

PSYC1022: The Psychology of Addiction

Topic 4: Harms of drug use (II)

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Outline

- Education
- Occupation
- Human neuropathology
 - Nicotine
 - Heroin
 - Cocaine
 - Cannabis
 - Alcohol
 - Methamphetamine
- Harm minimisation/reduction



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Poorer educational attainment

Clear evidence of an association between drug use (especially early cannabis initiation) & poorer educational attainment (Macleod et al. 2004).

- What drives this association is not clear. What is the causal mechanism?

1. Drug use may cause poorer educational attainment by:
 - producing a behavioural disorder
 - de-motivation
 - adoption of countercultural values
 - occupying study time

Drug
use



Poor
education

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Poorer educational attainment

2. Poorer education attainment may cause drug use because:

- individuals who are failing at school have less incentive to concentrate on their studies & so allocate more time to leisure
- selling drugs may be an attractive alternative to a low level job
 - Exposure leads to use

**Drug
use**



**Poor
education**

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Poorer educational attainment

3. Drug use & poorer educational attainment may be reciprocally causal in that they promote each other.

- De-motivation + more leisure time = drug use

**Drug
use**



**Poor
education**

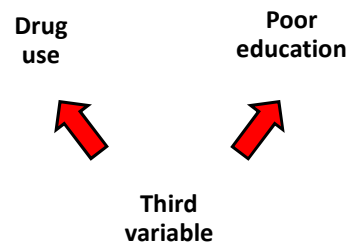
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Poorer educational attainment

4. Drug use & poorer educational attainment may be independently caused by a third variable such as impulsive personality, low IQ, subclinical or clinical psychiatric illness, disordered family life, influence of drug using siblings, etc.

Macleod et al. (2004):

- the association between drug use & poorer educational attainment was insignificant once a third variable (antisocial/problematic behaviour) was considered
- This analysis suggests that drug use does not cause poorer educational attainment, but rather, broader interpersonal or psychological disorders independently drives both.

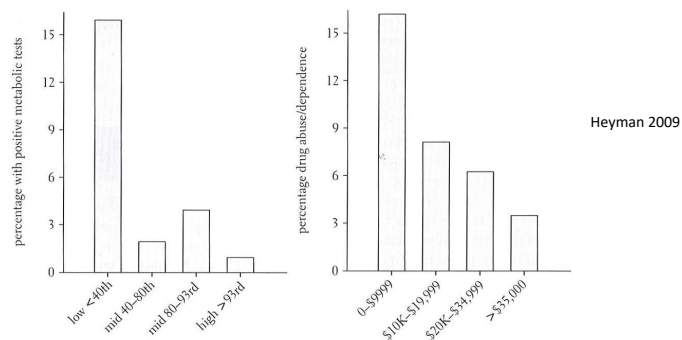


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Poorer occupational attainment

Drug use interferes with occupational success:

- drug use is associated with *greater* occupational income in early adulthood (age 24-29)
- by older ages (29-35) drug use is associated with *reduced* occupational income
- Drug use is associated with poorer occupational *performance*
- may be explained by poorer performance going undetected in younger adults in jobs with reduced growth capacity (Kandel et al 1995).



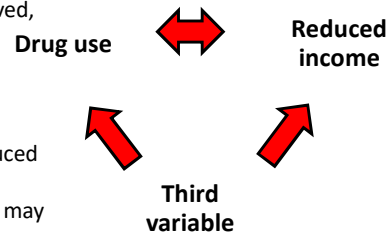
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Poorer occupational attainment

Does drug use causes reduced occupational attainment, vice versa, or are caused by a third variable?

- Greater cannabis & alcohol use in adolescence predicted reduced occupational performance in adulthood.
 - Consistent with the idea that drug use caused reduced performance
 - the cause (cannabis use) preceded the effect (reduced performance).
- When estimates of third variables (e.g. parental income, personality) were removed, the association between drug use & occupational performance remained significant.
 - Consistent with a causal relationship between adolescent drug use & reduced adult occupational attainment
- So, poorer long term economic prospects may be considered as a harm produced by drug

USE (Friedman et al. 1996).



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Neuropathology

Unclear whether neuropathology stems from:

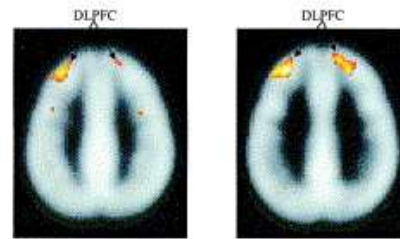
- psychoactive ingredient of the consumed compound
- adulterants within the substance
- secondary illnesses incurred by poor lifestyle
- infections/disease from the route of administration
- accidents under intoxication, violent assault &/or self-harm.
 - In some cases, etiology (causes) has been ascribed to the psychoactive substance itself using animal models
- Neuropathic changes can begin a decline into neuropsychological disorders
 - may help explain the strong comorbidity of protracted drug abuse & psychiatric illness.

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Neuropathology: Nicotine

Brody et al. (2004): Magnetic resonance imaging (MRI) to examine grey matter volume & density smokers (19) and non-smokers (17):

- Smoking associated with decreased brain matter volume in the frontal cortex
- Density also negatively correlated with years of smoking
 - as years of smoking increases frontal brain volume decreases
- Causation: Effects of chronic smoking? Predisposing traits that cause smoking? Combination of factors?
- Structural vs. Functional changes



Showing brain regions with lower grey matter density in smokers (left) compared to nonsmokers (right).

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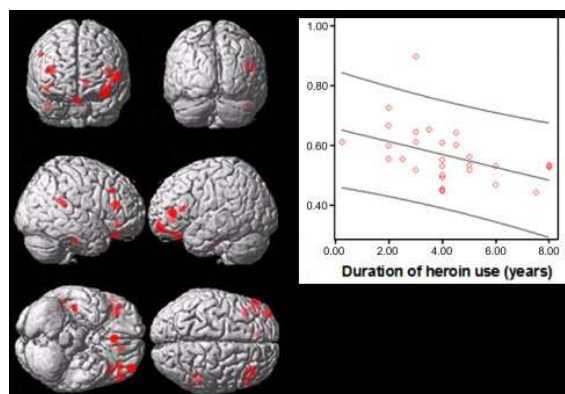
Neuropathology: Heroin

Heroin use is *associated* with a range of neuropathologies:

- brain hypoxia, cerebral edema, stroke, loss of brain white matter, paralysis (Büttner et al. 2000).

Yuan et al (2009) voxel-based morphometry heroin-dependent (30) & controls (34)

- Reduced grey matter density in frontal cortex
- Duration of use negatively correlated with grey matter density
 - Important for planning & decision making



Yuan et al., 2009

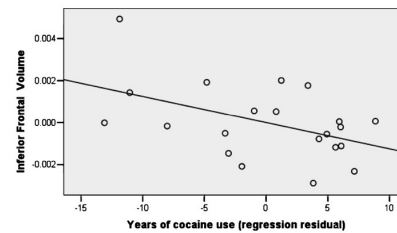
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Neuropathology: Cocaine

Cocaine abuse is associated with premature stroke, seizures, movement disorders (Büttner et al. 2003)

Lim et al. (2002): diffusion tensor imaging (MRI technique used to quantify integrity of white matter), cocaine users (12) & 13 age-matched controls- all male

- negative correlation between white matter integrity (inferior frontal cortex) & years of cocaine use
- Gender differences? Poly-drug use?



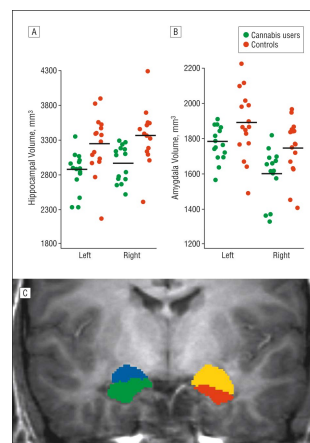
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Neuropathology: Cannabis

Reduced metabolic activity in the frontal cortex. Unclear to what extent this is due to recent consumption, short term withdrawal, or permanent damage (Block et al. 2000; Jacobus et al. 2012)

Yücel et al. (2008): anatomical abnormalities using MRI

- 15 long-term (>10 years) heavy (>5 joints daily) cannabis-using men vs. 16 matched non-using controls
 - Only men, no poly drug use
- reduced volume in the hippocampus & amygdala of the cannabis users compared to non-users.
- unlikely that these changes were due to acute cannabis exposure or withdrawal as brain volumes do not fluctuate in this way.
- evidence of permanent neuropathology associated with long term heavy cannabis use.
- It remains a question as to whether damage takes place prior to the 10 year point & with "lighter" use.



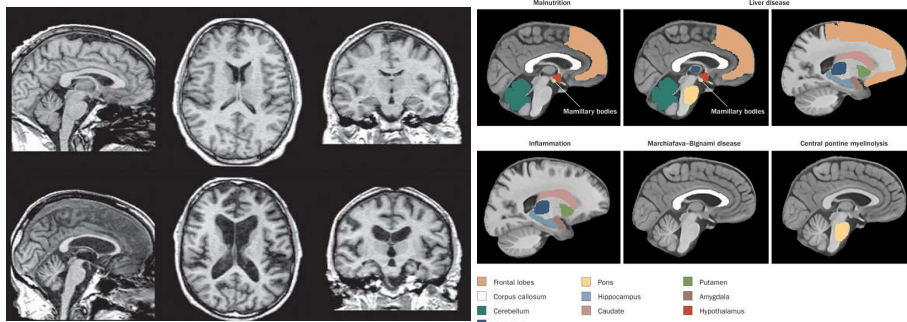
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Neuropathology: Alcohol

Alcoholism is strongly linked to Wernicke–Korsakoff syndrome

(Zahr et al. 2011)

- Wernicke encephalopathy is a general reduction in brain tissue (below left)
- Korsakoff syndrome is a psychiatric diagnosis characterized by anterograde amnesia (inability to remember new things), which can sometimes be treated with thiamine supplements.
- Depending upon complicating factors, different regions of the brain are predominantly affected (below right)



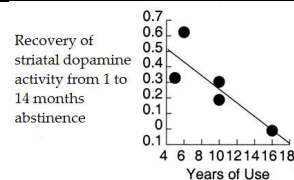
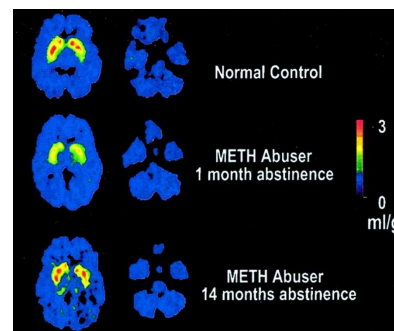
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Neuropathology: Methamphetamine

Strokes & haemorrhage: 2nd most common cause in persons < 45 years (Büttner 2011).

Volkow et al. (2001):

- Meth users underwent PET imaging following 1 & 14 months abstinence
- compared to controls, meth users showed reduced DAT (index of damage to DA nerve terminals) in the striatum at 1 month abstinence, but showed recovery of DAT by 14 months abstinence.
- the level of recovery was less in meth abusers with a longer history of use
- brain is capable of recovery, this becomes less likely with protracted drug use.



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Harm Minimisation/Reduction

Aim: to reduce the harms (to users & society) associated with substance use

1. Substance use is an inevitable part of society
2. Substance use spectrum (no use, occasional use, dependence)
3. Various harms are associated with different types of substances & different patterns of use
4. Harms can be tackled in various ways (policies, programs, practices)

[Federal government: Harm Minimisation](#)

[Harm Reduction Australia](#)



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Harm Reduction: Injecting users

Needle exchange programs provide clean needles for dirty ones

- minimizes unsafe disposal (reduces needle stick injuries to others)
- reduces transmission of blood born disease (e.g. HIV/AIDS, Hepatitis B & C)
- reduces health care costs
- Political rows between moral absolutists who claim this promotes drug use & consequentialists who highlight the beneficial effects to users & society

(Wodak & Cooney, Substance Use and Misuse)

[Australian Drug Law Reform](#)



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Harm Reduction: Opioid users

Provision of naloxone overdose kits to heroin/opioid users & their families/friends.

- Naloxone: an injectable compound which blocks the effects of opioids quickly & effectively reverses overdose.
- naloxone kits has been effective in reducing the incidence of overdose & reducing cost (Mueller et al, 2015; Coffin & Sullivan, 2013; Olsen, MacDonald, Lenton, Dietze, 2015; Chronister, Lintzeris, Jackson, et al. 2016; Nelson, Lenton Dietze, et al., 2016)
- Governments are moving in favour of supporting this intervention, although not without routine objections from moral absolutists (Kim, 2009)



[Take home Naloxone pilot](#)

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Summary

Gained knowledge of the metrics used to estimate burden of disease & come to understand the impact alcohol, tobacco and illicit drugs have at global and national levels.

Examined a different method of estimating harm that relies on expert opinion of harms to users/others.

Substance use is *associated* with poorer educational attainment & job performance.

Gained an understanding of neuropathologies that have been *associated* with specific substances & the techniques researchers use to examine these in humans.

Knowledge of harm minimization/reduction & examples of these strategies.



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