments?

- We haven't emphasized assessment, but it takes several hours to 'do it right'
  - Thorough developmental history
  - Normed parent and teacher rating scales
  - Medical eval: rule-outs
  - Achievement and cognitive testing re: learning issues
  - Yet computerized attention tests , brain scans not definitive
- In practice, however, 10-15' with non-specialist carries day
  - Lack of training, lack of reimbursement
  - Need 'team approach'

# Composite Score
# Adjusted for Baseline
# Conners et al., 2001

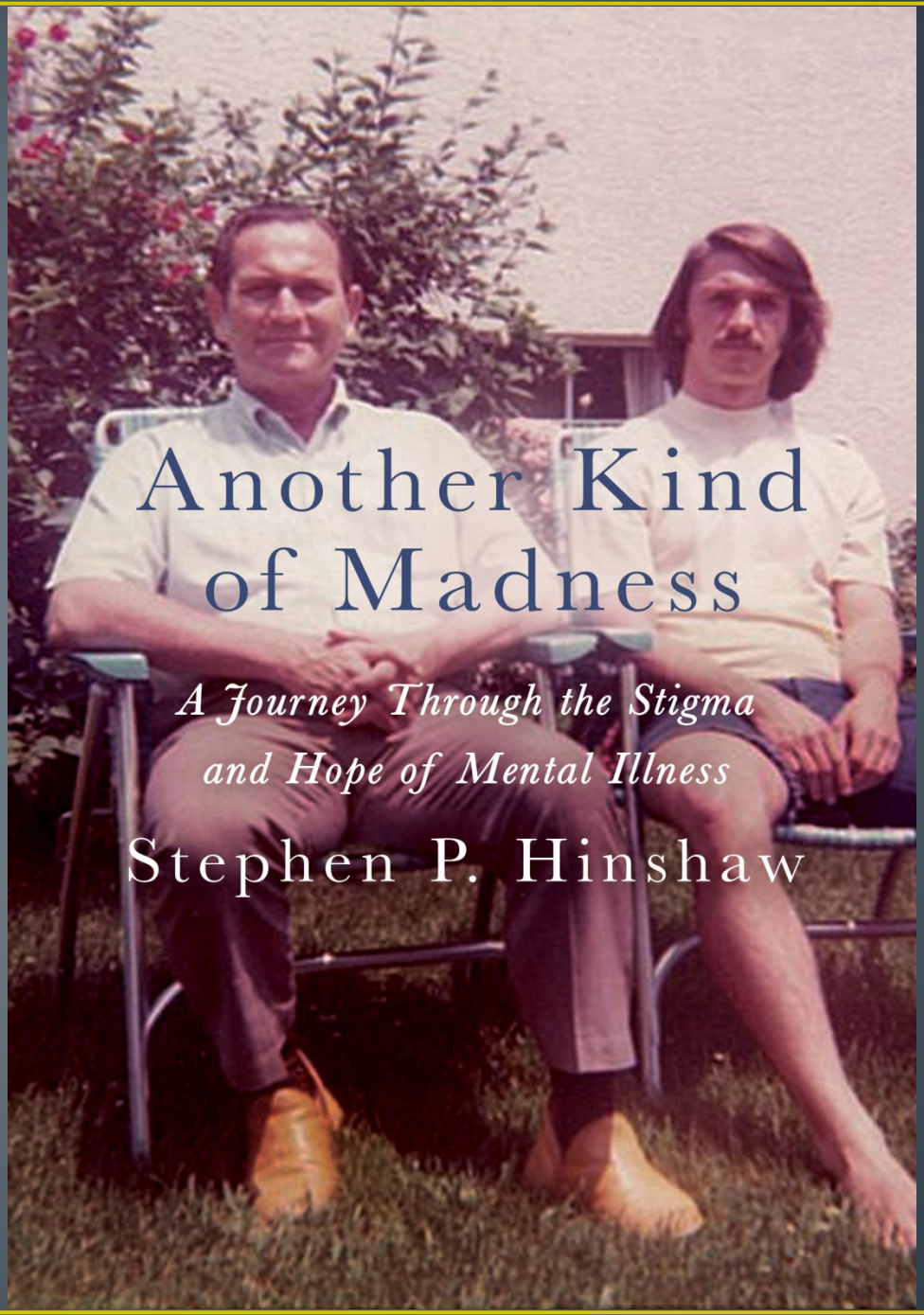


# Outcomes Across 14 months
# Teacher SNAP DB
# Negative/Ineffective Discipline:
# Greatest Decrease



# Stigma and ADHD

- Wait, wouldn't stigma pertain to ultra-severe disorders (e.g., psychosis), and not ADHD?
  - Paradoxically, inconsistency in behavior (with high expectations) may trigger strong stigma
    - E.g., high-functioning ASD
  - And, the overdiagnosis, paired with accounts of faking symptoms, stigmatize the entire condition
  - Parents still fearful of receiving the diagnosis for their kids, etc.


Another Kind of Madness
A Journey Through the Stigma and Hope of Mental Illness
Stephen P. Hinshaw

# Shame, Silence, Stigma

## Tomorrow morning's session

- Idyllic childhood in Midwest, except for mysterious disappearances of dad for half-year to year at a time
- Began in 30's in Pasadena: At age 16 he believed he could save the free world from the Nazi threat by flying
- 6 months at Norwalk
  - Then Stanford and Princeton (Einstein, Russell)
  - Then Byberry
- Life of brilliance and madness had begun

# As a boy…

- I knew nothing about his disappearances into hospitals
  - Doctor's orders: Children would be permanently destroyed
- Internalization
- Not until first spring break from college, back East, did he divulge the truth
  - I diagnosed him with bipoolar disorder
- Moral: I went into psychology, yet terrified until I opened up
- WE MUST DO SCIENCE <AND> TELL OUR STORIES!

# Acknowledge…


- Members (past and present) of Hinshaw Lab
- Hundreds of participants
- MTA and BGALS Collaborators
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- Colleagues whose ideas resonate
- The HELP Group…and you, the audience