ADHD: What Everyone Needs to Know

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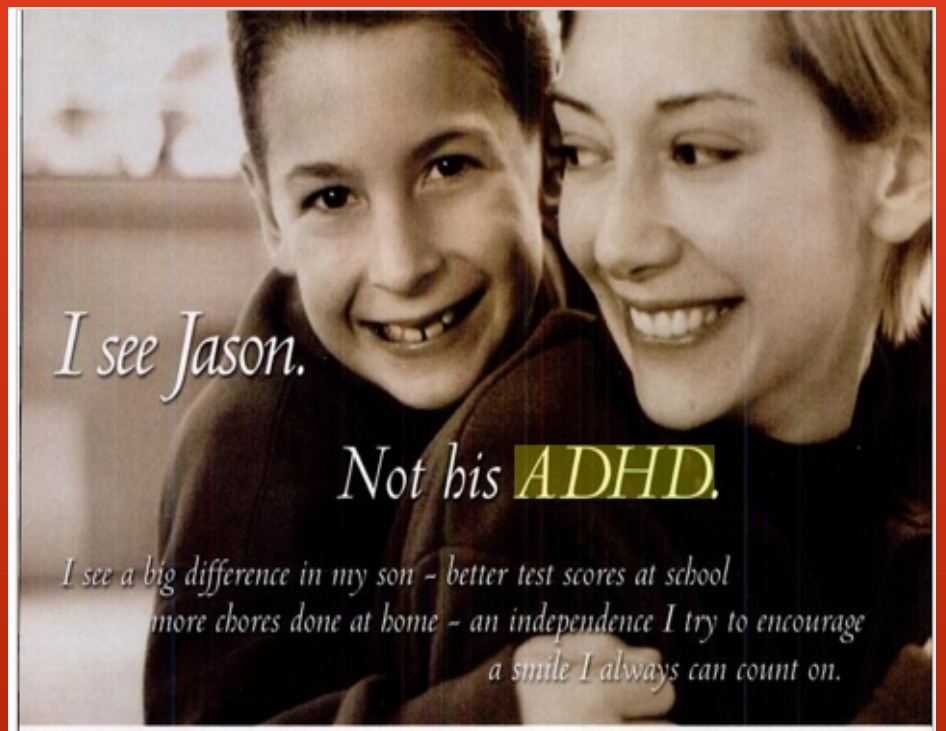
The Help Group
Los Angeles
10/23/15

Objectives

- Tour of what you should know—and will soon!—about ADHD
  - There's so much out there now, I must be selective
- Will feature multiple levels of analysis:
  - Genes
  - Biology
  - Neuropsychology
  - Families
  - Peers
  - Policy

ADHD

- Newsworthy
  - Rates of diagnosis up 41% within 9 years in US
  - Stigma still great, thanks in part to media
    - *NY Times*: Sroufe, Kureishi, Friedman, Brooks: Back to the past
- Controversial
  - It's all about diet/Sponge Bob/lax parenting/cultural norms
  - It's an excuse related to gaining accommodations
  - Stimulants as performance enhancers/'smart pills'



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**
- ☑ **Patented OROS® delivery system controls symptoms consistently for 12 hours with a single dose**

The Makers of CONCERTA® believe in the importance of proper diagnosis and treatment of ADHD. Only a doctor can decide whether medication is right for you or your child. CONCERTA® should not be taken by patients with: significant anxiety, tension or agitation; allergies to methylphenidate or other ingredients in CONCERTA®; glaucoma; Tourette's syndrome, tics or family history of Tourette's syndrome; current/recent use of monoamine oxidase inhibitors (MAOI). CONCERTA® should not be taken by children under 6 years of age. Abuse of methylphenidate may lead to dependence. Tell your healthcare professional if your child has had problems with alcohol or drugs. In the clinical studies with patients using CONCERTA®, the most common side effects were headache, stomach pain, sleeplessness and decreased appetite.

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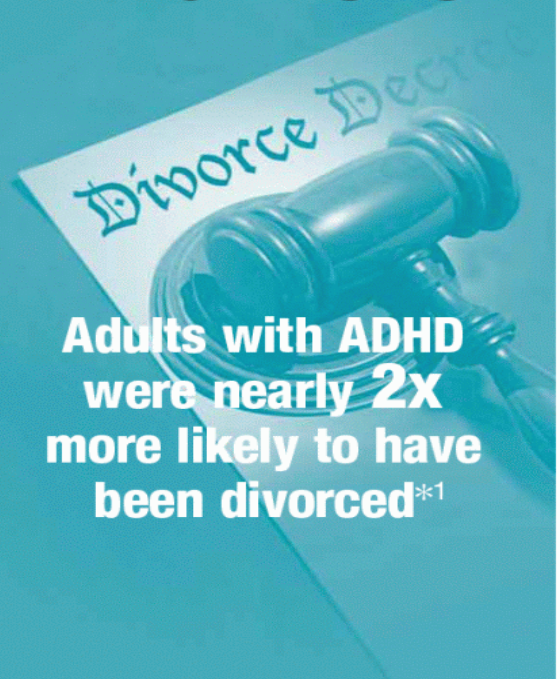
BROKEN PROMISES



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

Shire US Inc.
...your ADHD Support Company™

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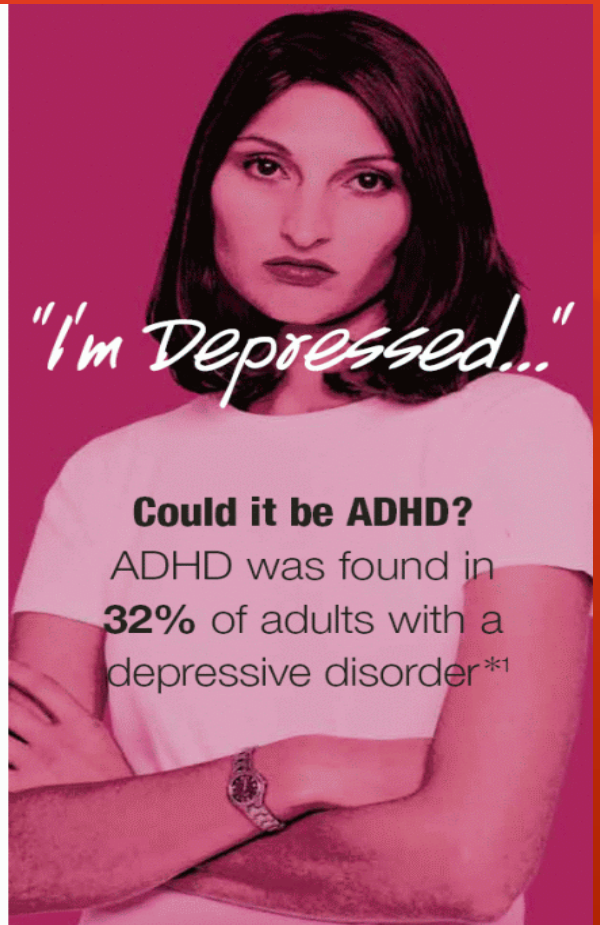

Could it be ADHD?
ADHD was found in **32%** of adults with a depressive disorder*1

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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Shire US Inc.
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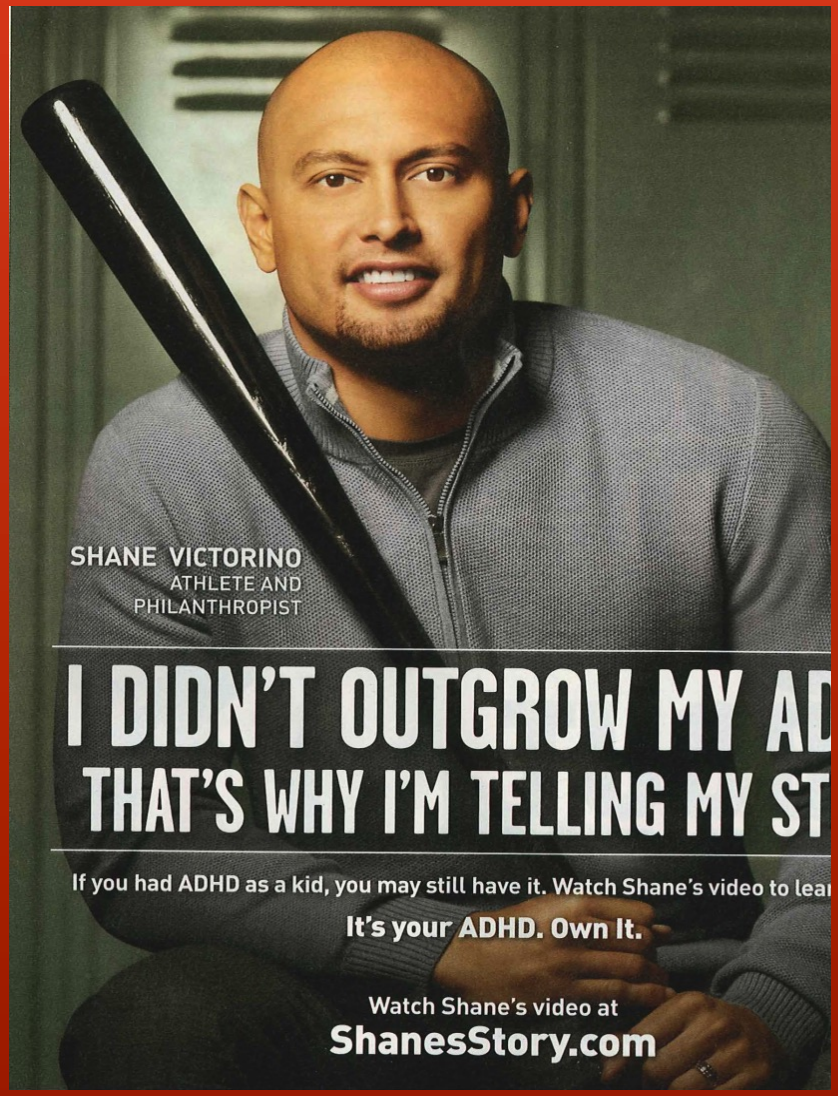
A third ad, from this decade

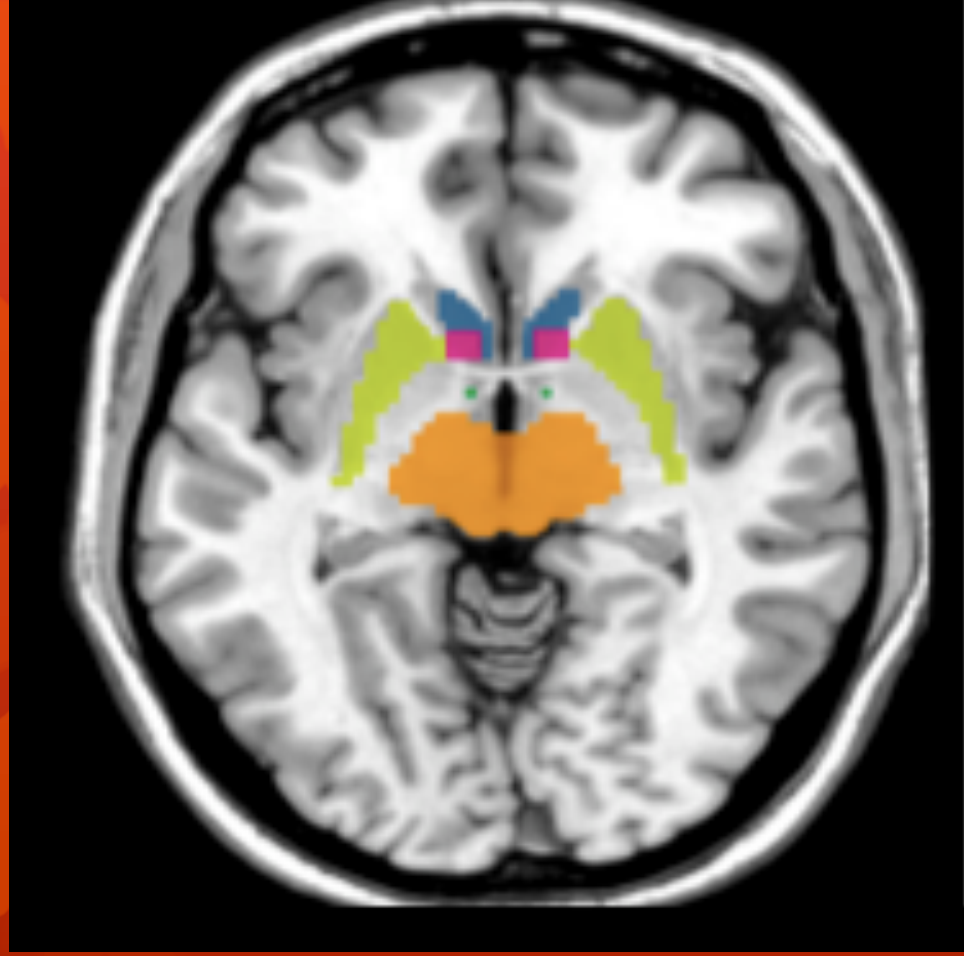


ADHD Realities: Impairment

- **Academic** (school failure)/**Vocational** (multiple issues in workplace)
  - $125 billion/year indirect costs for youth: Sp ed, juvenile justice
  - $250 billion/year indirect costs for adults: Job-related problems
- **Social/peer** (Most peer-rejected condition)
- **Family** (reciprocal chains of bidirectional influences)
- **Accidental injury** (across the age span)
- **Increasing severity of comorbidities over time:**
  - Substance abuse, delinquency, depression, self-harm

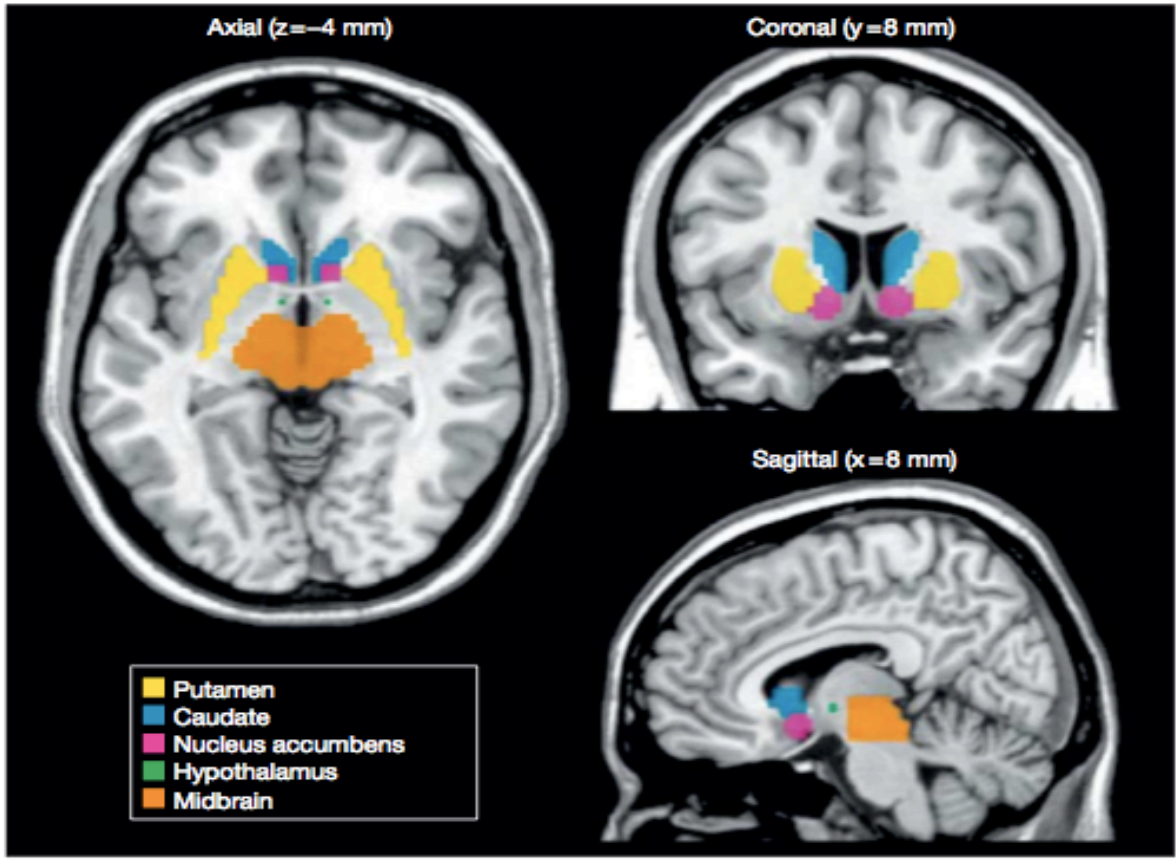
Dimensions and Models

- Continuous symptom distribution across population
  - Inattention vs. hyperactivity/impulsivity
  - "Ripe" for RDoC approach:
    - negative valence, approach, cognition, inhibition, etc.
- Cognitive models: Attention deficit, EF
- Inhibitory models: Barkley (1997)
- Motivation models: Reward undersensitivity
  - E.g., Volkow et al. (2009): large medication-naïve adult sample, PET scans of transporters and receptors



Transporter PET Image

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

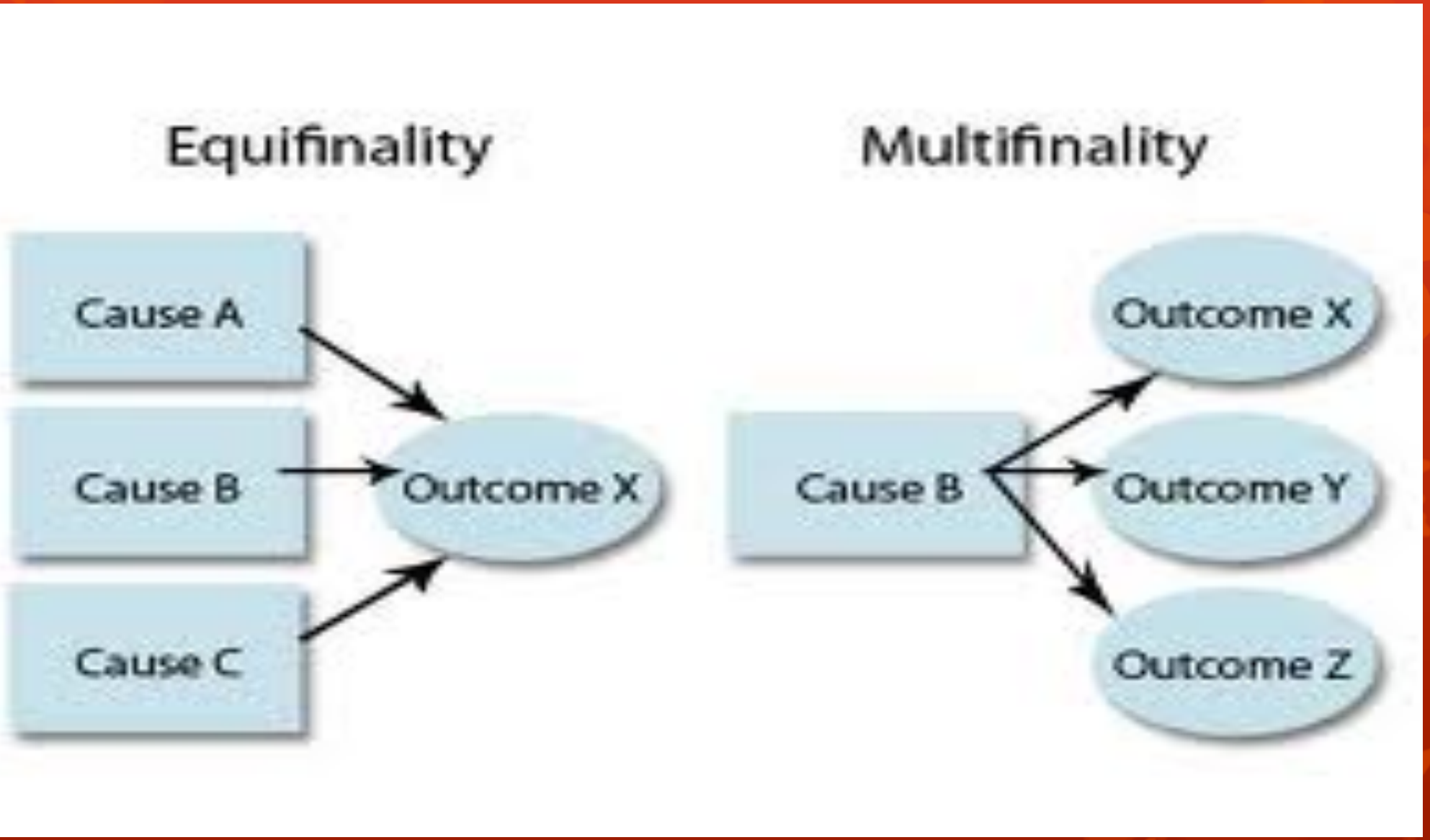


The regions of interest for the midbrain are obtained in several planes, and the shadow is projected to the axial image shown in the figure, which explains why the third ventricle is covered by the region. The x coordinate maps the left-right position; the y coordinate, the anterior-posterior position;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

Dopamine transporter					
Accumbens (Motivation)	0.71 (0.16)	0.63 (0.11)	0.59	0.03 to 0.13	.004
Caudate (Attention)	0.66 (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

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 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**
  - **Castellanos: widespread neural markers and processes**


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

Other Risk Factors

- Low birthweight
  - Predicts ADHD, LD, Tourette's, CP, retardation
- Teratogenic effects
  - FAE: Many are nearly identical to ADHD symptoms
  - Smoking/nicotine: genetic mediation, too
- Environmental toxins (lead, pesticides, etc.)
  - May interact with genetic risk
- Insecure attachment?
  - Does NOT strongly predict later ADHD, but does predict aggression

Role of Parenting

- Maintaining cause, not primary cause
  - What's it like to raise a kid with these tendencies?
- Parents tend to fight fire with fire
- Coercive discipline (too lax, too harsh)
- Cycles of dysregulated emotion
  - *Parents likely to have ADHD symptoms themselves*
- Parent management: Essential part of intervention

Even ruling out r(G,E)…
Harold et al. (2013a, 2013b)

- Adoption study in UK
- Even in adoptive families, young kids' levels of ADHD elicit overcontrolling parenting from parents
- AND, levels of parental harshness predict further ADHD symptoms, over time
- It's not 'all biology'/*Parenting as protective??*

Peer Rejection: How Quick?

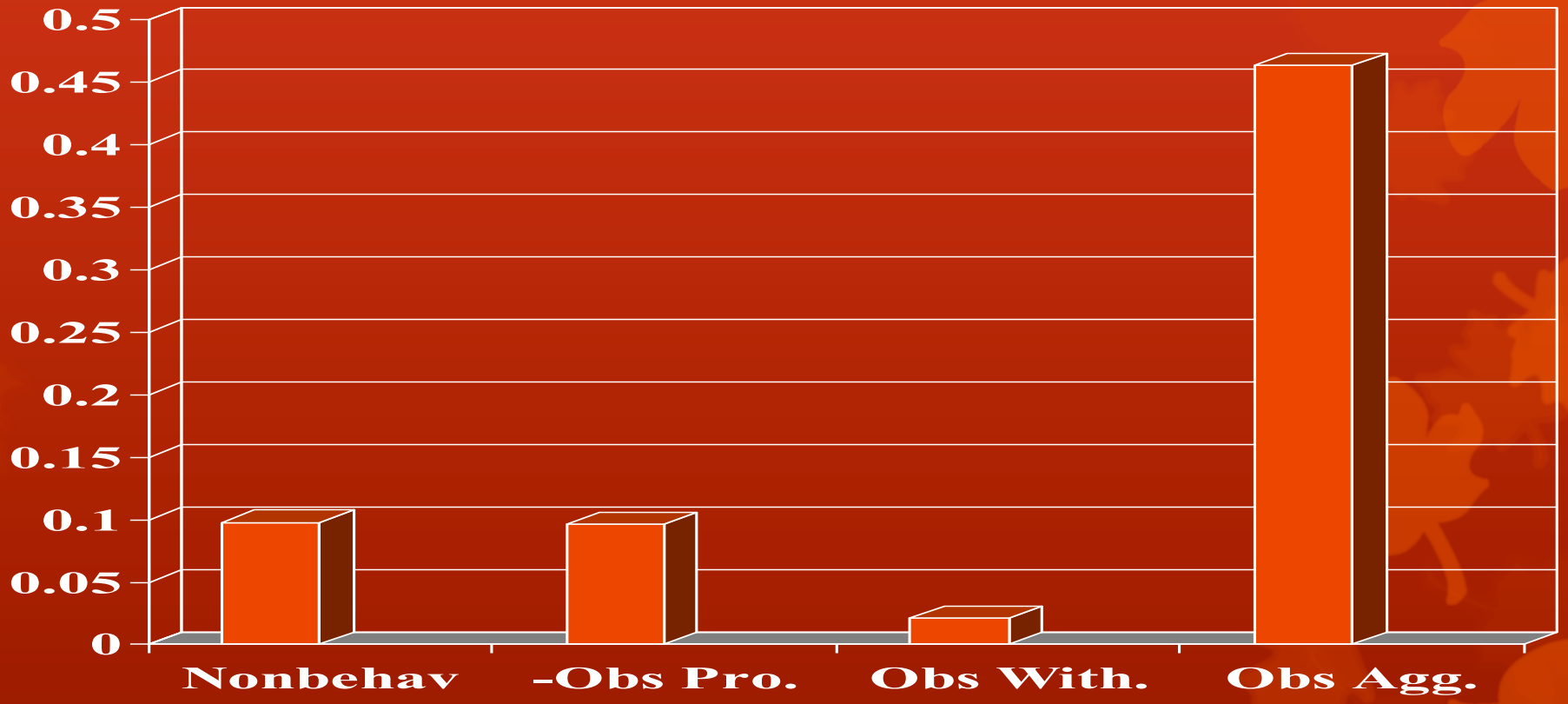
Erhardt & Hinshaw (1994)

- Summer program for boys with ADHD and comp's
  - None knew one another prior to program
  - Behavior observations began Morning 1
  - Peer sociometric interviews afternoon of Day 1, again Day 3, then each Friday
- By afternoon of Day 1 and 3, boys with ADHD >4 times more to be disliked than comparisons
- Correlation of Week 1 noms with end of summer: r = .7
  - Moral re: treatments in place at beginning of school year

Predictions

- What predicted Week 1 negative noms?
  - Not IQ, achievement, attractiveness, athleticism
  - Not daily observations of prosocial behavior
- Strongest predictor ever in my research career:
  - Days 1-3 noncompliance/aggression predicting Week 1 negative nominations
  - Explained 50% of variance
- Treatment implications:
  - How your son will be immediately disliked

Explained Variance in Day 3 Negative Nominations, via Hierarchical Regression



Sex Differences/Female Presentation

- Myth: ADHD affects only boys
- For decades, ADHD (‘hyperactivity’) believed to be a male condition
- Gender paradox?
  - Group (sex) with lower prevalence must have more and ‘stronger’ risk factors
  - Thus, females with ADHD…or males with depression or eating disorders
- Berkeley Girls with ADHD Longitudinal Study (BGALS)

228 girls: 140 with ADHD, 88 comparisons

Childhood (Ages 6-12) → **Adolescence (Ages 11-17)** Retention: 92% → **Early Adulthood (Ages 17-24)** Retention: 95%

- Ethnically and socioeconomically diverse
- Group-matched comparison sample
- Three waves to date, 4th just completed (94% retention)
  - Largest female sample of childhood ADHD
- Follow-ups: Multi-domain assessments
  - Psychiatric, academic, neuropsychological, family/social, occupational functioning

ADHD: Female Differences from Males

- Lower rates of delinquency and substance abuse
- Our girls did graduate from high school (barely) but have major post-secondary issues
- Around half no longer met criteria for ADHD
- Yet markedly higher rates of self-harm in ADHD-C
  - Predicted by early impulsivity, mediated by adolescent response inhibition, and either externalizing (NSSI) or internalizing (suicide) problems

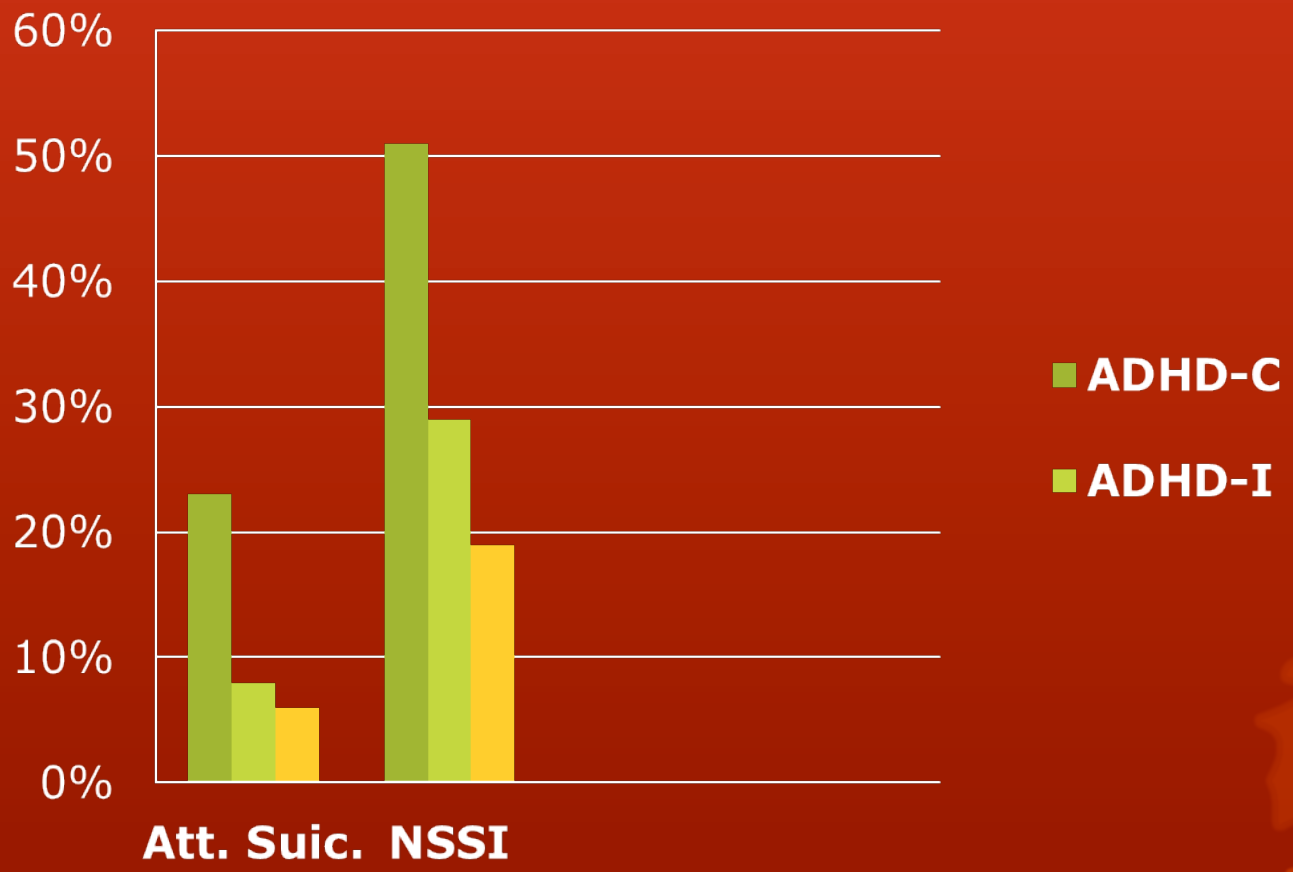
Self-harm

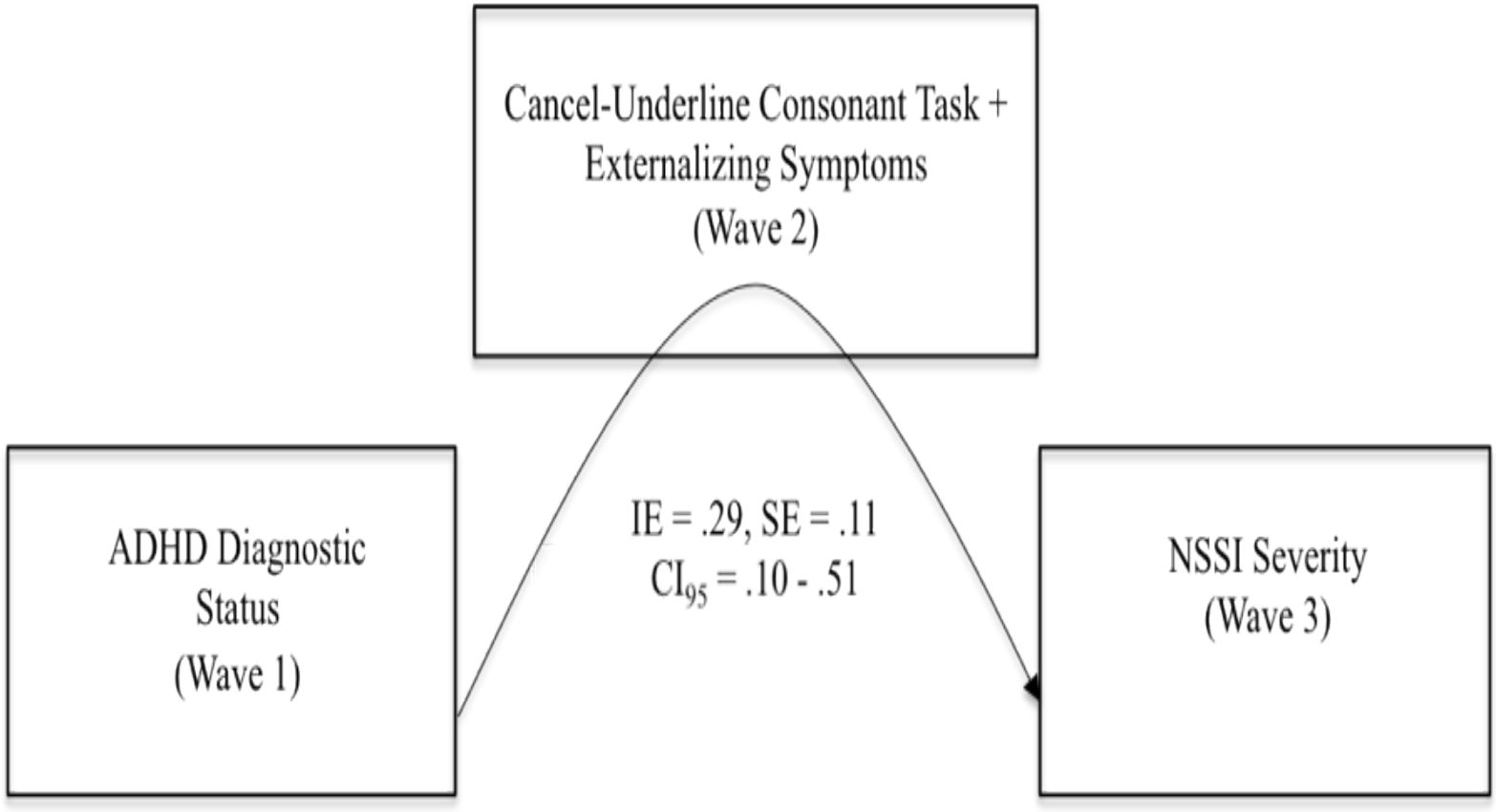
- Suicidal behavior: intent is to die
  - Suicidal ideation (common)
  - Suicide attempt (rarer)
- Non-suicidal self-injurious behavior (NSSI)
  - No express intent to die, but to express (or ease) psychological pain
  - Linked to poor emotion regulation
  - Wide range—cuticles to cutting/burning
- But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

BGALS Follow-up: Self-harm

10-year follow-up (M age = 20)

Hinshaw et al. (2012), *Journal of Consulting and Clinical Psychology*

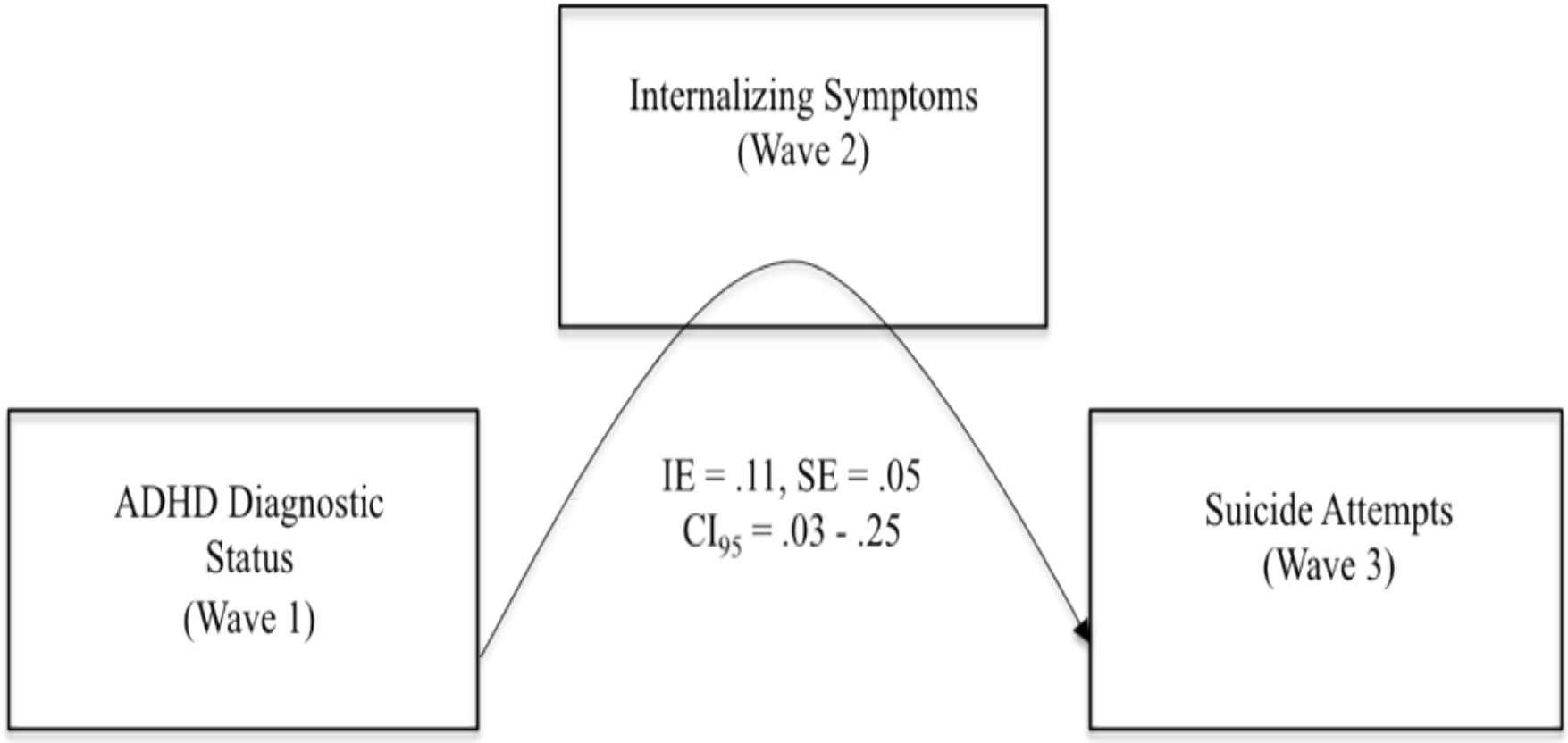




MEDIATION: WAVE 1 ADHD STATUS TO WAVE 3 NSSI

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 (2015)

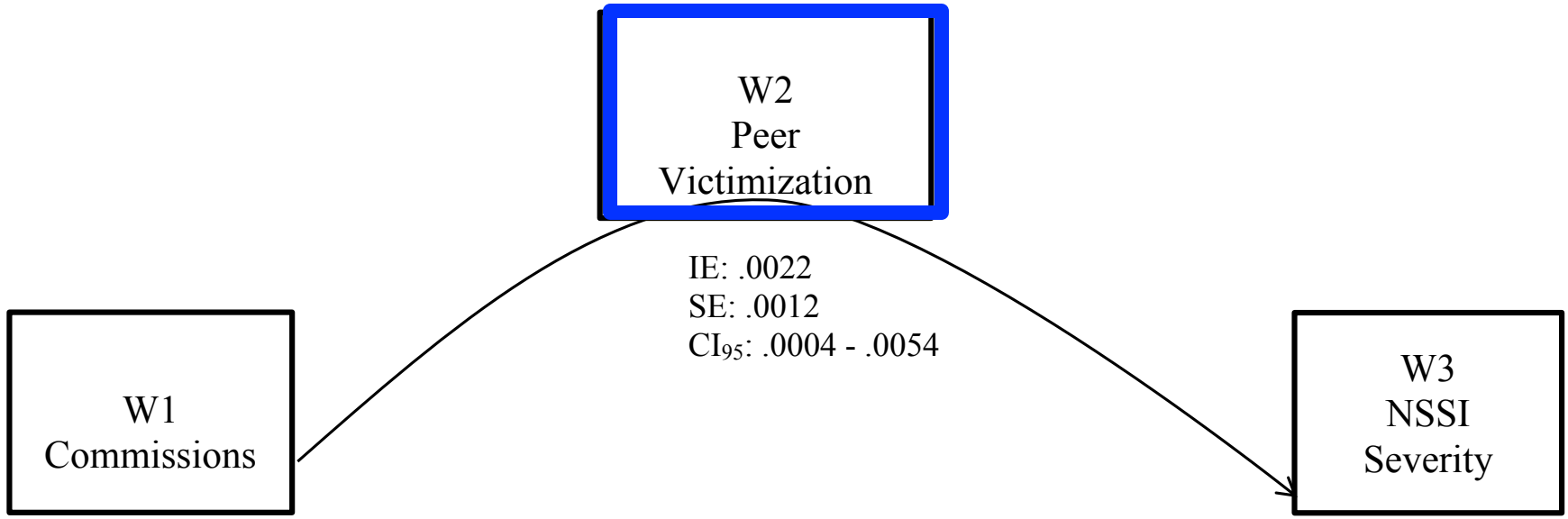


Figure 3. The relationship between W1 Commissions and W3 NSSI was partially mediated by W2 Peer Victimization over and above: WISC Full-Scale IQ, mother's education, household income, and age at W3. Data represent indirect effect and standard errors using 10,000 bootstrap samples to obtain bias-corrected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

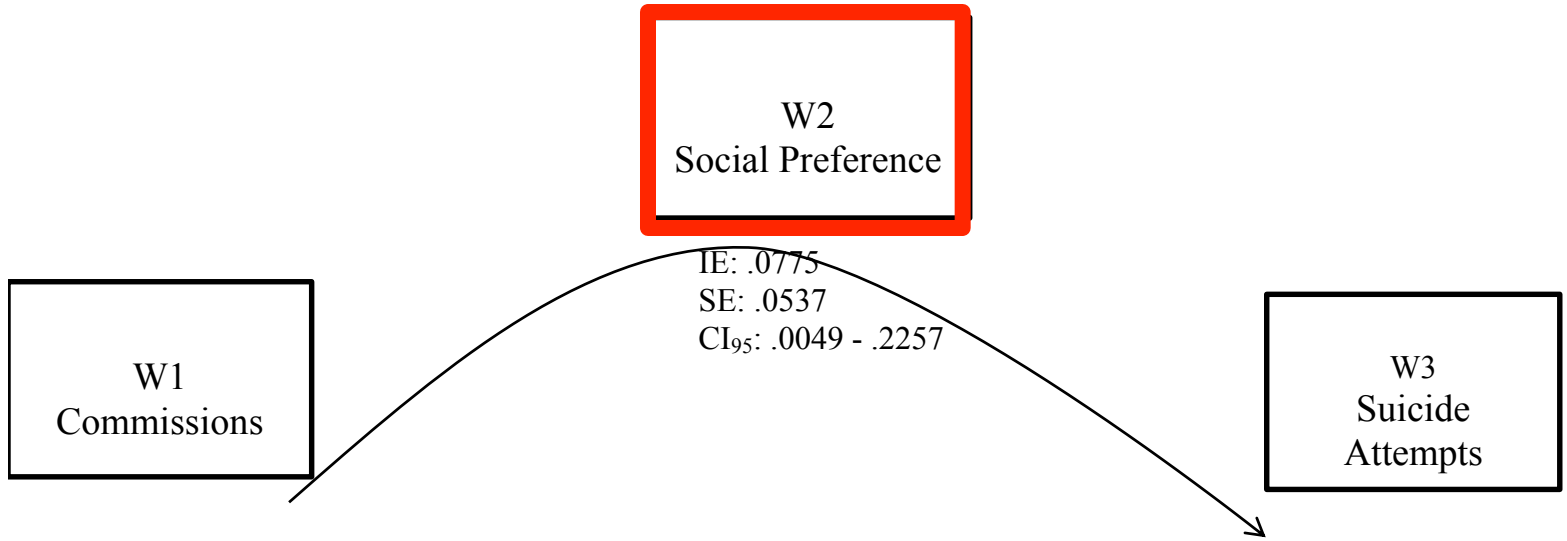


Figure 2. The relationship between W1 Commissions and W3 Suicide Attempts (y/n) was partially mediated by W2 social preference scores over and above: WISC Full-Scale IQ, mother's education, household income, and age at W3. Data represent indirect effect and standard errors using 10,000 bootstrap samples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

Trauma and peer relationships?

- Physical abuse, sexual abuse, and/or neglect higher in ADHD than comparison girls
- Within ADHD group, maltreated subgroup more likely to show depression and suicide attempts (over 30%)
  - But not externalizing behavior)
  - Guendelman et al. (2015a, *Development and Psychopathology*)
- AND, girls with ADHD likely to be victims of intimate partner violence by early adulthood
  - Guendelman et al. (2015b, *Journal of Abnormal Child Psychology*)

Interim Conclusions

- ADHD not a static "entity"
- Different pathways lead to ADHD: Equifinality
- Different outcomes from early symptoms: Multifinality
  - Predictors, moderators, mediators of differential outcomes
- Families; peer deficits and social skills; EF deficits
- Developmental, contextual factors crucial
  - Parenting styles, which may not be causal, are important determinants of outcome, even for a condition with $h^2 = .7/.8$
  - Systems, health-care, legislative, cultural, stigma-related factors related to underutilization and disparities in care

Tidal Wave/ADHD Explosion

National Survey of Children's Health (Visser et al., 2014)

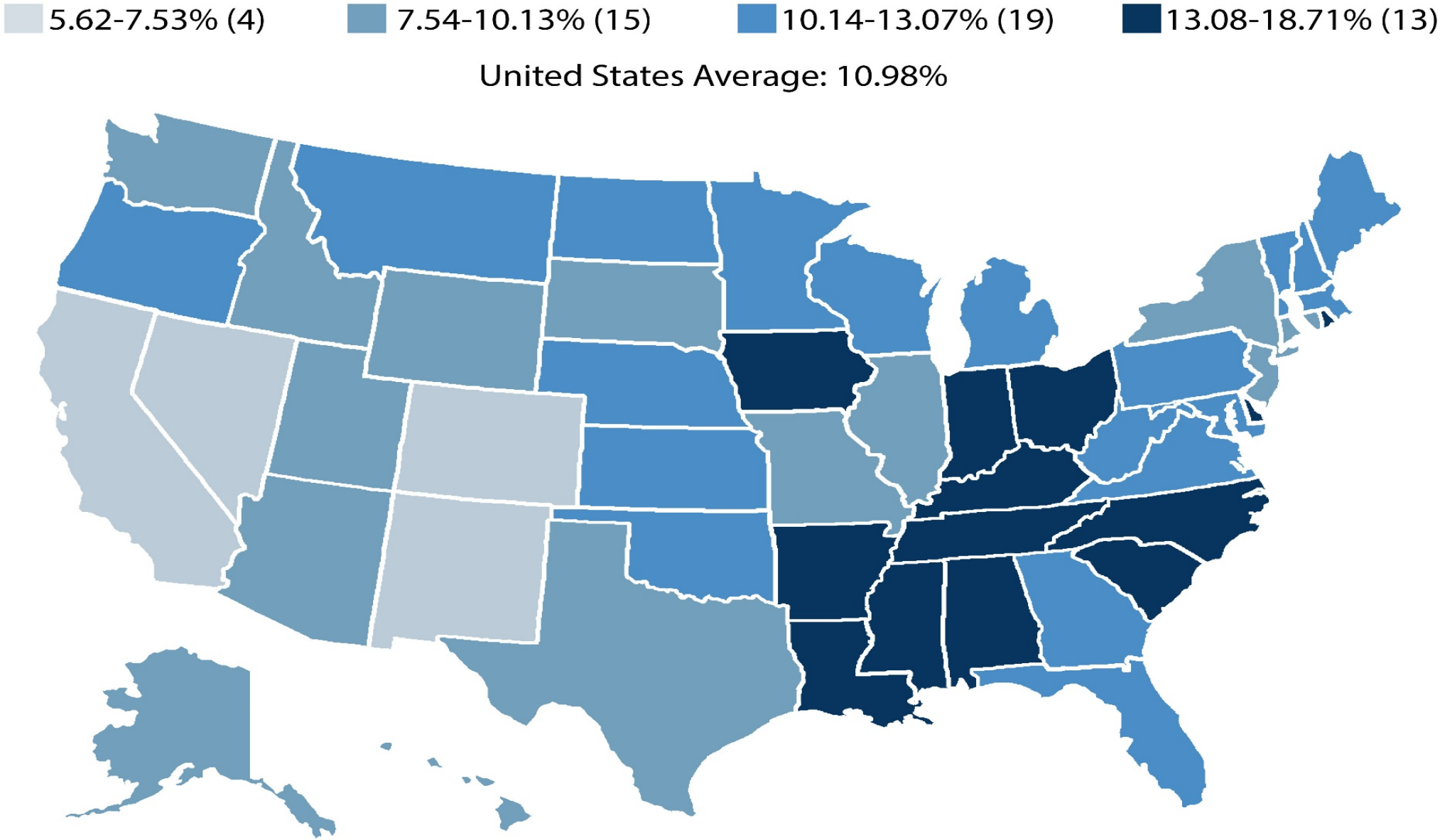
Journal of the American Academy of Child & Adolescent Psychiatry

- **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**
  - **From other sources: Largest medication increases: adolescents, adults**

Roots

- Policy shifts:
  - Early 1990s: IDEA: ADHD as “OHI”
  - Medicaid: Authorizes ADHD
  - SSI: ADHD (with other impairment) can qualify
  - Late 1990s: FDA changes regulations on DTC ads
  - 2000: First effective long-acting stimulant
- More and more LBW babies survive
- Typical diagnosis yielded by the following:
  - 10-15’ office visit from non-specialist

Diagnostic Prevalence:

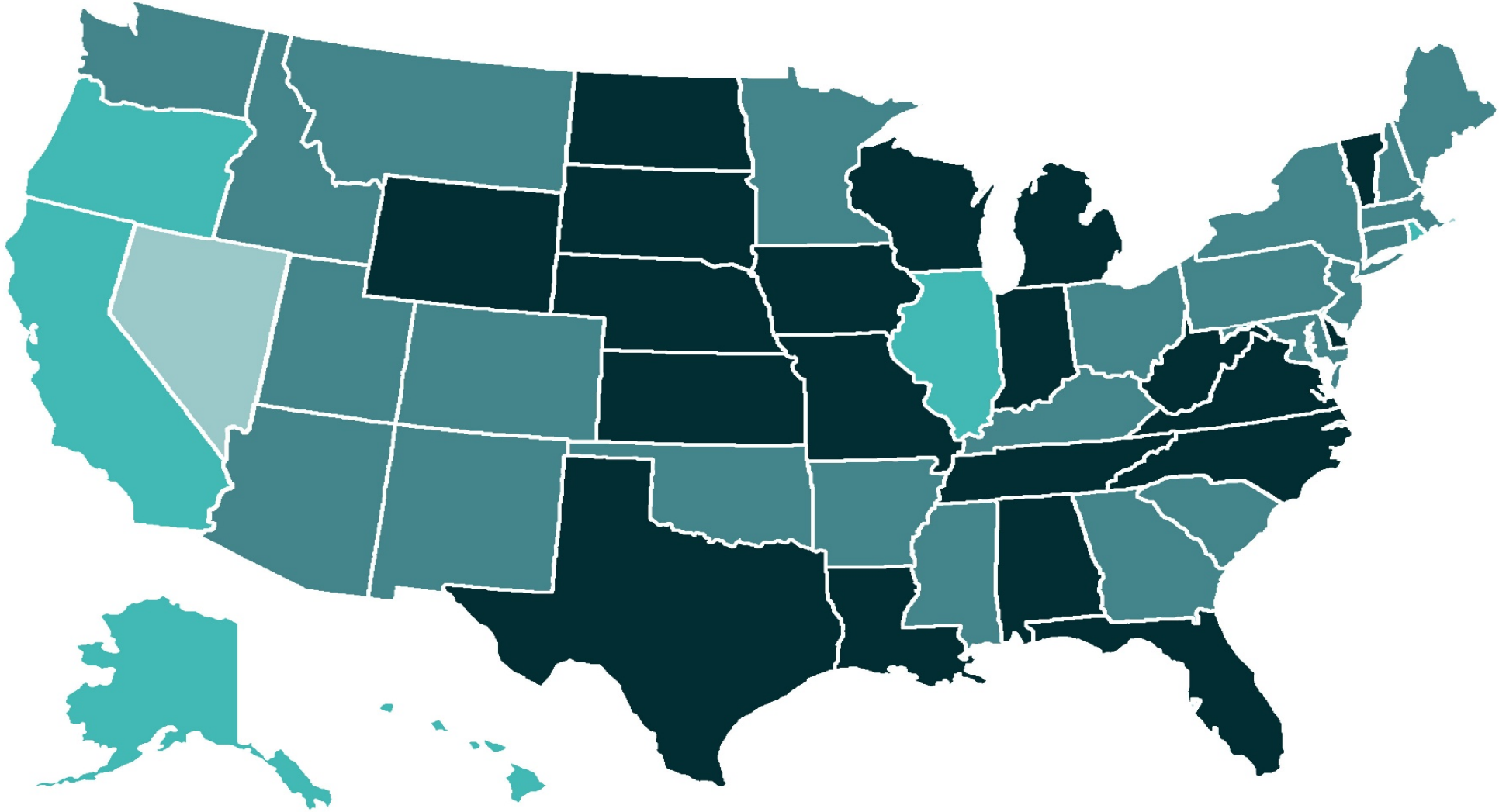


Source: 2011-2012 NSCH, Children Aged 4-17

Medication Rate Given Current Diagnosis:

46.96-52.41% (1) 52.42-60.02% (7) 60.03-69.99% (23) 70.00-86.15% (20)

United States Average: 69.08%



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 regional differences within state -- but not state-by-state per

Consequential accountability

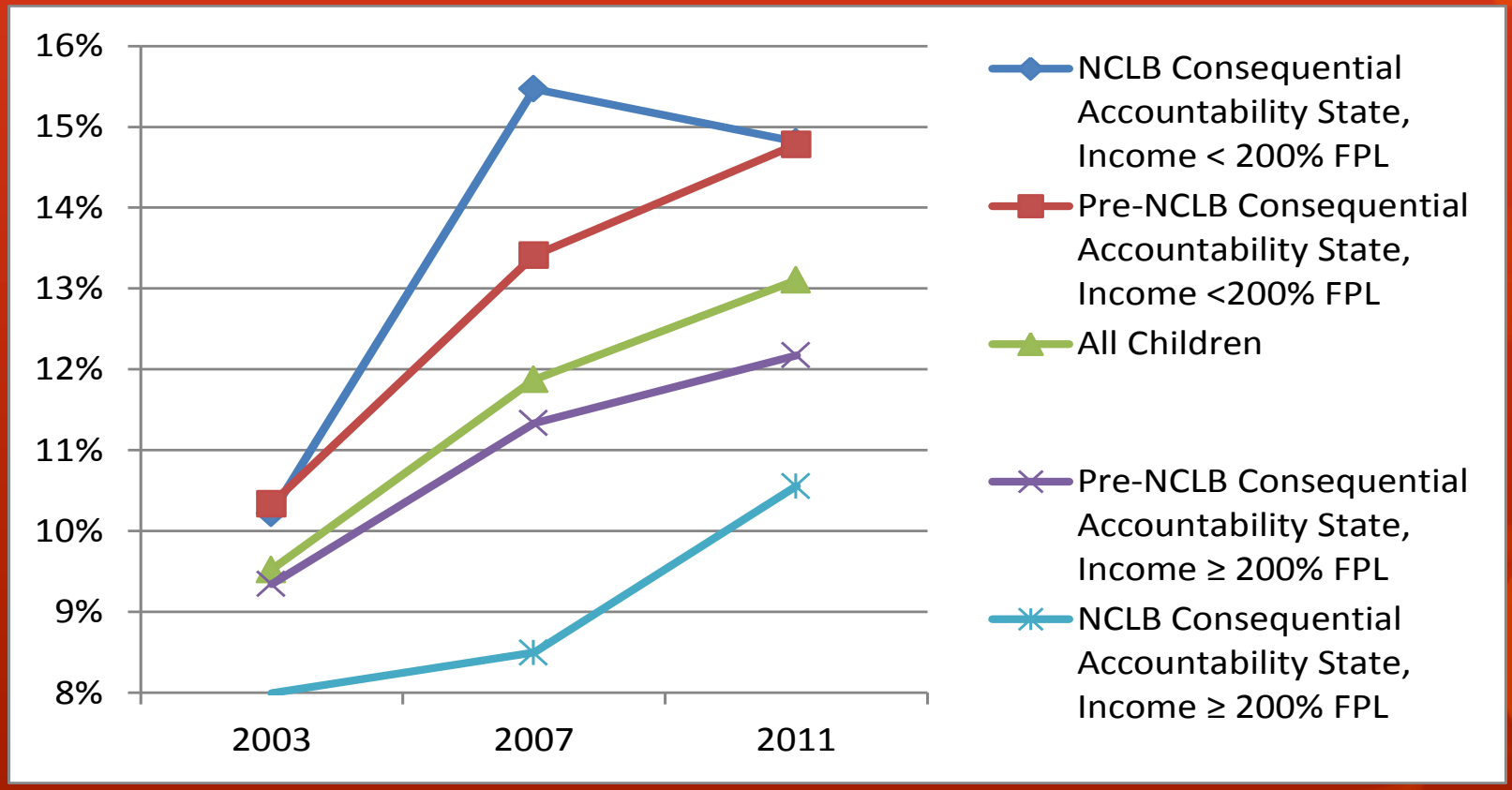
- 1970s-80s: public school reforms "input focused"
  - Reduce class size, pay teachers more, etc.
- Results not consistent; shift in 1990s to "output focused"
  - I.e., incentivize test score improvements per se
- Consequential accountability—districts get 'noted' or even cut off from funds, unless test 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 laws prior to NCLB (but not psychotropic medication laws): In the South

Region	Number of States	Consequential Accountability before NCLB	High School Exit Exam	Psychotropic Medication Law
Northeast	9	5	4	2
Midwest	12	5	3	2
South	17	15	13	5
West	13	5	8	5
United States	51	30	28	14

Sources: Investigators' Research, Dee & Jacob 2011, Dee & Jacob 2006, and Center for Education Policy

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



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…

- **#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**
- **IRONY: white middle-class male condition spreads to nation’s poorest kids, disproportionately**
  - **Recall poor-quality, 10’ ‘diagnostic evaluations’**

TREATMENT: OVERVIEW

- Two evidence-based treatments for youth:
  - Medications
  - Behavioral treatment
    - For adults: CBT
- Promising and/or Questionable:
  - Neurofeedback (definitive trials ongoing)
  - Diet (small effects)
  - 1:1 therapy (vanishingly small effects)
  - Specific cognitive training in WM (little generalization)

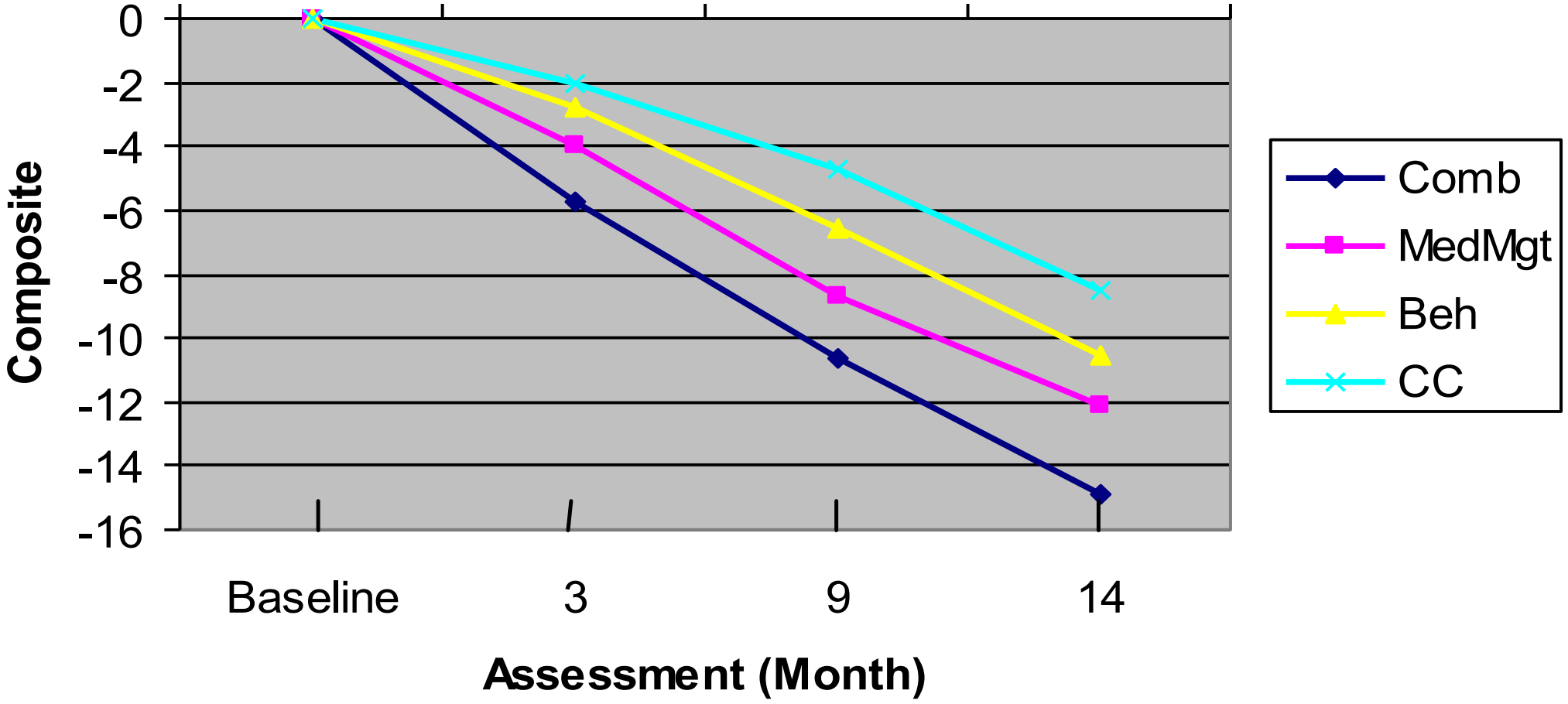
Medication

- SDRIs or SDNRIs
  - SNRIs
  - See in light of underarousal; Volkow et al.
- Paradoxical response?
- Average response rate: > 80%
  - < 15% on placebo; difference is large
- Academics?
- TES
  - Sleep, appetite, cardiovascular, growth

Behavioral Intervention

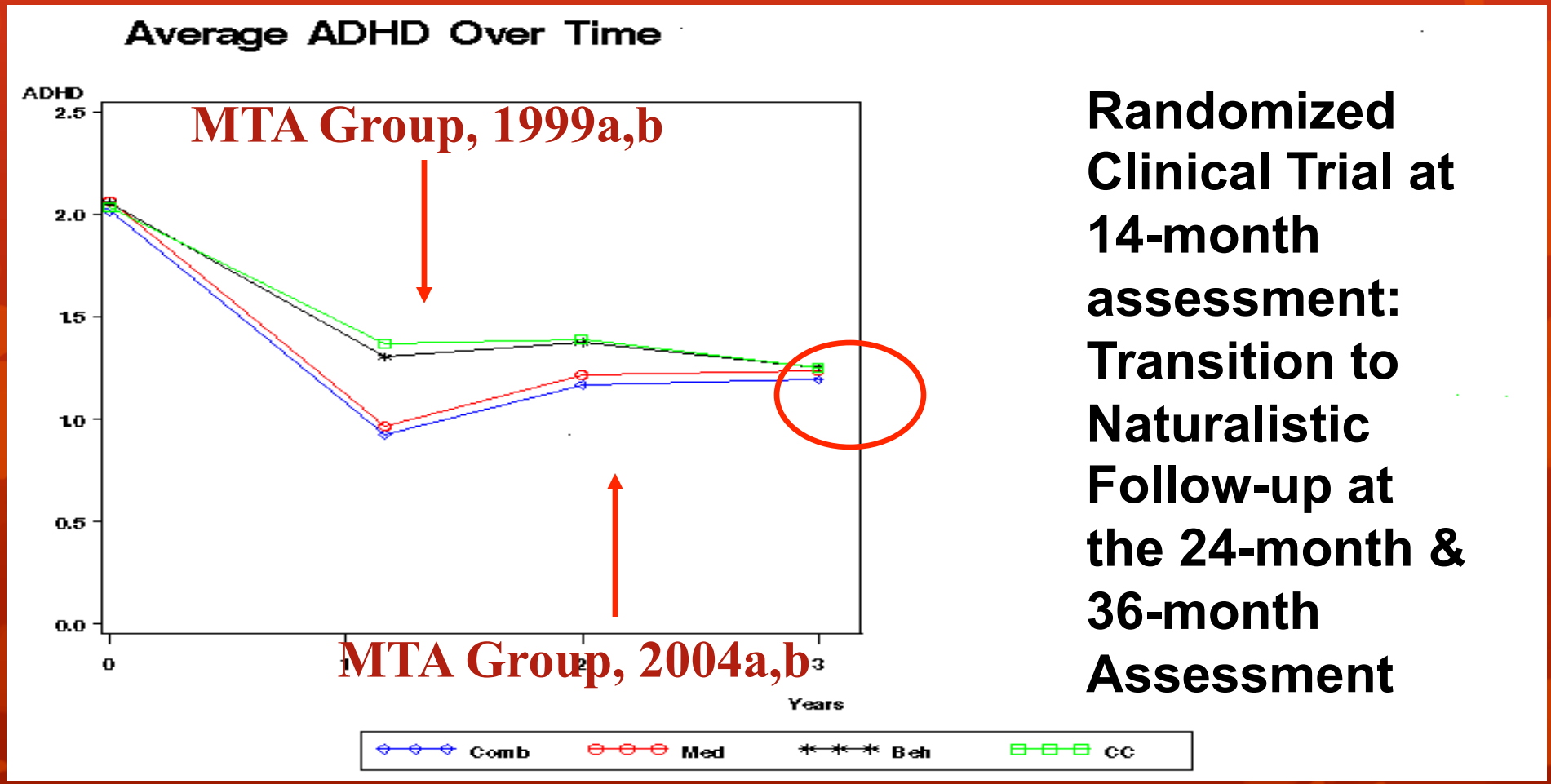
- Home, school, child components
- Small steps, regular rewards, clear consequences
- Take negative emotion out of parenting
- Parent-teacher collaboration (DRC)
- Generalization and maintenance?

Composite Score
Adjusted for Baseline
Conners et al., 2001



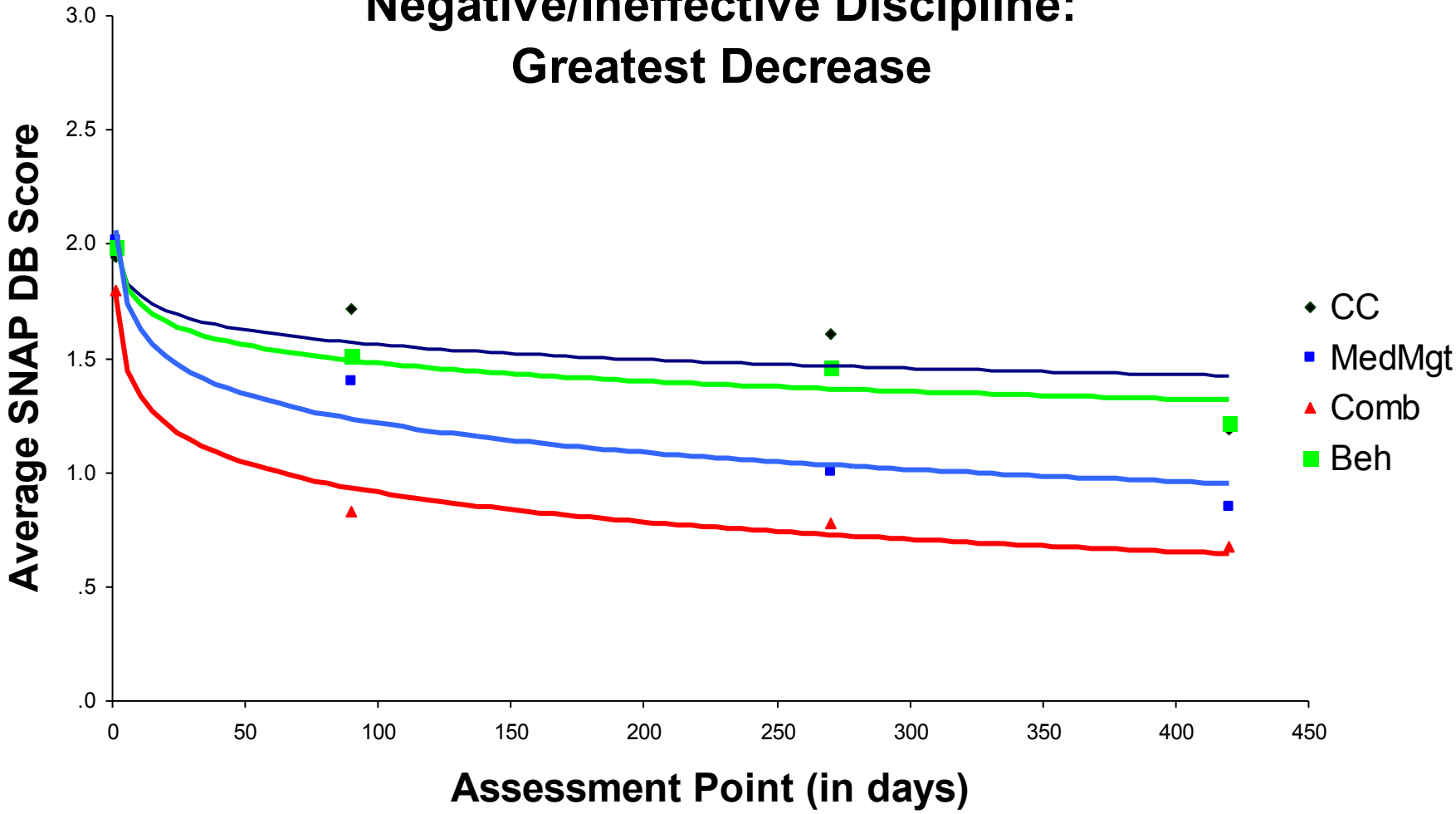
Convergence of Symptoms by 3/8 Years

Jensen et al. (2007), Swanson et al. (2007), Molina et al. (2009)



Randomized Clinical Trial at 14-month assessment: Transition to Naturalistic Follow-up at the 24-month & 36-month Assessment

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

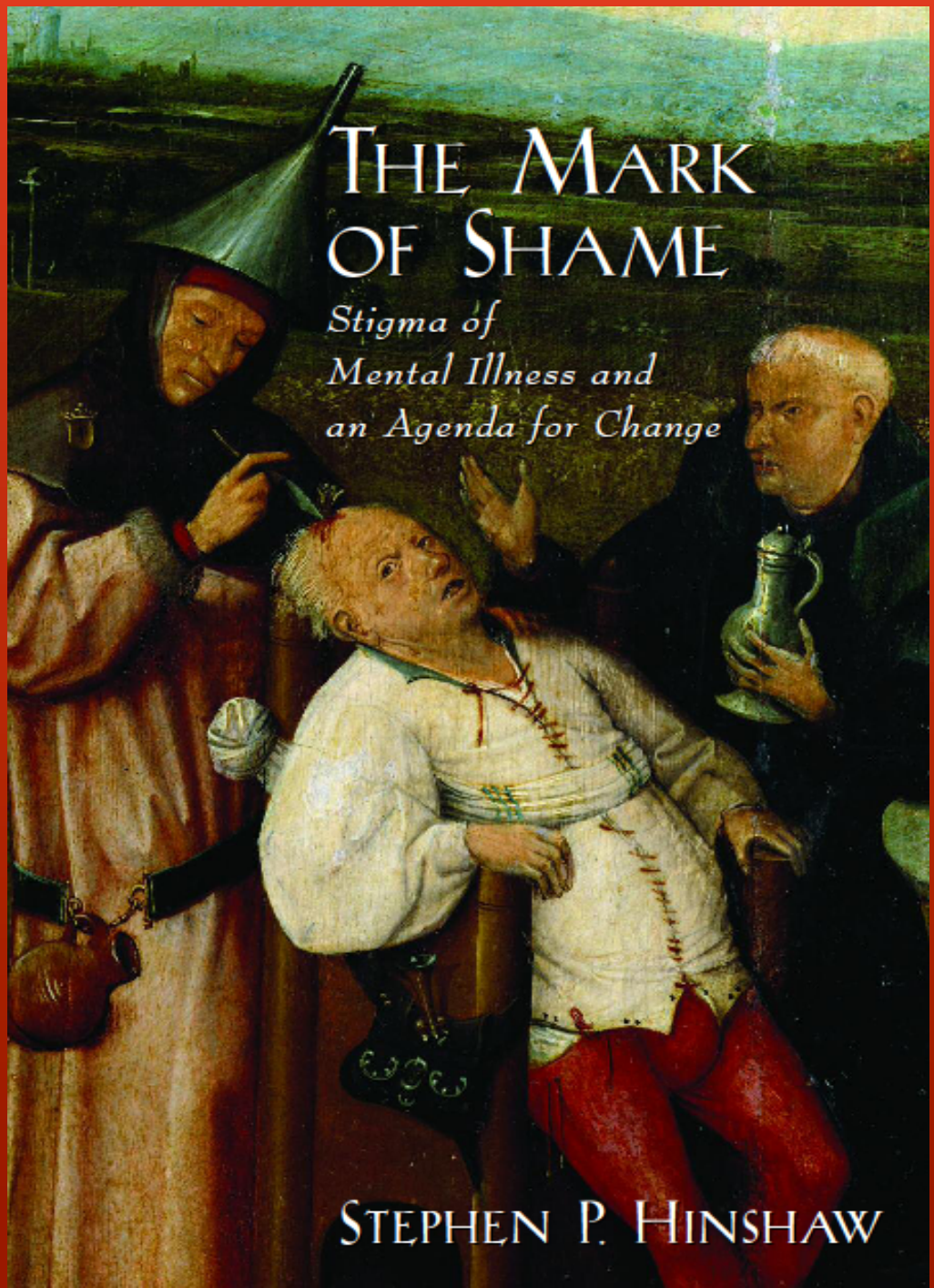


Conclusions

- Symptom relief from medications
- Skill building with multimodal tx
  - Normalization when parenting becomes far more authoritative
  - CBT for late adolescents and adults
- Additional interventions for comorbidities/associated conditions
  - Depression, trauma, learning disorders, anxiety, conduct problems

Diversion

- Define: non-prescription use
- Rates extremely high (why??)
- How effective are stimulants as ‘neuroenhancers’ for the general population?
  - Smith & Farah (2011), *Psychological Bulletin*
  - Ilieva et al. (2013), *Neuropharmacology*
- Rates of abuse/addiction: Policy implications


THE MARK OF SHAME
Stigma of Mental Illness and an Agenda for Change
STEPHEN P. HINSHAW

MI Stigma is Decreasing, Right??

- Actually, higher rates of stigma in 2000 than 1950
  - US public 2.5 times more likely to believe that m.i. linked to violence
  - Shootings dominate media
  - Involuntary commitment laws: 'danger' to self/others

- No fundamental change in US stigma levels from 1996 -2006 (Pescosolido et al., 2010)

- Does ascription of MI to biogenetic causes reduce stigma?
  - Kvaale et al. (2013): yes regarding blame, but *increases* in pessimism and social distance related to such attribution
  - Martinez, Piff, Mendoza-Denton, & Hinshaw (2011): *dehumanization*

Stigma and ADHD

- Expected to be low, because of lower severity
  - Yet stigma higher for Asperger's than severe autism
  - People with ADHD seem as though they should just 'get it together' because of fluctuation of symptoms with demand levels, etc.
- Interesting research
  - Biological attribution for ADHD increases hopelessness but reduces social distance
- What if public knew the truth about causes, and the real stories of families like yours?

Thanks…

- NIMH and NIDA grants
- Robert Wood Johnson Policy Investigator Award
- Participants in many studies
- Mentors, colleagues, students
- The Help Group and you, the audience