History of an idea 1993-2023:

"Adolescence-Limited" and

"Life-Course Persistent"

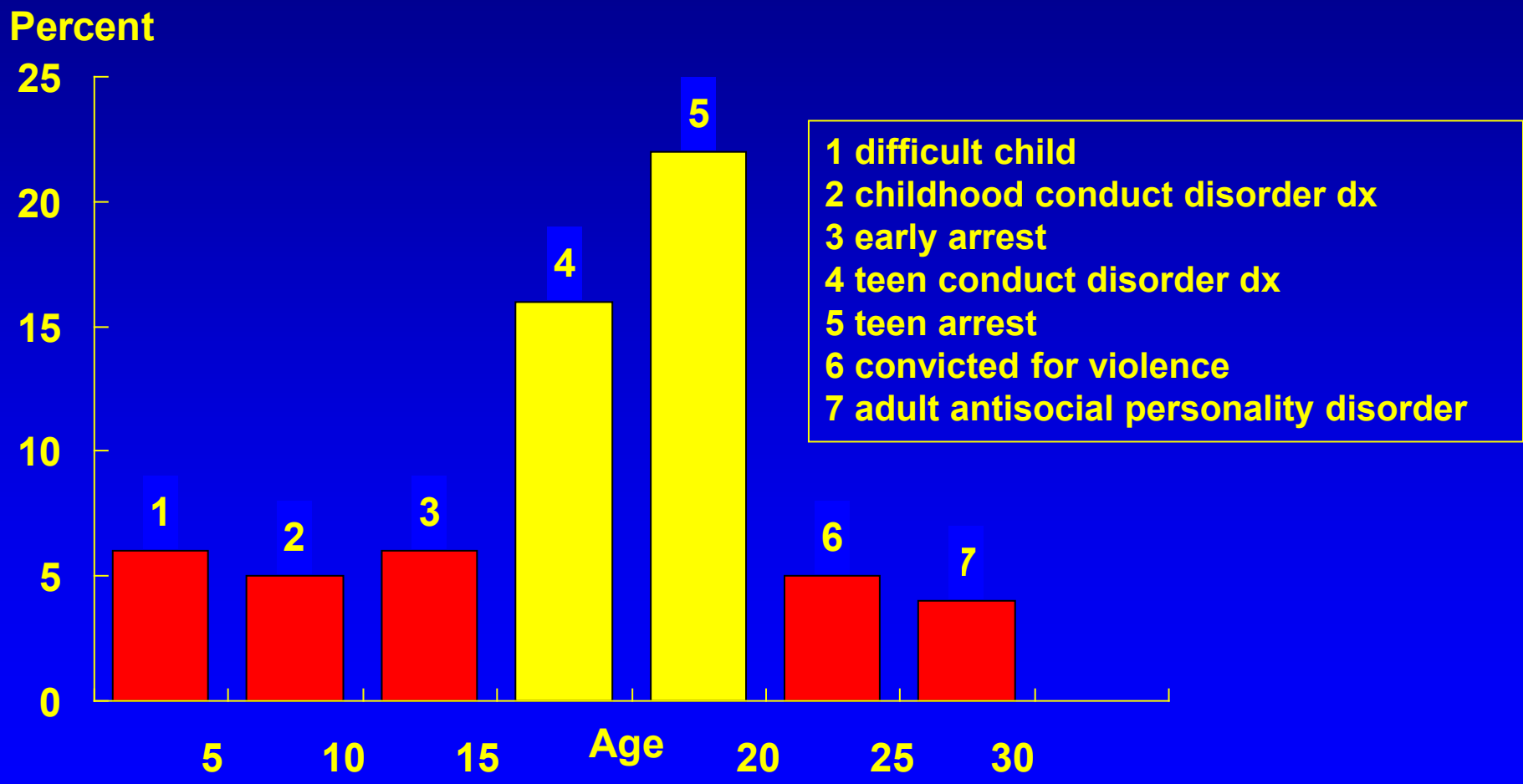
antisocial behaviour

Terrie Moffitt, Oslo, November 2023

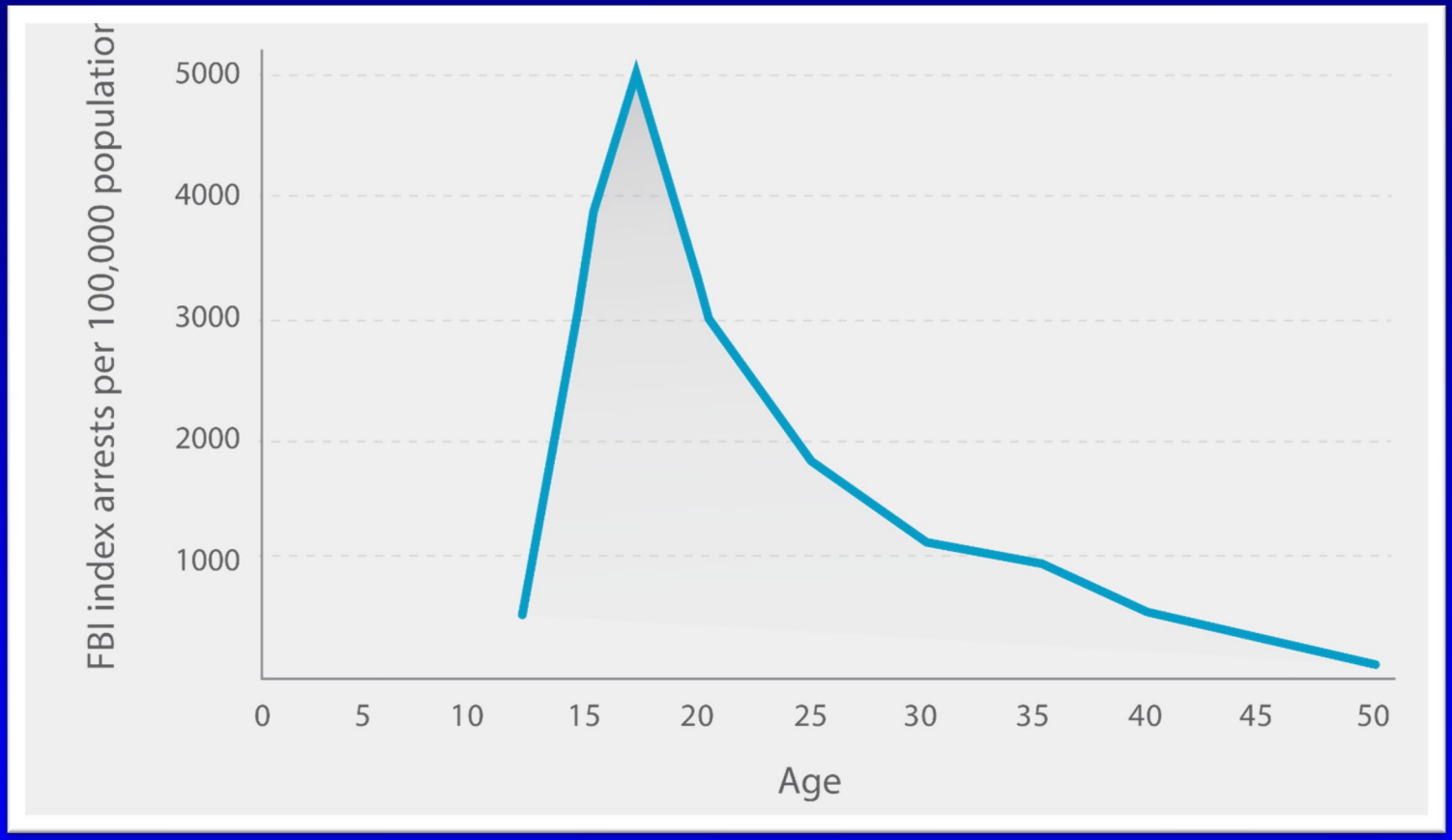
Why speak with NUBU?

- Long road from research to application in clinical practice
- Is this research being used?
- Is use of the research a close match to the original science?

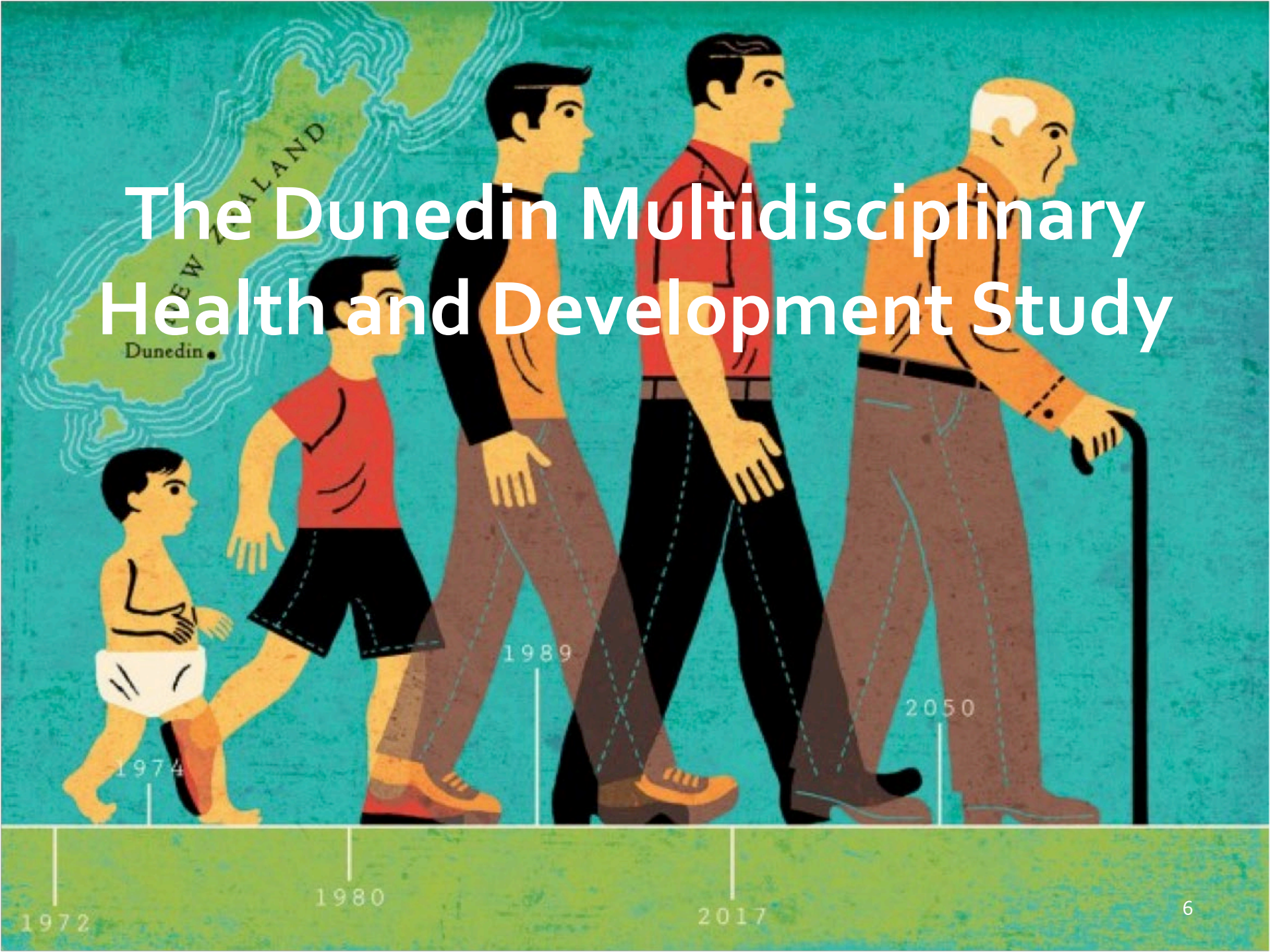
1980's: What psychology knew: The cross-sectional prevalence of male antisocial behaviour



1980's: The curve of official crimes over age




Dunedin, New Zealand



The Dunedin Multidisciplinary Health and Development Study

Dunedin Study Design

Age	Year	Number	Percent*
Birth	1972-73		
3	1975-76	1037	**100%**
5	1977-78	991	96
7	1979-80	954	92
9	1981-82	955	92
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15	1987-88	976	95
18	1990-91	993	97
21	1993-94	992	97
26	1998-99	980	96
32	2004-05	972	96
38	**2010-12**	**961**	**95**
45	**2017-2019**	**938**	**94%**
52	**2024-2026**	**??**	**??**

* Percent assessed, of those who were alive at each age.

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Dunedin Study Design

Birth to age 11

Dunedin Phase 13: 1985

Dunedin Study Design

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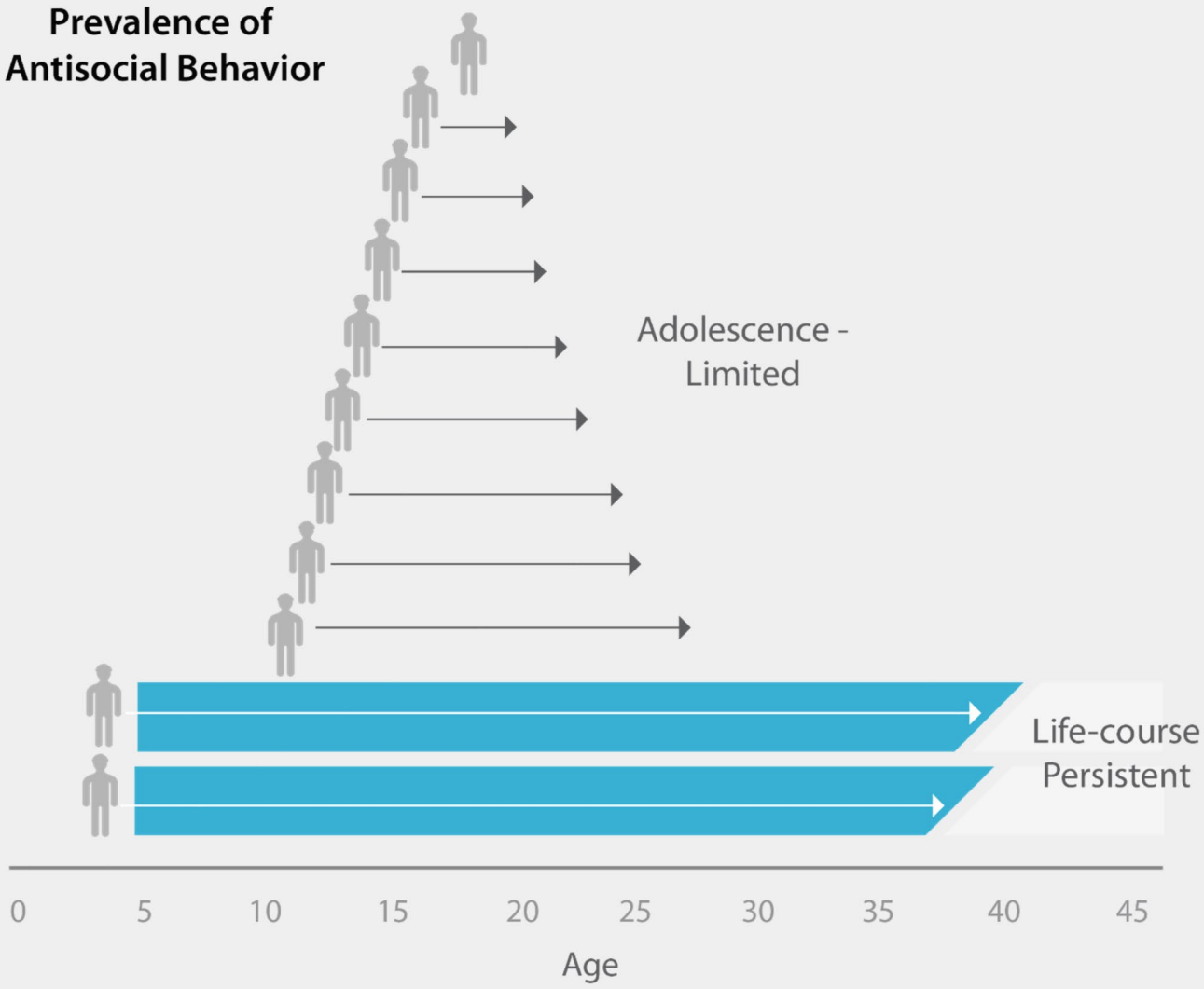
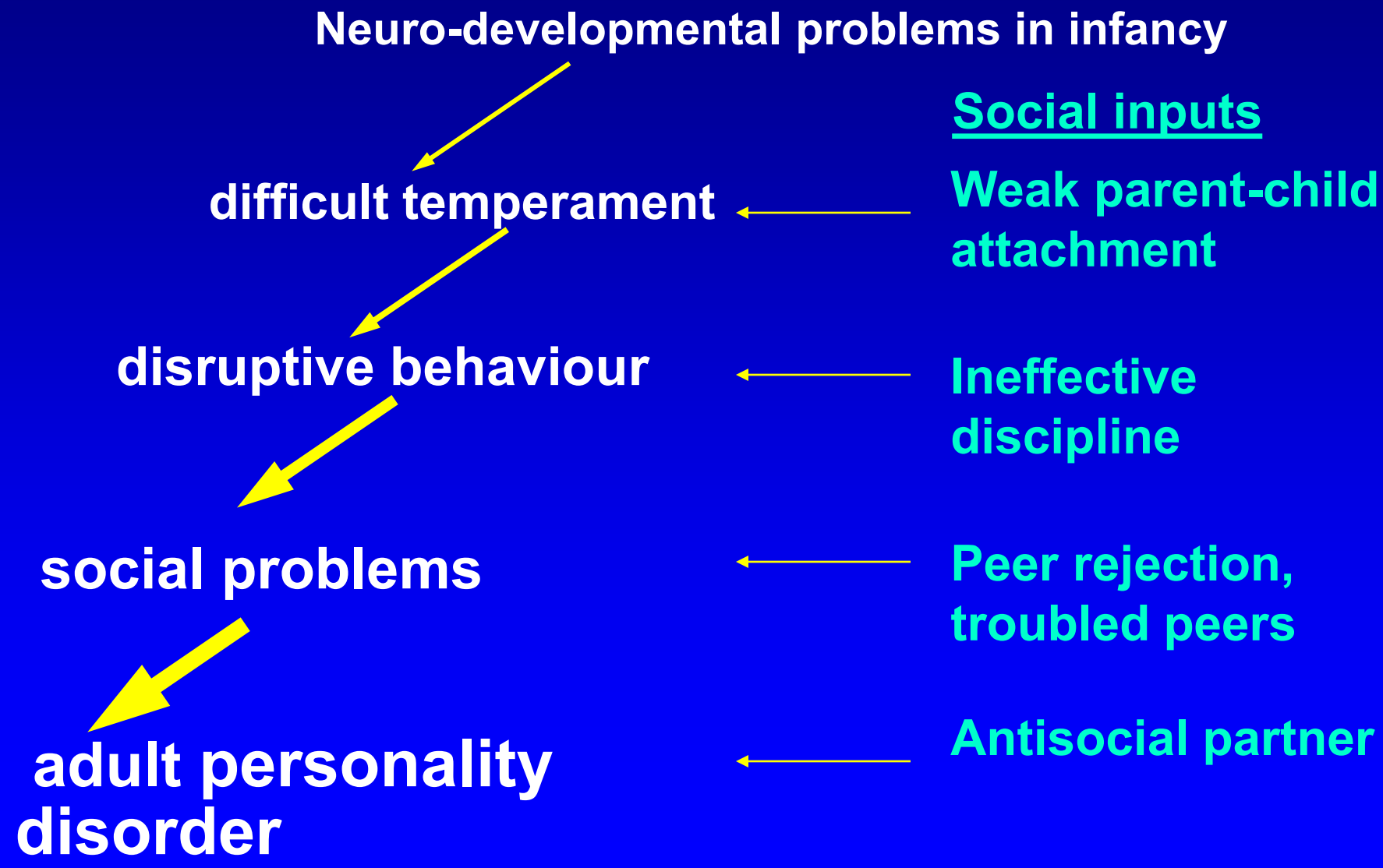
ages 13 and 15


Prevalence of
Antisocial Behavior
Adolescence -
Limited
Life-course
Persistent
0
5
10
15
20
25
30
35
40
45
Age

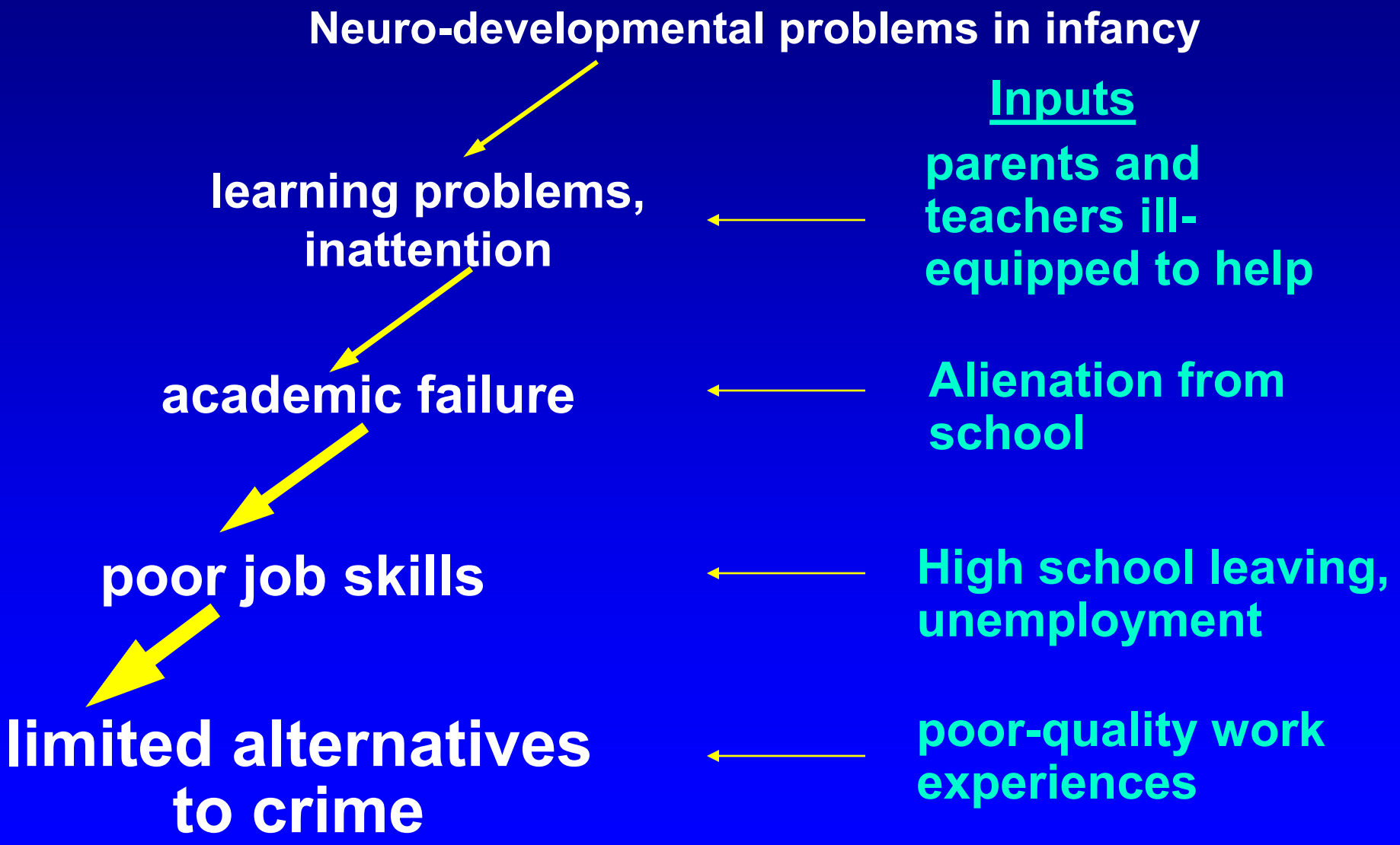
Moffitt, 1993,
Adolescence-Limited and Life-Course Persistent Antisocial Behavior:
A Developmental Taxonomy.
Psychological Review 100:674-701.

Now cited > 14,500 times

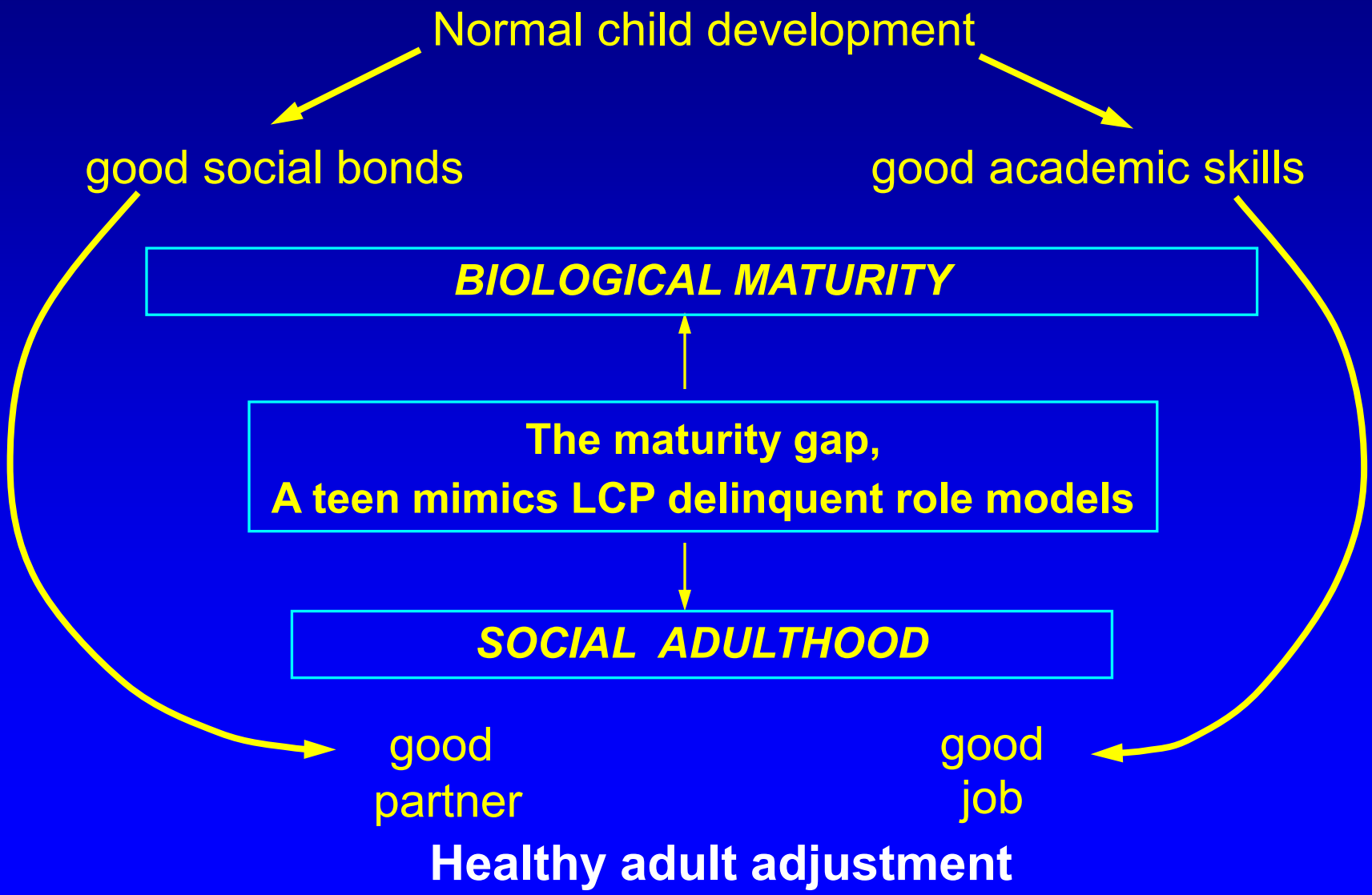
1993 Lifecourse Persistent Theory: A social path



1993 LCP Theory path 2: Academic path



1993 Adolescence-Limited Theory



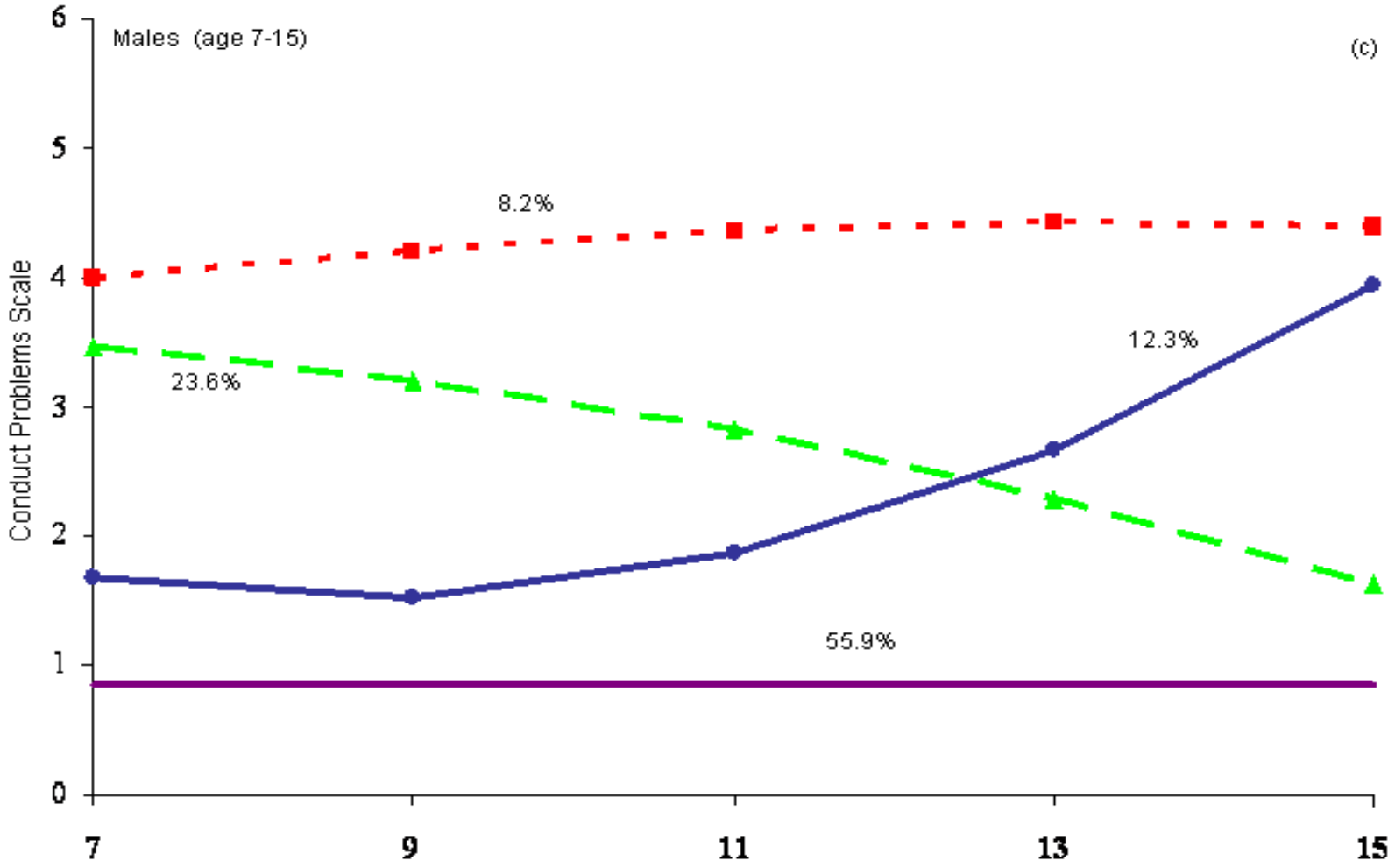
Measurement of Antisocial Behaviours

Fighting, Bullying, Telling Lies, Stealing, Truancy, Destroying Property.

Ages 7, 9, 11, 13, 15

Teacher, Mother and Self-Reports

Trajectory analysis to age 15



LCP

AL

Recover

Low

Admiral

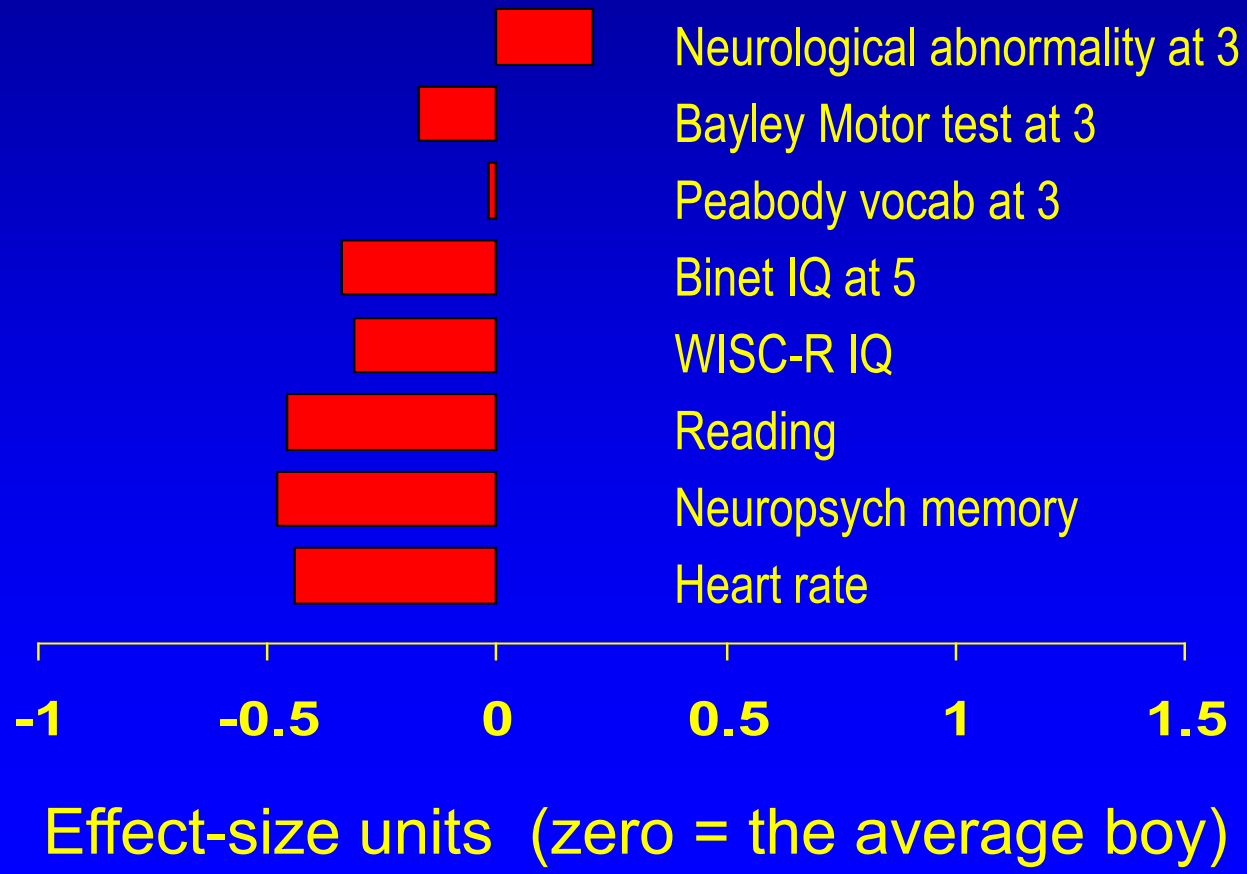
Monarch
poison

Studying childhoods of boys on the LCP and AL paths

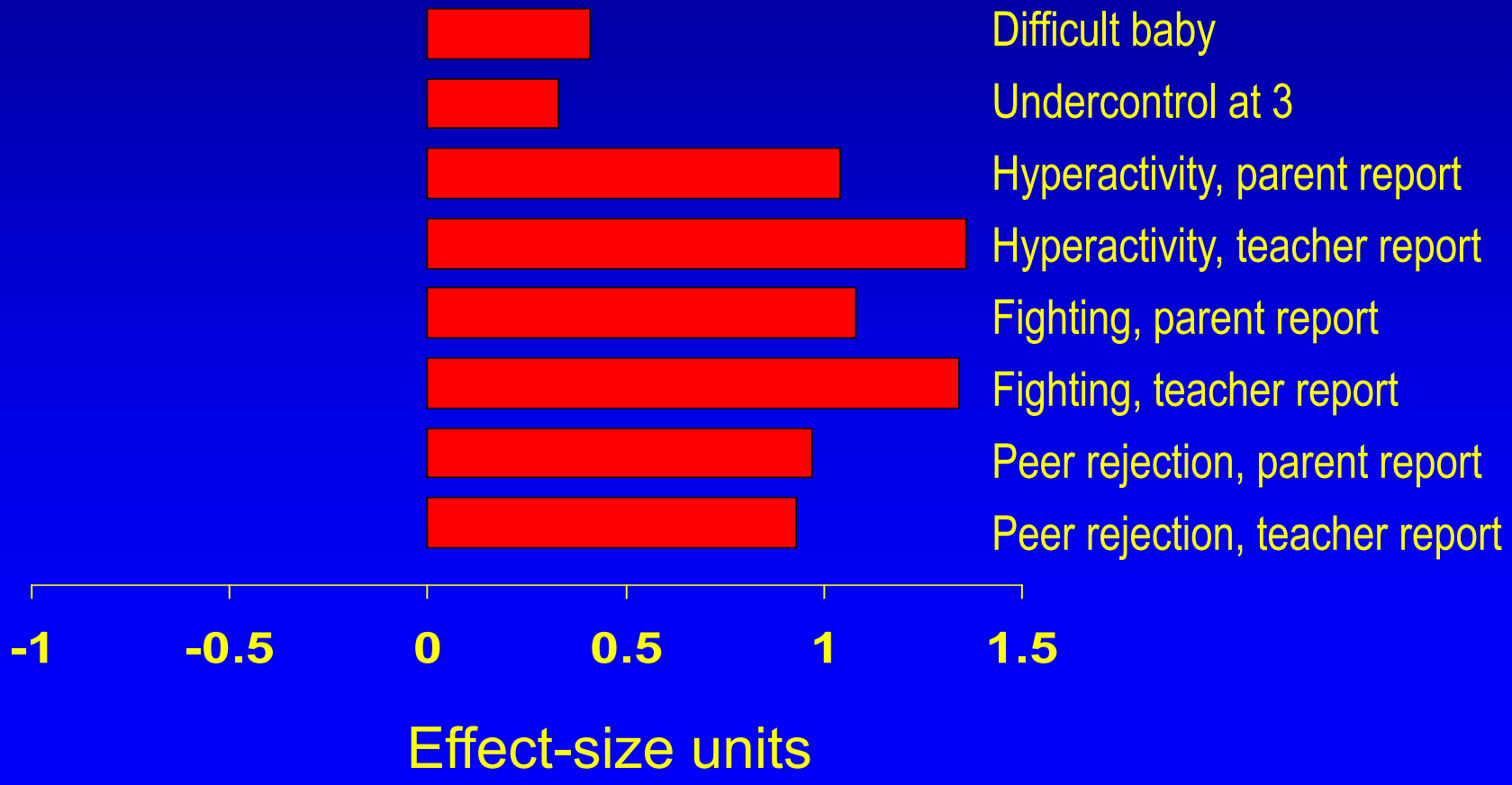
- Graphs will be scaled so the zero midpoint is the population norm
- We compared each trajectory group to the average boy

- Effect sizes for group differences shown on graphs
- ~.2 = small
- ~.5 = medium
- ~.8 = a large

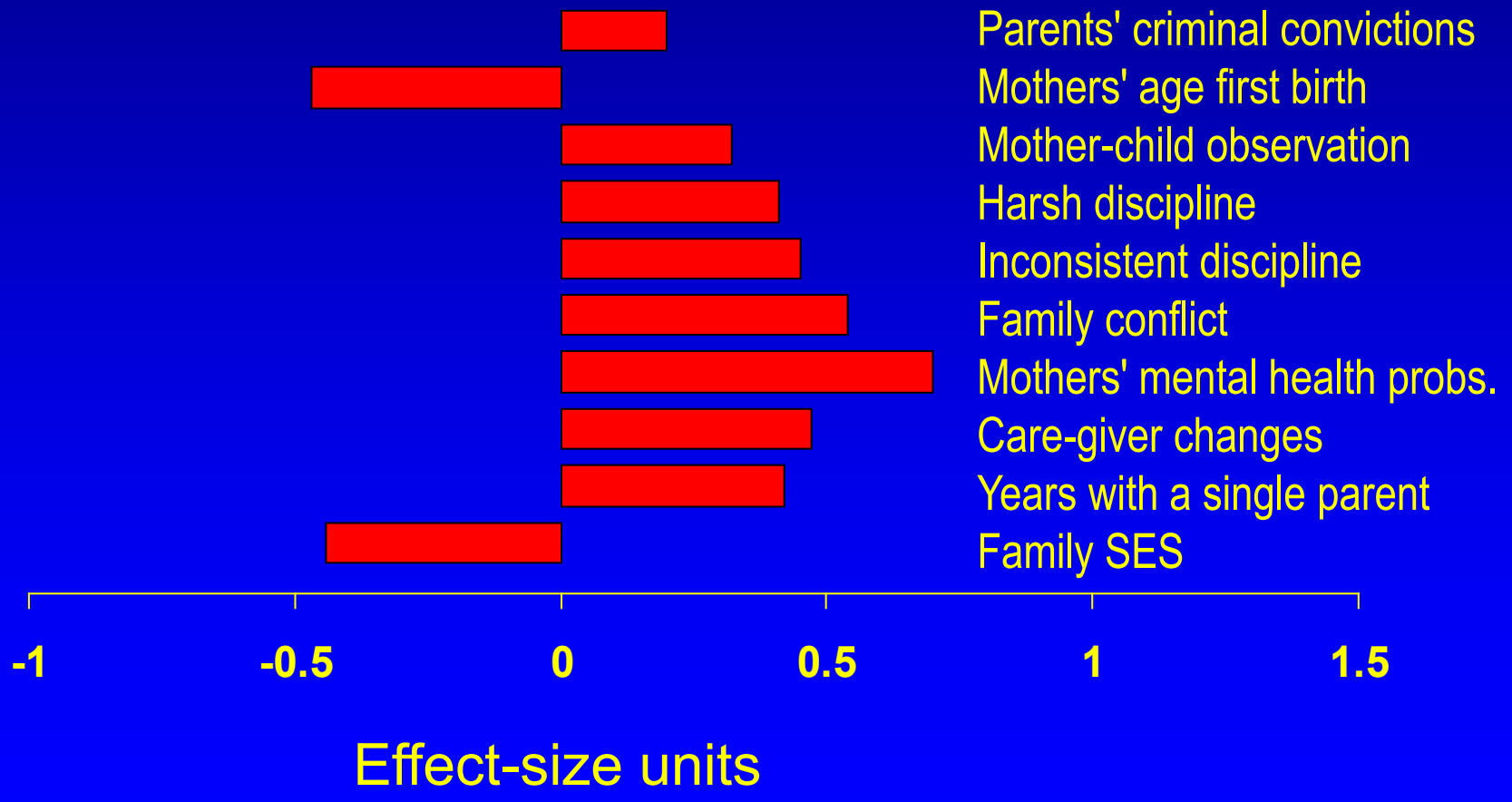
LCP-path males
Neuro-developmental risks, age 3-11



LCP-path males
Temperament-Behaviour Risks, age 3-11



LCP-path males
Parenting Risk Factors, age 3-11



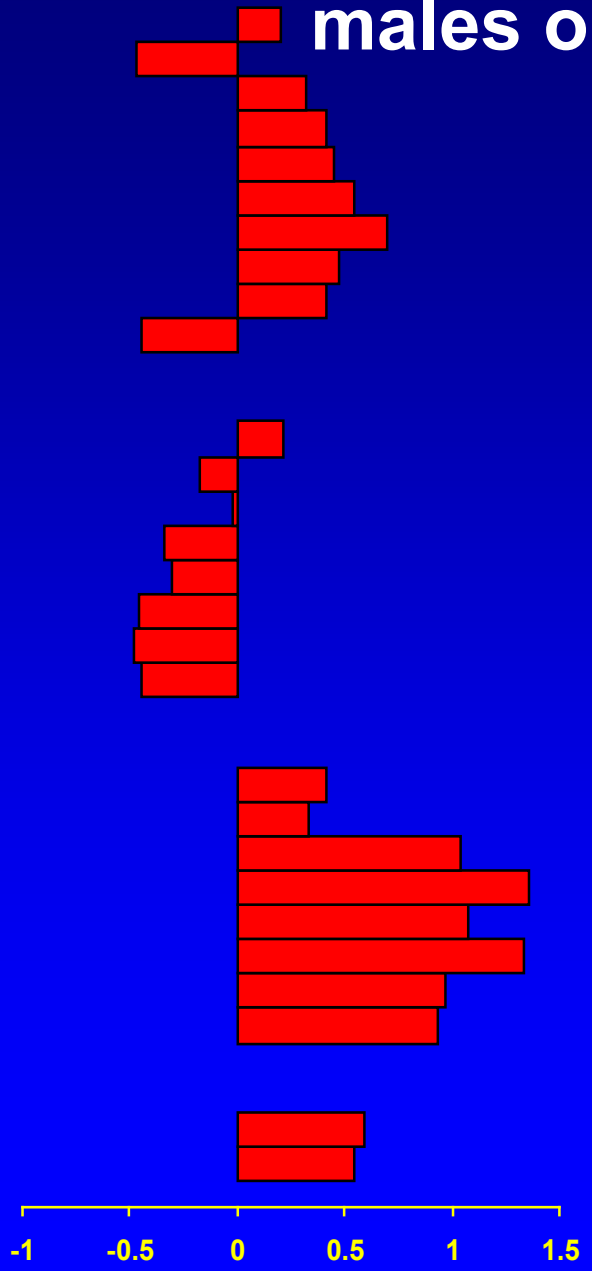
SUMMARY: childhood of males on LCP path

PARENTING RISK FACTORS
Parents' criminal convictions
Mothers' age first birth
Mother-child observation
Harsh discipline
Inconsistent discipline
Family conflict
Mothers' mental health probs.
Care-giver changes
Years with a single parent
Family SES

NEURO-COGNITIVE RISK
Neurological abnormality at 3
Bayley Motor test at 3
Peabody vocab at 3
Binet IQ at 5
WISC-R IQ
Reading
Neuropsych memory
Heart rate

TEMPERAMENT - BEHAVIOUR RISK
Difficult at 2
Undercontrol at 3
Hyperactivity, parent report
Hyperactivity, teacher report
Fighting, parent report
Fighting, teacher report
Peer rejection, parent report
Peer rejection, teacher report

PEER DELIQUENCY
Delinquent peers at 13
Delinquent peers at 18



Moffitt et al., 2001,

Dev & Psychopathology

SUMMARY: childhood of males on AL path

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Mothers' age first birth
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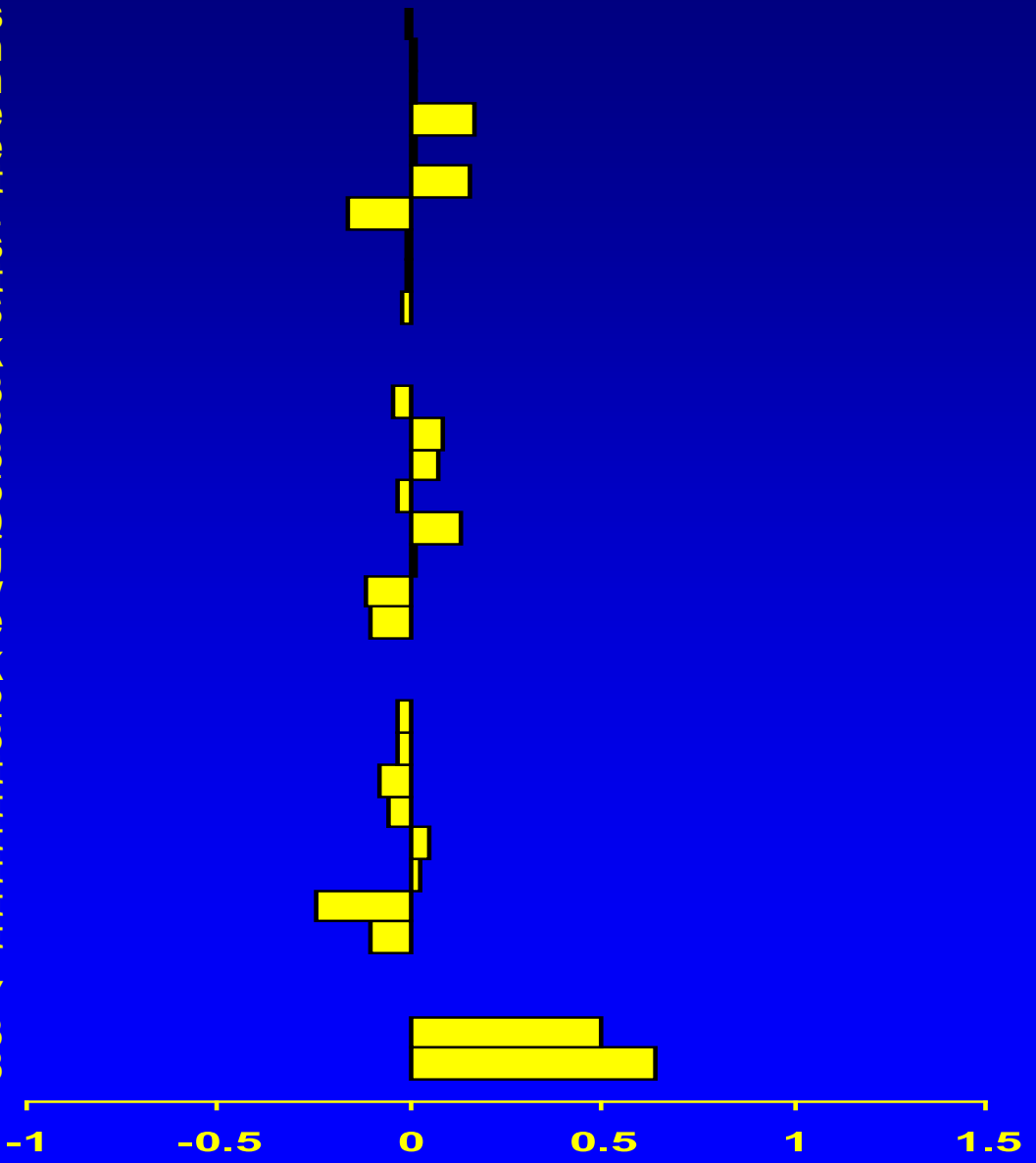
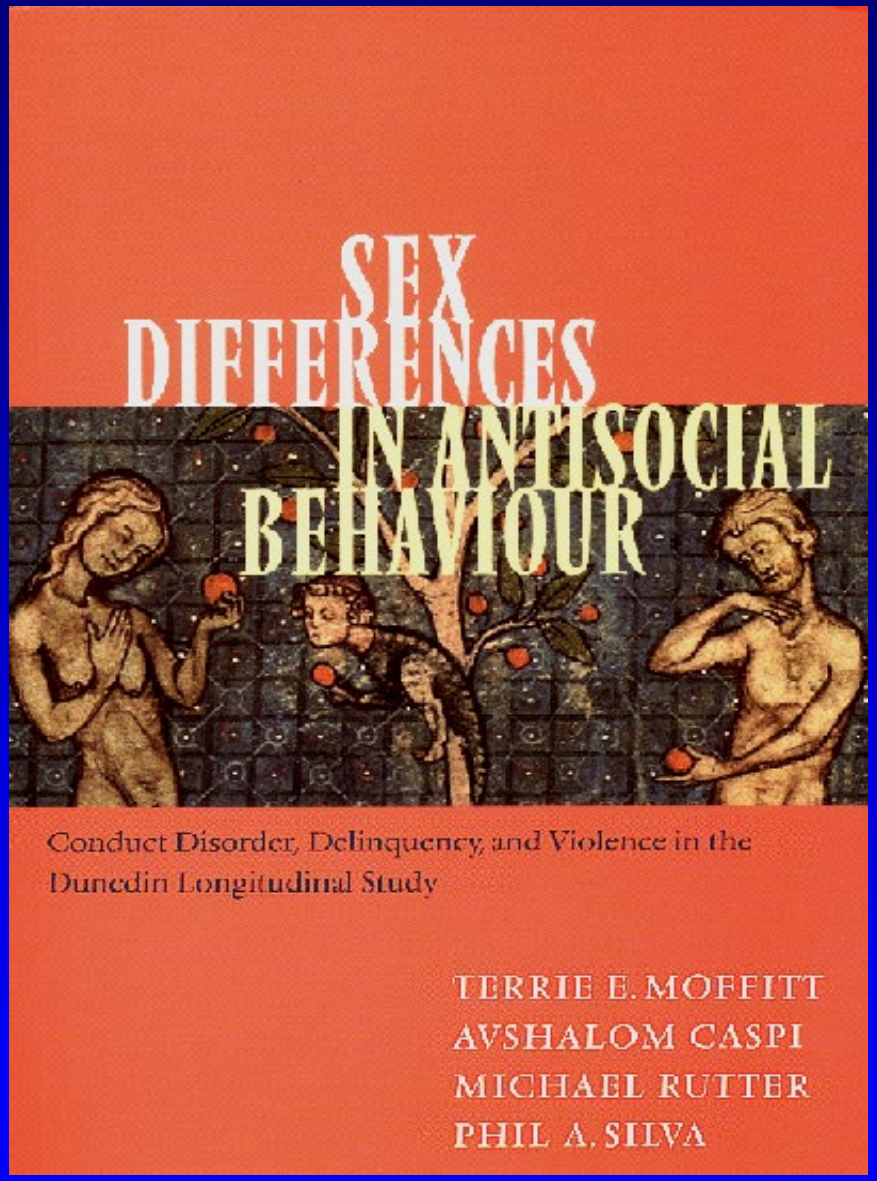


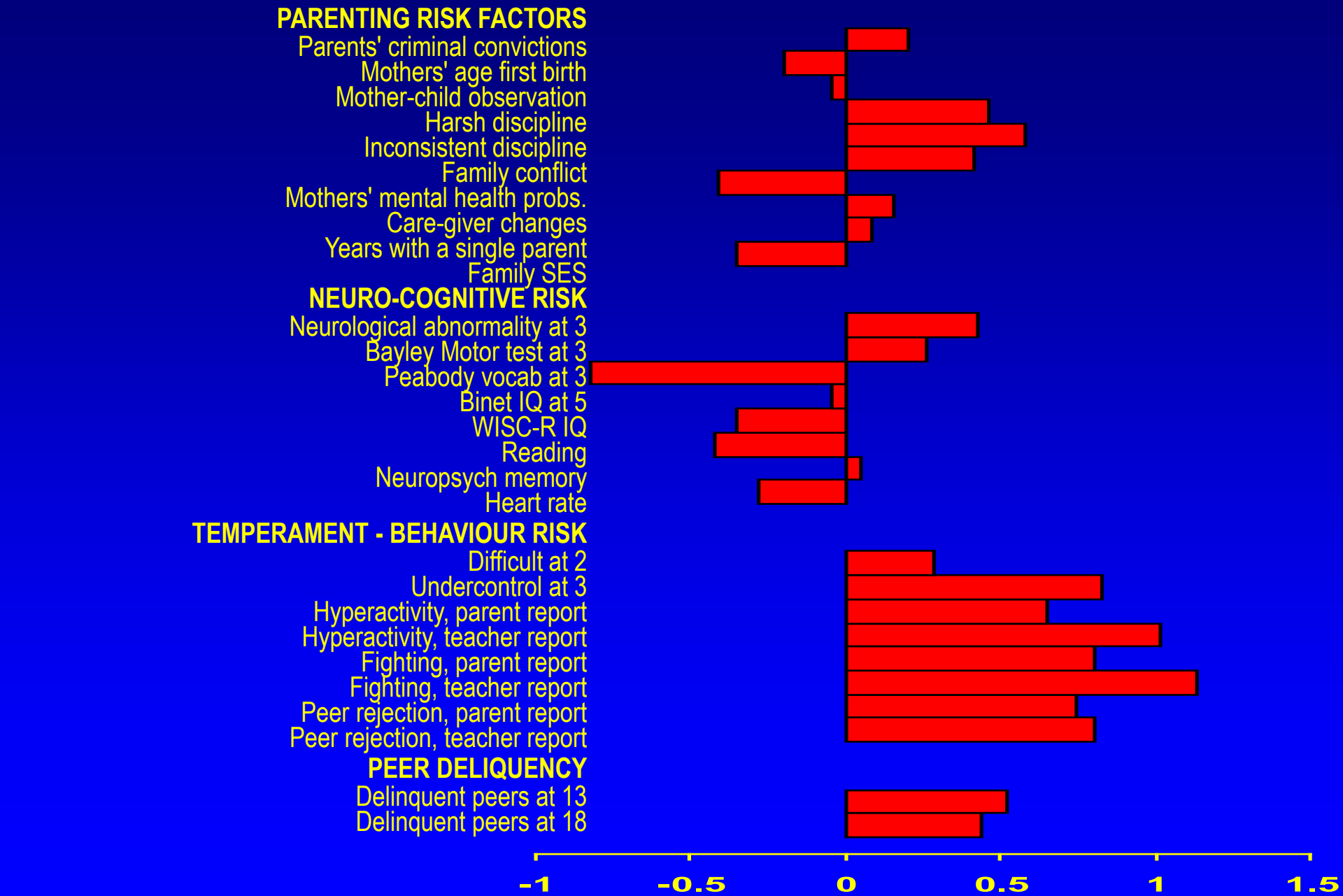


Cambridge Univ. Press, 2001

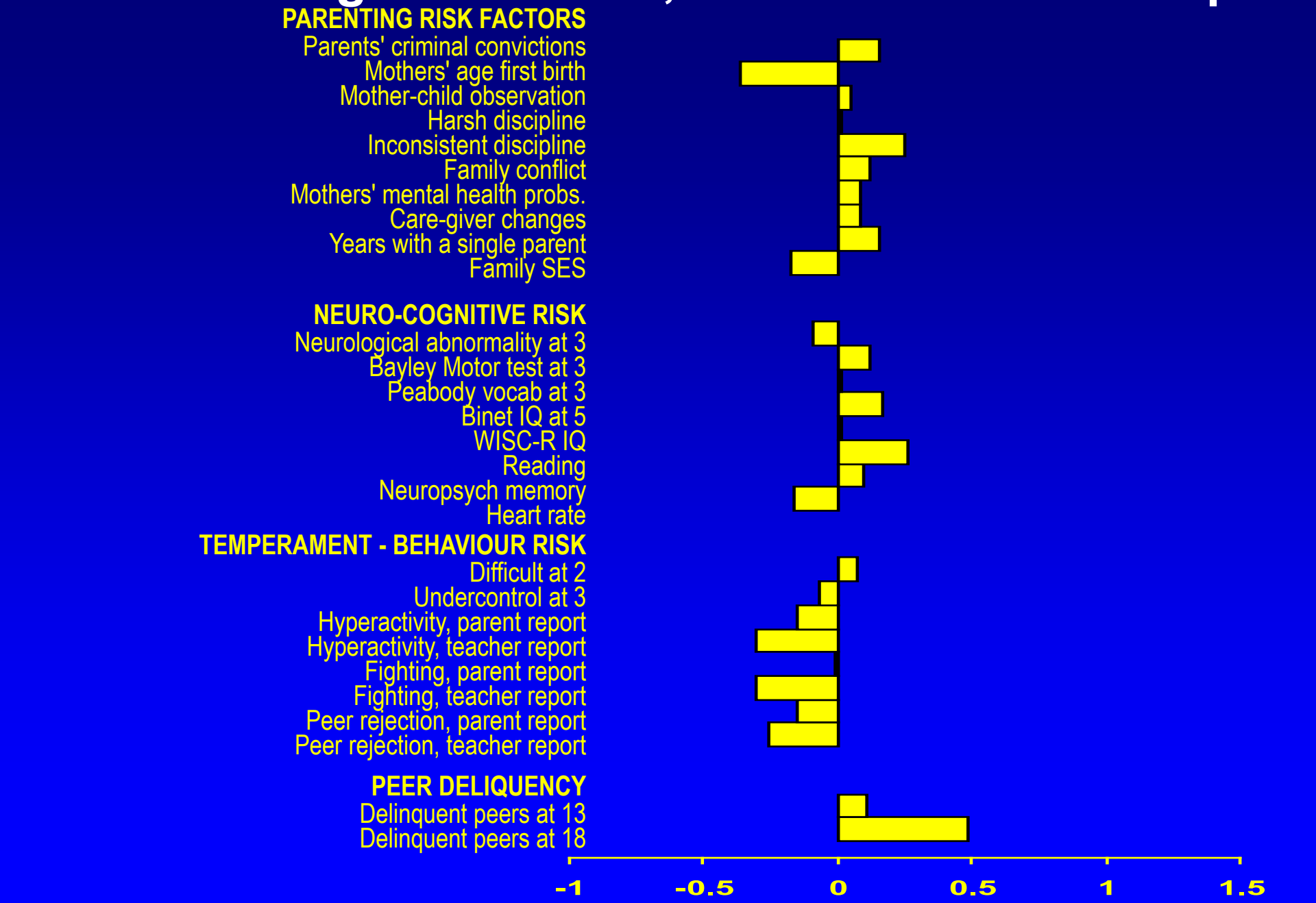
Life-course Persistent is more common in males than females

Adolescence-Limited has an equal male:female ratio

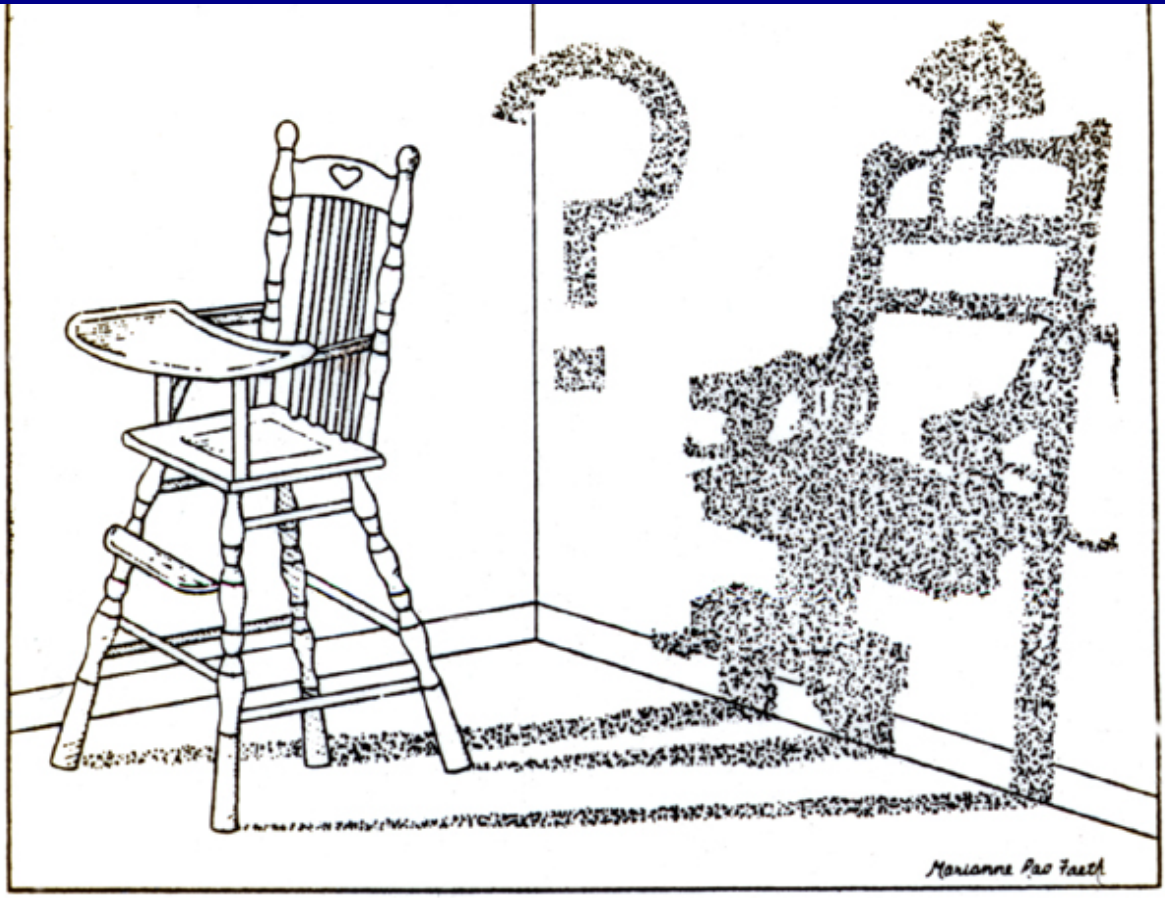
Childhood of the few girl offenders on the LCP path



Childhood of girl offenders, most were on the AL path



Do LCP & AL adolescents have different adult outcomes?



Washington Post, 1994

Dunedin Study Design

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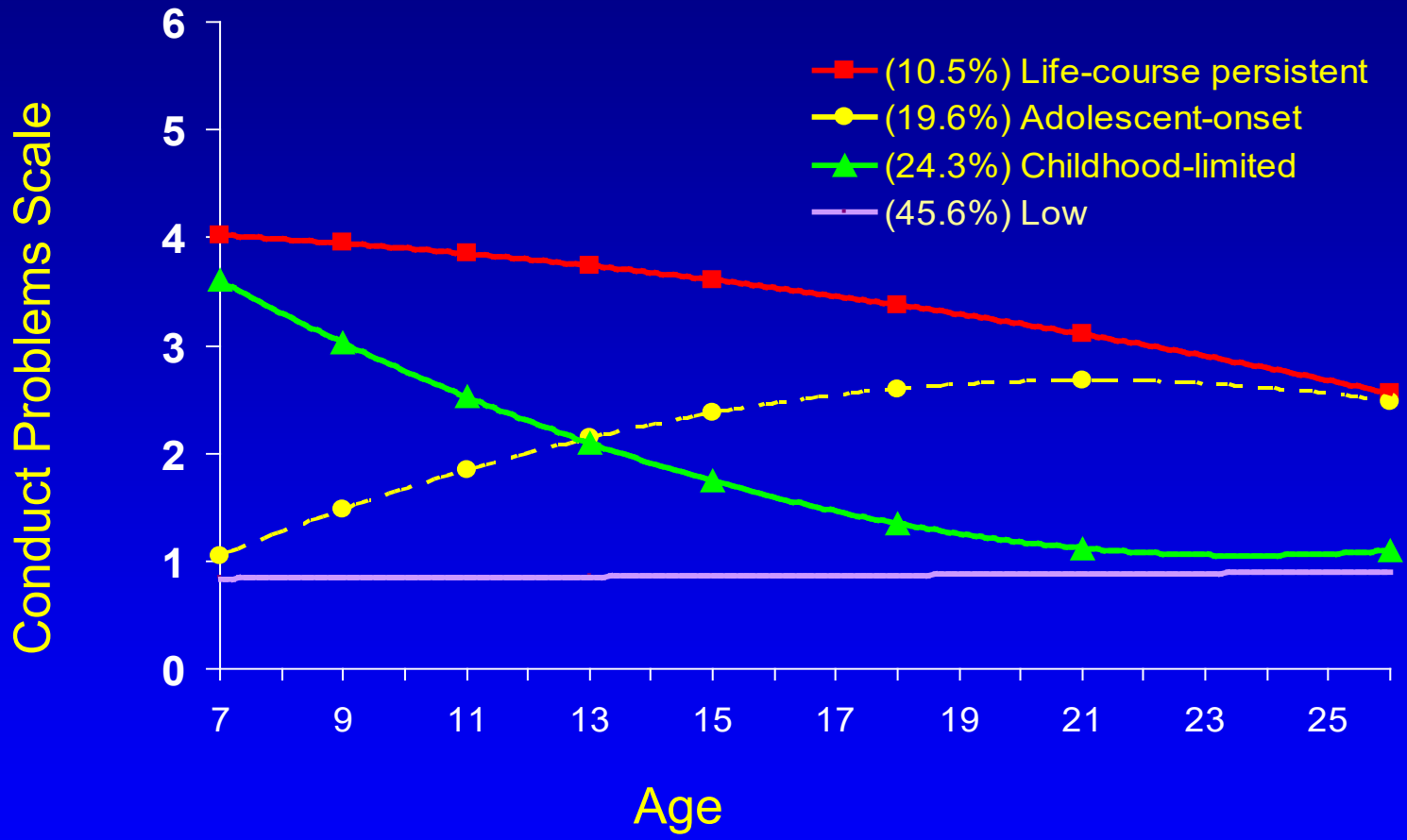
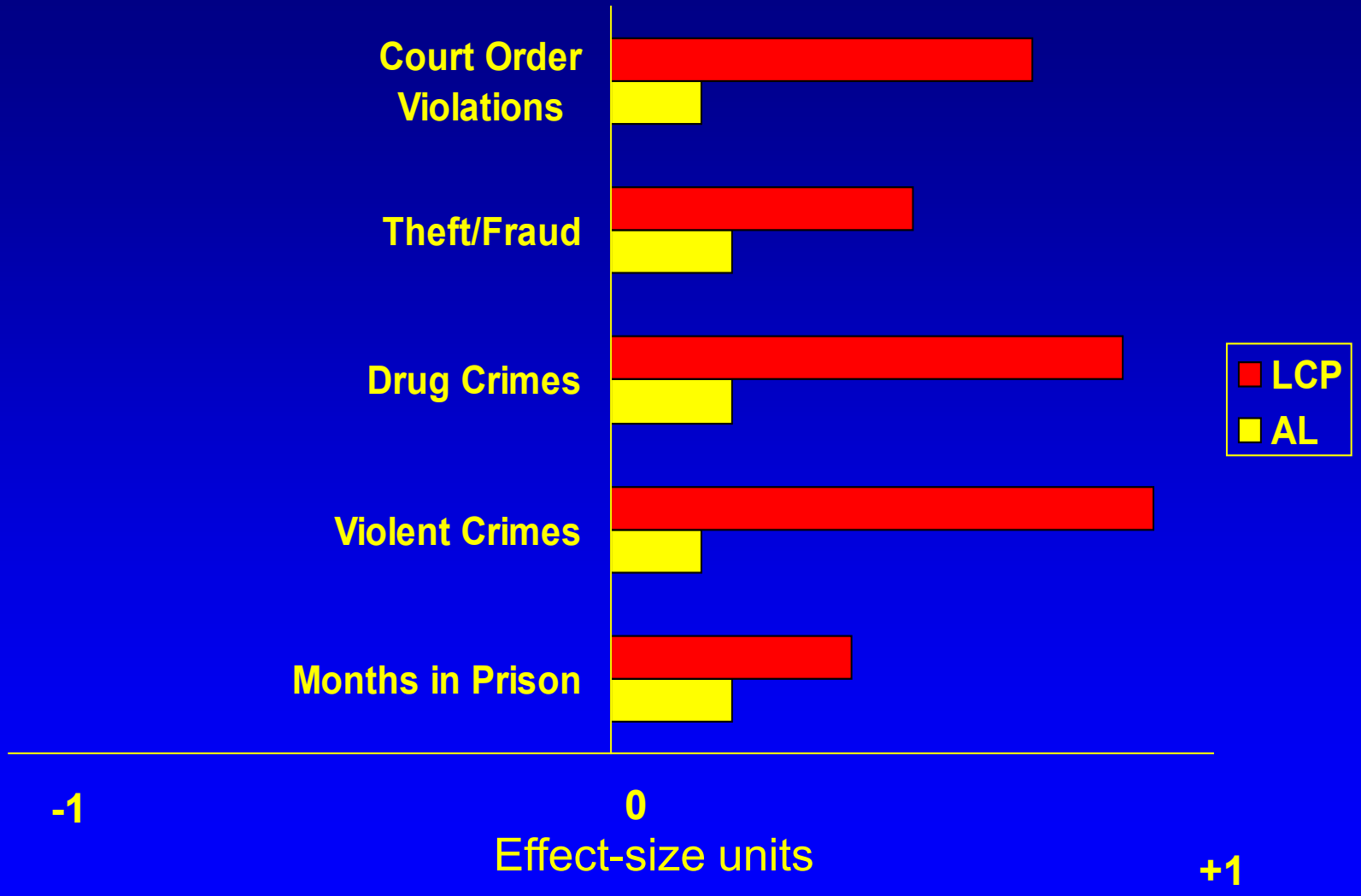
Age 18, 21, 26

Trajectories age 7 to 26 (males and females)



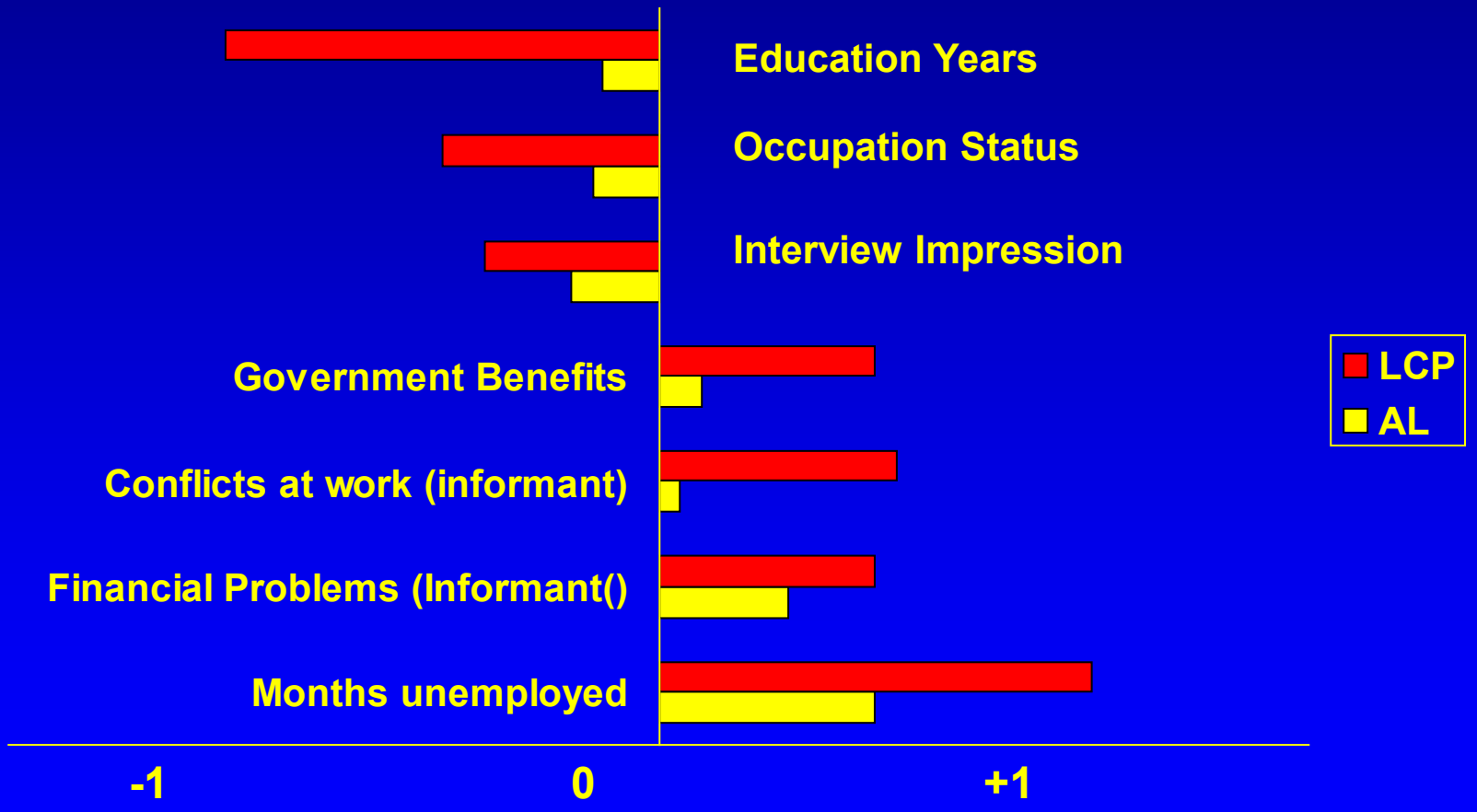
Odgers, Moffitt, Caspi, D&P, *2008*

Convictions in adult court age 18-26



Family problems at age 26

Work problems at age 26



Conduct-problem boys who did not become offenders: A magic key to protective factors?

- “Childhood-limited” conduct-problem boys.
- Were they really recoveries?

The childhood-limited group's adult outcomes…

- Social phobia
- Agoraphobia
- No partner
- No children
- Neuroticism
- Introversion
- Welfare-dependent
- Low education
- Lowest SES jobs
- Financial difficulties
- 1/3 convicted, for trivial crimes

Childhood-limited conduct disorder: Not a key to protective factors

Lee Robins, *Deviant Children Grown Up* (1966):

"Half of boys with conduct disorder do not develop antisocial personality disorder as adults….

but most of them develop other adjustment problems."

David Farrington et al. (1988):

"…there were no real adult success stories among the conduct-problem males in the British cohort."

American Psychiatric Assocation Diagnostic and Statistical Manual

1994

Pediatric clinician's dilemma: Childhood-limited or Life-course Persistent?

2006 Dunedin Family Health History Study:

Informants

Study member

Father

Mother

Family members

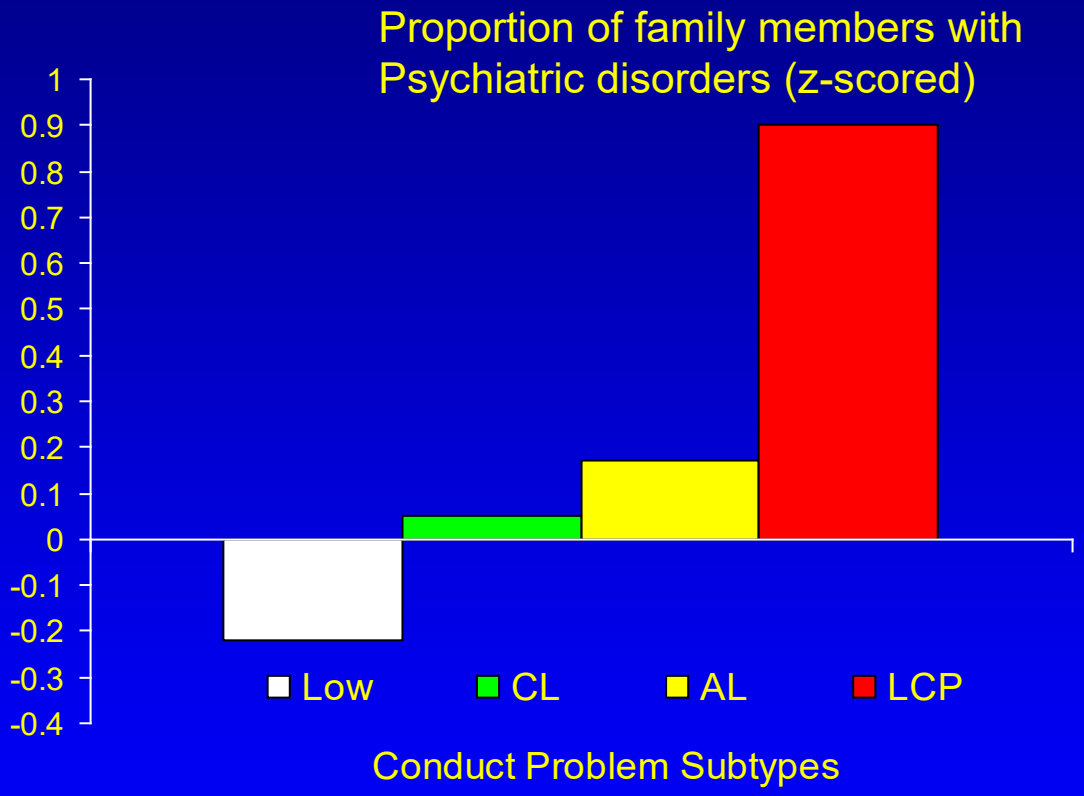







7-16 members per each of 1000 families,
> 8,000 individuals

Family psychiatric history distinguished young children on the life-course-persistent path



Odgers, Moffitt et al. (2007) J. Am Academy Child Adolesc Psychiatry

Dunedin Study Design

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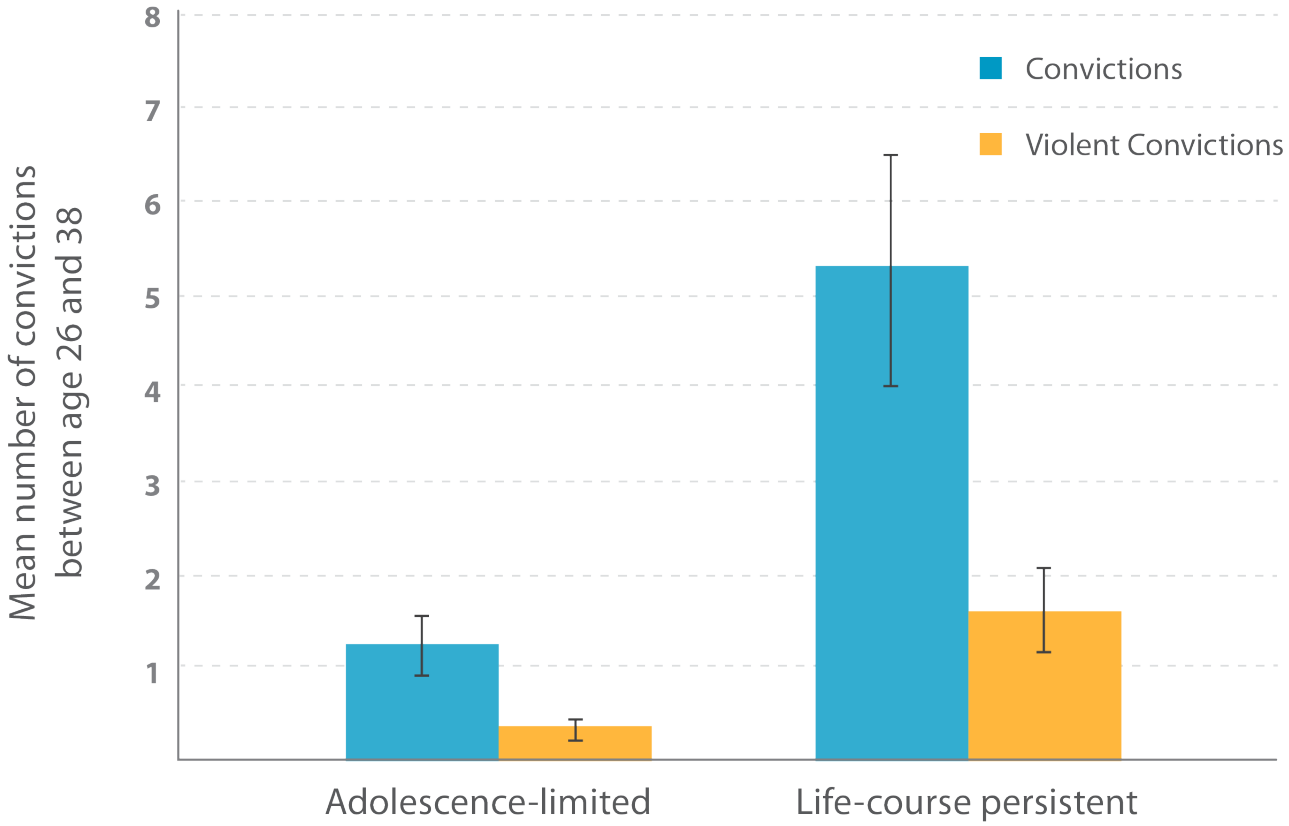
Ages 32, 38, 45

After age 26, Adolescence-limited & Life-course persistent continued to diverge on criminal convictions.



Moffitt, 2018, Nature Human Behaviour

Biology and Crime: A heated debate

- Neurodevelopmental hypothesis of LCP in 1993
- But technology not available then to test
- New data technologies 3 decades later
- Genome-wide genetics
- MRI brain imaging

Research Article

aps ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Psychological Science
2018, Vol. 29(5) 791–803

DOI: 10.1177/0956797617744542
www.psychologicalscience.org/PS
SAGE

Genetics and Crime: Integrating New Genomic Discoveries Into Psychological Research About Antisocial Behavior

J. Wertz[1], A. Caspi[1,2,3,4], D. W. Belsky[5,6], A. L. Beckley[1,7], L. Arseneault[4], J. C. Barnes[8], D. L. Corcoran[3], S. Hogan[9], R. M. Houts[1], N. Morgan[10], C. L. Odgers[11], J. A. Prinz[3], K. Sugden[1], B. S. Williams[1], R. Poulton[9], and T. E. Moffitt[1,2,3,4]

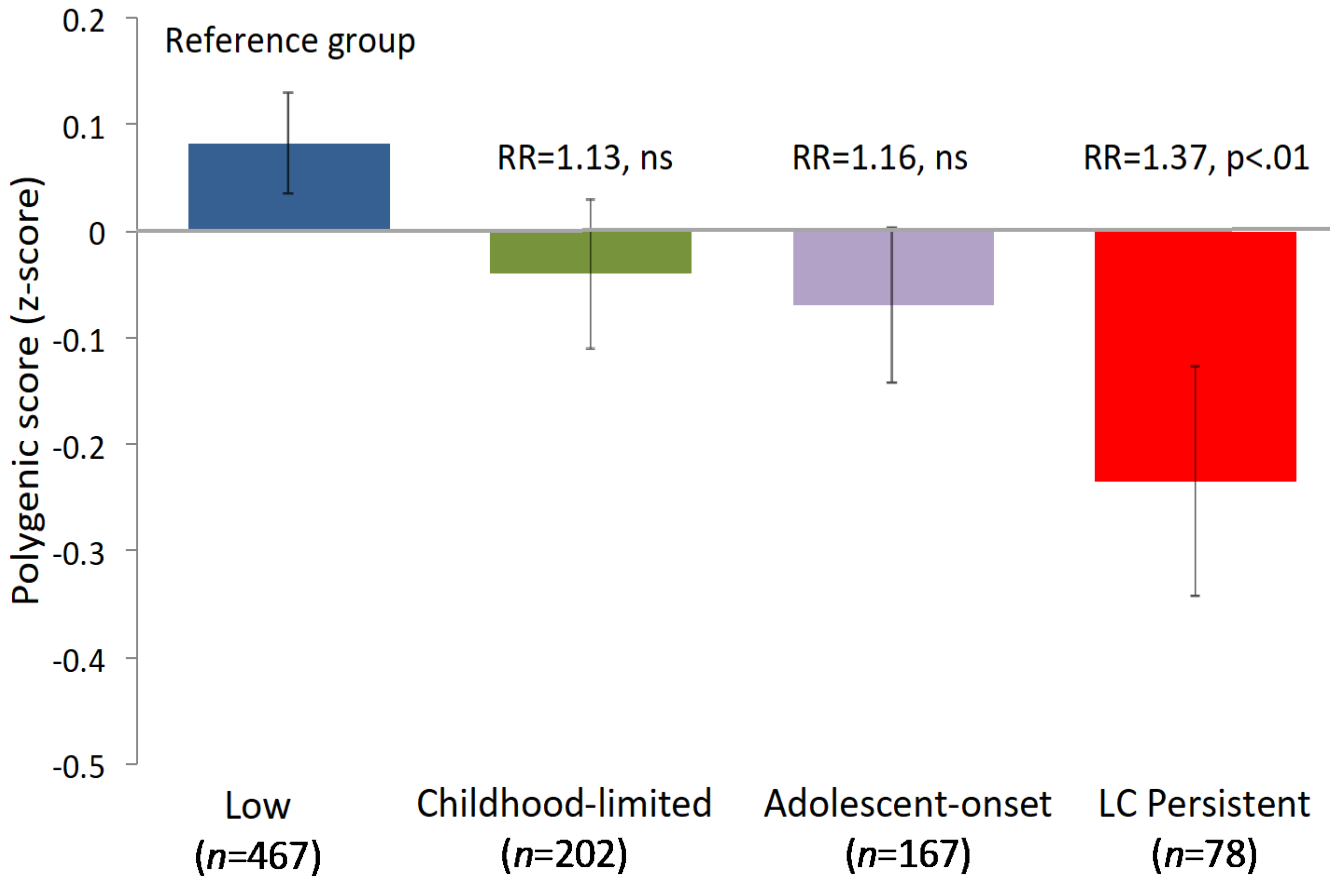
[1]Department of Psychology & Neuroscience, Duke University; [2]Department of Psychiatry & Behavioral Sciences, Duke University School of Medicine; [3]Center for Genomic and Computational Biology, Duke University; [4]Social, Genetic, & Developmental Psychiatry Research Centre, Institute of Psychiatry, Psychology, & Neuroscience, King's College London; [5]Department of Medicine, Duke University School of Medicine; [6]Social Science Research Institute, Duke University; [7]Demography Unit, Department of Sociology, Stockholm University; [8]School of Criminal Justice, University of Cincinnati; [9]Dunedin Multidisciplinary Health and Development Research Unit, Department of Psychology, University of Otago; [10]Home Office, London, United Kingdom; and [11]Sanford School of Public Policy, Duke University

2018

What is the education polygenic score?

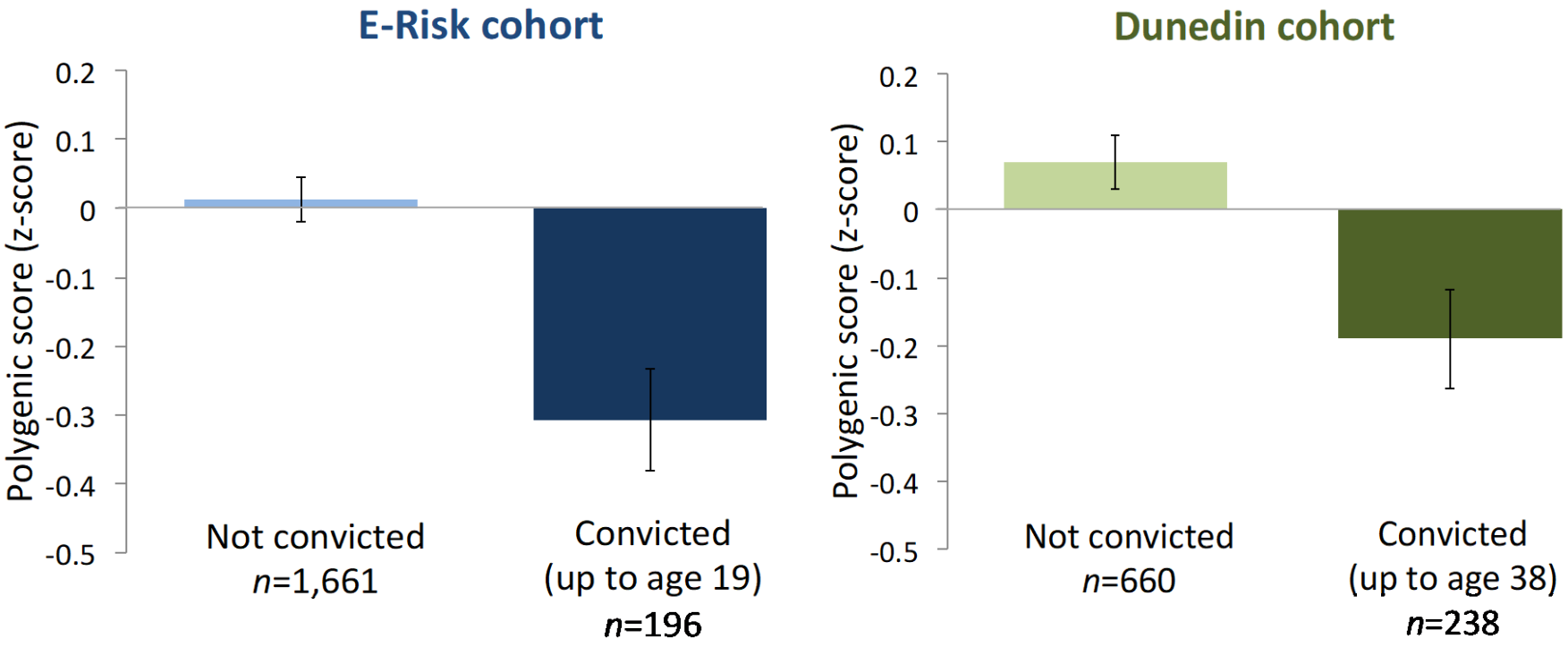
- 1 million people provided their DNA (e.g., 23andMe)
- Stated their level of education
- GWAS: whole genome is searched for markers characteristic of people with high levels of education
- Genetic markers summed to create the polygenic score for educational attainment
- Score taps intelligence, but also self-control, attention
- We derived this score in each Dunedin Study member's DNA

Mean Educational Attainment polygenic score derived from GWAS of >1million, for Dunedin Study crime trajectory groups:



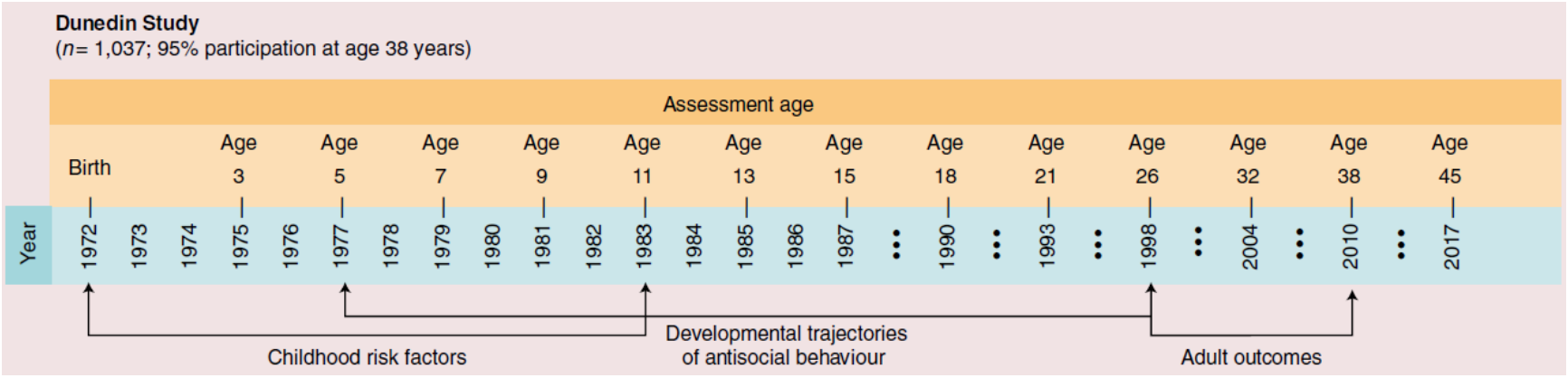
The Environmental Risk (E-Risk) longitudinal study

Cross-cohort replication of mean education polygenic score by crime conviction



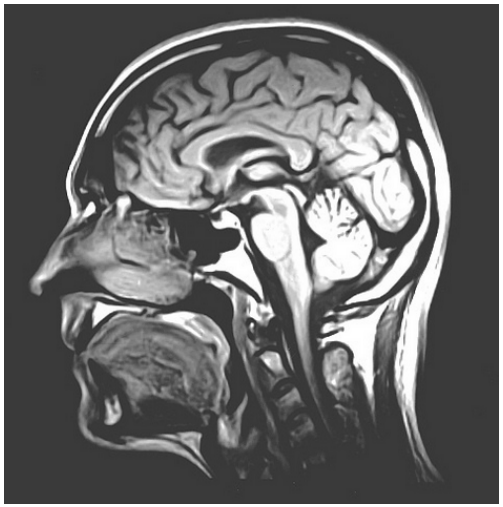
Wertz, Caspi, Moffitt, Psychological Science, 2018

Dunedin Study adds brain imaging 2017-2019



Physical fighting
Bullying
Destroying property
Truancy
Stealing
Lying

MRI Brain scans

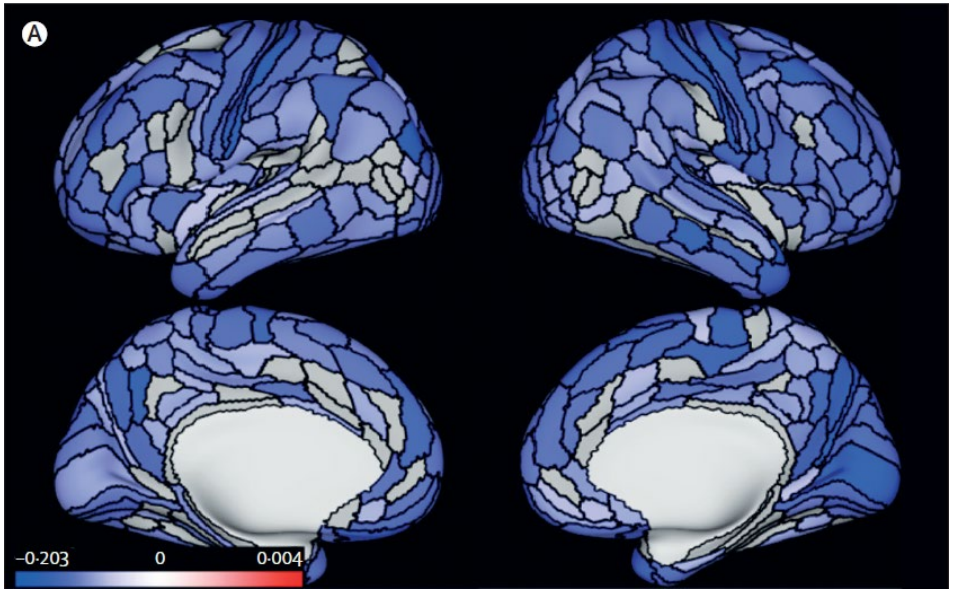


Brain's surface area at age 45

Blue = smaller surface area

Darker = bigger *group* differences

Life-course persistent had smaller surface area than low-antisocial



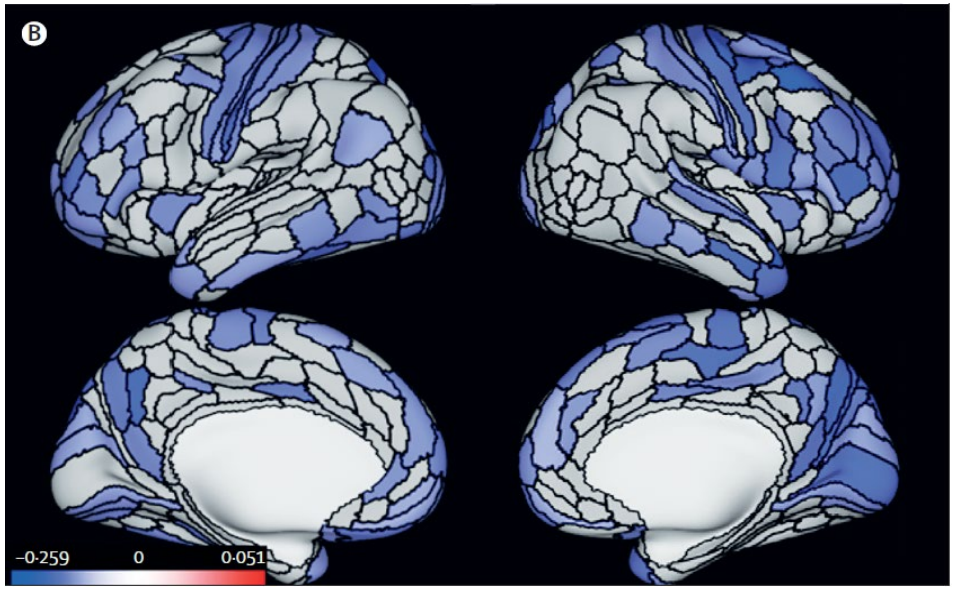
Carlisi, Caspi, Moffitt, et al. 2020, *Lancet Psychiatry*

Brain's surface area at age 45

Blue = smaller surface area

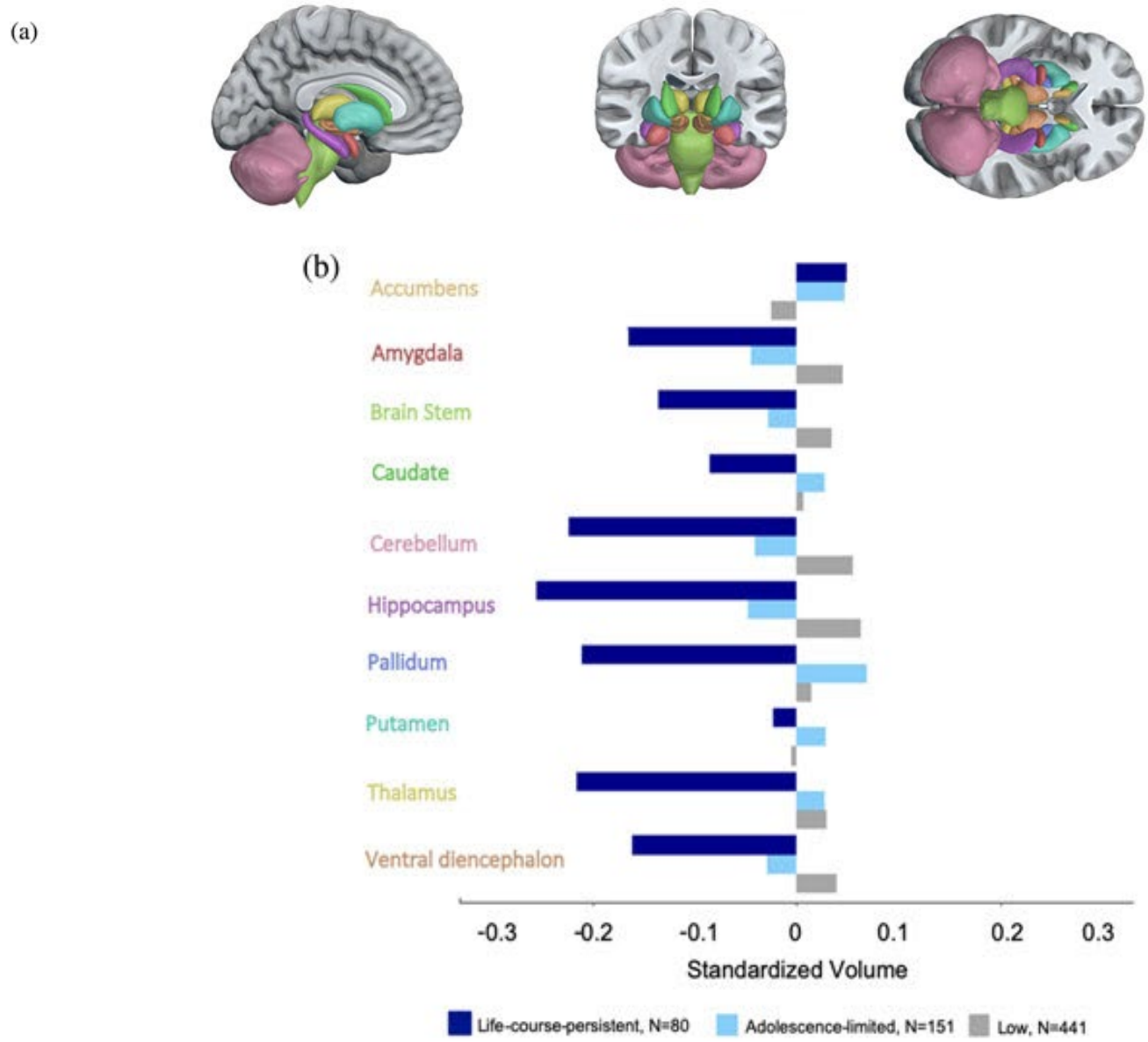
Darker = bigger *group* differences

Life-course persistent also had smaller surface area than adolescence-limited



Adolescent-limited did not differ from low-antisocial group

Brain's subcortical gray-matter volumes were smaller in Life-course Persistent group



Genetics and Adult Brain Structure

- Only the small *minority* of offenders, those who showed antisocial behaviour throughout their lives from childhood to adulthood, had any differences in genetics or in brain structure.

- The *majority* of offenders, those who break the law as young people but reform as young adults, *do not* have genetic or brain findings.

LCP are doing less crime in midlife, should we still worry about them?

An antisocial lifestyle may have biological consequences

3-D Facial photography at Phase 45 in Dunedin

These Dunedin cohort members are 45 years old

Composites of 10 Dunedin Study cohort members, all born 1972.

Each composite is created from 10 faces with Psychomorph.

These cohort members are 45 years old too

Fastest-aging 10
Dunedin Study
Cohort women
and men

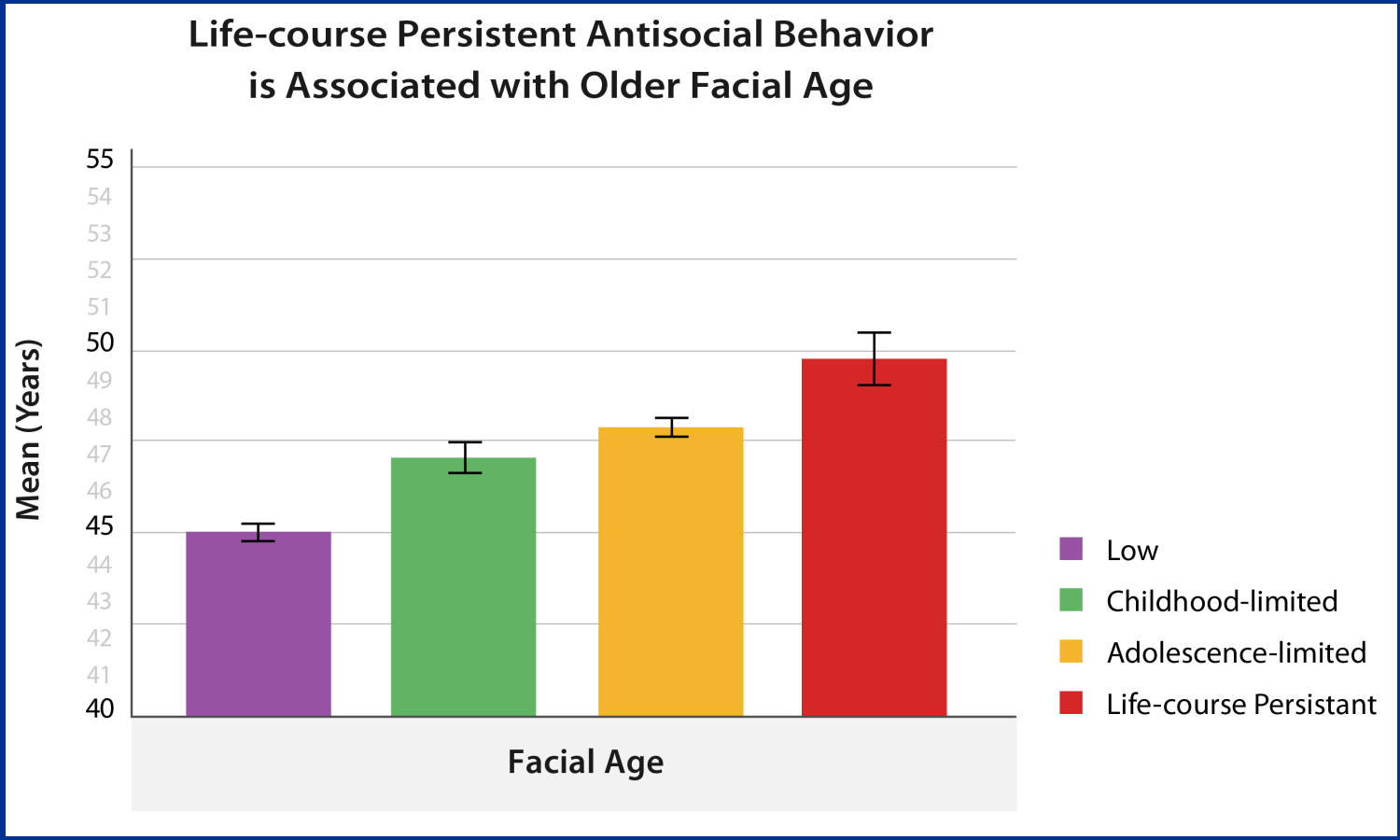
Elliott, Caspi… and Moffitt, *Nature Aging*, 2021

10 slowest-aging cohort members

10 average-aging cohort members

10 fastest-aging cohort members

FACIAL AGE RATINGS

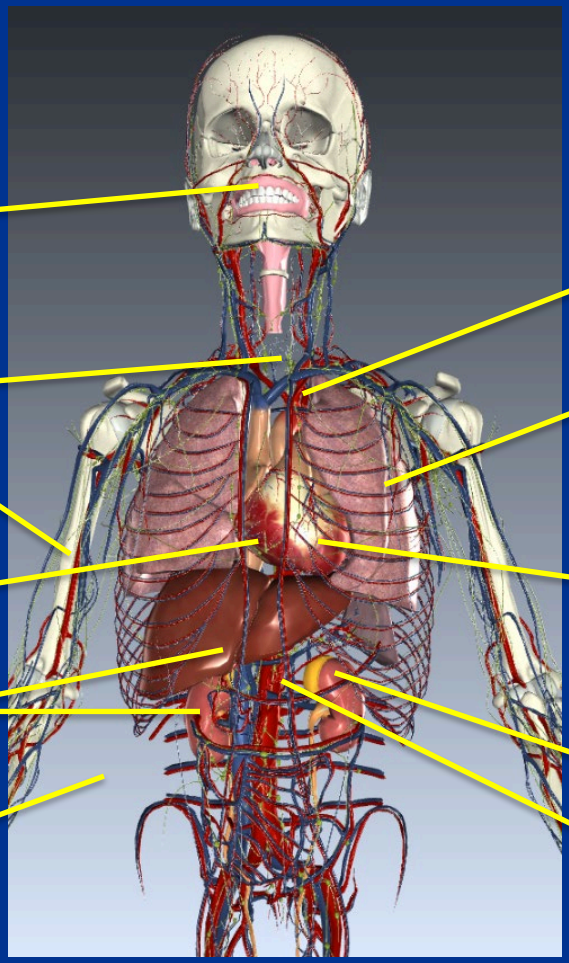


Studying aging outcomes in the Dunedin cohort….

Controlled for history of tobacco smoking.

Controlled for health in childhood, to test for decline from a youthful peak of health.

19 biomarkers tracked coordinated physiological deterioration: age 26, 32, 38, 45 years



Gum health,
Tooth decay

Leukocyte count,
C-Reactive Protein

Cardiorespiratory Fitness

Creatinine, Urea Nitrogen

BMI, Waist-hip ratio

Mean arterial pressure

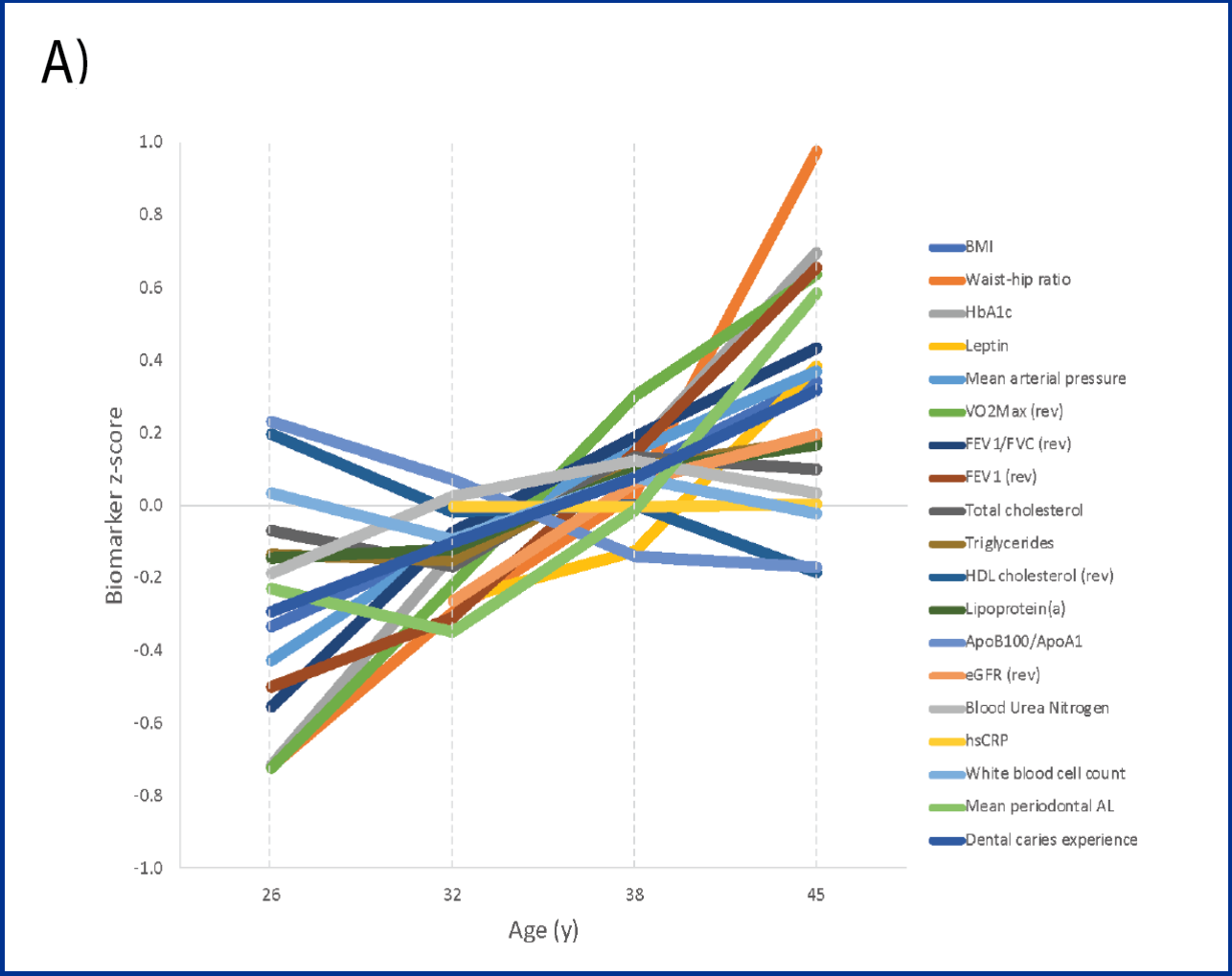
FEV1, FEV1/FVC

Total Cholesterol,
HDL, Triglycerides,
Lipoprotein(a),
ApoB100/ApoA1

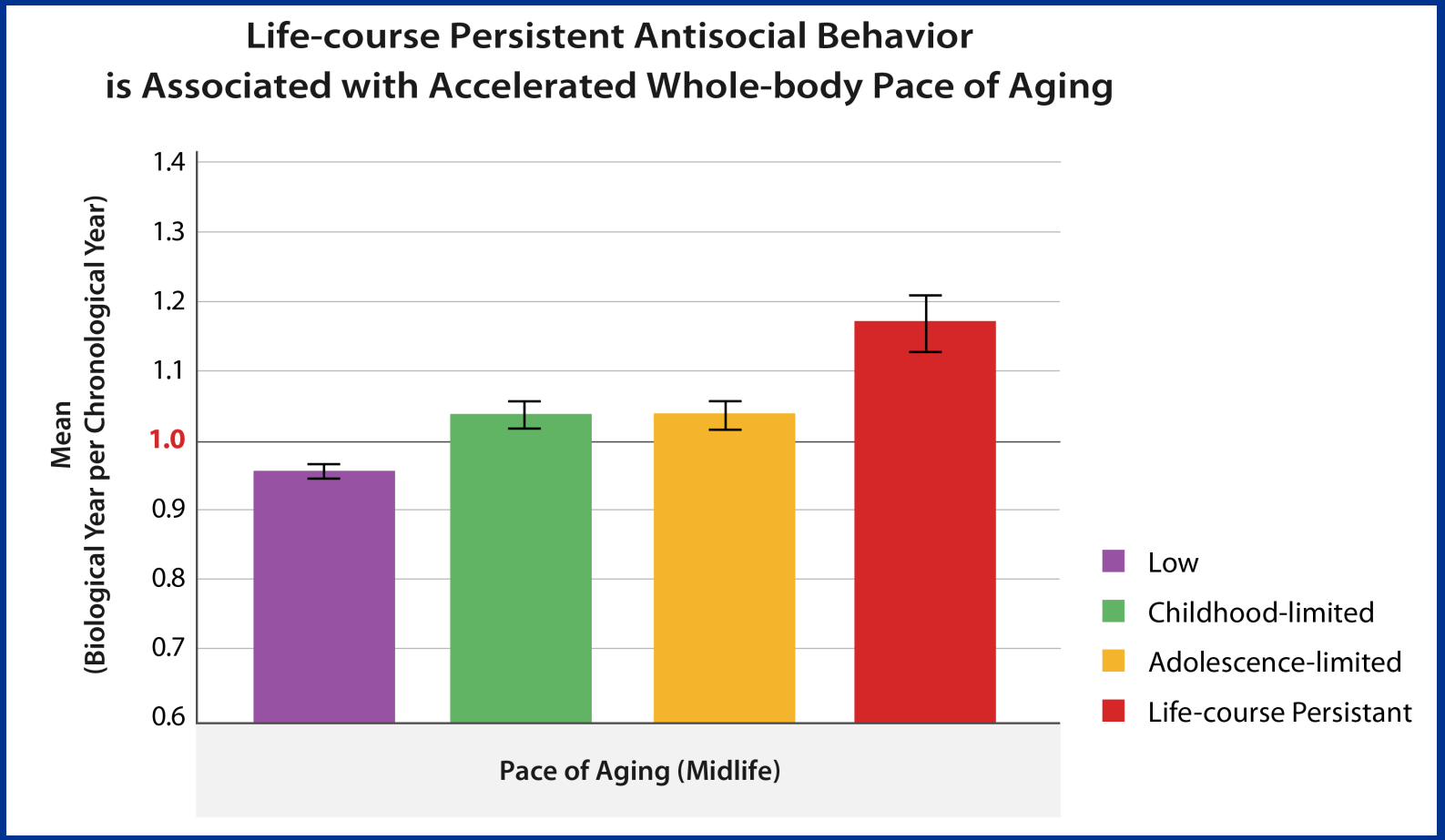
HbA1C

Leptin

Biomarker Panel: Correlated Worsening in Physiological Integrity from Age 26 to 45

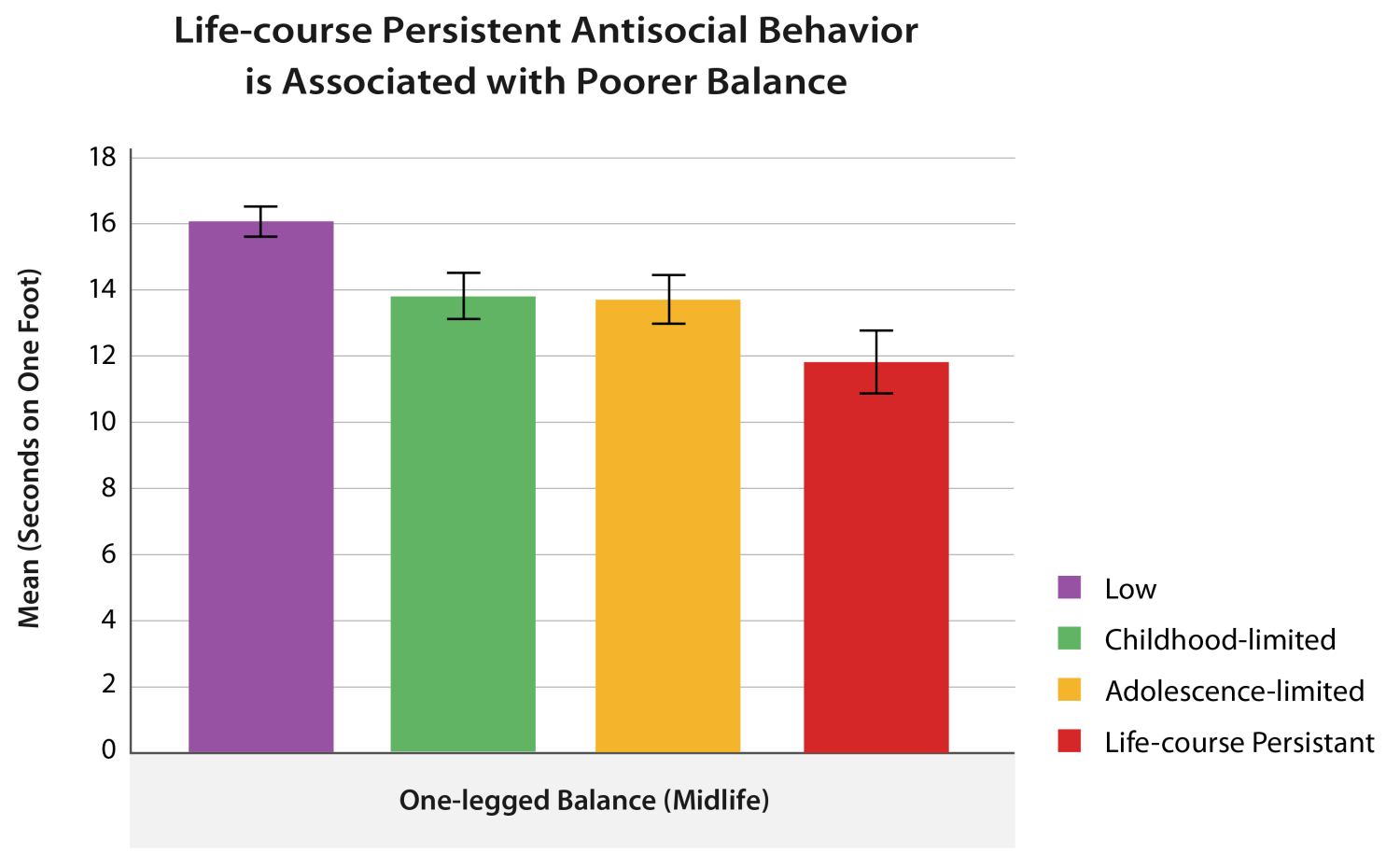


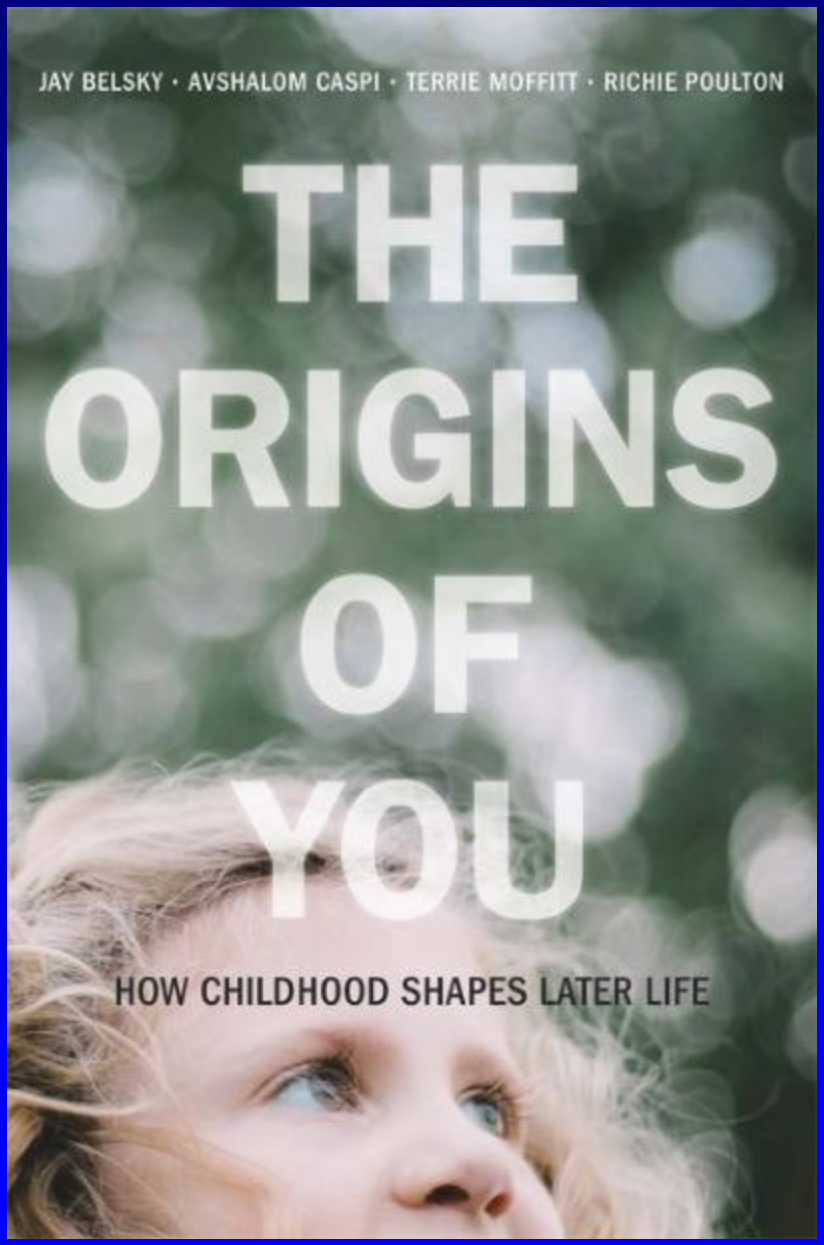
Whole-body Pace of Ageing



Physical function: one-leg balance

Balance at age 45





Harvard University Press, 2020

Tests of the taxonomy by other research teams in 16 countries, and in nonwhite ethnic groups

- Moffitt, T.E. (2006).
  In D. Cicchetti & D. Cohen. Developmental Psychopathology, 2nd edition.

- Moffitt, T.E. (2018).
  Nature Human Behaviour.

IMPACT?

- Difficult to trace provenance of an idea
- Real-world impact from science to clinical practice takes 17 years on average
- Once a finding is used, policy makers stop crediting the original publications

“For improving the lives of young people in conflict with the law around the world”

2018 award International Juvenile Justice Observatory

IMPACT

- Difficult for researchers to control use
- US Supreme court decisions:
- Death penalty for juveniles 2004
- Life without parole for juveniles 2009, 2017
- The 1993 theory was invoked to argue **both sides**

No. 03-633

IN THE

upreme Court of the United States

DONALD P. ROPER, Superintendent,
Potosi Correctional Center,

Petitio

v.

CHRISTOPHER SIMMONS,

Respon

RIT OF CERTIORARI TO THE SUPREME COURT OF MISSO

GRAINS?

ST. LOUIS POST-DISPATCH

Court bars juvenile executions

A LOCAL CASE YIELDS A LANDMARK DECISION • 72 DEATH SENTENCES ARE THROWN OUT

THE SUPREME COURT'S DECISION

MIXED REACTIONS IN ST. LOUIS

2 April, 2022

Dear Professor Moffitt,

Your research helped me make the most difficult decision that I have faced in my 20 years on the bench: whether to sentence a 16-year-old to life without parole. The central issue was whether his youth should be considered in mitigation…I simply offer my thanks.

XXXXX XXXXX,
Justice of the State Supreme Court

Implications for Prevention: Life-Course Persistent Offenders

- Half of the crime rate
- Small numbers, disproportionate societal costs
- Early-childhood primary prevention
- Public-health maternal health approaches to reduce infants' neuro-developmental problems
- Multimodal multisystemic approach: child, family, school, justice system
- A chronic cumulative condition needs life-long sustained intervention

Implications for Prevention: Adolescence-Limited Offenders

- Other half of the crime rate
- Good candidates for positive change
- Healthy attachment bonds and good school achievement
- Stop deviant peer influences on them
- Prevent “snares” that may retard natural desistence: addictions, lost education, an official conviction record
- Diversion to give them a chance to reform

Ways that we prevent and control crime

- Punishment (for an individual)
- Incapacitation to protect victims (prison).
- Deterrence (highly-visible severe punishments).
- Rehabilitation (therapies, education, job training).
- Target-hardening technology (locks, outdoor lighting, surveillance cameras, AI solutions for internet crimes)
- Individual & family prevention programs.
- Population-level programs (ante-natal health, school anti-bullying)

Thank you to Oslo hosts

NUBU

Duke
UNIVERSITY

Institute of Psychiatry at The Maudsley
KING'S College LONDON

UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND
SAPERE AUDE