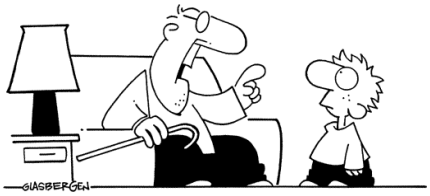



"You can live a perfectly normal life if you accept the fact that your life will never be perfectly normal."

# Psych 3102
# Introduction to Behavior genetics

## Lecture 24
## Genetics of personality disorders

**- evidence points to continuous variation linking normal personality dimensions with personality disorders and some psychopathologies**

| normal personality dimension | | personality disorder | | psychopathology |
|---|---|---|---|---|
| low | | high | | extreme |
| neuroticism | → | obsessive-compulsive personality | → | obsessive-compulsive anxiety disorder |
| mood variation | → | borderline | → | depression |
| ????? | → | schizotypal (paranoid) (schizoid) | → | schizophrenia |

**A personality disorder is defined as:**

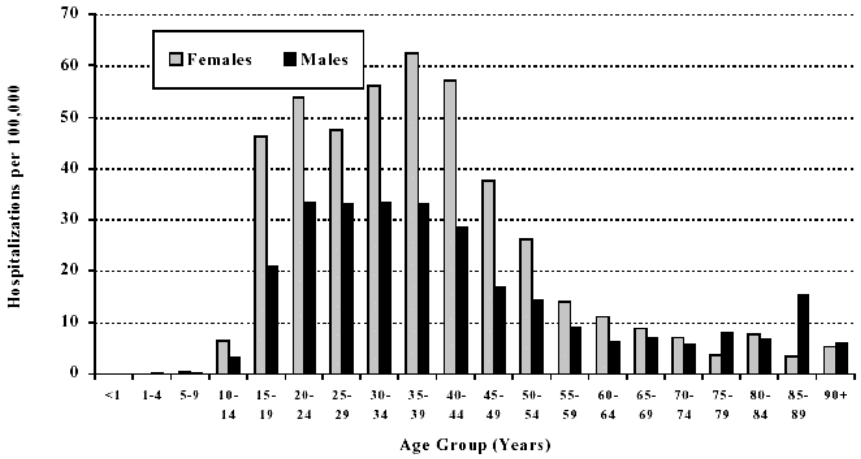
a personality trait that causes significant impairment or distress

- not classified as a clinical syndrome
- compared with long-term, early-onset disorders, same axis as mental retardation

Prevalence = 6 – 9% US (rate of having any disorder)
females > males

DSMIV recognizes 10 personality disorders
- 4 studied by behavioral geneticists:
  - obsessive-compulsive
  - borderline
  - schizotypal
  - antisocial

**Figure 5-1 Hospitalizations for personality disorders* in general hospitals per 100,000 by age group, Canada, 1999/2000**




* Using most responsible diagnosis only

Source: Centre for Chronic Disease Prevention and Control, Health Canada using data from Hospital Morbidity File, Canadian Institute for Health Information

## Antisocial personality disorder

- psychopathic/sociopathic personality
- at least 18 years old
- onset before age 15 (diagnosed as CD)
- continuing into adulthood

- criminal record (stealing)
- social disapproval
- irresponsible
- disregard for truth lying cheating
- aggressive lack of empathy
- reckless

Prevalence males 4% females 1%

Good correlation between clinical, legal and personality measures

**Table 1**
**Criteria for Antisocial Personality Disorder**

A. There is a pervasive pattern of disregard for the rights of others occurring since the age of 15 years indicated by three or more of the following:
   (1) Failure to conform to social norms with respect to lawful behaviors as indicated by repeatedly performing acts that are grounds for arrest
   (2) Deceitfulness, as indicated by repeated lying, using aliases, or conning others for personal profit or pleasure
   (3) Impulsivity or failure to plan ahead
   (4) Irritability and aggressiveness, as indicated by repeated physical fights or assaults
   (5) Reckless disregard for the safety of others or self
   (6) Consistent irresponsibility, as indicated by repeated failure to sustain consistent work behavior or honor financial obligations
   (7) Lack of remorse, as indicated by being indifferent to or rationalizing having hurt, mistreated, or stolen from another person

B. The individual is at least 18 years old

C. There is evidence of conduct disorder with onset before the age of 15 years

D. The occurrence of antisocial behavior is not exclusively during the course of schizophrenia or a manic episode

Source: *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. Washington, DC: American Psychiatric Association; 1994.

Black DW. *Primary Psychiatry*. Vol 8, No 1. 2001.

**Table 2**
**Clinical Symptoms in Antisocial Personality Disorder (%)**

| Symptoms | Women (n=14) | Men (n=80) | Total (n=94) |
|---|---|---|---|
| Unstable work history | 100 | 82 | 85 |
| Financial dependency | 71 | 80 | 79 |
| Arrests | 43 | 81 | 75 |
| Marital difficulties | 93 | 71 | 74 |
| Alcohol abuse/dependence | 64 | 74 | 72 |
| Poor school history (including truancy) | 29 | 79 | 71 |
| Impulsivity | 71 | 66 | 67 |
| Promiscuous sexual behavior | 93 | 59 | 64 |
| "Wild" adolescence | 71 | 60 | 62 |
| Vagrant | 29 | 65 | 60 |
| Belligerent | 36 | 61 | 58 |
| Socially isolated | 64 | 55 | 56 |
| Lacks remorse | 64 | 36 | 40 |
| Somatic complaints | 36 | 30 | 31 |
| Use of aliases | 14 | 31 | 29 |
| Poor military performance* | — | 28 | 23 |
| Pathological lying | 14 | 16 | 16 |
| Drug abuse/dependence | 14 | 15 | 15 |
| Suicide attempts | 21 | 9 | 11 |

*No data were reported for women.
Adapted from: Robins LN. *Deviant Children Grown Up*. Baltimore, Md: Williams & Wilkins; 1966.
Black DW. *Primary Psychiatry*. Vol 8, No 1, 2001.

## Family and adoption studies

- ASP appears to run in families
- adoption studies indicate similarity within family is due to genes not shared environment

Males: prevalence = 4%
first degree relative risk = 20% whether reared at home or adopted away

Females: prevalence = 1%
first degree relative risk = 10%

## Twin studies

- population studies
- personality questionnaire
- similar results from several studies

Rhee & Waldman (2002)

Meta-analysis of 51 twin and adoption studies on antisocial behavior: heritability = 0.41

Lyons et al (1995)

Longitudinal study, 3000 pairs of male twins

| | | | |
|---|---|---|---|
| correlations | as adults: | MZ = 0.47 | $e^2$ = 50% $c^2$= 10% |
| | | DZ = 0.27 | $a^2$ = 40% |
| | as adolescents: | MZ = 0.39 | $e^2$ = >50% $c^2$=40% |
| | | DZ = 0.33 | $a^2$ = <10% |

Genetic influences increase, shared e decreases over time

## Relationship to other problems

**Criminality** ~40% male, ~8% female ] diagnosed with ASP

Danish study

1000+ twin pairs, all male twins born 1881-1910, criminality assessed from police records

Prevalence = 20 - 30% depending on age

Concordances MZ = 51% adult criminality

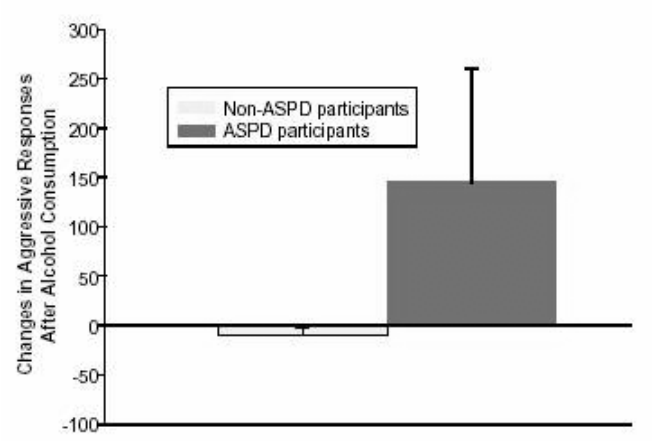
DZ = 30%

overestimate of gene effect due to participation in crime together by MZ twins

- very modest gene effect for criminality
- similar modest effect reported from adoption studies, property crimes
- GxE interaction: criminal bio parents → highest rate of criminality in adopted
  criminal adoptive parents →

interaction with alcohol use and aggression

Alcohol use increases aggression in those with antisocial personality disorder




## Role of genotype in the cycle of violence in maltreated male children **Caspi et al (2002) Science 297**

- study provides evidence for a GxE interaction in response of children to abuse

abuse + low MAOA levels → higher rates of ASP in later life

12% of cohort → 44% of cohort's violent convictions

From previous studies:

boys who experience abuse (erratic, coercive, punitive parenting) have higher risk for CD, ASP, 50% increased risk of becoming criminals, increased risk for violent crime

BUT large differences in response, most abused boys do NOT suffer any disorders why the differences in response?

Answer: G x E interaction - variant forms of the MAOA gene moderate the response to maltreatment

MAOA = monoamine oxidase A X chromosome

- an enzyme involved in neurotransmitter metabolism (inactivates NE, serotonin, dopamine)

- increased gene expression lowers risk for ASP and aggression

## Comorbidity between alcoholism and externalizing disorders

COGA Collaborative study of the Genetics of Alcoholism

- Washington University, St Louis + other centers
- longitudinal study of a sample of high risk offspring of alcoholic parents
- assessed at ages 13 – 17 so far n = 1333

Substantial comorbidity within the sample

Rates of disorders: alcohol dependence 5.2%
conduct disorder 17.8%
ADHD 12.8%
ODD 14.9% (oppositional defiant disorder)

CD, ADHD, ODD all conferred sig. risk for concurrent alcohol dependence

what might cause this comorbidity?

## Genetic and environmental influences on behavioral disinhibition

Young et al American Journal of Medical Genetics (Neuropsychiatric genetics) 2000

- study aimed to investigate comorbidity among childhood disruptive behavioral disorders:

conduct disorder
ADHD } externalizing behaviors
ASP
early substance abuse

- co-occurrence shows familial aggregation
- no evidence for large shared environment effects
- possibly pleiotropic genes underlie the comorbidity

population-based twin study n = 334 pairs 12 – 18 years old

DSMIV symptom counts obtained for:

1. conduct disorder
2. ADHD
3. substance experimentation
4. novelty-seeking

novelty-seeking (NS) Cloninger personality dimension

- heritable (30 – 40%)
- tendency to show exploratory activity in pursuit of rewards and avoidance of monotony
- increased levels associated with increased risk for CD ASP ADHD early-onset drinking

Aim of study – to find evidence for a latent trait termed 'behavioral disinhibition': inability to inhibit behavior in spite of social/familial/educational consequences

- an executive function deficit

Latent trait analysis revealed strong evidence for the latent trait:

- it accounted for between 16 and 42% of observed variance for the 4 measures
- it was highly heritable $a^2 = 0.84$ $e^2 = 0.16$ $c^2 = 0$

☆ Other sources of variance for the measures:

7% $c^2$ for CD 45% $c^2$ for substance experimentation

5% genetic dominance for ADHD 20% dominance for NS