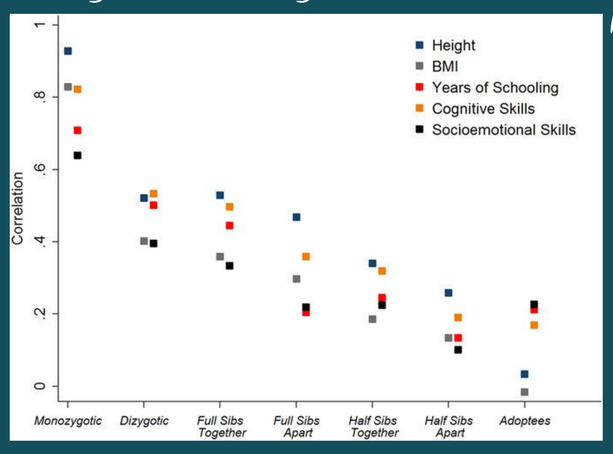
LEE Vivian Wei (UID: 3035482984)

Cognitive ability: any ability that concerns some class of cognitive task e.g. processing and manipulating mental information

Spearman (1940): Two-factor theory of intelligence = g-factor of general intelligence + s-factor of specific cognitive abilities → predict academic performance

Correlation between heritability and cognitive abilities? 🤔
See graph 1: Sibling Correlations for Behavioral Traits (Published in 2017)



Applying Falconer's formula:

$$H_b^2 = 2(r_{mz} - r_{dz})$$

58% for cognitive skills!
→ proven correlation between heritability and cognitive abilities
Conclusion: possible for scientists to predict scholastic achievements based on genetic data

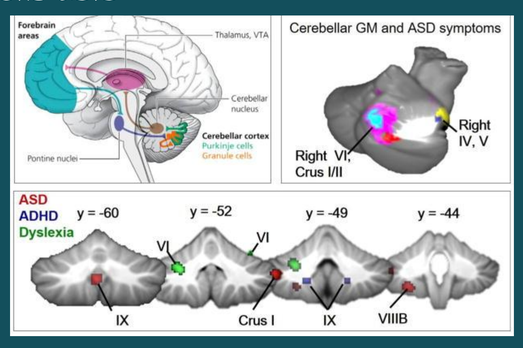


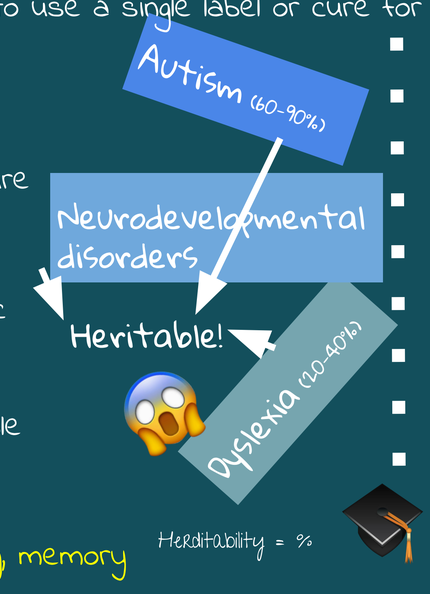
Figure 2 (right): Cerebellum and developmental disorders
The observed significant reduction of grey matter in brain impairs functional connectivity and language capability.

Exisitng problems:
1. Many heritable medical conditions that can impair our cognitive abilities
2. Imperfect understanding of such conditions cause doctors to use a single label or cure for diverse conditions

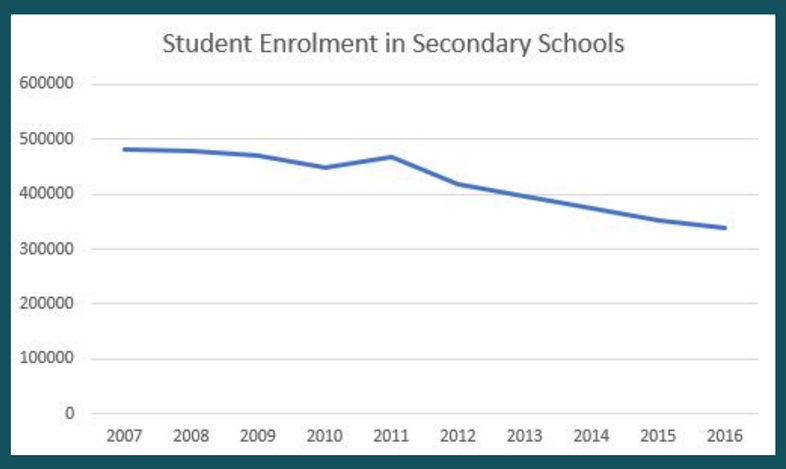
Suggested measure:
Invest resources in gene-mapping
Aim develop effective drugs and therapeutic treatments to cure conditions that impair learning

Beneficial outcomes:
1. Specified drugs can exclusively target on enhancing specific CNS signal transmission and processing.
2. Disease classifications. Different and specific therapeutic cure for conditions which are observationally indistinguishable but genetically heterogeneous, yielding therapeutic benefits.

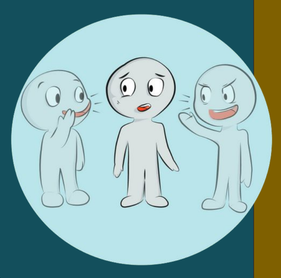
Subsidiary benefit:
1. Further our understanding of genetic mechanisms of learning, memory
2. Produce projections of future scholastic achievements



Lee Hong Yuen (UID: 3035492317)



Overall Trend: Decrese
>>> Number of Secondary School Graduates: Falling
Most Common Explanation: ***Falling Birth Rate***
But is it really the only explanation?
Probably **genes** could account for the decreasing trend.



DRD2 gene: -encodes dopamine receptor D2
-links to **myoclonus dystonia**(a movement disorder) and **schizophrenia**

DRD4 gene: -encodes dopamine receptor D4
-links to mental disorders like **schizophrenia**, **ADHD**, and **bipolar disorder**

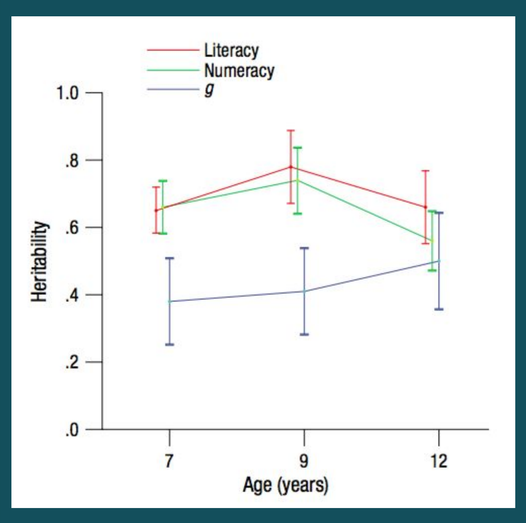
Correlations between educational attainment and
/ DRD2: -0.41
\ DRD4: -0.31

People with DRD2 gene/DRD4 gene are likely to have lower education level.

Suggestion:
allocate resources to do genetic research and provide extra help to those students
Benefits:
1. obtain knowledge about relationships between genes and disease that may discourage people from learning
2. Help people with those genes more effectively

Government policies to improve **education** based on knowledge of genetics and human nature

Li Yi Lam (UID: 3035385186)



Result:
Heritabilities of literacy and numeracy are substantial

Hypothesis:
compulsory education lowers environmental differences

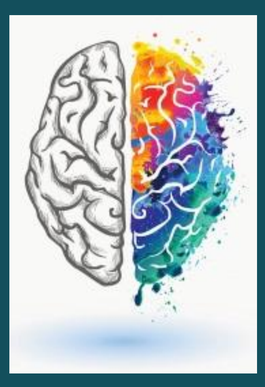
Differences in grades due to genes

Suggestion
1. Focus on developing skills related to literacy and numeracy to promote learning
e.g. writing, calculating & solving algebra

2. invest resource in identifying genes to predict strengths & shortcoming
→ tailor-make learning programs

Mok Tsz Ching Andrea (UID:3035281885)

Creativity: a trait or a skill?



Definition:
1. a sudden imspiration
2. Transforming something old to a new idea

FTrans
Factors:
1. Genetics
2. Personality
3. Environment

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Genetics
1. Right posterior middle temporal gyrus (pMTG)
   - Social Cognitive and Affective Neuroscienc (2014)
   - Brain region responsible for creative thinking
   - Correlation of highly creative peopl
   - Larger grey matter volume and increase activity
2. Corpus callosum
   - Department of Neurology and Neuroscience, Cornell University (2011)
   - Smaller size in creative prople
   - Allow brain specialization

Personality
- Journal of Personality and Social Psychology (2016)
- Openness to experience
- Extraversion

Environment:
1. Education and culture
   - Creativity Research Journal (2016)
   - US stuedents score higher in all 4 dimensions in the creativity test (ATTA) than China students
2. Training
   - American Psychological Association (2009)
   - 55% increase in rate of new idea generation

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