Child Psychopathology

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- ✓ Syllabus Review (handout)
- ✓ Presentation assignment [see schematics: PDD; ADHD]
- ✓ Overview of the course
- ✓ Child Disorder Template (Word File: make available on-line)
- ✓ Introduction to Child Psychopathology and Core Concepts
- ✓ Week 2 reading assignment

"He who loves practice without theory is like the sailor who boards ship without a rudder and compass and never knows where he may cast" **Leonardo da Vinci (1452-1519)**

Foundational Concepts

- ✓ Controversies regarding what constitutes a clinical disorder
- ✓ What constitutes abnormality?
- ✓ The concept of 'differential diagnosis'
- ✓ Conditional probabilities as a means of understanding clinical symptoms and disorders
- ✓ The importance of epidemiology for clinical decision making
- ✓ Empirical methods for investigating clinical phenomena
- ✓ The importance of understanding mediators and moderators
- ✓ Equifinality and multifinality
- ✓ Statistical and clinically meaningful change

Child Psychopathology

Psychopathology: **the study of individual differences, deviant or maladaptive behaviors and processes.**

Scientific understanding is, in large measure, the ability to describe precisely the functional relations between entities or events.

The ability to set apart such entities or events from one another and to describe their properties in terms of observable phenomena is a precursor to understanding the relations between them.

Psychopathology

The science dealing with diseases and abnormalities of the mind.

Psycho

From the Greek, "psyche"; soul or mind.

Pathology

From the Greek, "patho"; that part of medicine that deals with the nature of diseases, their causes and symptoms, and especially the structure and functional changes caused by the disease.

Disease

Any departure from health.

Ology

The 'study' of any topic

Disorder

Irregularity, disturbance, or interruption of the normal functions, as in a mental disorder.

Defining and Identifying

- What is abnormal behavior?
  - Atypical
  - Harmful
  - Inappropriate
  - Depends of age, culture, gender, and situational factors
  - Parents may differ on their views of what is acceptable
  - Society has changing views of abnormality

What is abnormal?

- What is abnormal behavior?
  - Atypical
  - Harmful
  - Inappropriate
  - Depends of age, culture, gender, and situational factors
  - Parents may differ on their views of what is acceptable
  - Society has changing views of abnormality

How Common are Problems?

- **Up to 35.5% of youth age 4-18 have mental health problems**
- **15-20% have "clinic level" disorders**** **[this may be a gross underestimate based on the Kessler et al. (2005) findings]**
- **Variability in rates due to**
  - **Different methods (e.g., rating scales vs interviews)**
  - **Different populations (inpatient, outpatient, community-based epidemiology studies)**
  - **Different definitions**
  - **Increasing stress**

Foundational Knowledge

What is a clinical disorder?

Clinical Disorder

Working Definition of a Clinical Disorder: a constellation of symptoms that significantly impairs an individual's ability to function, and is characterized by a particular symptom picture with a specifiable onset, course, duration, outcome, and response to treatment, and associated familial, psychosocial, and biological correlates.

Onset: age of initial symptoms + insidious vs rapid
Course: slowing worsening or improving; episodic vs chronic; waxing & waning vs continuous
Duration: how long does a particular episode last?
Outcome: do you fully recover?

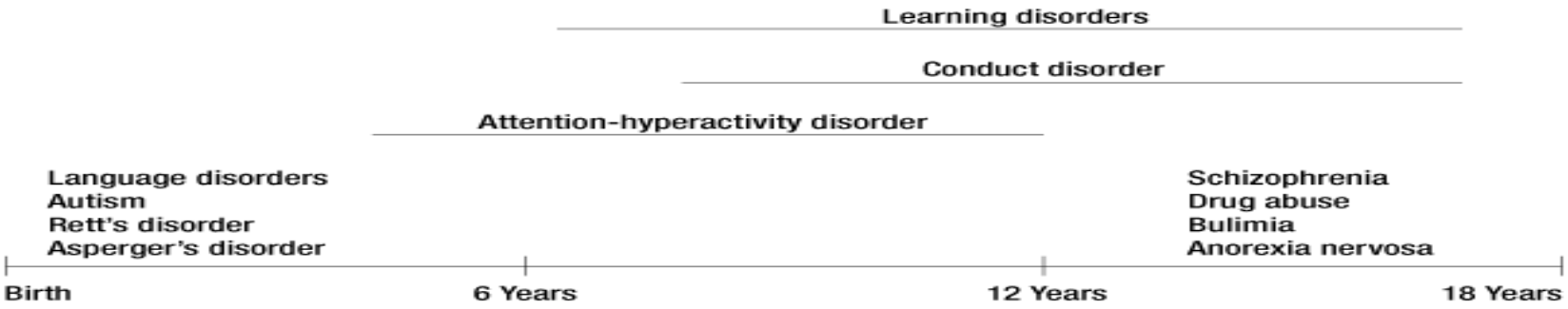
Clinical disorders

Clinical Disorders	Onset[a,b,c]	Course	Duration
Disruptive Behavior Disorders:			
Attention-Deficit/ Hyperactivity Disorder (ADHD)	3.5[b]	Chronic	Adolescence.-– Llifelong
Conduct Disorder (CD)	<10[c] <16[c]	Variable Variable	Adulthood Early Aadulthood
Oppositional Defiant Disorder (ODD)	<8[c]	Variable	Remits or Aantecedent to CD
Pervasive Developmental Disorders:			
Asperger's Disorder	3–-6[c]	Chronic	Lifelong
Autistic Disorder[e]	<3[b]	Chronic	Lifelong
Childhood Disintegrative Disorder[e]	3–-4[b] or [c]	Chronic	Lifelong
Rett's Disorder[e]	1–-2 & <4[c]	Chronic	Lifelong or Ffatal
Mood Disorders:			
Major Depressive Disorder[f]	5–-19[b] or [c]	Variable	Remits or Vvariable
Dysthymic Disorder[g]	8.5[c]	Variable	Remits or Vvariable
Manic Episode (In context of Bipolar Disorder)	5–-14	Variable	Lifelong
Anxiety Disorders:			
Acute Stress Disorder	Any Aage[i]	1 Mmonth	2-D days to 1-M month
Obsessive-Compulsive Disorder[j]	6–-15(m)[c] 20–-29(f)[c]	Chronic Chronic	Lifelong Lifelong
Posttraumatic Stress Disorder	Acute or Delayed[i]	Variable Variable	2-M months to 2- Yyears
Separation Anxiety Disorder[m]	9–-13[b] or [c]	Variable	2- Yyears-– Aadolescence.
Social Phobia[m]	Mid-Tteens [b] or [c]	Chronic	Remits by Aadulthood
Specific Phobia[k,m]	7–-12[b] or [c]	Variable	Remits by Aadolescence.
Other Clinical Disorders:			
Tourette's Disorder	7[c]	Variable	Lifelong
Early- Onset Schizophrenia	5–-11[b] or [c]	Variable	Lifelong

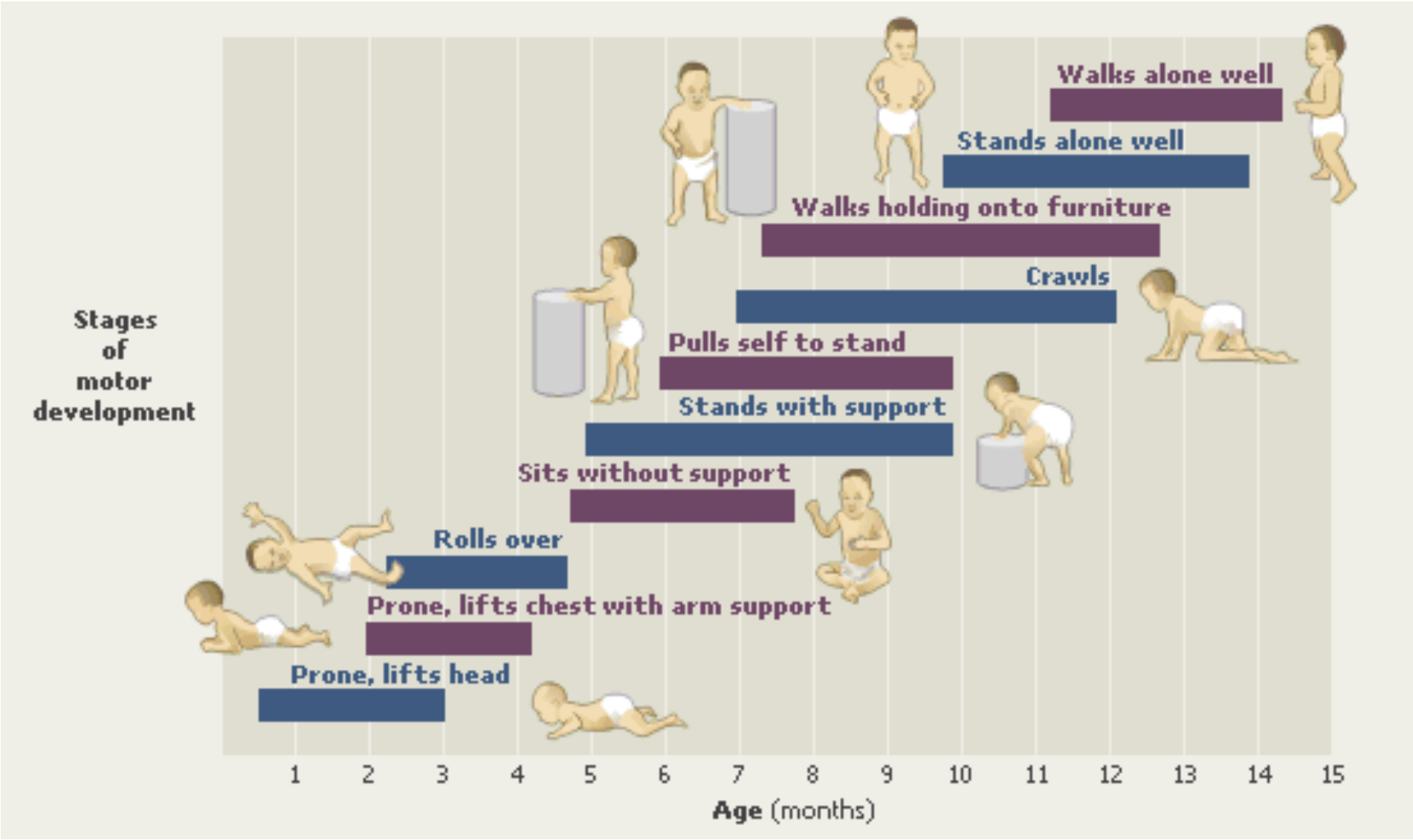
[a]Age of onset indicates age in years at which symptoms are most frequently first reported in children; [b]Acute onset; [c]Insidious onset; [d]At risk for Antisocial Personality Disorder and Substance Abuse Disorder as adults; [e]Typically associated with an Aanxiety Ddisorder; [g]Frequently associated with Conduct Disorder; [i]Onset immediately following a traumatic event; [j]Commonly associated with Ddepression, other Aanxiety Ddisorders, and/or Tourette's; [k]Slightly higher rates in females and dependent upon the type of phobia; [l]Significantly higher number of males versus females prior to age 10; [m]Frequently continuous with Aadult Aanxiety Ddisorder.

Impact of Developmental Level

Clinical disorders and age of onset



Developmental norms



Developmental Milestones Checklist from http://ecdc.syr.edu/ECDCpublications.html

DATE OBSERVED

LANGUAGE MILESTONES (cont)

- ✓ Babbles “dada” and “mama” (8-10 mos.)
- ✓ Says “dada” and “mama” for specific person (11-12 mos.)
- ✓ Uses exclamations such as “oh-oh”

SOCIAL/EMOTIONAL

- ✓ Shy or anxious with strangers (8-12 mos.)
- ✓ Cries when mother or father leaves (8-12 mos.)
- ✓ Enjoys imitating people in his play (10-12 mos.)
- ✓ Shows specific preferences for certain people and toys (8-12 mos.)
- ✓ Prefers mother and/or regular care provider over all others (8-12 mos.)
- ✓ Repeats sounds or gestures for attention (10-12 mos.)
- ✓ Finger-feeds himself (8-12 mos.)
- ✓ Extends arm or leg to help when being dressed

DEVELOPMENTAL RED FLAGS (8 TO 12 MONTHS)

- ✓ Does not crawl
- ✓ Drags one side of body while crawling (for over one month)
- ✓ Cannot stand when supported
- ✓ Does not search for objects that are hidden (10-12 mos.)
- ✓ Says no single words (“mama” or “dada”)
- ✓ Does not learn to use gestures such as waving or shaking head
- ✓ Does not sit steadily by 10 months
- ✓ Does not show interest in “peek-a-boo" or "patty cake” by 8 mos.
- ✓ Does not babble by 8 mos. (“dada,” “baba,” “mama”)

COMMENTS:

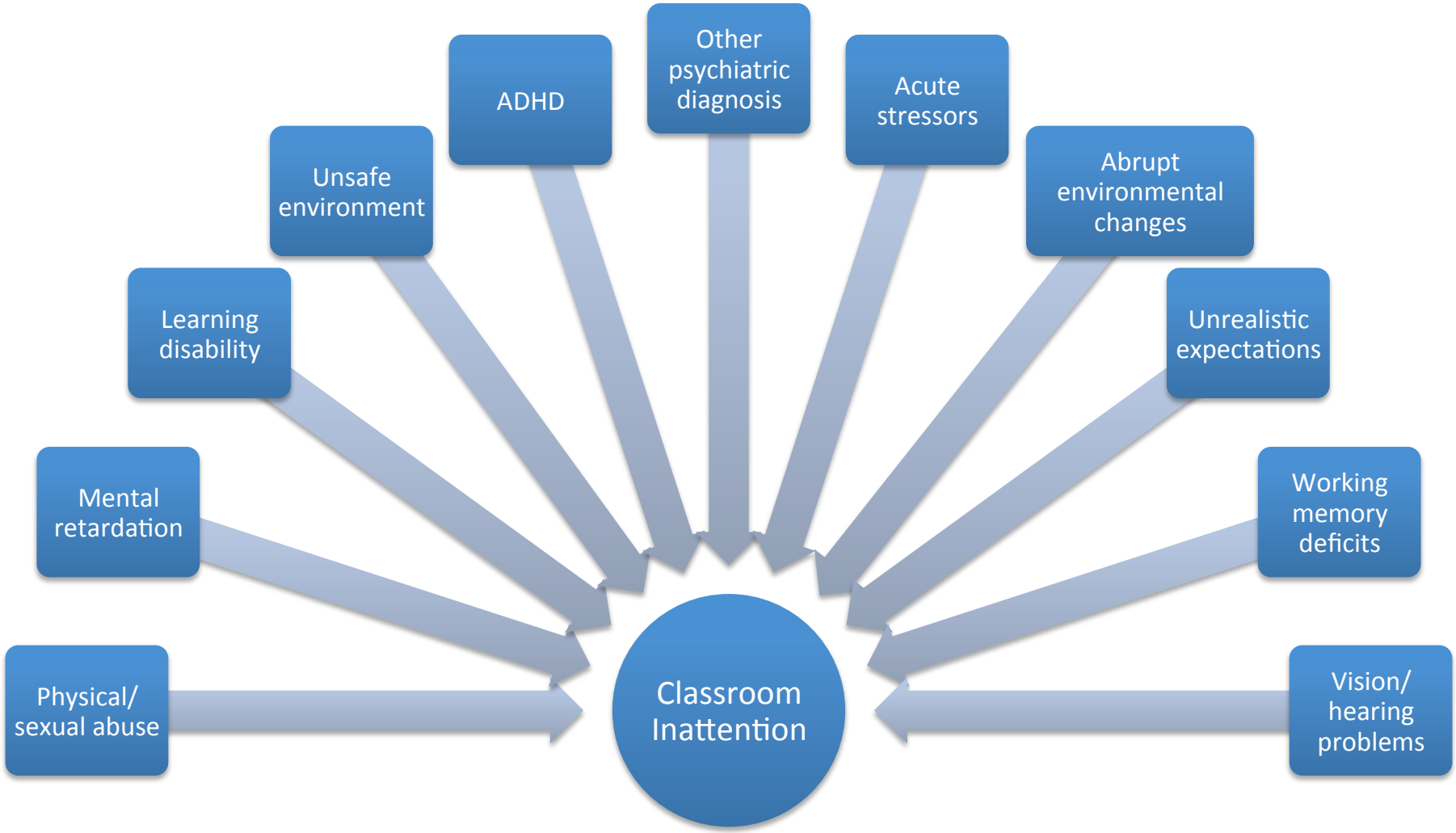
Differential Diagnosis

- The process of weighing the probability of one disease versus that of other diseases possibly accounting for a patient's symptom pattern.
- e.g., cold vs. flu

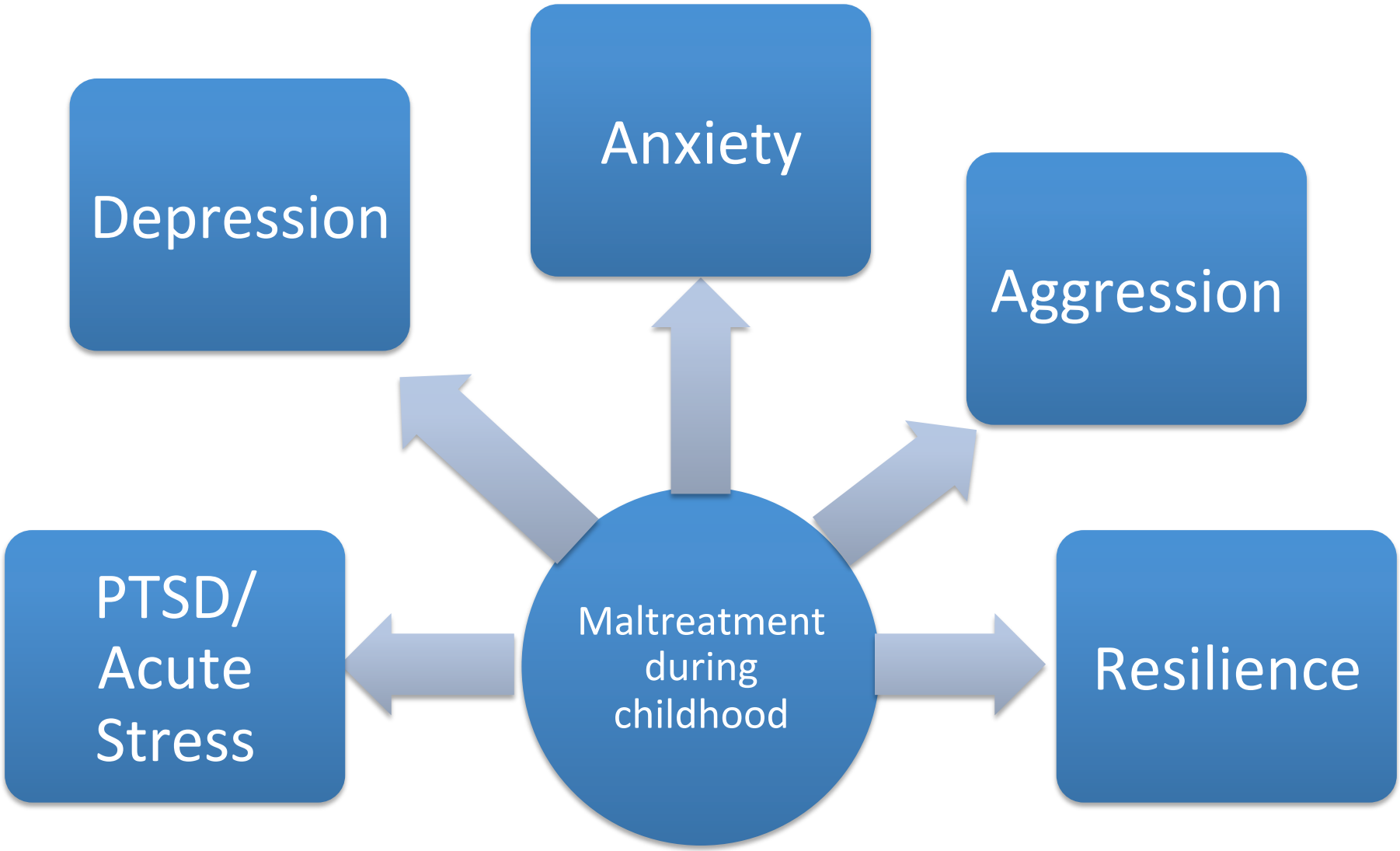
Cold versus the Flu

Colds	Influenza
Gradual onset over days	Sudden onset
Begins with scratchy throat, sneezing, and sniffles leading to congestion	Begins with fever, headache, and all over body aches (myalgia) – one feels exhausted or fatigued; can include stuffy nose, sneezing, sore-throat
Fever is mild or not present	Fever develops quickly and is usually high (> 101 degrees)
Coughing is generally hacking and & can be moist due to congestion	Coughing is usually dry and hacking and can last after other symptoms are gone
Generally affects just the upper body	Systemic illness – affects your entire body [more serious illness – can lead to complications

Equifinality – multiple causes, one outcome



Multifinality – one cause, multiple outcomes



The Role of Factor Analysis in Understanding Clinical Disorders

PEER RELATION DIFFICULTIES

IRRITABLE

TEARFULNESS

INATTENTIVE

WORRY

POOR ACADEMICS

HIGH ACTIVITY LEVEL

NERVOUS

POOR APPETITE

POOR CONCENTRATION

IMPULSIVE

UNIQUE SYMPTOMS that correlate with one another

HIGH ACTIVITY LEVEL

IMPULSIVE

PEER RELATION DIFFICULTIES

SHARED SYMPTOMS

INATTENTIVE

POOR ACADEMICS

POOR CONCENTRATION

UNIQUE SYMPTOMS that correlate with one another

WORRY

IRRITABLE

TEARFULNESS

NERVOUS

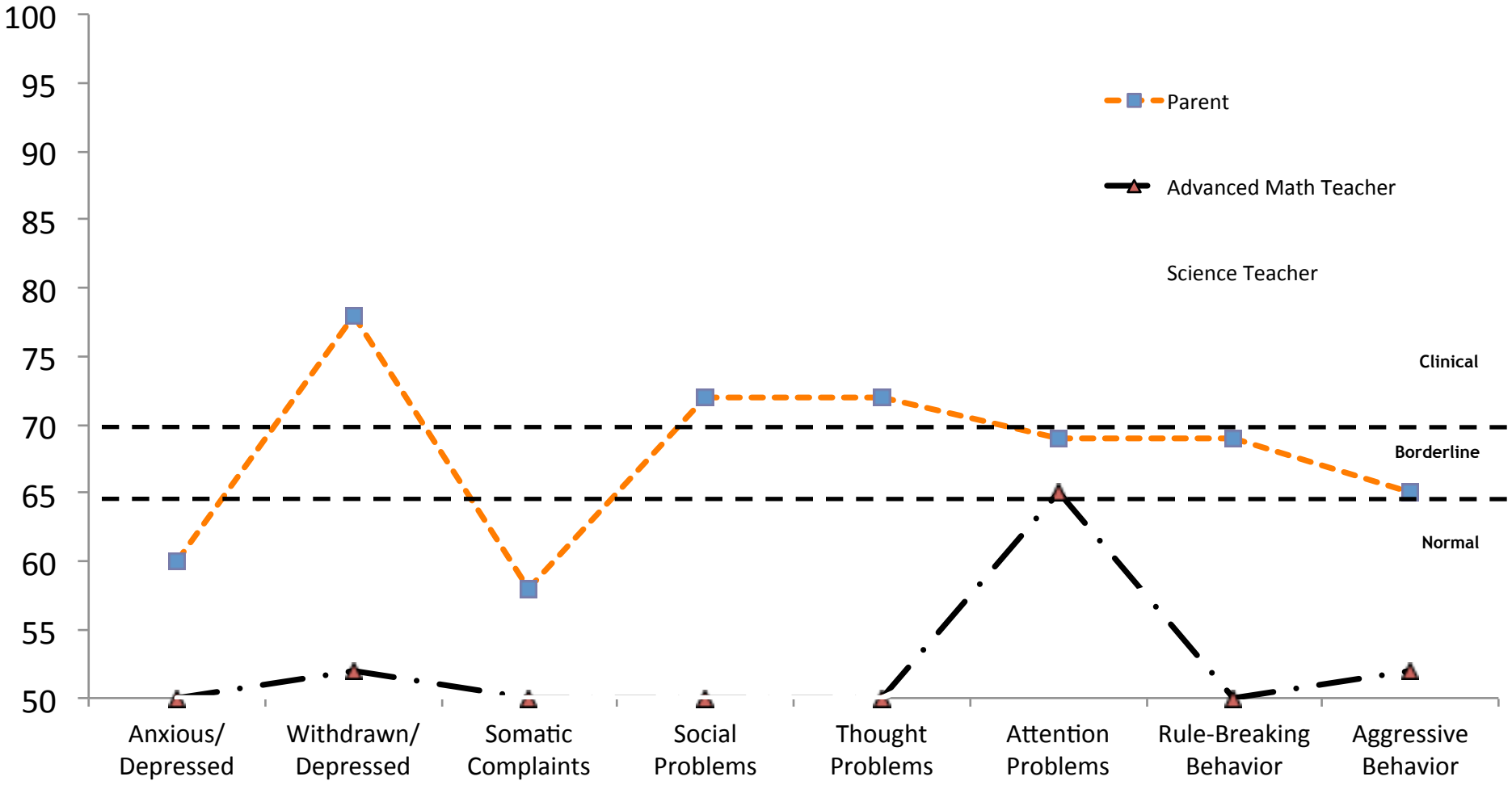
Pathognomonic Symptoms

Quantitative vs Qualitative Differences in child disorders [excess/deficit vs qualitative difference in presentation]

Externalizing	vs	Internalizing Disorders
ADHD		Affective Disorders
Conduct Disorder		Anxiety Disorders
ODD		

Child Behavior Checklist and Teacher Report Forms

Client: 12-y.o. Hispanic male



Conditional Probabilities as a means of understanding Clinical Symptoms:

The Role of Sensitivity, Specificity, PPP, and NPP

Differential Diagnosis & Conditional Probabilities

	Meets Dx	Doesn't Meet Dx	
Symptom Present	A		E
Symptom Absent		C	F
	B	D	

Sensitivity = A/B (true positive)
Specificity = C/D (true negative)
PPP = A/E
NPP = C/F
The importance of Symptoms Base Rates

Sensitivity: what proportion of children with a particular disorder exhibit a specific symptom?

Specificity: what proportion of children without a clinical disorder do not exhibit that same symptom?

PPP: what proportion of children with a specific symptom meet full diagnostic for a specific clinical disorder?

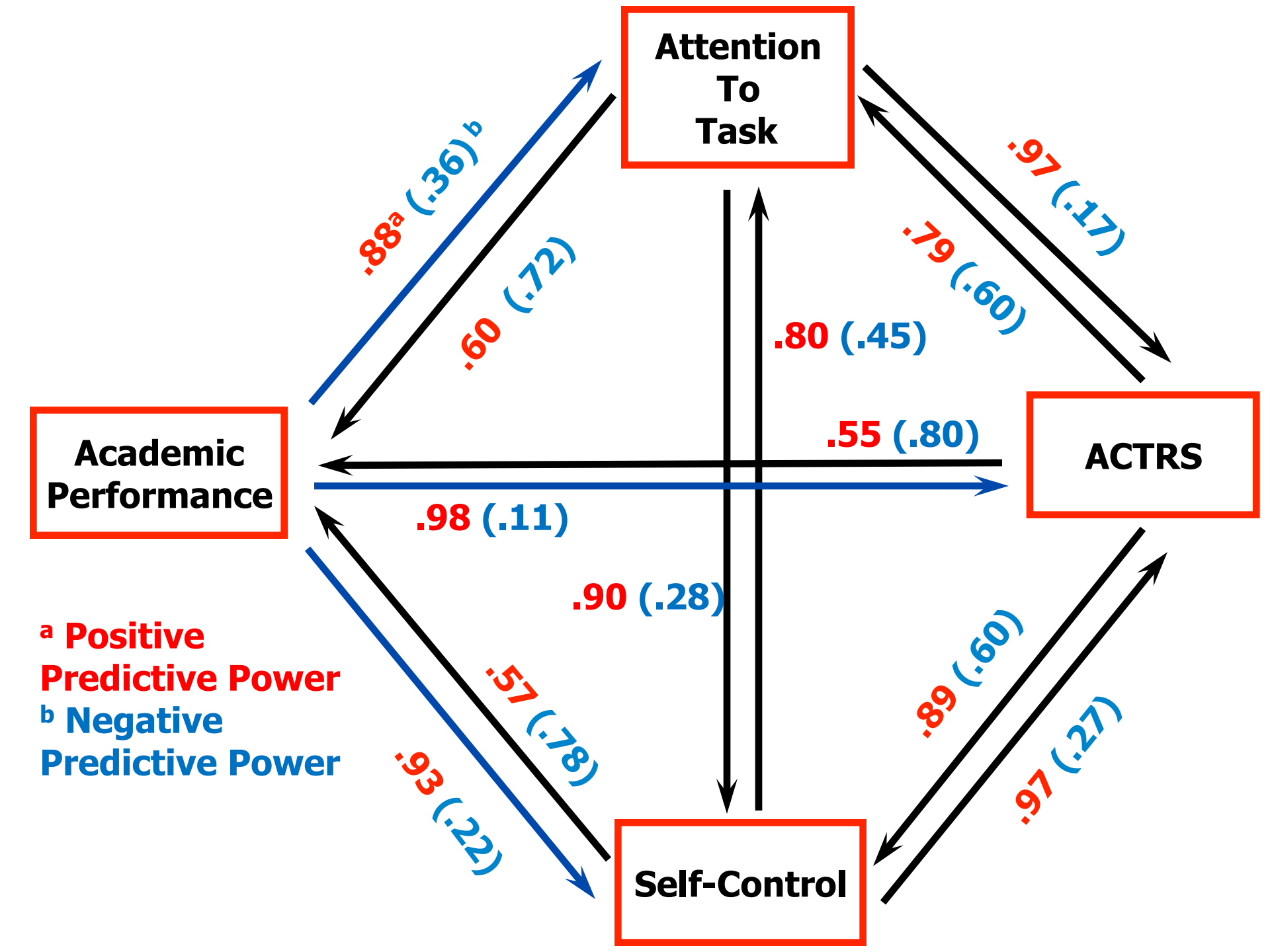
NPP: what proportion of children without that identical symptom do not meet full diagnostic criteria for that same disorder?

POSITIVE AND NEGATIVE PREDICTIVE POWER

	ON-TASK RESPONDER	ON-TASK NON-RESPONDER	
Academic RESPONDER	A		B
Academic NON-RESPONDER		C	D

PPP = A/B; GIVEN A POSITIVE RESPONSE IN ACADEMIC EFFICIENCY (B), THE PROBABILTY OF OBTAINING A POSITIVE RESPONSE IN ATTENTION (A).

NPP = C/D; GIVEN NO academic improvement (D), THE PROBABILITY OF NO improvement in ATTENTION (C).


Attention To Task
Academic Performance
ACTRS
Self-Control
.88[a] (.36)[b]
.60 (.72)
.80 (.45)
.79 (.60)
.97 (.17)
.55 (.80)
.98 (.11)
.90 (.28)
.57 (.78)
.93 (.22)
.89 (.60)
.97 (.27)
[a] Positive Predictive Power
[b] Negative Predictive Power

The Role of Epidemiology for Understanding Child Psychopathology

What is epidemiology?

Epidemiology is concerned with the ways in which clinical disorders and diseases occur in human populations, and with factors that influence these patterns of occurrence.

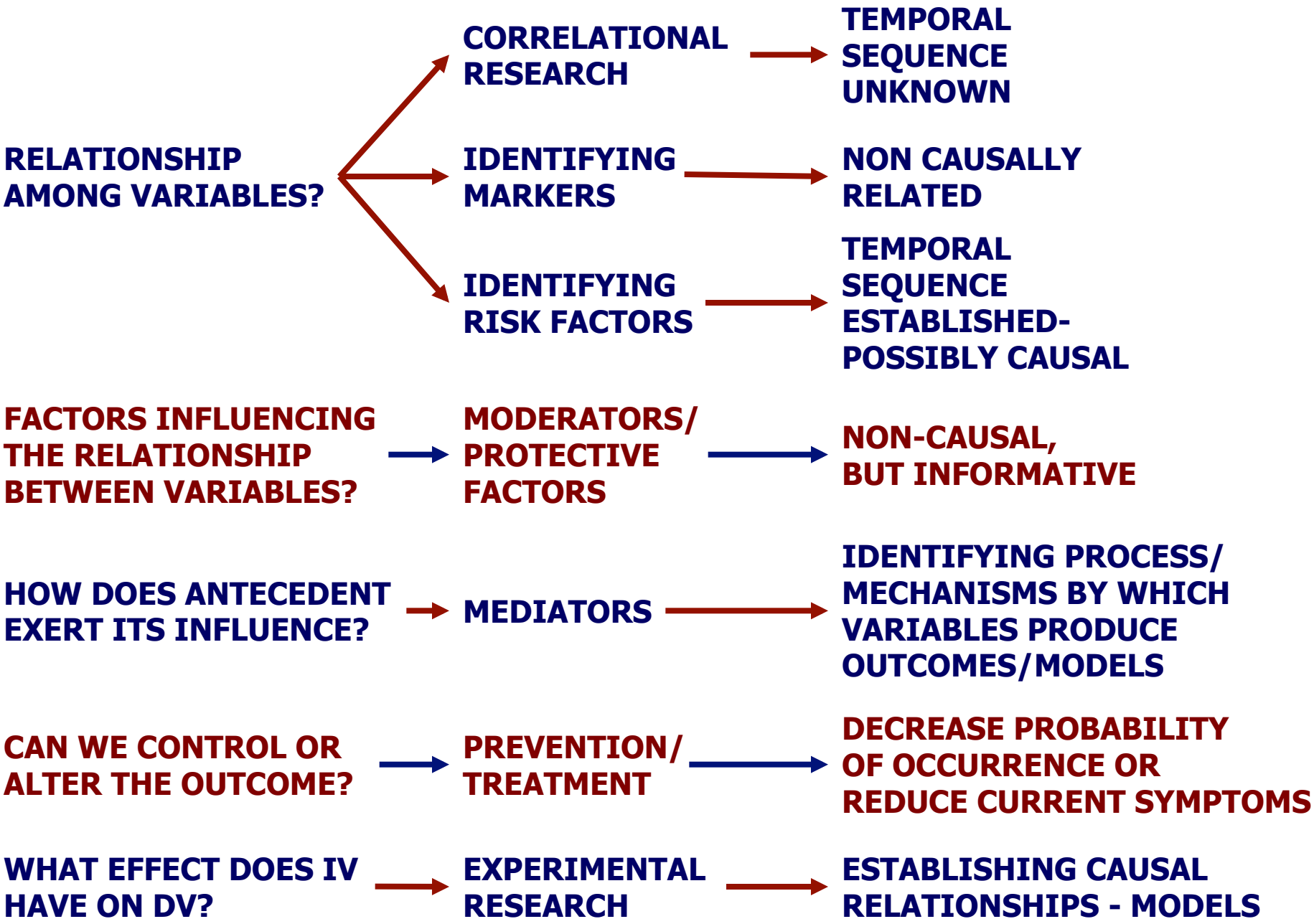
Three interrelated components of epidemiological research involve:

1. Assessing the occurrence of new cases (**incidence rate**) or existing cases (**prevalence rate**) of the disorder at a given period of time or within a specific time period; [note: community vs clinic samples]

2. Assessing how the disorder is distributed in the population, which may include information concerning geographic location, gender, socioeconomic level, and race; and

3. Identifying factors associated with the variation and distribution of the disorder to enable etiological hypotheses to be generated.

The Role of Different Variables in Understanding Child Psychopathology


RELATIONSHIP AMONG VARIABLES?
CORRELATIONAL RESEARCH
TEMPORAL SEQUENCE UNKNOWN
IDENTIFYING MARKERS
NON CAUSALLY RELATED
IDENTIFYING RISK FACTORS
TEMPORAL SEQUENCE ESTABLISHED-POSSIBLY CAUSAL
FACTORS INFLUENCING THE RELATIONSHIP BETWEEN VARIABLES?
MODERATORS/ PROTECTIVE FACTORS
NON-CAUSAL, BUT INFORMATIVE
HOW DOES ANTECEDENT EXERT ITS INFLUENCE?
MEDIATORS
IDENTIFYING PROCESS/ MECHANISMS BY WHICH VARIABLES PRODUCE OUTCOMES/MODELS
CAN WE CONTROL OR ALTER THE OUTCOME?
PREVENTION/ TREATMENT
DECREASE PROBABILITY OF OCCURRENCE OR REDUCE CURRENT SYMPTOMS
WHAT EFFECT DOES IV HAVE ON DV?
EXPERIMENTAL RESEARCH
ESTABLISHING CAUSAL RELATIONSHIPS - MODELS

The Formula for the Percent of Regression to the Mean

You can estimate exactly the percent of regression to the mean in any given situation. The formula is:

P rm = 100(1 - r) .....test/retest reliability or correlation between 2 variables

where:

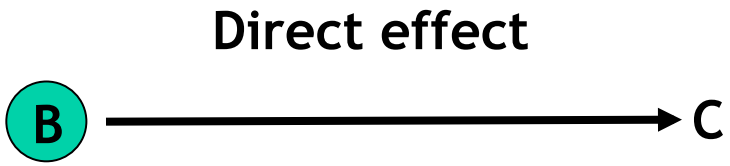
Prm = the percent of regression to the mean
r = the correlation between the two measures

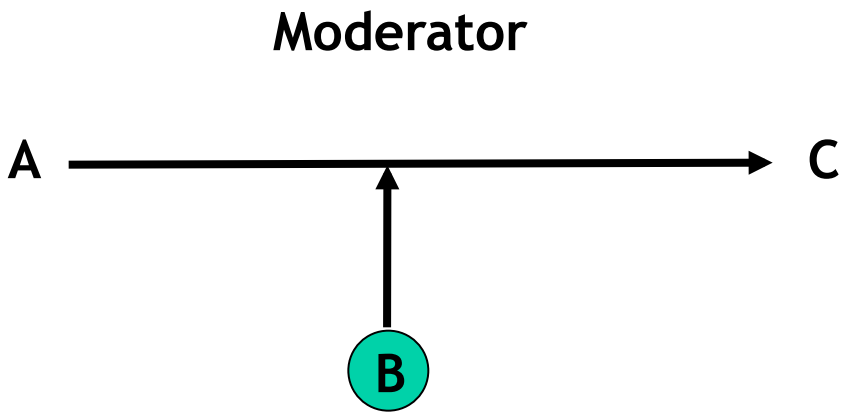
Consider the following four cases:

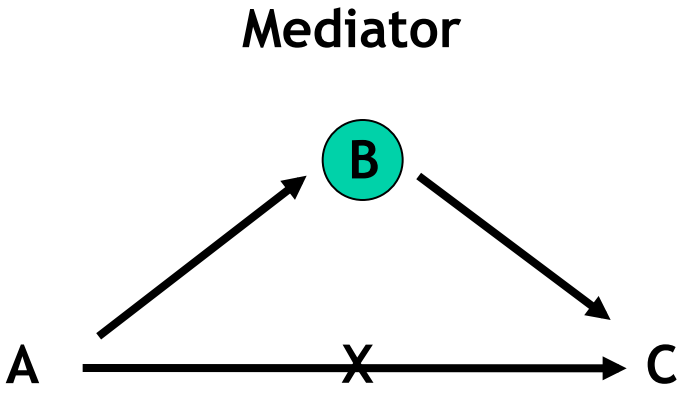
if r = 1, there is no (i.e., 0%) regression to the mean
if r = .5, there is 50% regression to the mean
if r = .2, there is 80% regression to the mean
if r = 0, there is 100% regression to the mean
In the first case, the two variables are perfectly correlated and there is no regression to the mean. With a correlation of .5, the sampled group moves fifty percent of the distance from the no-regression point to the mean of the population. If the correlation is a small .20, the sample will regress 80% of the distance. And, if there is no correlation between the measures, the sample will "regress" all the way back to the population mean! It's worth thinking about what this last case means. With zero correlation, knowing a score on one measure gives you absolutely no information about the likely score for that person on the other measure. In that case, your best guess for how any person would perform on the second measure will be the mean of that second measure.

Developmental Psychopathology

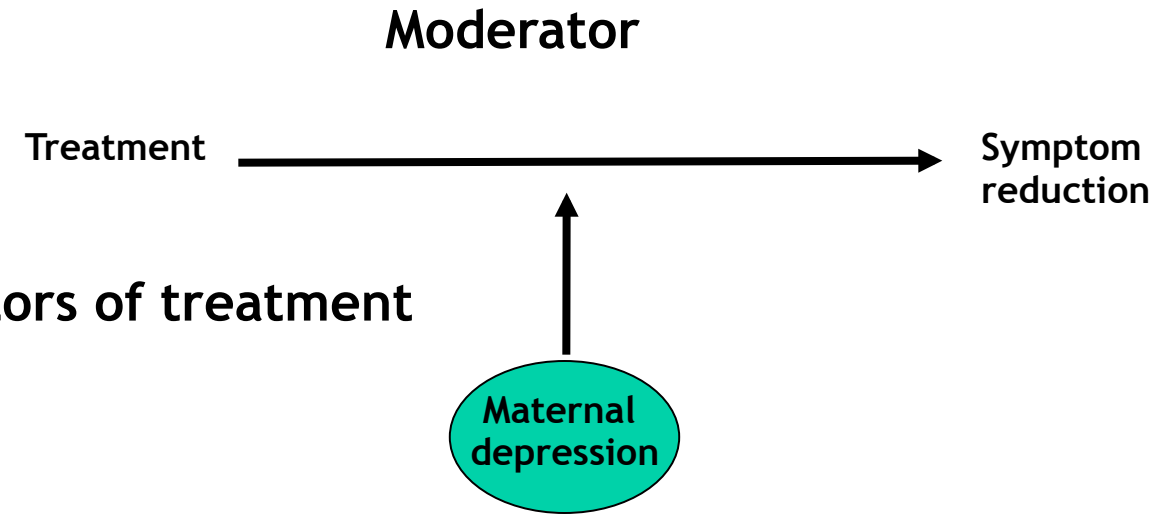
- A single cause?
- Direct vs. indirect effects:



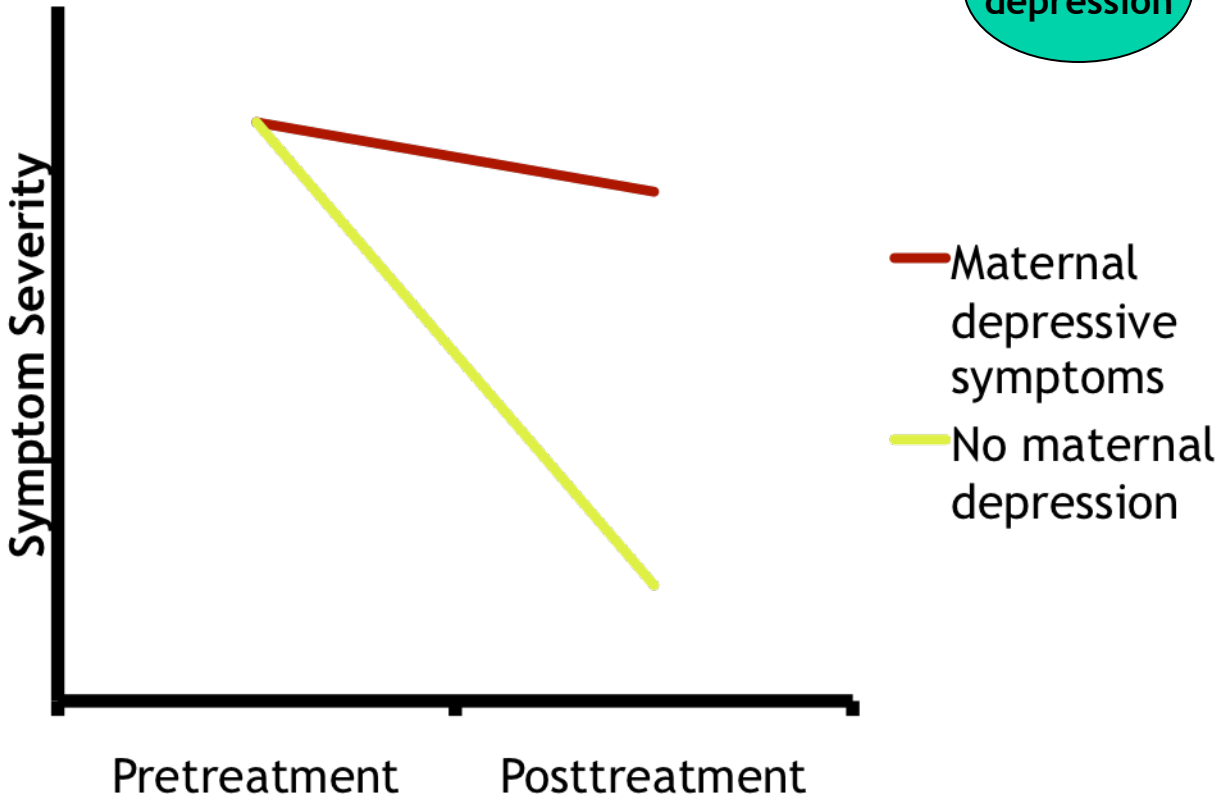




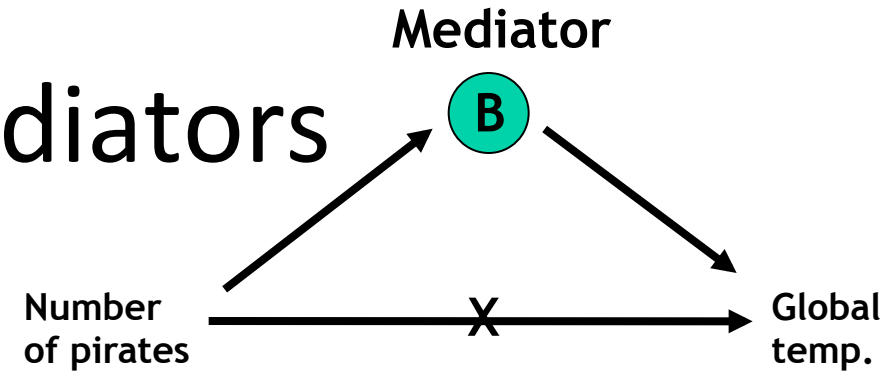
Moderators

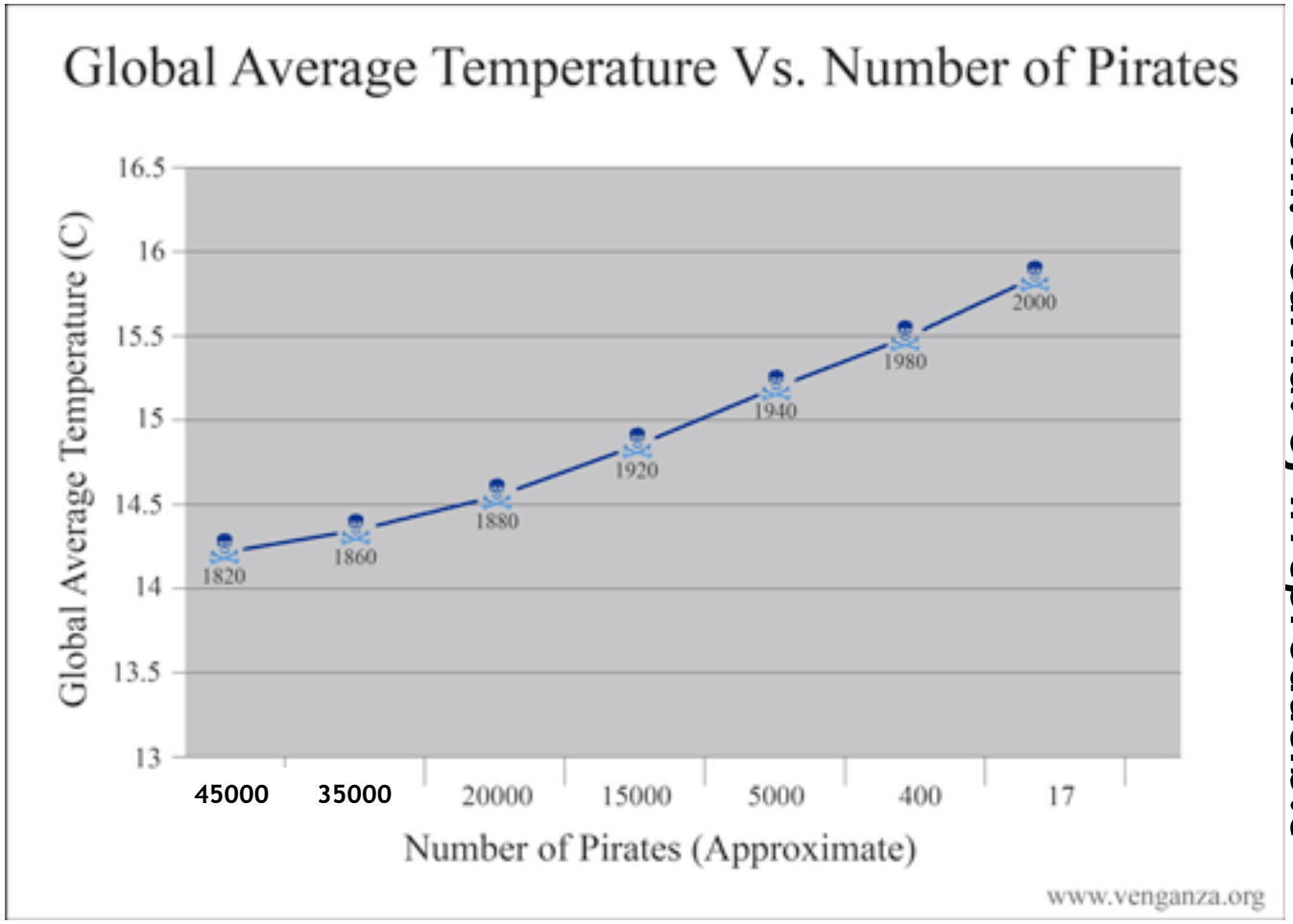


Hinshaw (2007) - moderators of treatment response in ADHD



Mediators





From: *Journal of Irreproducible*

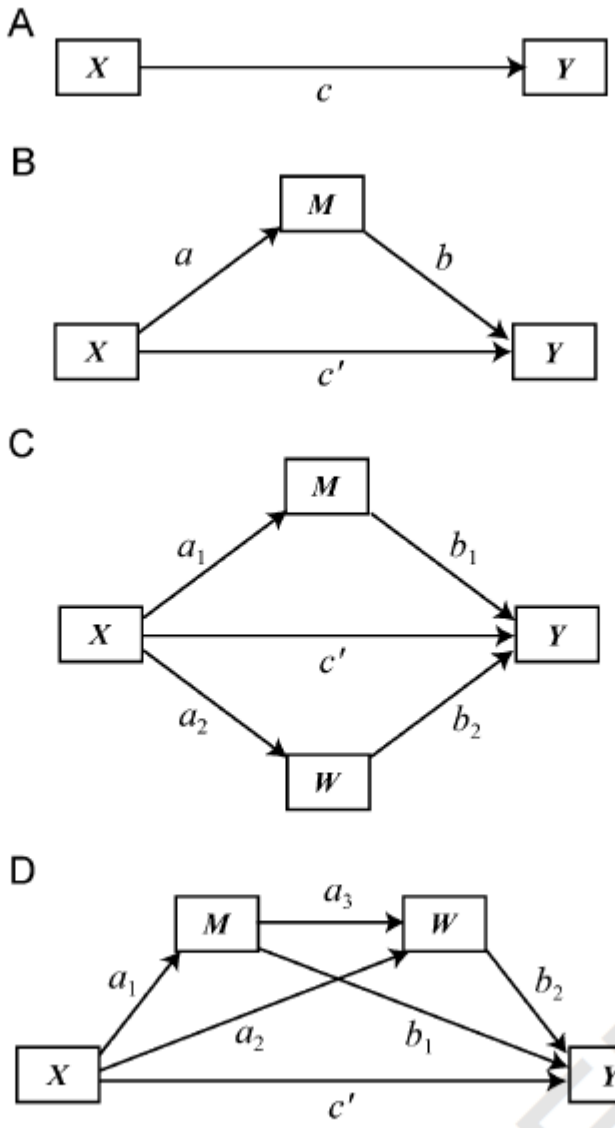
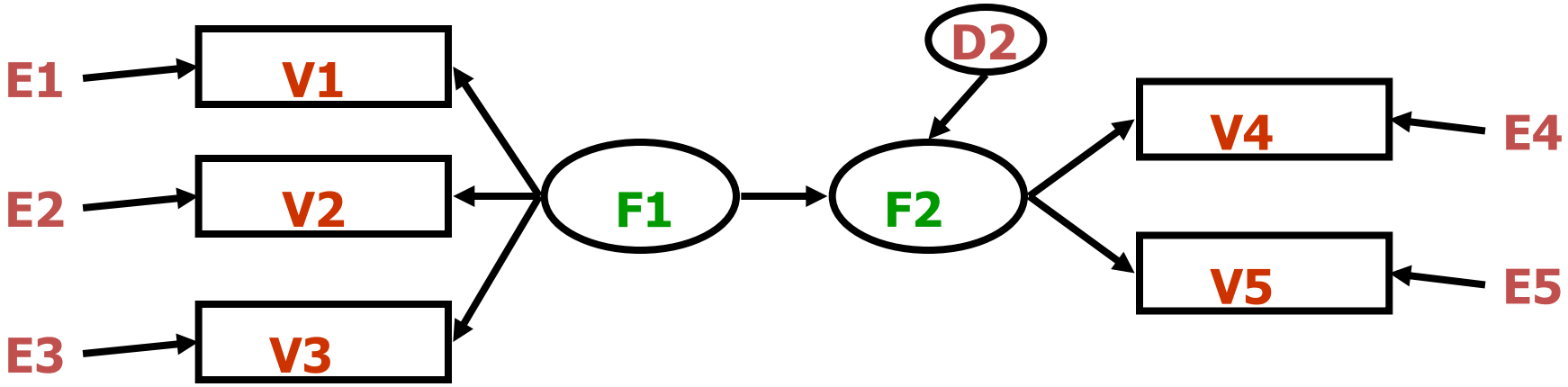
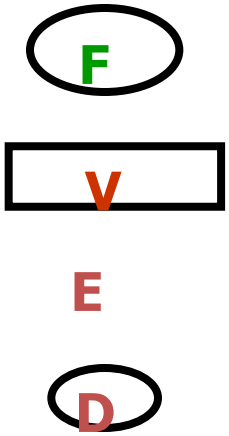


Figure 1 The total effect of X on Y (A), a simple mediation model (B), a single-step multiple mediator model (C), and a multiple-step multiple mediator model (D).

Structural Equation Modeling





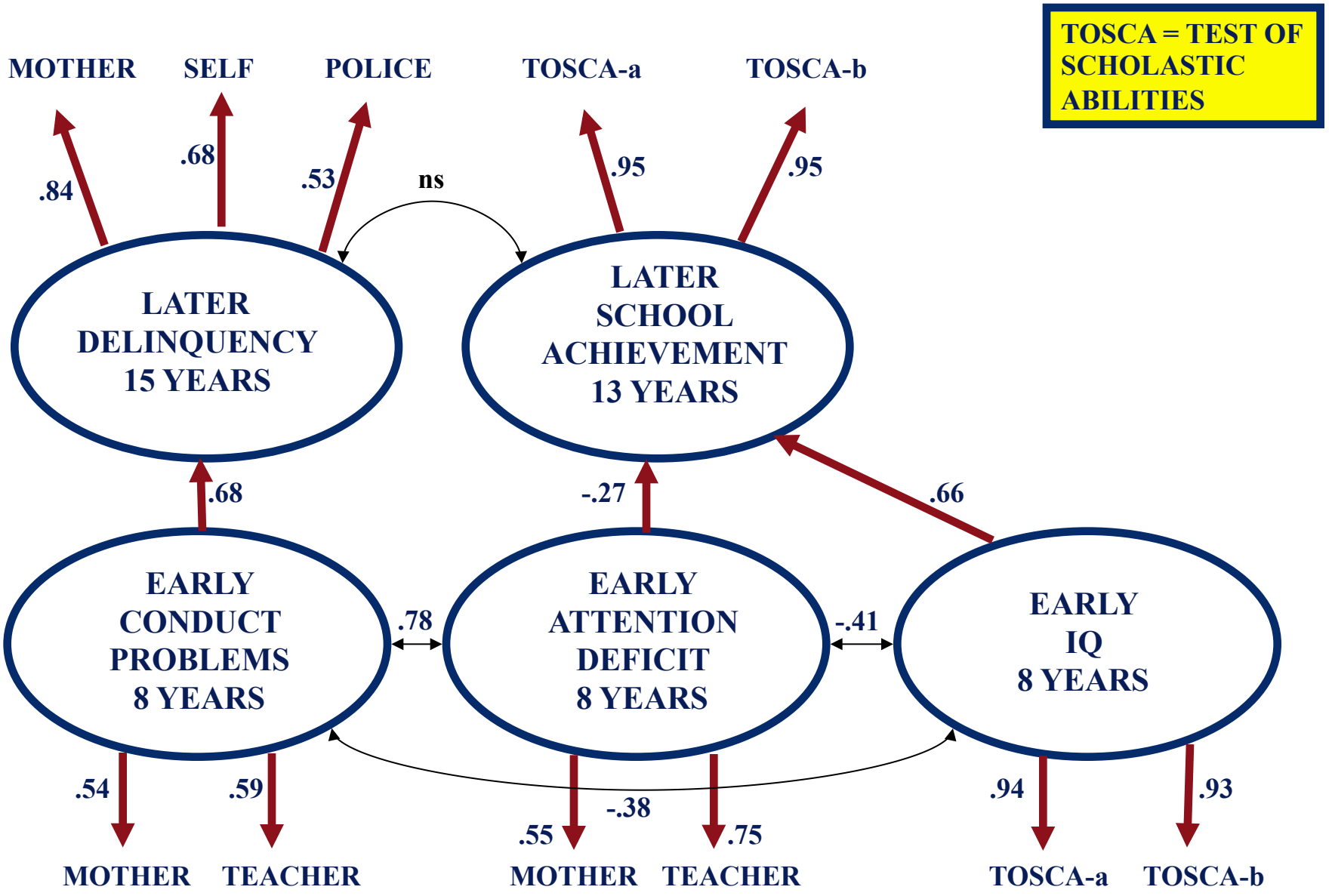
Unobserved (latent) factor.

Observed (manifest) variables that serve as indicators of factors.

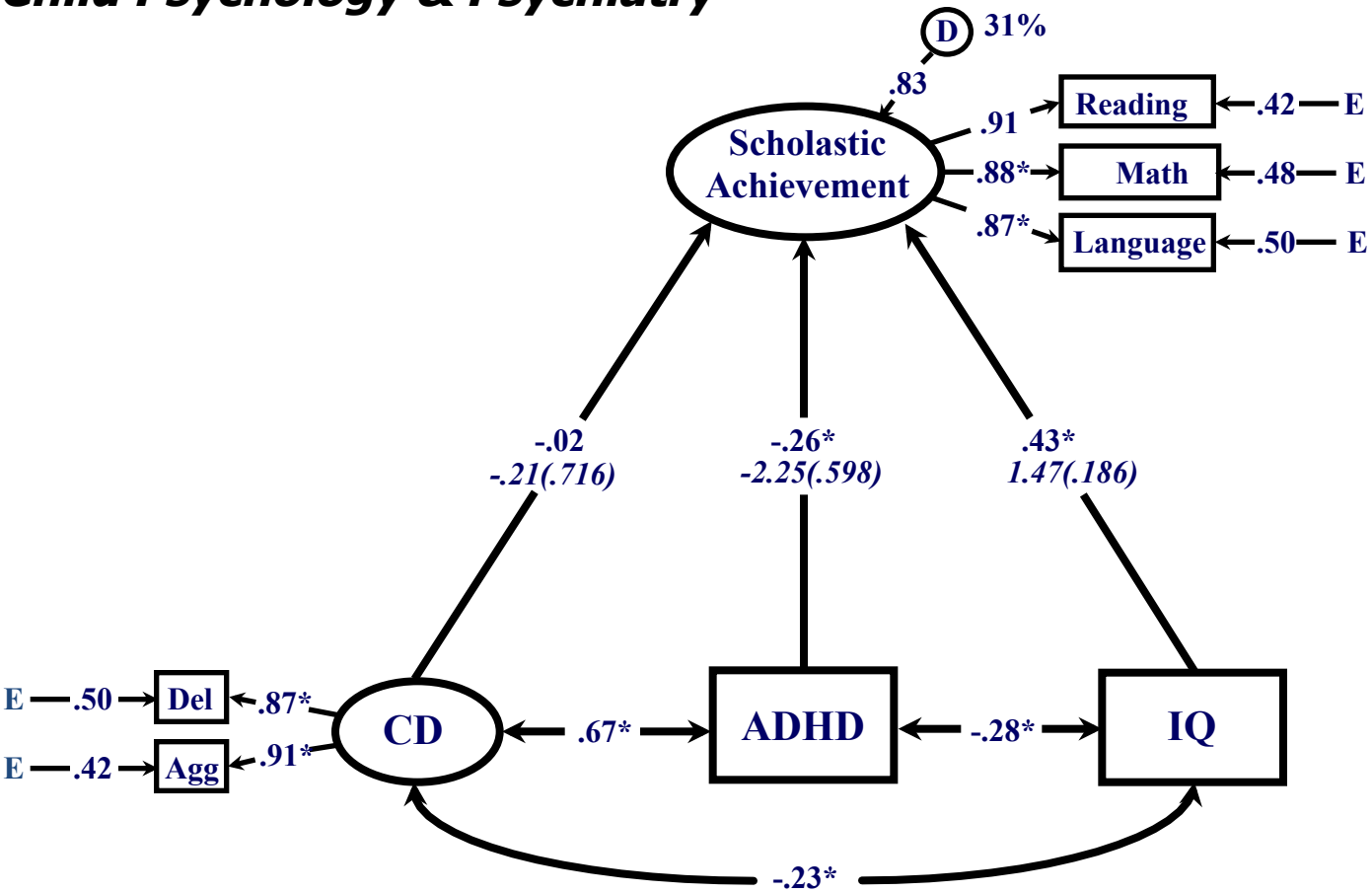
Measurement error associated with observed variables.

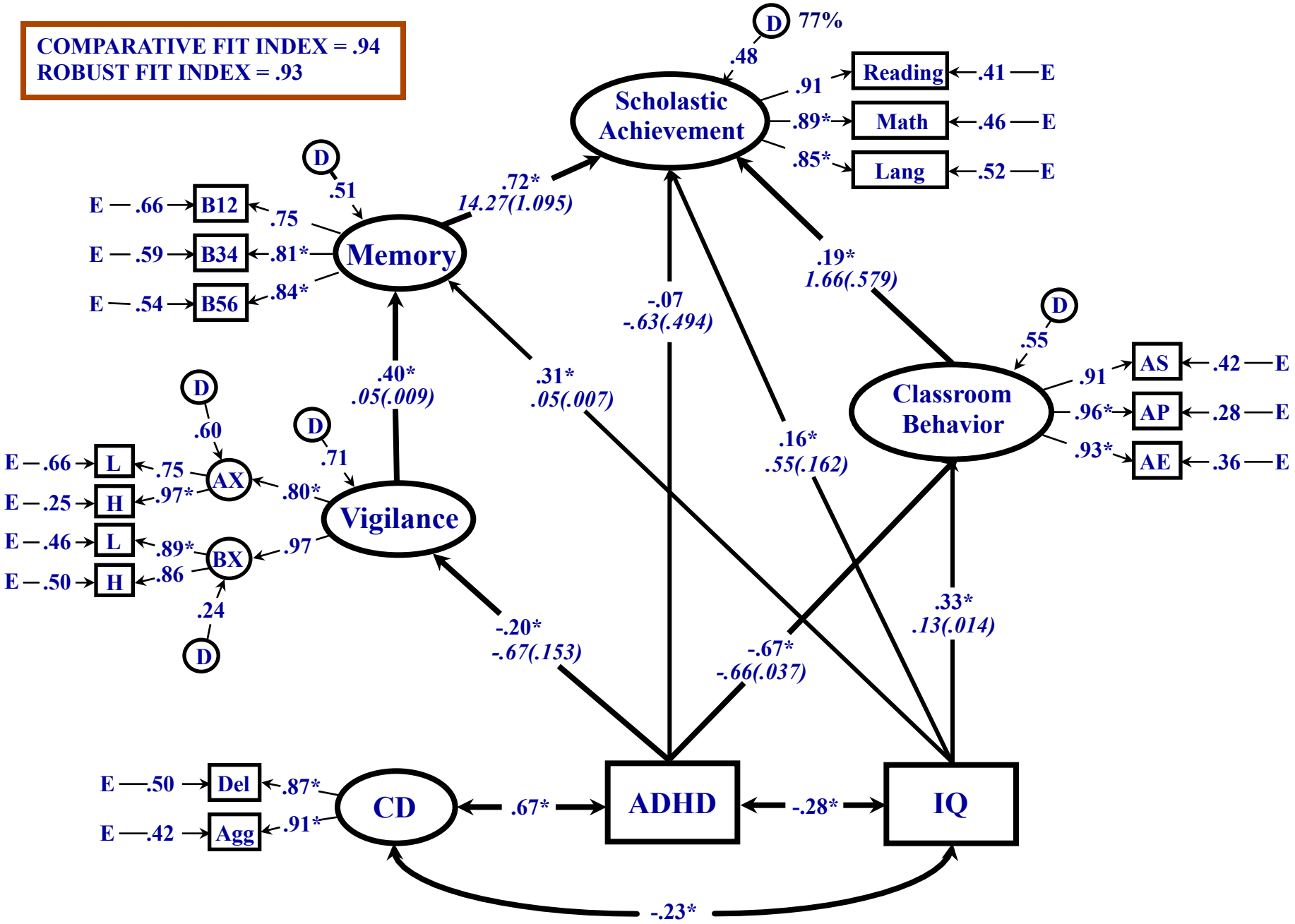
Residual error (disturbance) in the prediction of the unobserved factor by another factor.

FITTED STRUCTURAL EQUATION MODEL OF EARLY BEHAVIOR, EARLY IQ, AND LATER DELINQUENCY AND SCHOLASTIC ABILITY. [FERGUSSON & HORWOOD, 1995, *J OF ABNORM CHILD PSYCHOLOGY, 23*, 183-199]



Rapport, Scanlan, & Denney (1999).
J Child Psychology & Psychiatry





Rapport, Scanlan & Denney (1999) J. of Child Psychiatry and Psychology

Assessing Therapeutic Change:

The Truax and Jacobson Model

Statistically significant change
vs
Clinically meaningful change

Statistical vs. clinical significance

- Statistical significance: $p < .05^{*}$
  - Power issues?
  - "The World is Round, $p < .05$" (Cohen)
- Clinical significance: so what?

- e.g., gender differences in IQ, achievement?

Statistical vs. clinical significance

- Hynd (2005) review of gender differences
- Statistical significance
  - Dependent on sample size
    - Large enough sample almost always means significant differences
- Effect size: estimate of the *magnitude* of group differences

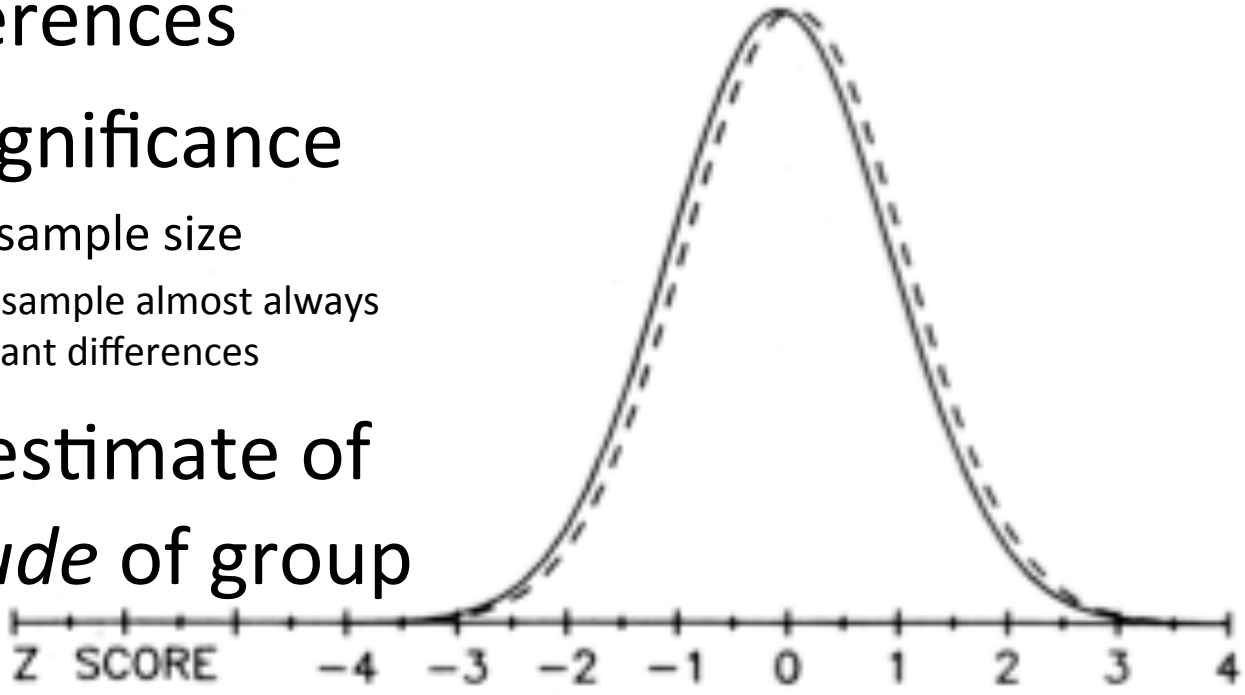


Figure 1. Two normal distributions that are 0.15 standard deviations apart (i.e., $d = 0.15$. This is the approximate magnitude of the gender difference in mathematics performance, averaging over all samples.)

Statistical vs. clinical significance

- Clinical significance (Jacobson &Truax, 1991; Speer, 1992)
  - So what?

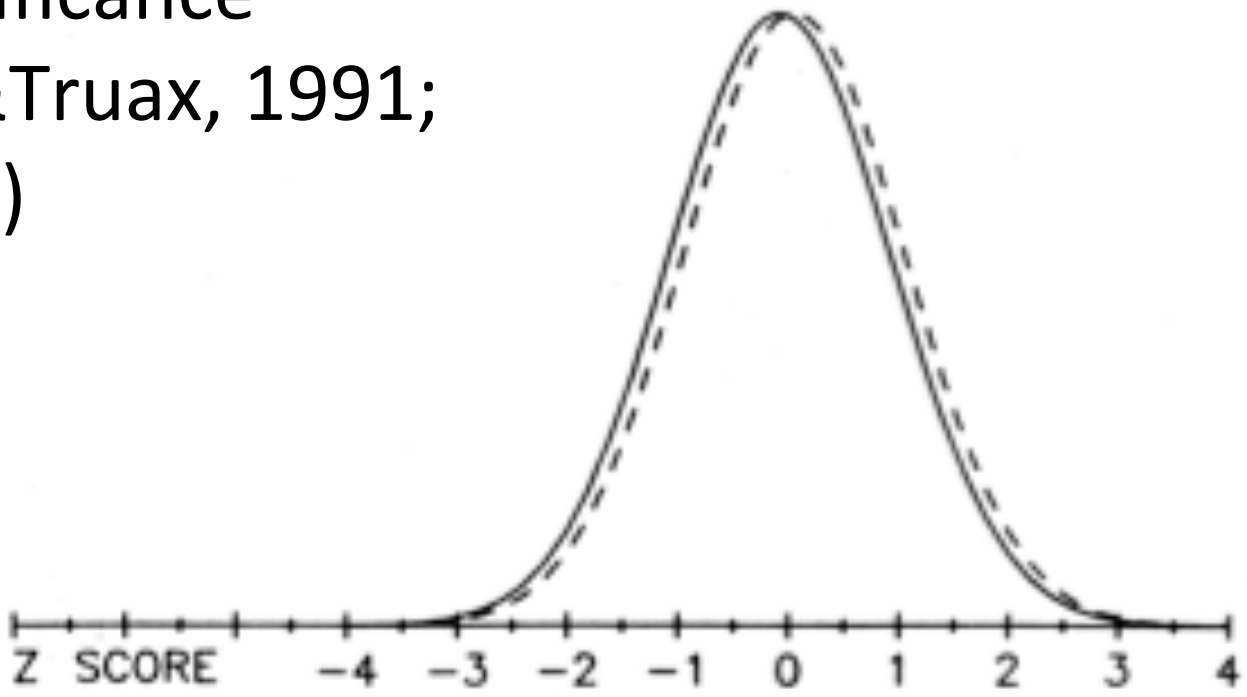
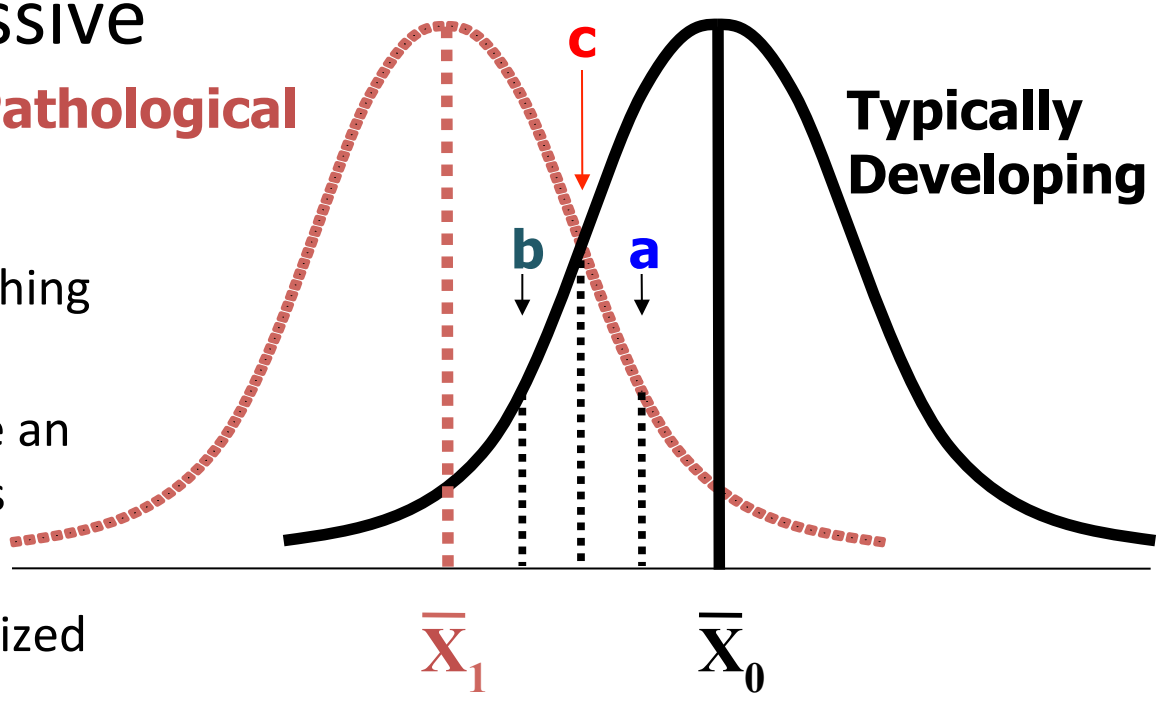


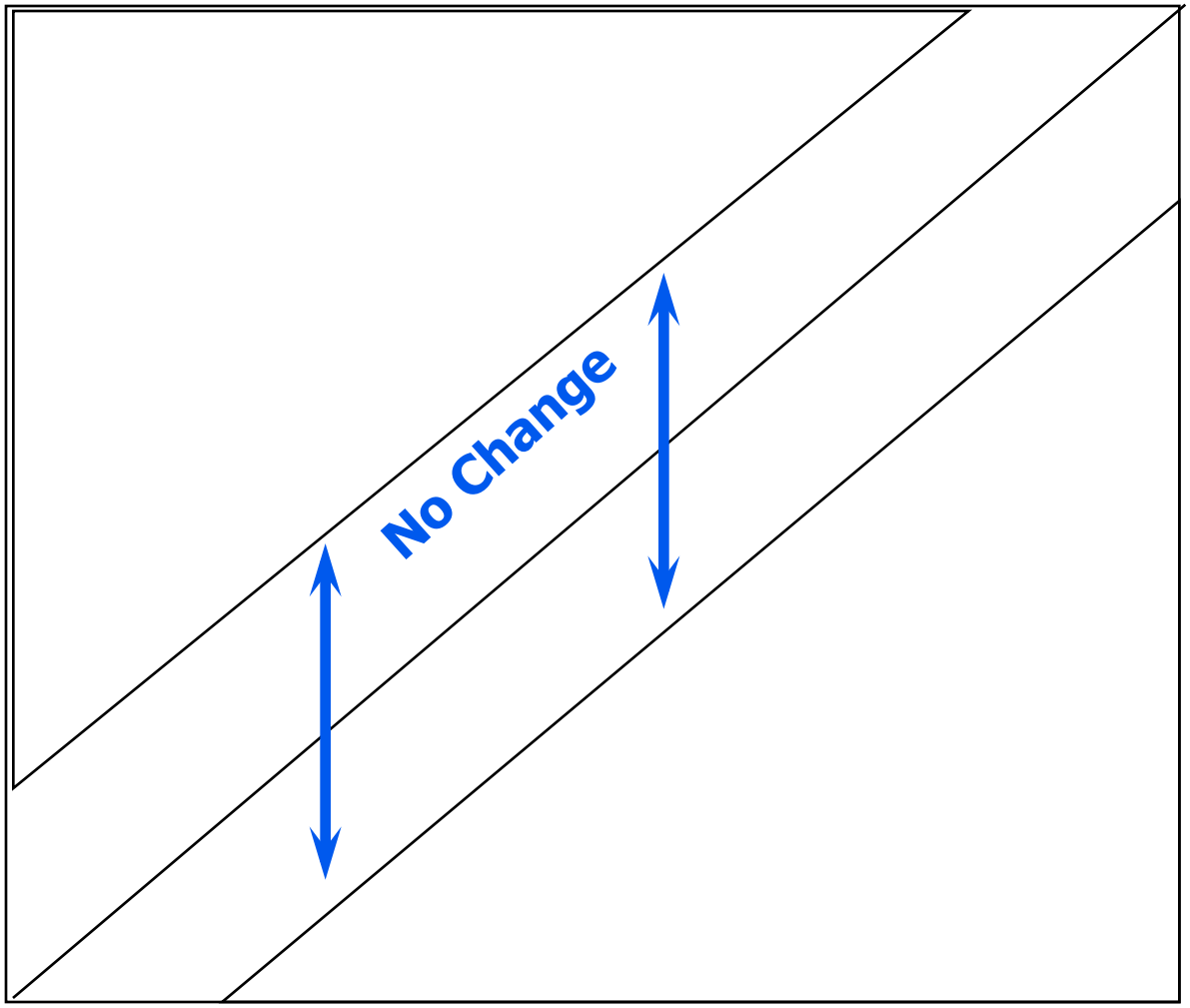
Figure 1. Two normal distributions that are 0.15 standard deviations apart (i.e., $d = 0.15$. This is the approximate magnitude of the gender difference in mathematics performance, averaging over all samples.)

Statistical vs. clinical significance

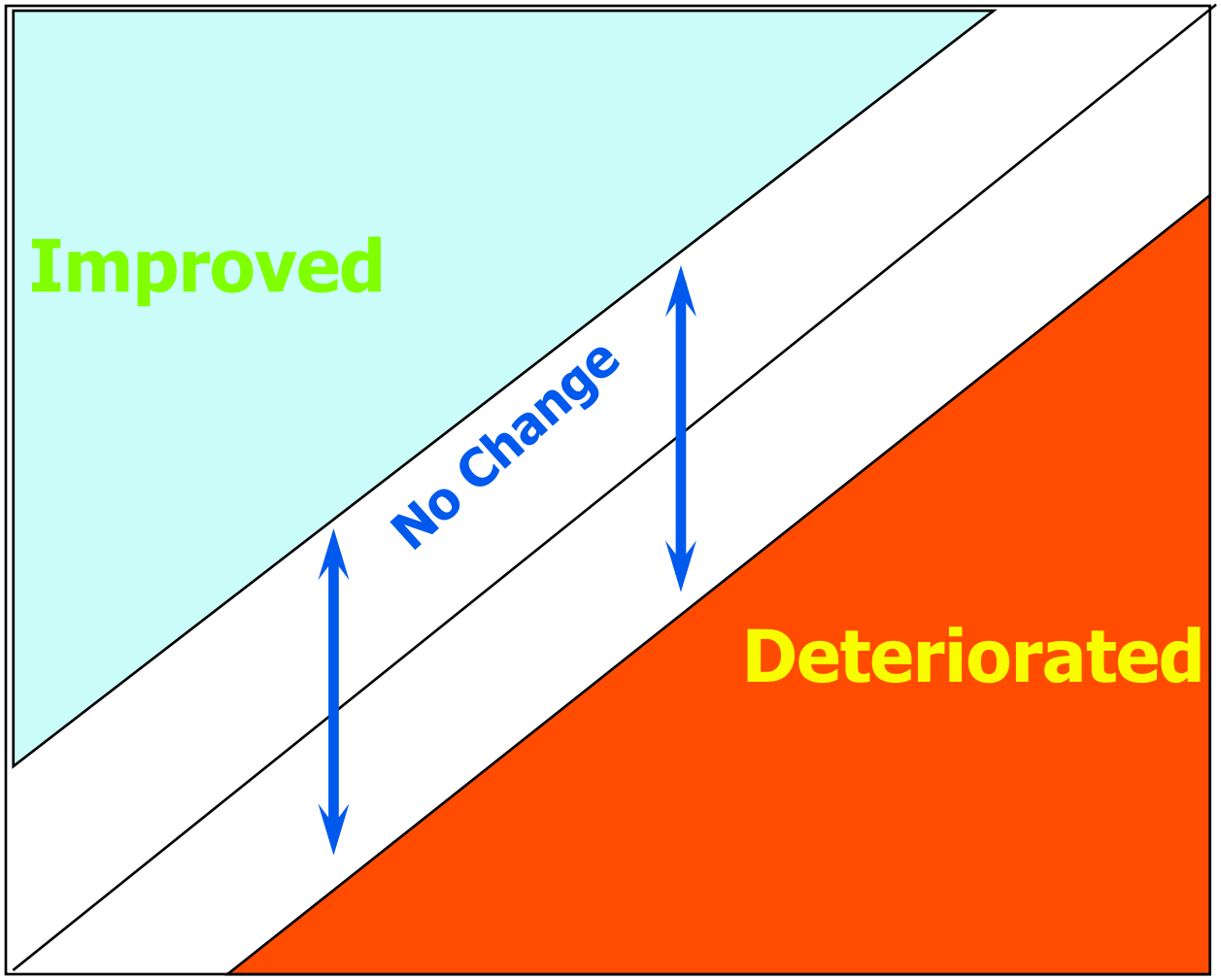
- Example: Your treatment significantly decreased depressive symptoms
  - So what?
  - Did you measure something meaningful?
  - Did the treatment make an impact on the children's functioning?
  - Are the children normalized with the treatment?



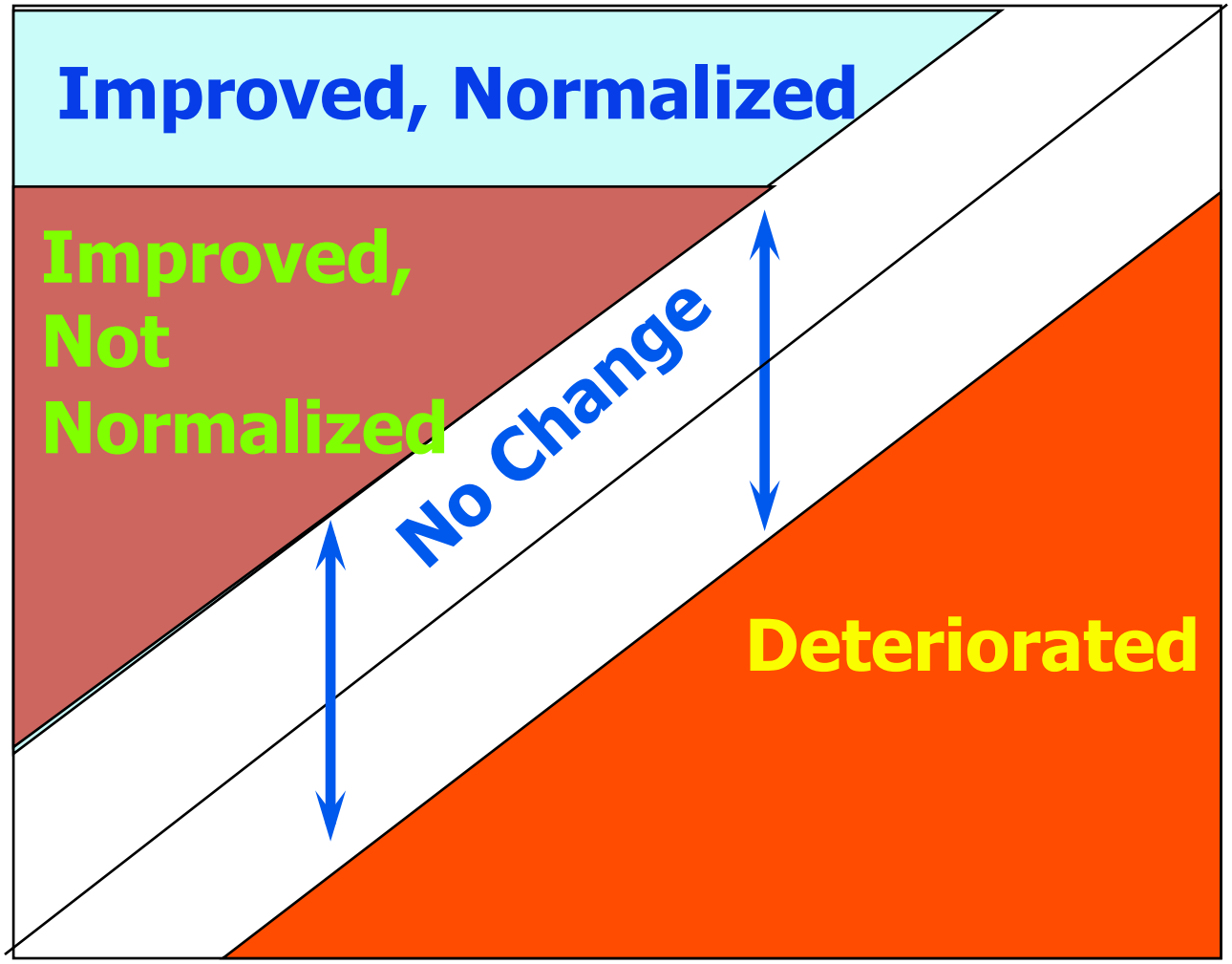
Normalization Paradigm

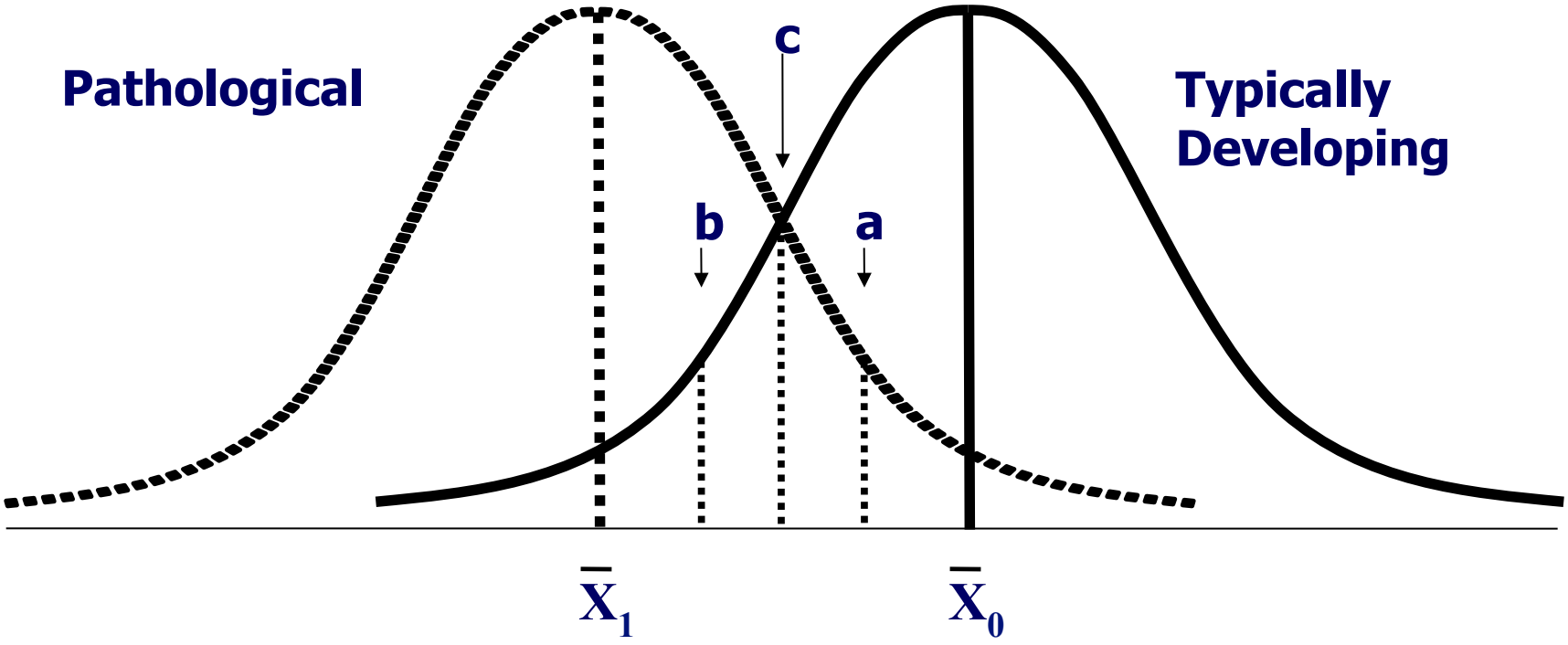


Normalization Paradigm



Normalization Paradigm




Pathological
c
Typically
Developing
b
a
$\bar{X}_1$
$\bar{X}_0$

Rating Scales as Measures of Children's Behavior

Ratings Scales as Measures of Behavior

Positives:

- ✓ ease of administration and scoring
- ✓ appropriate for examining underlying factor structure
- ✓ cost efficiency

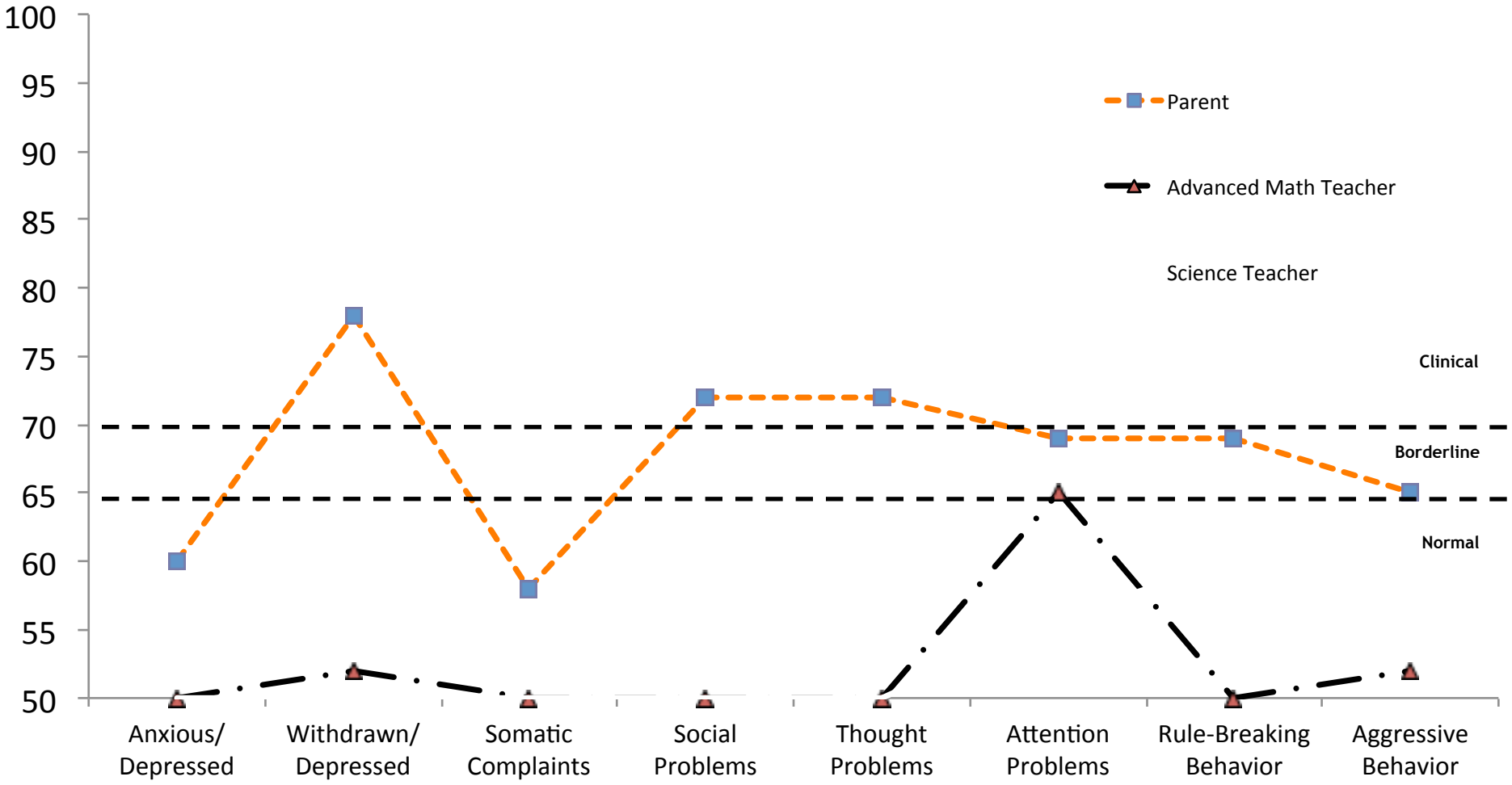
Negatives:

- ✓ not real quantitative measures in the physical sense
- ✓ rely on retrospective recall
- ✓ subject to rater expectation biases & halo effects
- ✓ rarely constructed according to measurement theory
- ✓ weak or non-significant correlations with objective measures of the same construct (e.g., 66%-91% not linearly related between rating scales and actigraph measures of activity level)
- ✓ most fail to account for symptom severity in scoring

Rating Scale Construction

Child Behavior Checklist and Teacher Report Forms

Client: 12-y.o. Hispanic male

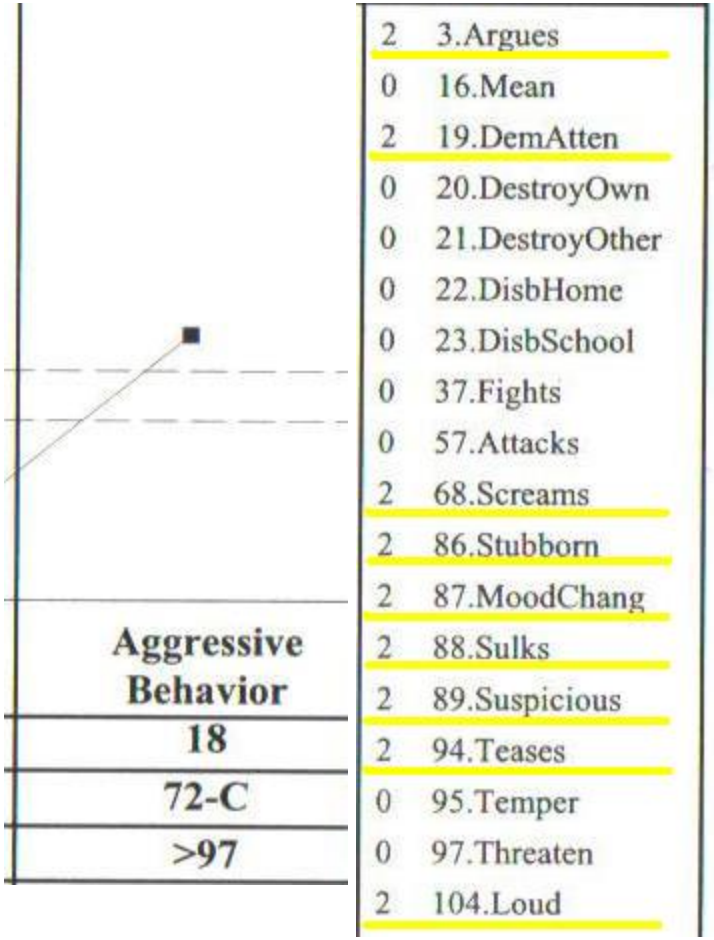


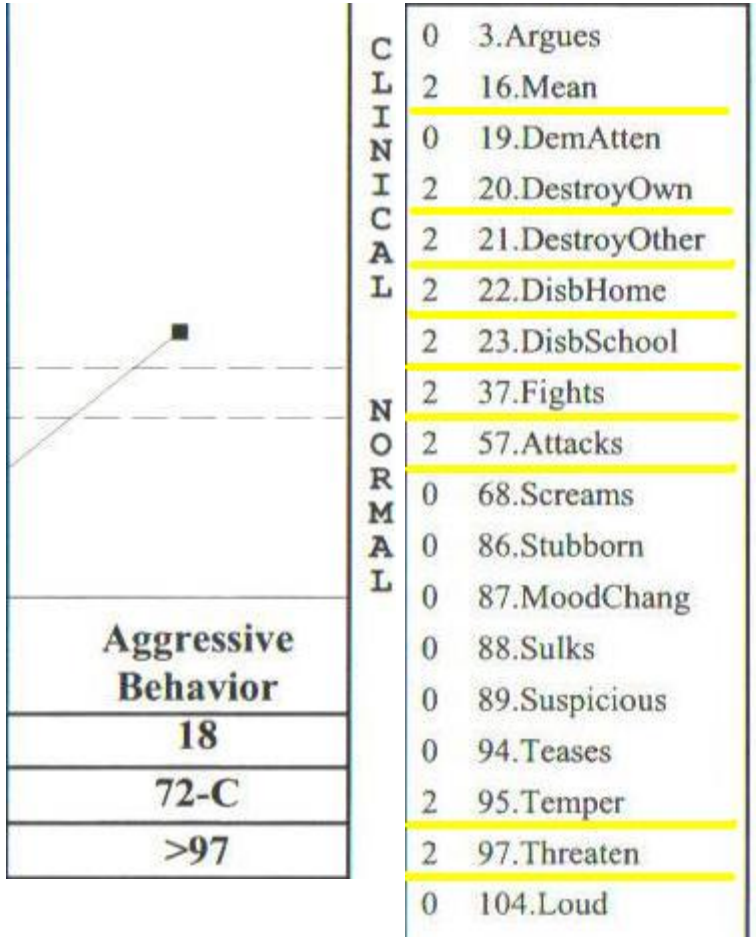
Rasche Modeling

Please print. Be sure to answer all items.

0 = Not True (as far as you know) 1 = Somewhat or Sometimes True 2 = Very True or Often True

0	1	2	57.	Physically attacks people	0	1	2	84.	Strange behavior (describe): _____
0	1	2	58.	Picks nose, skin, or other parts of body (describe): _____	0	1	2	85.	Strange ideas (describe): _____
0	1	2	59.	Plays with own sex parts in public	0	1	2	86.	Stubborn, sullen, or irritable
0	1	2	60.	Plays with own sex parts too much	0	1	2	87.	Sudden changes in mood or feelings
0	1	2	61.	Poor school work	0	1	2	88.	Sulks a lot
0	1	2	62.	Poorly coordinated or clumsy	0	1	2	89.	Suspicious
0	1	2	63.	Prefers being with older kids	0	1	2	90.	Swearing or obscene language
0	1	2	64.	Prefers being with younger kids	0	1	2	91.	Talks about killing self
0	1	2	65.	Refuses to talk	0	1	2	92.	Talks or walks in sleep (describe): _____
0	1	2	66.	Repeats certain acts over and over; compulsions (describe): _____	0	1	2	93.	Talks too much


Aggressive Behavior
18
72-C
>97
2 3.Argues
0 16.Mean
2 19.DemAtten
0 20.DestroyOwn
0 21.DestroyOther
0 22.DisbHome
0 23.DisbSchool
0 37.Fights
0 57.Attacks
2 68.Screams
2 86.Stubborn
2 87.MoodChang
2 88.Sulks
2 89.Suspicious
2 94.Teases
0 95.Temper
0 97.Threaten
2 104.Loud


CLINICAL
NORMAL
Aggressive Behavior
18
72-C
>97
0 3.Argues
2 16.Mean
0 19.DemAtten
2 20.DestroyOwn
2 21.DestroyOther
2 22.DisbHome
2 23.DisbSchool
2 37.Fights
2 57.Attacks
0 68.Screams
0 86.Stubborn
0 87.MoodChang
0 88.Sulks
0 89.Suspicious
0 94.Teases
2 95.Temper
2 97.Threaten
0 104.Loud

Item Response Theory

Item response theory is presently in widespread use in the development of intelligence and achievement tests.

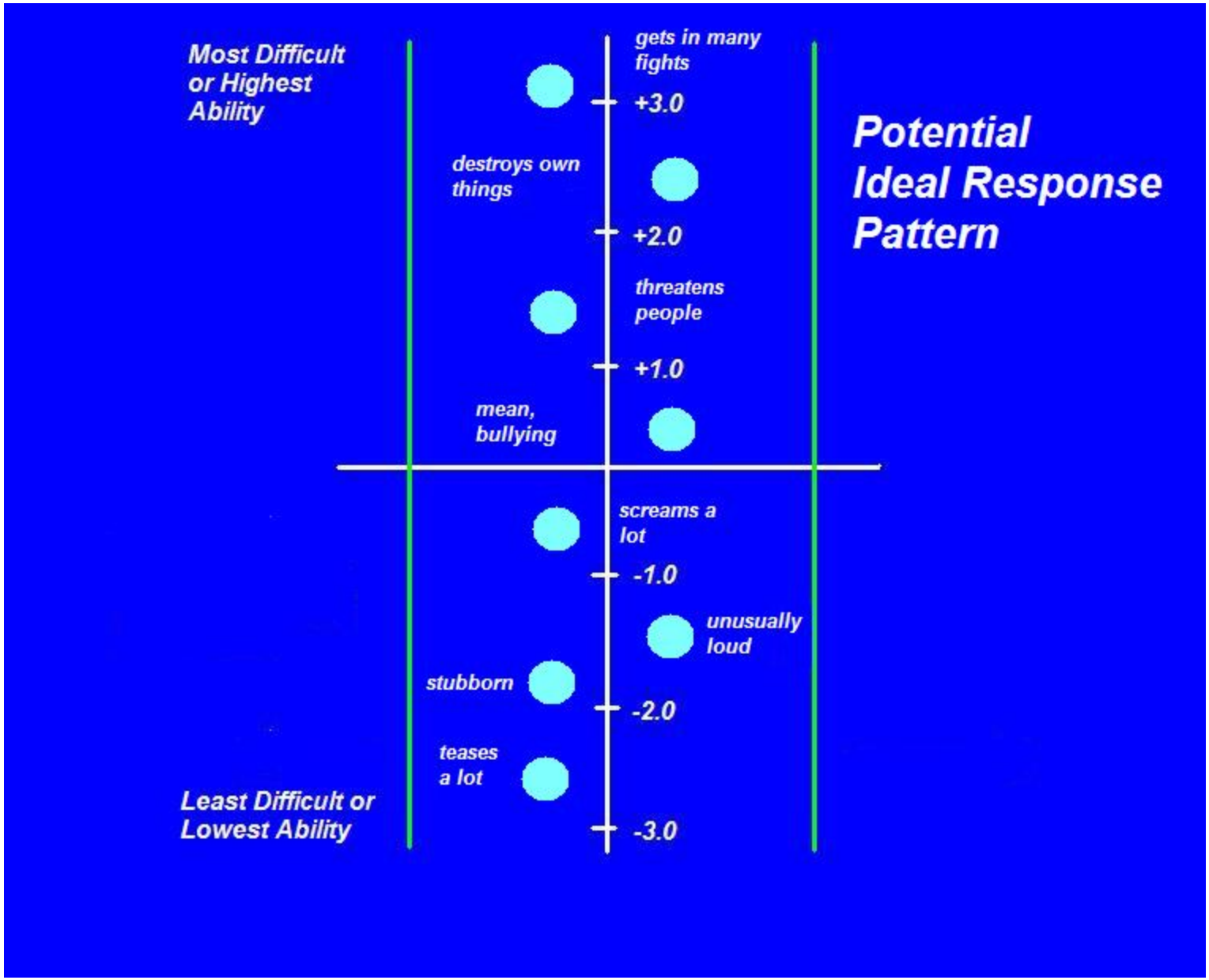
Its use is specifically to help identify the hierarchy of items ranging from the easiest (or most often endorsed) to the most difficult (or least endorsed).

Item Response Theory and Rasche Modeling

Item Response Theory – based on the assumption that test responses reflect an underlying trait (or set of traits) & that the relation between response and trait can be described for each test item by a monotonically increasing function called an 'item characteristic curve' or ICC.

Individuals with higher levels of the trait have higher expected probabilities for answering an item correctly or in the expected direction and the ICC provides the precise values of these probabilities for each level of the trait.

IRT also provides statistics indicating the precision with which an individual respondent's trait level is estimated, and also provides estimates to indicate the usefulness of a particular item for differentiating among different levels of the trait.


Most Difficult or Highest Ability
gets in many fights
+3.0
destroys own things
+2.0
threatens people
+1.0
mean, bullying
screams a lot
-1.0
unusually loud
stubborn
-2.0
teases a lot
-3.0
Least Difficult or Lowest Ability
Potential Ideal Response Pattern

MetaThought 1:
Language Biases in Psychopathology: Descriptions vs Evaluations

✓ pushy	assertive
✓ greedy	ambitious
✓ manipulative	persuasive
✓ ruthless	driven
✓ stubborn	tenacious
✓ intrusive	concerned
✓ exhibitionist	outgoing
✓ reckless	brave
✓ troublemaker	feisty
✓ cheap	frugal
✓ rigid	steadfast
✓ unfeeling	nerves of steel
✓ oversensitive	vulnerable
✓ cowardly	self-protective
✓ overly emotional	passionate
✓ abnormal	unique
✓ weird	interesting
✓dead	ontologically impaired
✓ sociopath	morally challenged

Underscores the reciprocal influence of attitudes & language

Meta-thought 2: Reification Errors

- ❑ **The error of regarding abstract concepts as if they were concrete objects.**
- ❑ **To reify is to invent a concept (or construct), name it, and then convince ourselves that such a thing exists in the world.**
- ❑ **Example: 'self-esteem' – people don't actually have 'self-esteem' – it is merely a concept we have created to help us organize and make sense out of other people's behavior.**
- ❑ **Therapist: 'Your self-esteem is too low…you need to get more of it'…as if self-esteem were a commodity that can be purchased at the store.**
- ❑ **Examples of commonly reified constructs:**

✓ the mind	cognition
✓ intelligence	personality
✓ emotions	the unconscious
✓ motivation	personality traits
✓ complexes	mental illnesses

Meta-Thought 3: The Reification of Theories

✓ **Theory: a proposed explanation of observed phenomena**

✓ **Two types: Event Theory and Construct Theory**

a. **Event theory – theories that provide explanations that lend themselves to direct measurement…and under the right circumstances, can be proven or disproven…in the former case, it is no longer a theory (e.g., how the patient acquires an infection? Did humans evolve from apes?).**
b. **Construct theory – theories that provide explanations that, by their very nature, are not directly measurable. As a consequence, even under ideal conditions, a Construct Theory can never be proven because the explanations themselves are intangible abstractions (e.g., the phenomena under investigation may be observable, but the underlying explanation is not – gravity, motivation, personality, psychopathology).**

Meta-thought 4: Multiple levels of description: the simultaneity of physical and psychological events (mental vs physical)

- ✓ Mind & body relationships – which comes first and does one cause the other?

- ✓ Physical and mental are non-comparable terms & represent an error of reification – treats a theoretical construct (mental) as if it were a concrete object (physical).

- ✓ Mental events all have physical correlates – if one causes the other at least two conditions must occur:
  1. Event A must precede Event B
  2. When Event A changes or is manipulated, Event B changes accordingly; similarly, when Event A stops changing, Event B changes accordingly.

Can a physical event occur in the absence of a psychological event?
Biochemical activity exists in a deceased person.

Can a psychological event occur in the absence of a physical event?
Probably not – every mental event corresponds with a physical event (basis of fMRI and other scans).

Anxiety as an example

At the biological level, anxiety involves specific neurochemical activity (viz., arousal of the sympathetic division of the autonomic nervous system along with other particular neurological configurations).

Concurrently, at the psychological level, anxiety involves the subjective perception and experience of apprehension or fear.

Thus, neurochemistry doesn't cause fear, and fear doesn't cause neurochemistry – they are equivalent and simultaneous phenomena, merely described in two different ways and at two different levels of analysis (i.e., they are a singular event).

Implication: psychotherapy is no less biochemical than medication!

The Relevance of Historical Influences for Understanding Child Psychopathology and Treatments

Historical Influences

- **Behaviorism and Social Learning Theory**
- **Behavior is learned-caused by interactions with the environment**
  - **Classical Conditioning**
    - **Pavlov**
    - **Watson**
  - **Operant Learning**
    - **Skinner**
  - **Modeling**
    - **Bandura**

Schematic of Operant Conditioning Relationships

	Outcome of Conditioning	
	Increase Behavior	**Decrease Behavior**
Positive Stimulus	**Positive Reinforcement** (add stimulus)	**Response Cost** (remove stimulus)
Negative Stimulus	**Negative Reinforcement** (remove stimulus)	**Punishment** (add stimulus)

Positive Reinforcement – a positively viewed stimulus follows a particular behavior and strengthens or increases the behavior.

Negative Reinforcement – a negatively viewed stimulus is removed or avoided and strengthens or increases the behavior (e.g., carrying an umbrella); 2 primary types: avoidance and escape behavior.

Punishment – a negatively viewed stimulus is presented or occurs following a behavior and weakens or reduces future occurrences of the behavior (e.g., spanking).

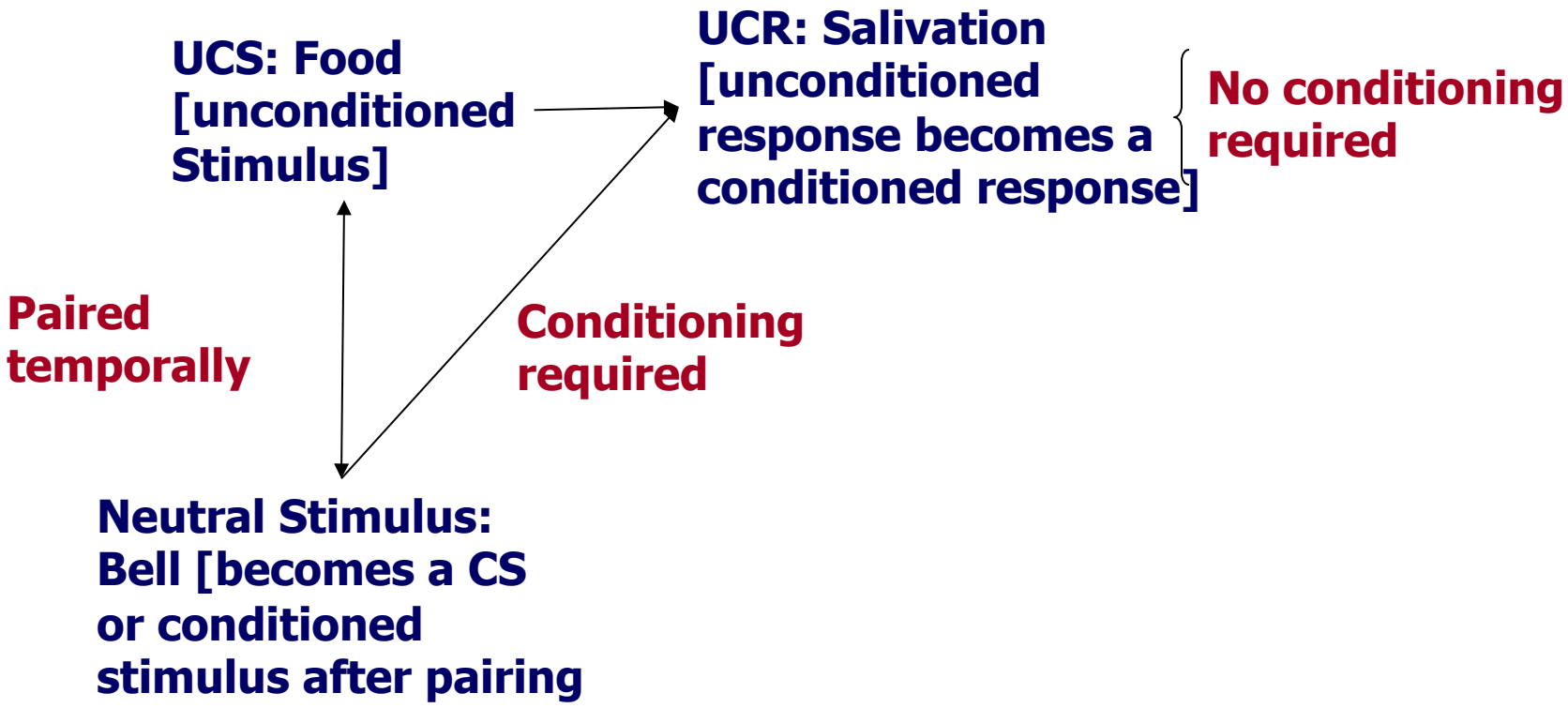
Response Cost – a positive stimulus is removed and strengthens or increases a particular behavior.

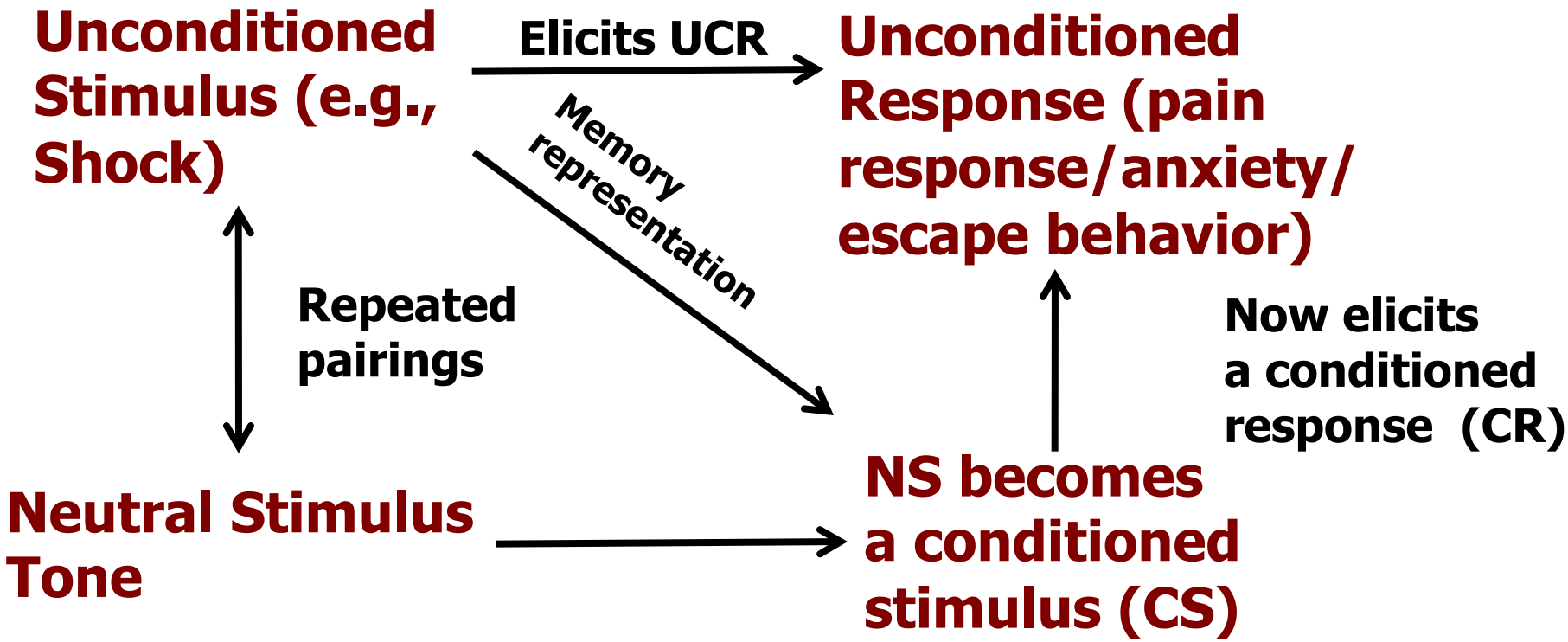
Extinction – behavior is no longer followed by reinforcement and decreases and eventually ceases in frequency.

- **S-d's – discriminative stimuli that indicate the likely occurrence of reinforcement.**

- **S-delta's – stimuli that indicate the unlikely occurrence of reinforcement.**

Basic Classical Conditioning Learning





Conditioned stimulus is also associated with a memory representation of the US, which then leads to the production of the CR – the CS predicts the onset of the US and thus elicits a CR

ADHD WORKING MEMORY MODEL

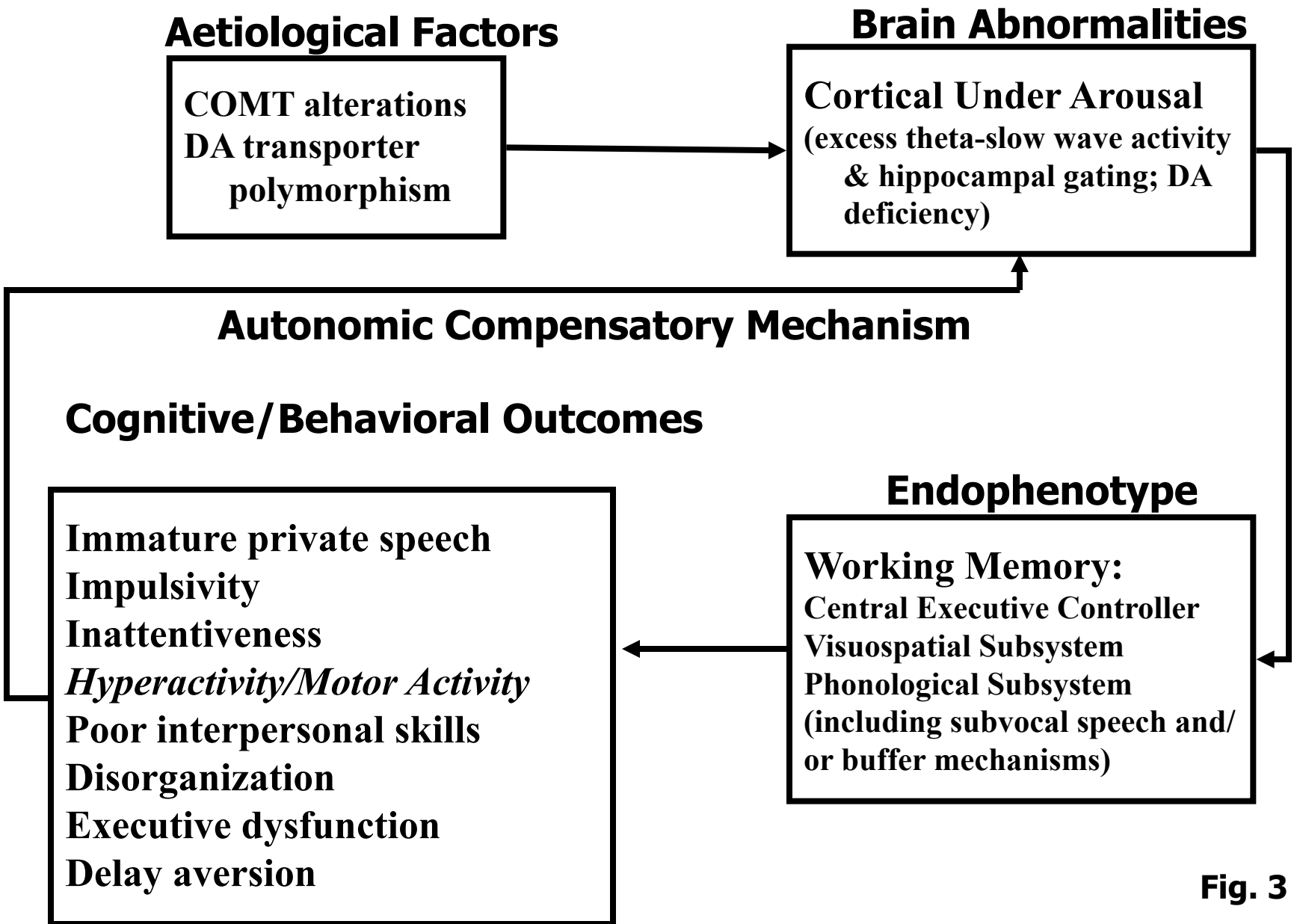
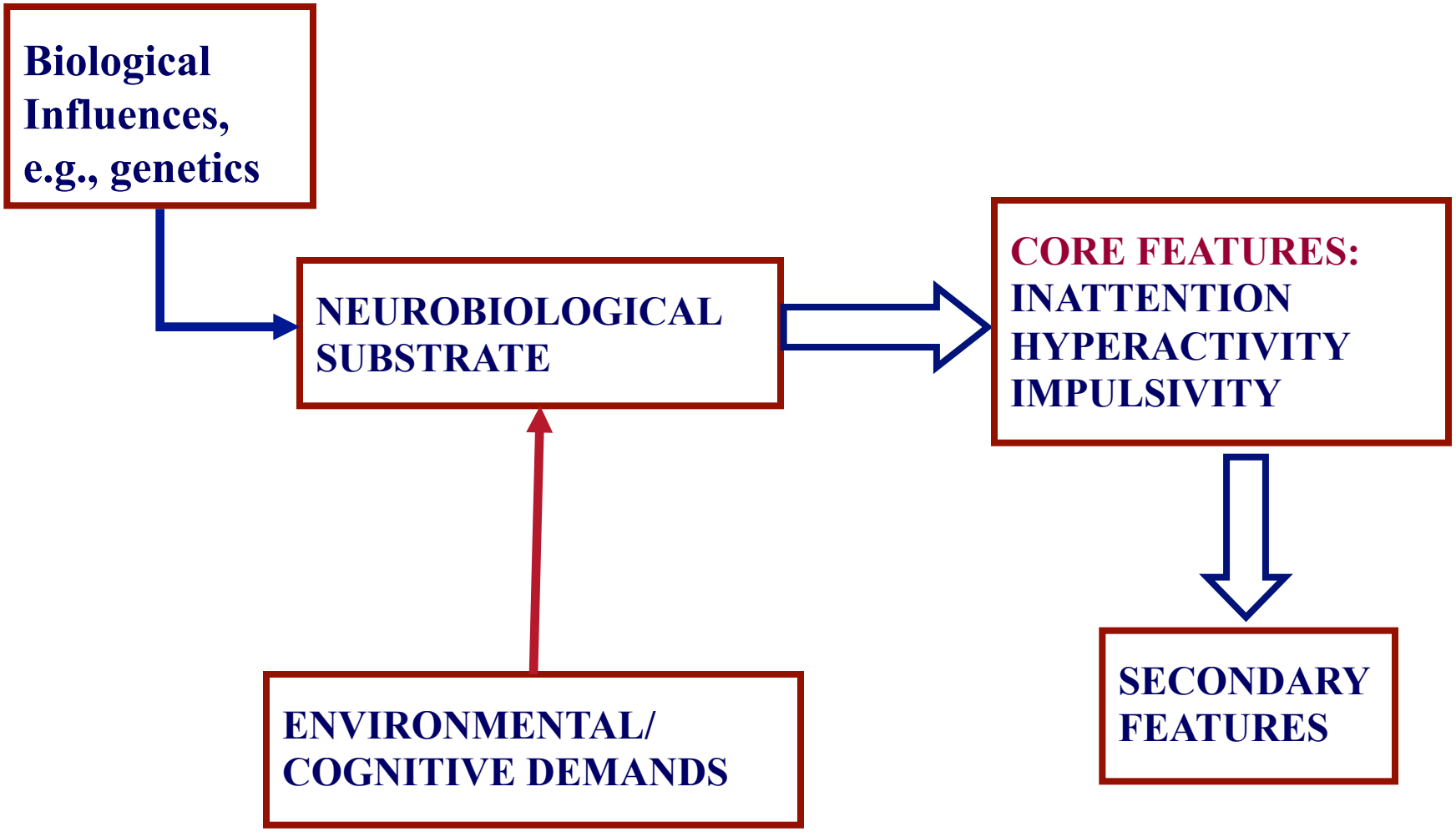


Fig. 3

WORKING MEMORY MODEL OF ADHD



Working Memory Model of ADHD