Center for
Precision Psychiatry
MGH Department of Psychiatry

ETHICAL CHALLENGES IN IMPLEMENTING GENETIC RISK PREDICTIONS FOR EDUCATIONAL ATTAINMENT

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DISCLOSURES

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Precision Psychiatry
MGH Department of Psychiatry

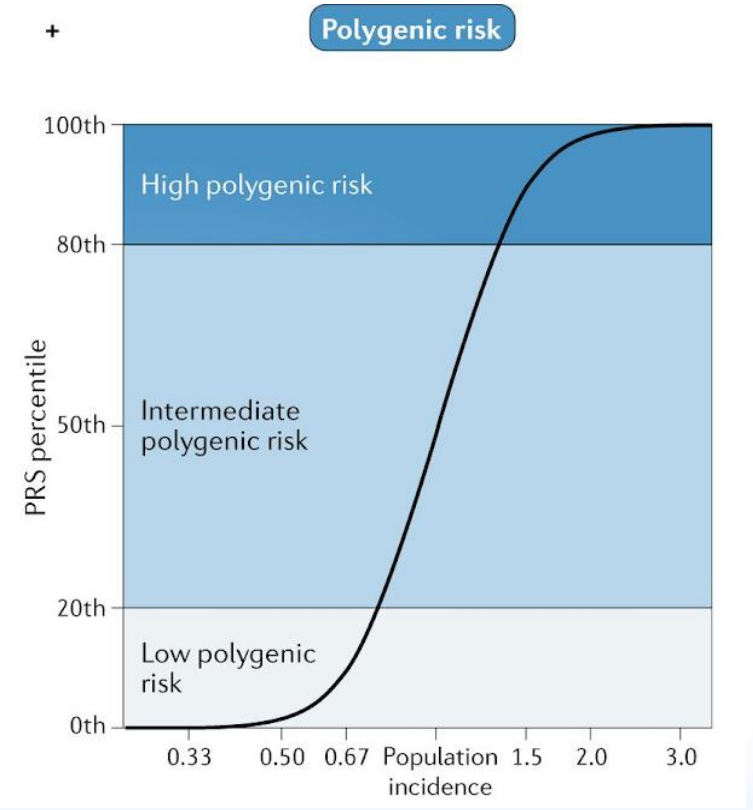
An IRB member of the *All of Us Research Program and a consultant to NIH's INCLUDE Program*

I am speaking in my personal capacity

Genetics in education

SHIFTS IN GENETIC RESEARCH & RISE OF SOCIOGENOMICS

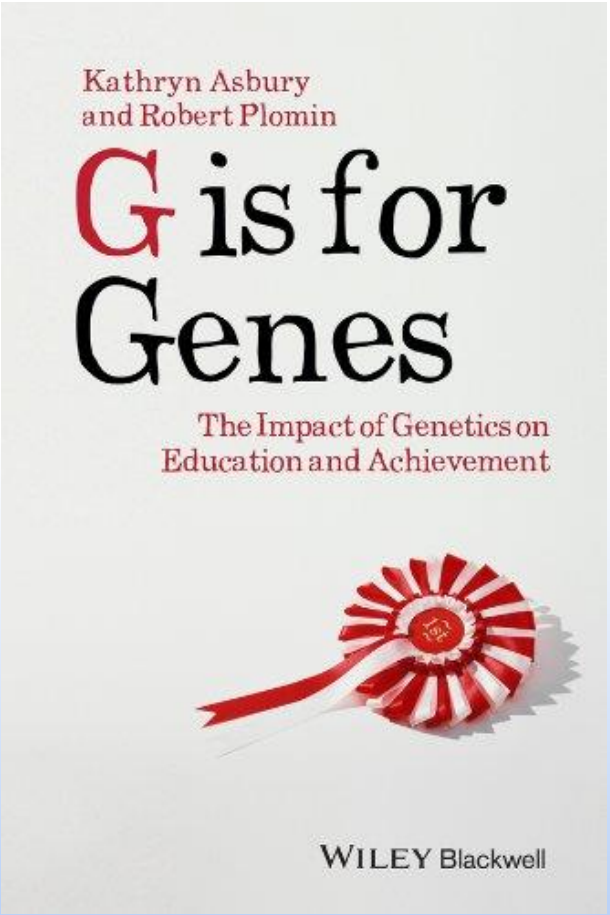
- Monogenic conditions to Polygenic risk scores (PRS)
- Diagnostic to prediction
- Clinical to sociogenomics, e.g. educational attainment
- Association btw PRS for educational attainment & criminal records



BEHAVIORAL GENETICS AND EDUCATIONAL ATTAINMENT

"Personalizing education is the best way to realize the potential of individual children who are 'naturally' different "

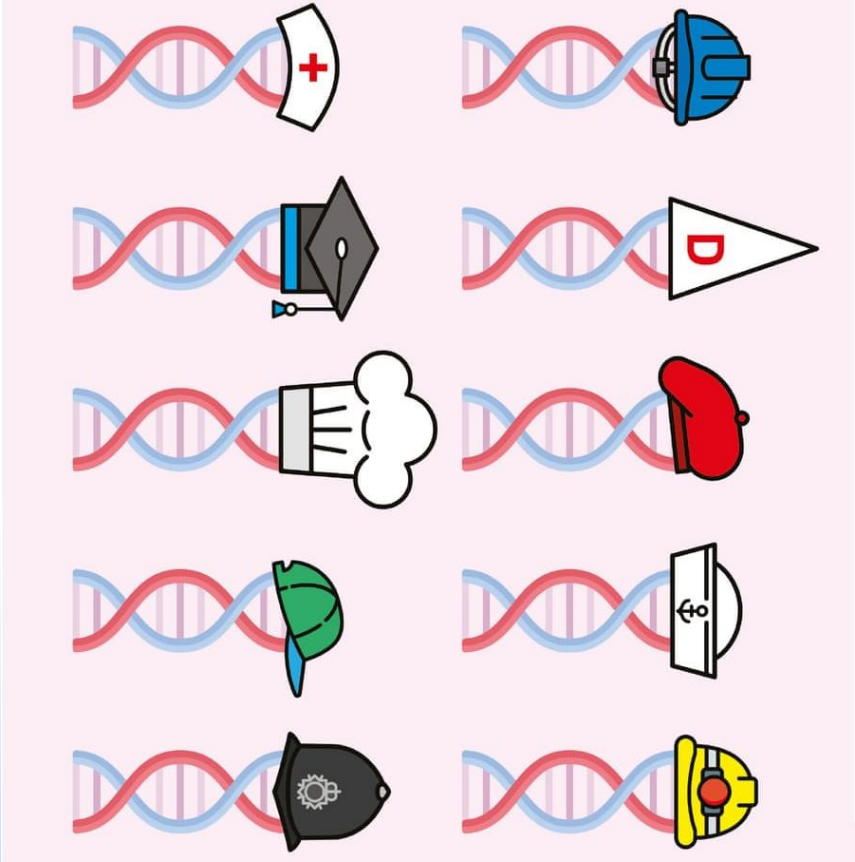
-Asbury & Plomin, 2013



- Disability: Child-find mandate and provisions of tailored accommodations

POLYGENIC RISK SCORES (PGS) FOR EDUCATIONAL ATTAINMENT

- Generated using Machine Learning and Deep Learning methods in genome-wide association studies (GWAS)
- A weighted sum of the estimated effects of each genetic variant on an individual's phenotype.
- Genetic variants identified in a GWAS often are not causal; results have limited predictive validity & portability
- "Polygenic scores can and do reflect societal prejudices, as well as more benign environmental factors" (Meyer et al, 2020)



BEHAVIORAL GENETIC RESEARCH HAS A DISTURBING HISTORY … AND CONTEMPORARY ABUSES

"Seeing the bright side of being handicapped is like praising the virtues of extreme poverty. To be sure there are many individuals who rise out of its inherently degrading states."

- James Watson

DNA scientist James Watson has a remarkably long history of sexist, racist public comments

"People say it would be terrible if we made all girls pretty," he said in 2003. "I think it would be great."

By Julia Belluz | @juliaoftoronto | Jan 15, 2019, 9:40am EST

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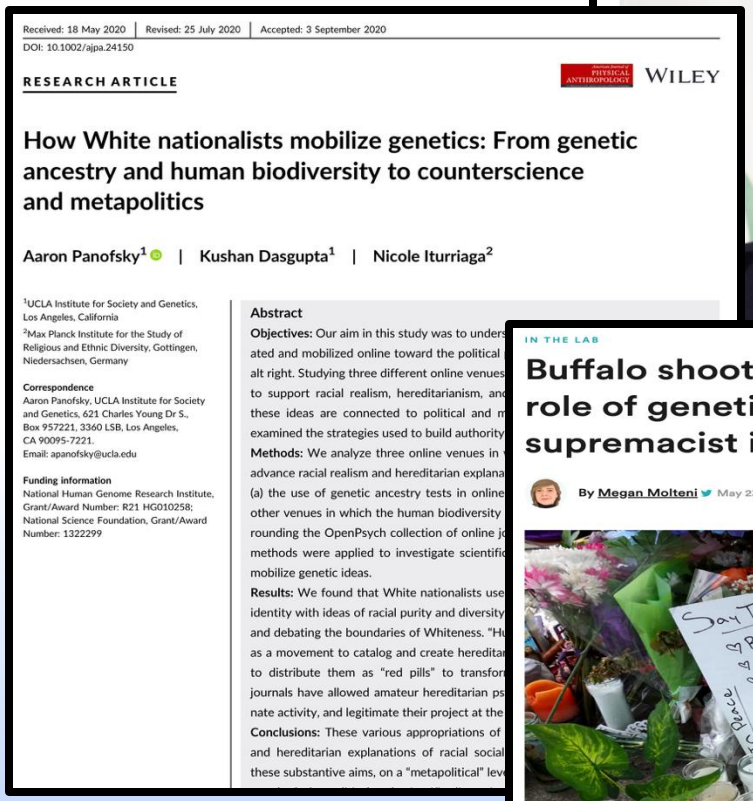
MOST READ



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RESEARCH ARTICLE

WILEY

How White nationalists mobilize genetics: From genetic ancestry and human biodiversity to counterscience and metapolitics

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Abstract

Objectives: Our aim in this study was to unders
ated and mobilized online toward the political
alt right. Studying three different online venues
to support racial realism, hereditarianism, an
these ideas are connected to political and m
examined the strategies used to build authority

Methods: We analyze three online venues in
advance racial realism and hereditarian explana
(a) the use of genetic ancestry tests in online
other venues in which the human biodiversity
rounding the OpenPsych collection of online jo
methods were applied to investigate scientific
mobilize genetic ideas.

Results: We found that White nationalists use
identity with ideas of racial purity and diversity
and debating the boundaries of Whiteness. "Hu
as a movement to catalog and create hereditar
to distribute them as "red pills" to transfor
journals have allowed amateur hereditarian ps
nate activity, and legitimate their project at the

Conclusions: These various appropriations of
and hereditarian explanations of racial social
these substantive aims, on a "metapolitical" leve

IN THE LAB

Buffalo shooting ignites a debate over the role of genetics researchers in white supremacist ideology

By Megan Molteni May 23, 2022

Reprints

The names of the 10 people killed in the shooting at a Buffalo, N.Y., supermarket are part of a memorial across the street from the store.

SCOTT OLSON/GETTY IMAGES

The 18-year-old gunman suspected of carrying out a racist attack that killed 10 and injured three people in Buffalo, N.Y., last weekend left no questions about why he drove 200 miles to a supermarket in a predominantly Black neighborhood and

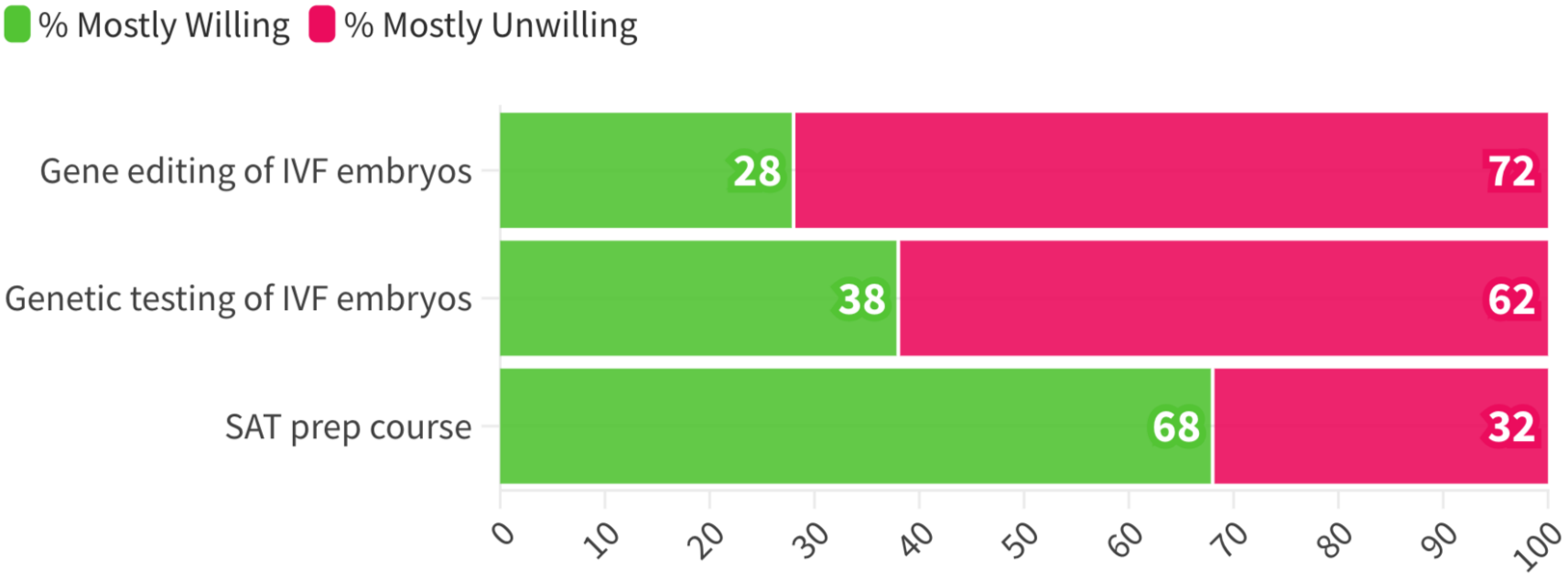
Geno-Education Examples

Americans are ready to test embryos for future college chances, survey shows

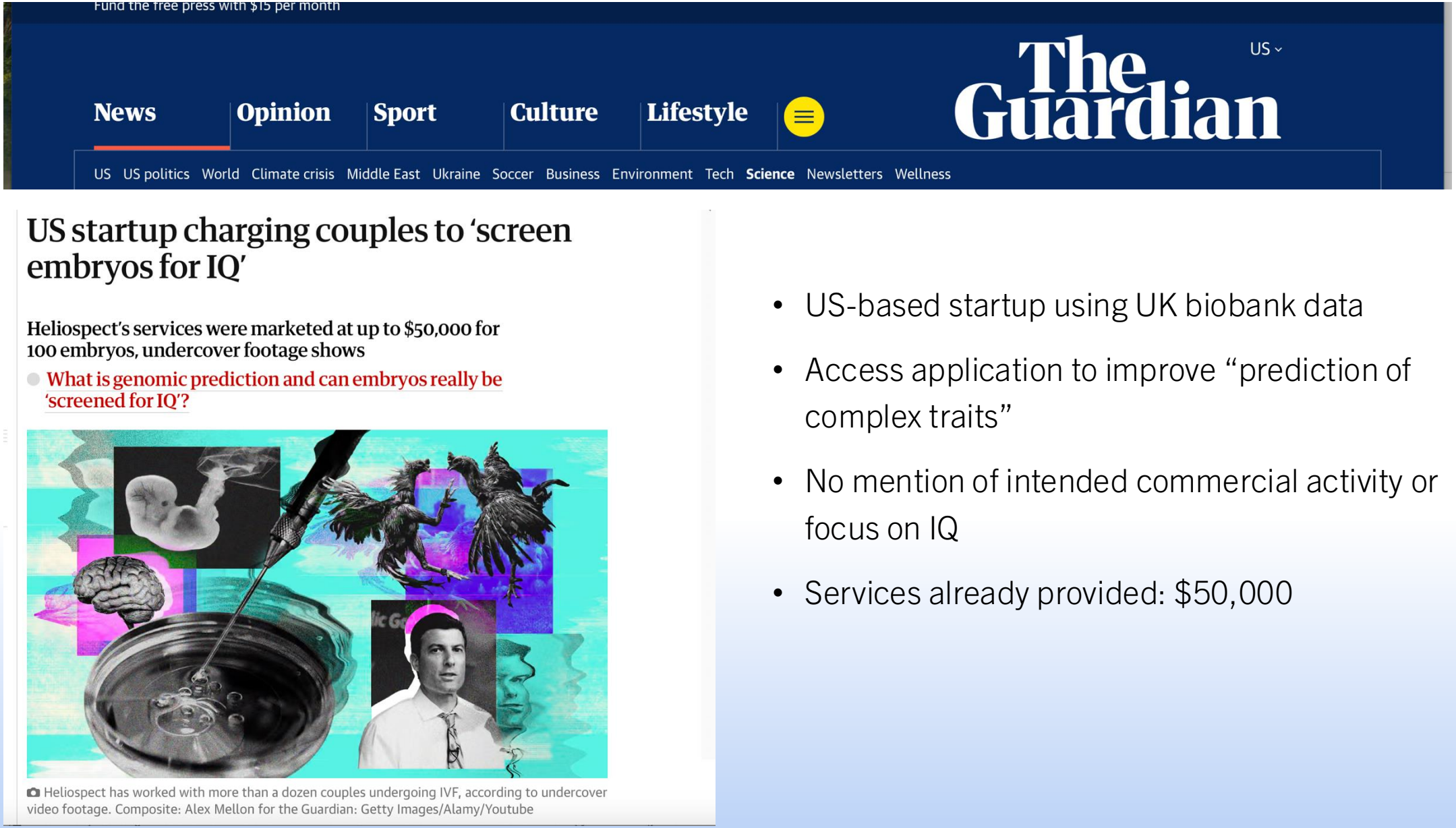
MIT Technology Review

Advanced Placement

Percent of Americans who said they would probably use the following methods, if it increased the chance their child could attend a top-100 university.



Adapted from Public views on polygenic screening of embryos, Meyer et. al., Science, Feb 2023.



- US-based startup using UK biobank data
- Access application to improve "prediction of complex traits"
- No mention of intended commercial activity or focus on IQ
- Services already provided: $50,000

Oct. 2024

ELEMENTARY SCHOOLS - UK

Genetic study aims to help poor, bright children succeed

Sian Griffiths, Education Editor

Sunday July 14 2019, 12.01am,
The Sunday Times

Robert J. Plomin, tbe American psychologist and geneticist

ALAMY

He was born into a poor Chicago family — yet he kept winning scholarships to top universities. Now Robert Plomin, one of Britain's leading scientists, wants to use genetics to help other bright children from poor backgrounds succeed.

Plomin is proposing to screen 5,000 three-year-olds from poorer families whose parents did not go to university to identify those with genetic profiles linked to high achievement, as well as those at the other end of the scale, and give them a boost in an attempt to help them realise their potential.

ELEMENTARY SCHOOLS - US

New Haven Lexinome Project

NEW HAVEN LEXINOME PROJECT

The New Haven Lexinome Project (NHLP), a partnership between Yale University and New Haven Public Schools, is a longitudinal genetics and neuroimagining study designed to assess reading and cognitive abilities of 1st grade students over a course of 4 – 5 years. The goals of the study are to develop a pre-symptomatic genetic screener for dyslexia, examine the relationship of genetic and environmental factors to reading and learning disability, investigate language and attention connections to reading ability, and explore the possibility of genetics enhanced intervention selection.

DNA-Testing Grant Approved, With Caveats

by **CHRISTOPHER PEAK** | Jul 24, 2018 4:34 pm

(5) Comments | **Post a Comment** | **E-mail the Author**

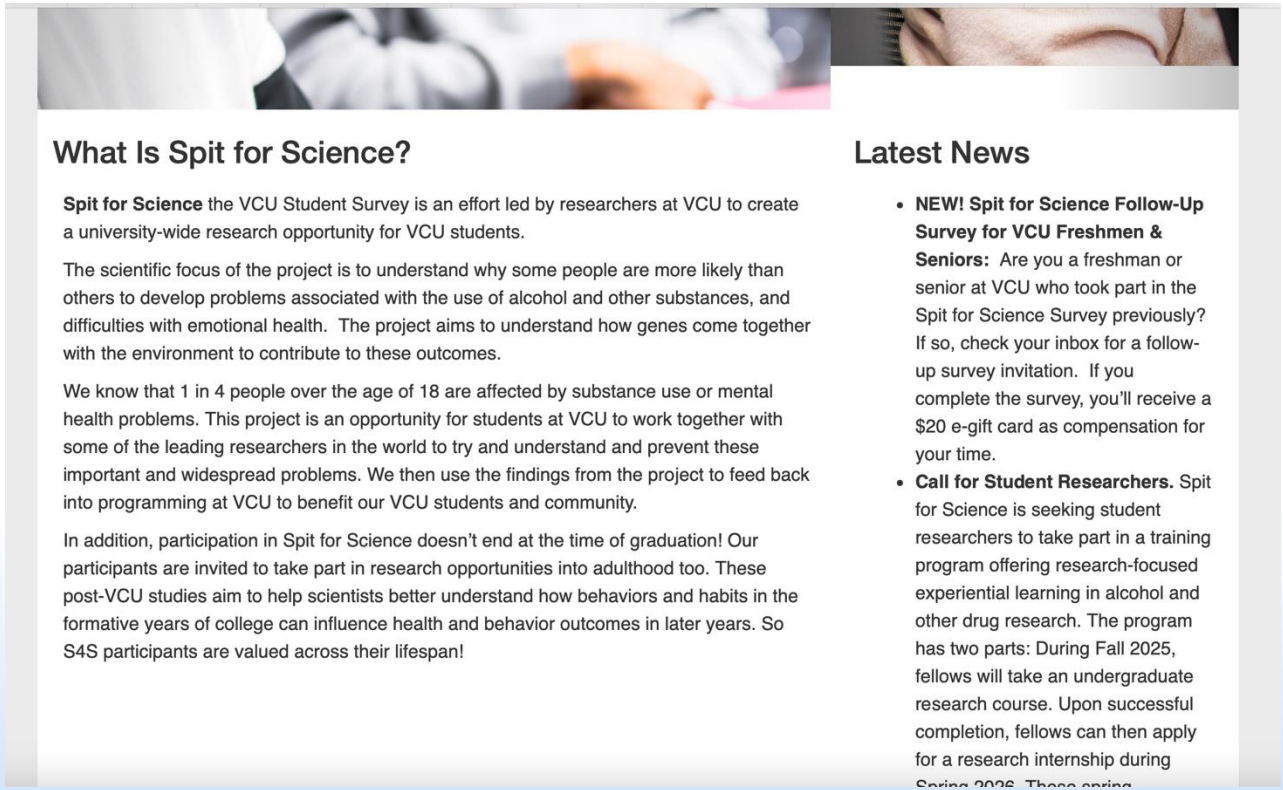
CHRISTOPHER PEAK PHOTO

Board of Ed members, still skeptical of DNA testing on kids.

The school board will allow Yale University continue with a study on students struggling to read, but tighter rules will be in place for any future research.

That's just one of the conditions that the Board of Education attached to the agreement with university researchers before voting to accept a $607,000 grant from the university at Monday night's board meeting.

COLLEGE EDUCATION



What Is Spit for Science?

Spit for Science the VCU Student Survey is an effort led by researchers at VCU to create a university-wide research opportunity for VCU students.

The scientific focus of the project is to understand why some people are more likely than others to develop problems associated with the use of alcohol and other substances, and difficulties with emotional health. The project aims to understand how genes come together with the environment to contribute to these outcomes.

We know that 1 in 4 people over the age of 18 are affected by substance use or mental health problems. This project is an opportunity for students at VCU to work together with some of the leading researchers in the world to try and understand and prevent these important and widespread problems. We then use the findings from the project to feed back into programming at VCU to benefit our VCU students and community.

In addition, participation in Spit for Science doesn't end at the time of graduation! Our participants are invited to take part in research opportunities into adulthood too. These post-VCU studies aim to help scientists better understand how behaviors and habits in the formative years of college can influence health and behavior outcomes in later years. So S4S participants are valued across their lifespan!

Latest News

- **NEW! Spit for Science Follow-Up Survey for VCU Freshmen & Seniors:** Are you a freshman or senior at VCU who took part in the Spit for Science Survey previously? If so, check your inbox for a follow-up survey invitation. If you complete the survey, you'll receive a $20 e-gift card as compensation for your time.
- **Call for Student Researchers.** Spit for Science is seeking student researchers to take part in a training program offering research-focused experiential learning in alcohol and other drug research. The program has two parts: During Fall 2025, fellows will take an undergraduate research course. Upon successful completion, fellows can then apply for a research internship during Spring 2026. These spring

Pygmalion in the genes? On the potentially negative impacts of polygenic scores for educational attainment

Genetics in Medicine (2025) 27, 101368

ELSEVIER

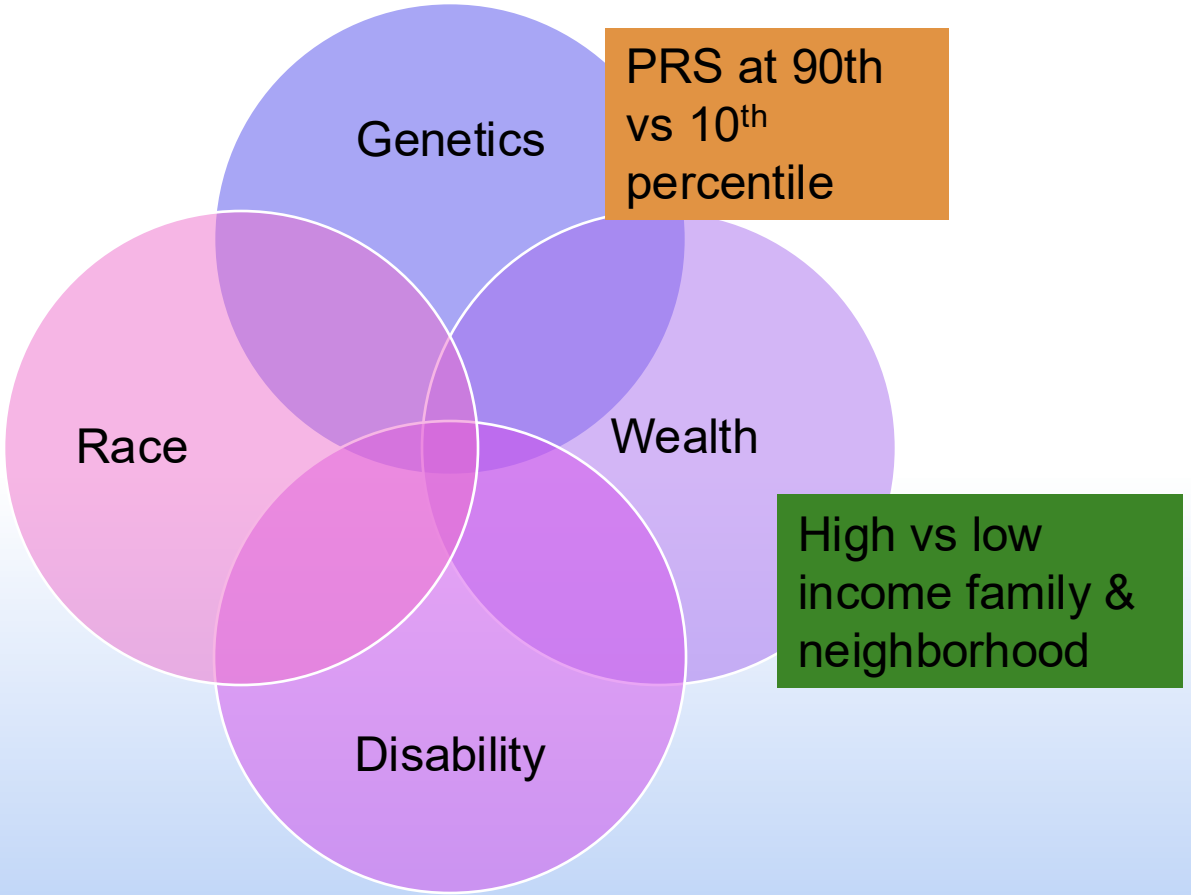
Genetics in Medicine
An Official Journal of the ACMG
www.journals.elsevier.com/genetics-in-medicine

ARTICLE

Intersectionality in a sociogenomic world: How do race, disability, socioeconomic status, and polygenic prediction interact to affect perceptions of educational trajectories?

Lucas J. Matthews[1,2,*], Daphne O. Martschenko[3], Colby Lewis V[4], Maya Sabatello[1,5]

SOCIOGENOMICS: PGS FOR EDUCATIONAL ATTAINMENT

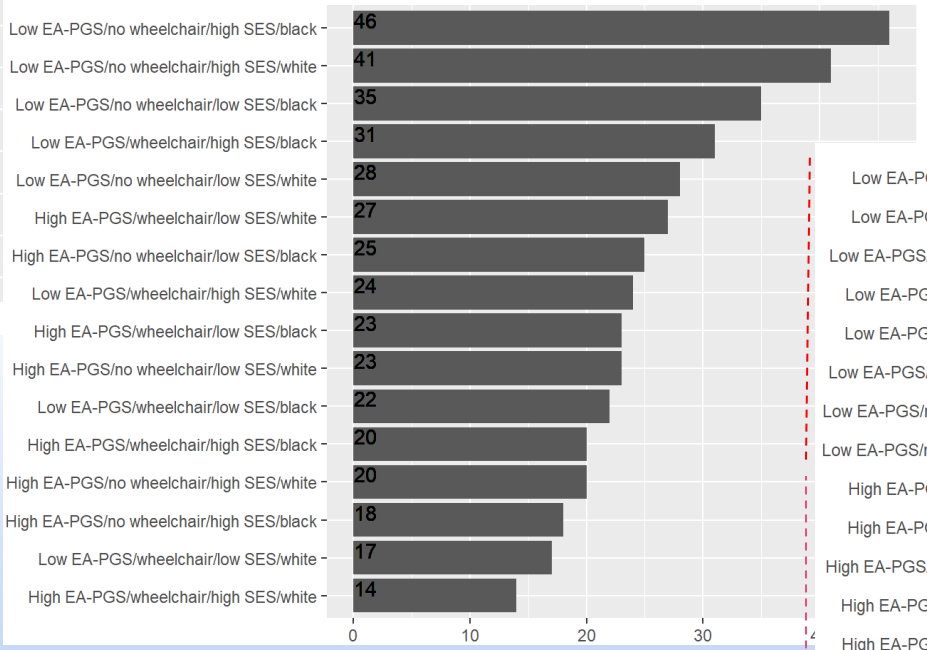


CU Precision Medicine & Society Award; Matthews et al 2025

IMPACT OF PGS FOR EDUCATIONAL ATTAINMENT ON PLACEMEN

Vignette

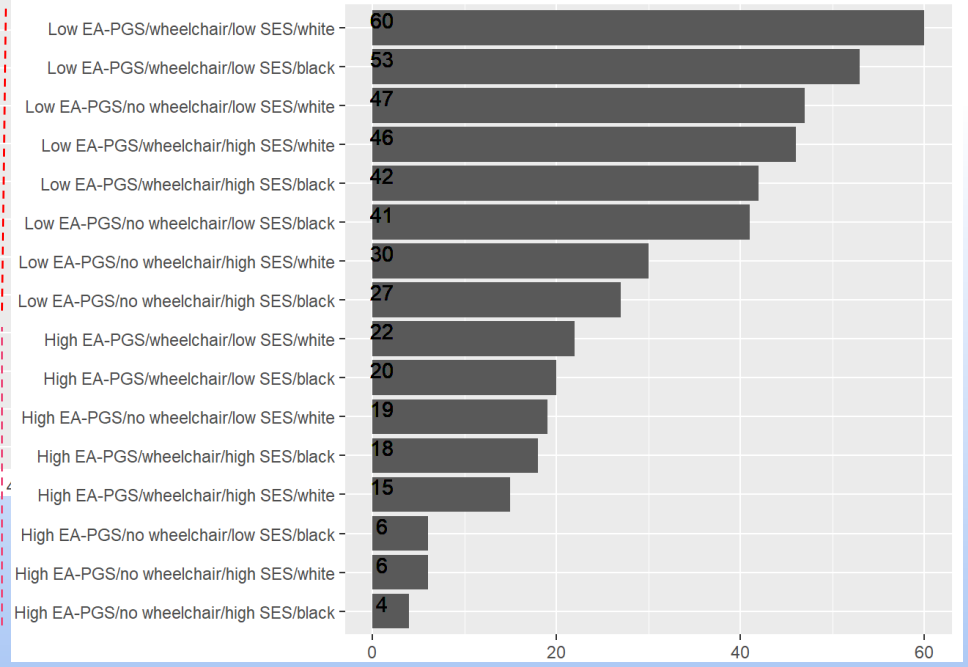
Gifted programs



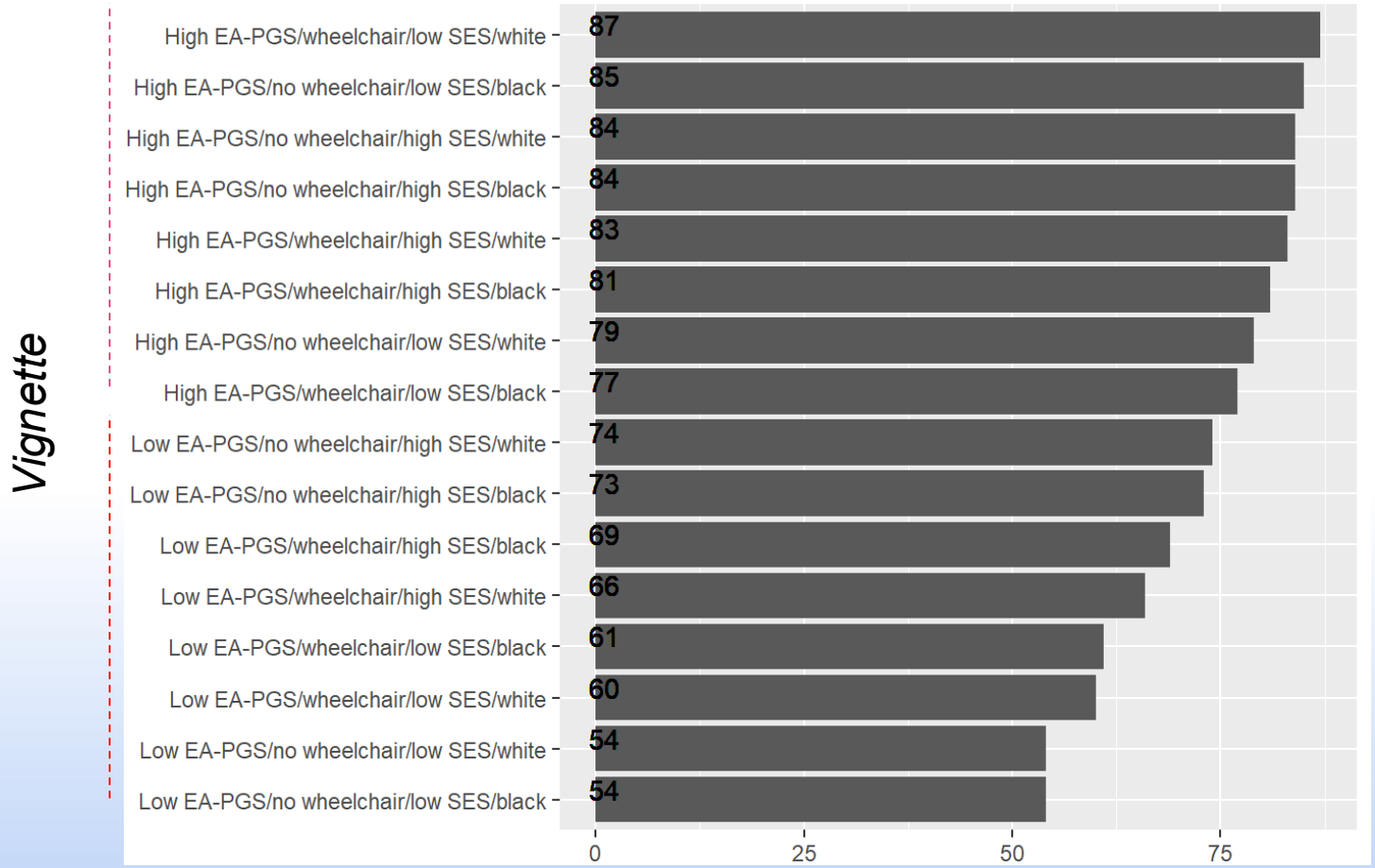
Mainstream edu

- Statistical significance ($p<0.05$):
  - PGS – OR=6.39
  - Disability – OR=1.94
  - SES – OR=1.37
  - Race – OR=0.89

Special/separate edu



IMPACT OF PGS ON FUTURE EDUCATIONAL TRAJECTORY: HS GRADUATION

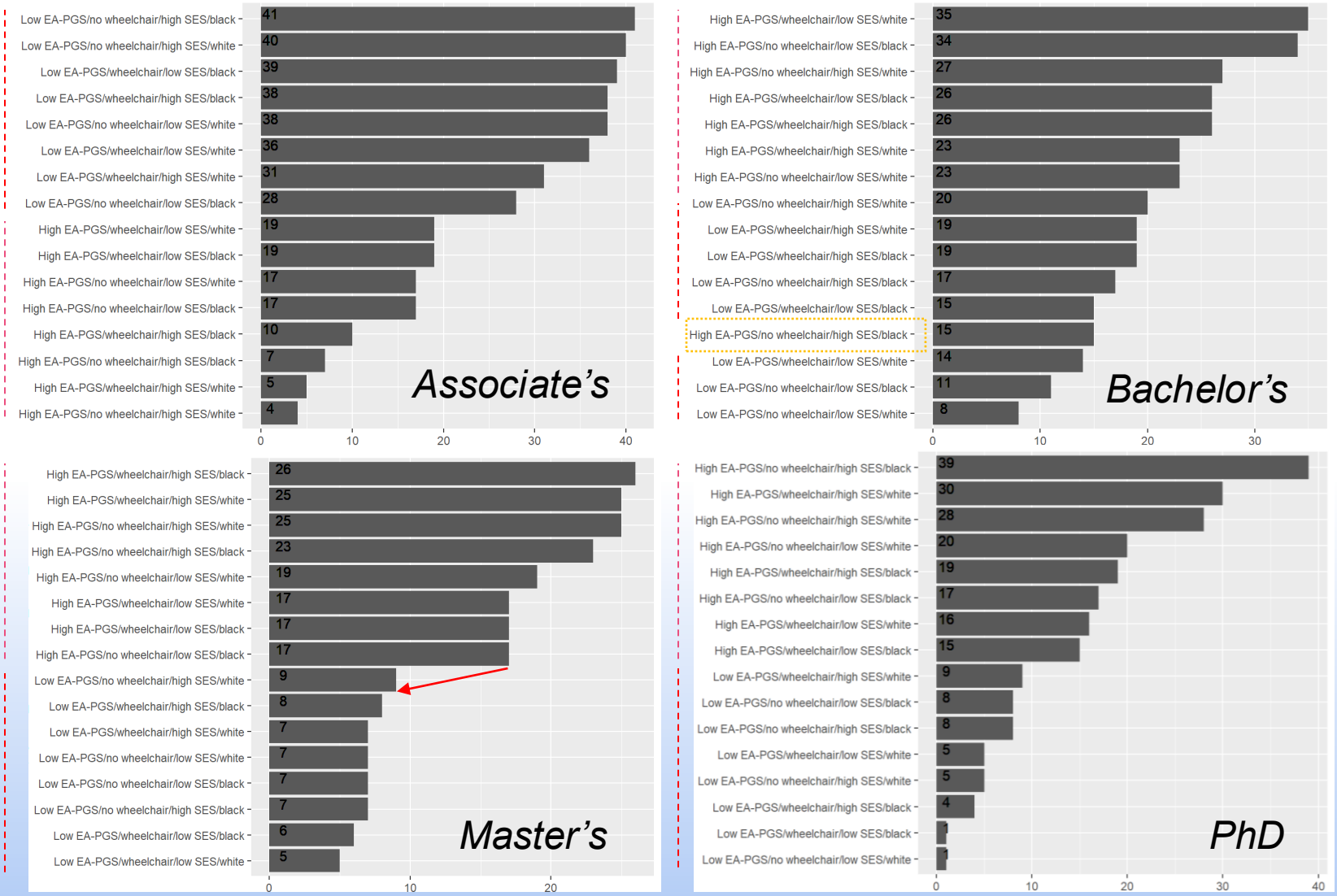


Statistical significance ($p<0.05$):

- PGS – OR=16.39
- Disability – OR=0.63
- SES – OR=1.55
- Race – OR=0.77

POST HS DEGREES

Vignette



Counts of final degree earned, among respondents who indicated Michael would graduate HS

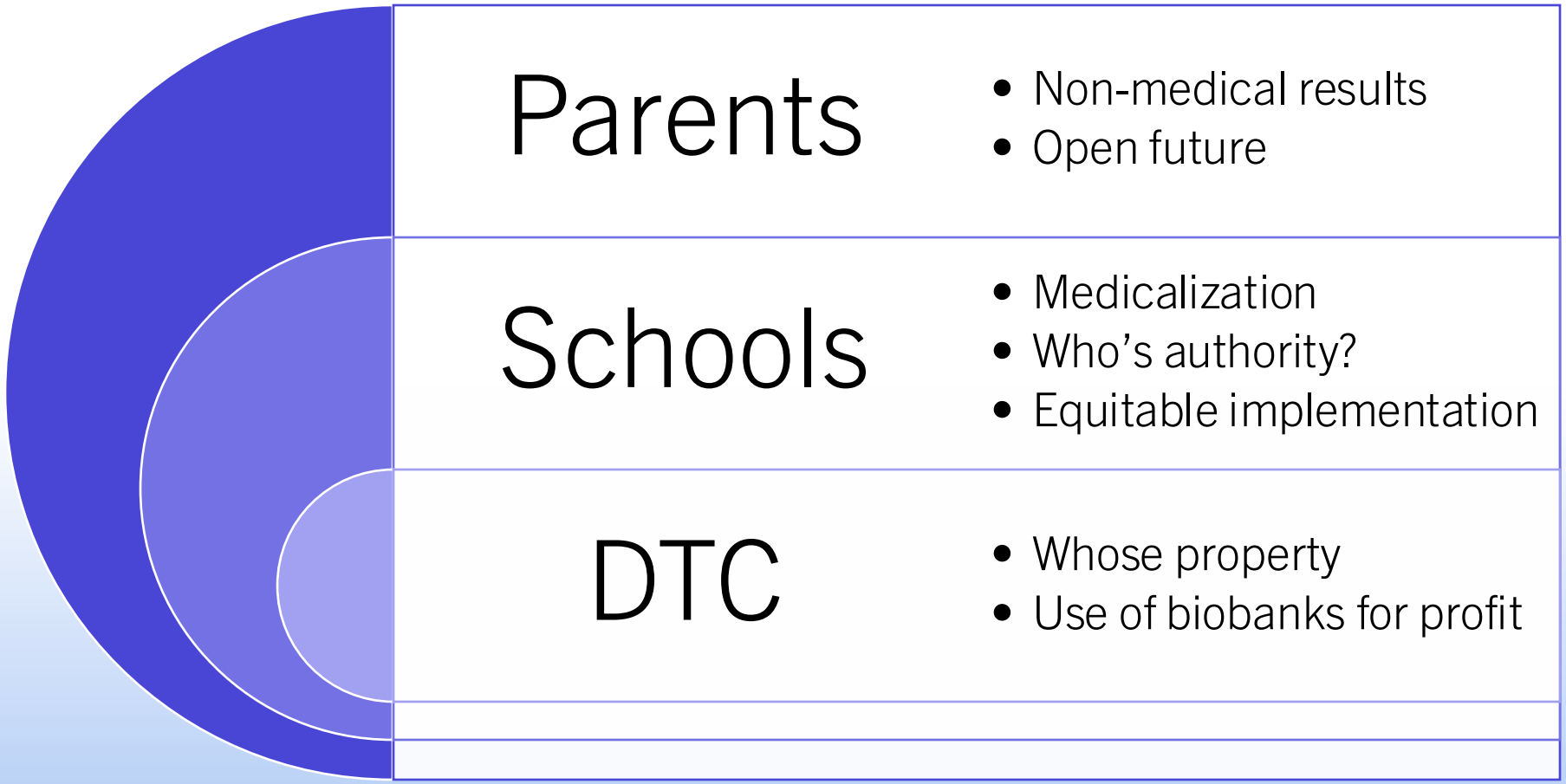
Statistical significance ($p<0.05$):

- PGS – OR=4.07
- Disability – OR=1.25
- SES – OR=1.32
- Race – OR=1.16

Intersectionality matters!

Thinking Through Ethics

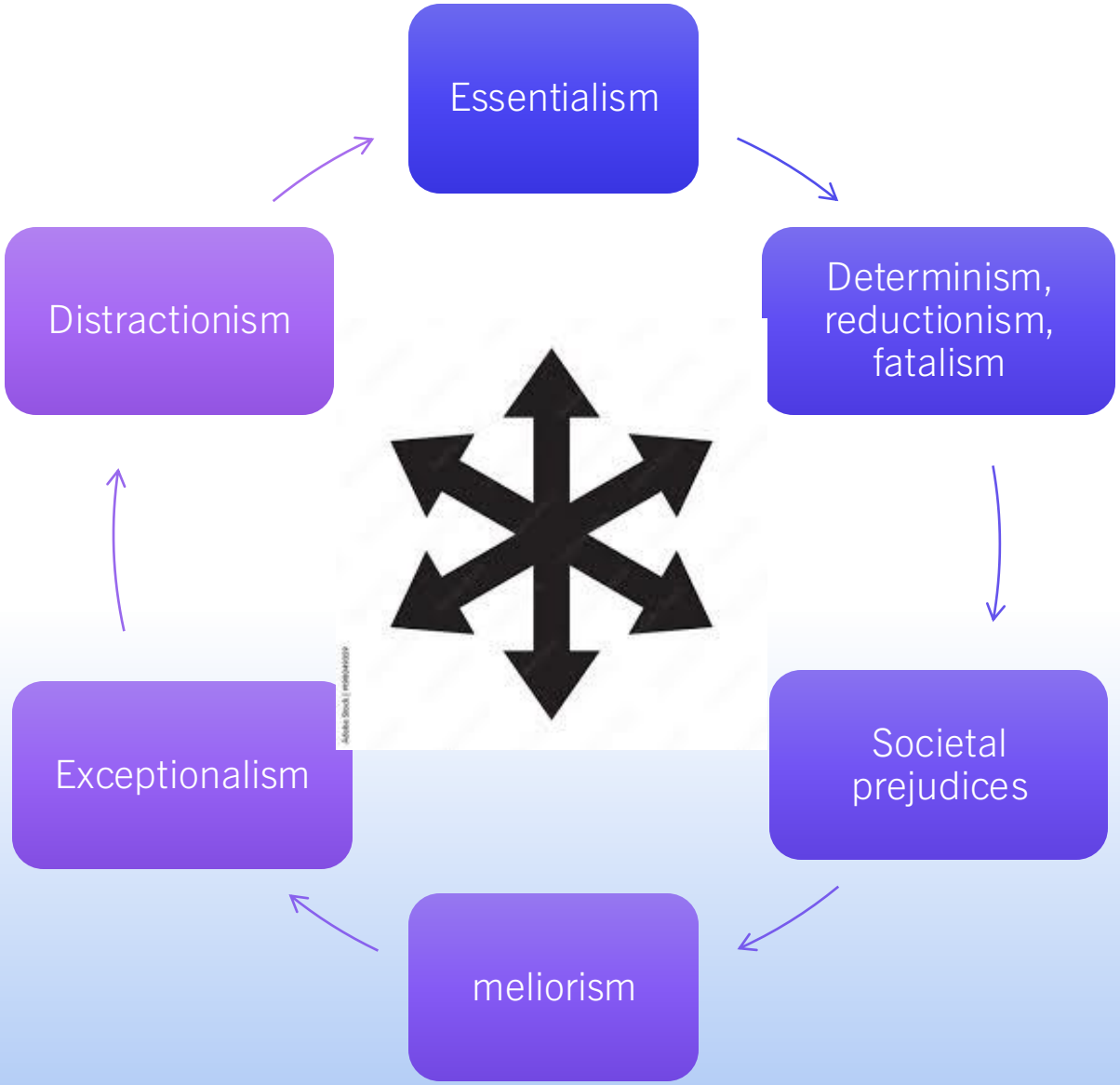
PRIVACY AND RISK FOR GENETIC DISCRIMINATION

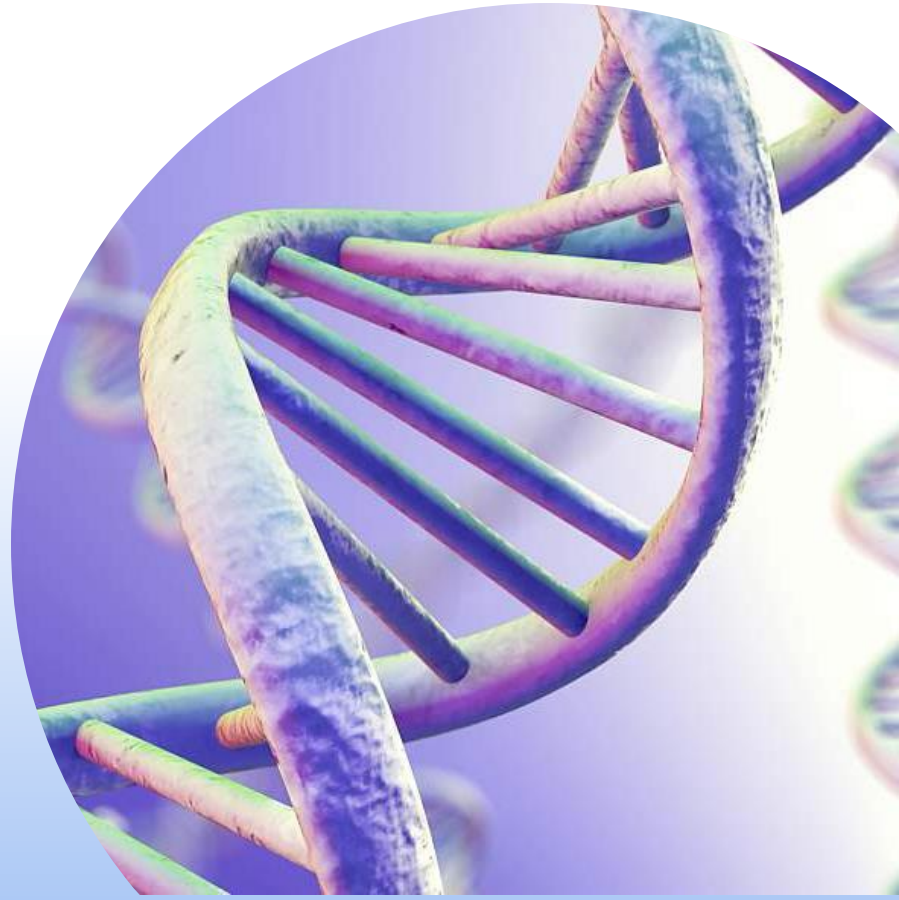


PSYCHOSOCIAL IMPACTS

- Parent-child relations
  - Lingering worry and/or disappointments
- Familial pressure & dynamics
  - Compounded stress for already marginalized parents
- Education
  - Low expectations & self-prophesy; Compounded at the intersections

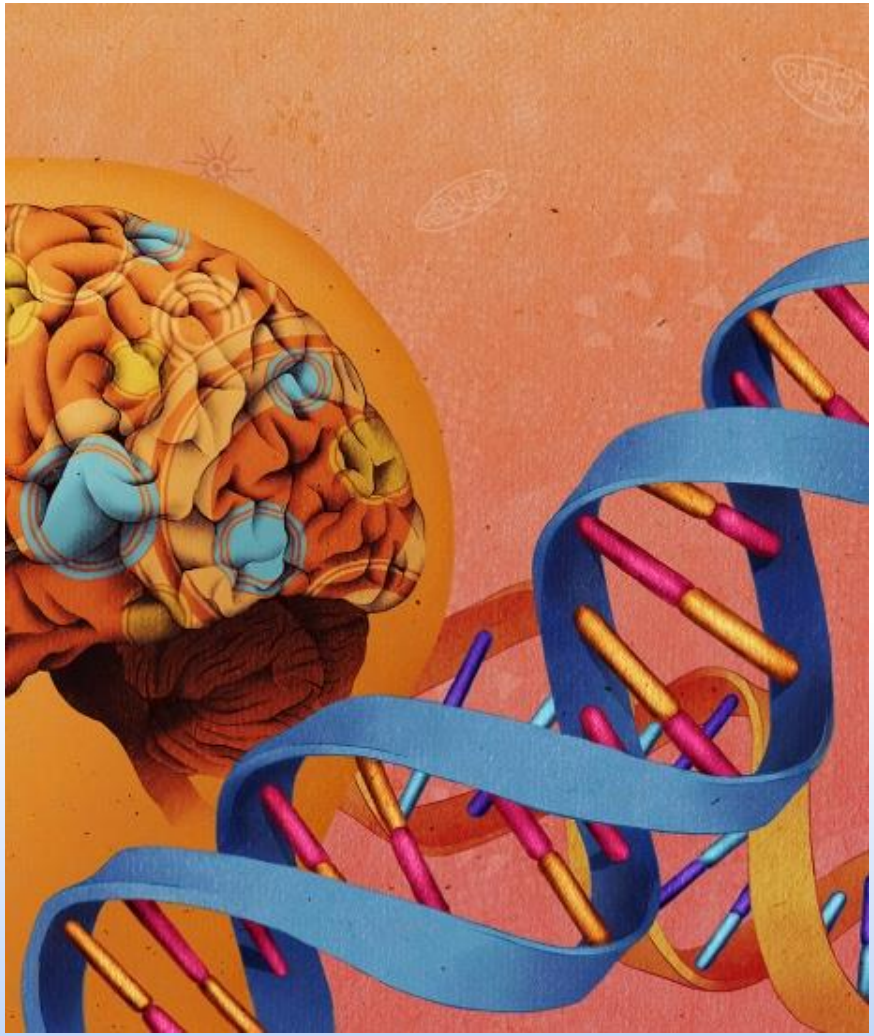
REINFORCING GENOMIC ISMS





Conclusions

- Existing scientific knowledge & technologies are not ripe for PGS for educational attainment
- PGS for educational attainment raises ethical, legal and societal challenges
  - Compounded risks at the intersections
- A societal responsibility to consider where it invests: human vs financial capital



* Image taken from Spectrum

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  - Lucas Matthews, PhD
  - Colby Lewis V, MPH

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