Substance use and mental illness in young people
Using comorbidity to investigate and evaluate novel prevention strategies

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Epidemiology

In year 1 in 4 young people will meet criteria for a mental or substance use disorder

• >670,000 young Australians

• 26% female; 21% males

Source: 2007 National Survey of Mental Health and Wellbeing (NSMHWB)
Mental and substance use disorders are more common in young people

Source: 2007 National Survey of Mental Health and Wellbeing (NSMHWB)

What is the impact?

Source: 2011 Australian Burden of Disease Study
**Comorbidity**

- 44% of young people with alcohol dependence have an anxiety disorder; 25% have an affective disorder

![Pie charts showing comorbidity]

- Comorbidity is the rule rather than the exception

Source: 2007 National Survey of Mental Health and Wellbeing (NSMHWB)

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**Models of Comorbidity**

- **Direct causal relationship**
  - Substance use disorder may result from mental illness
    - i.e., “self-medication”
  - Mental illness may result from substance use
    - i.e., substance-induced depression, bipolar disorder, anxiety, psychosis

Source: National Comorbidity Guidelines
Models of Comorbidity

*Indirect causal relationship*

- One condition has an effect on an intermediary factor increases the likelihood of developing the other condition

Mental illness → Unemployment → Substance use

Source: National Comorbidity Guidelines

Models of Comorbidity

*Common factors*

- shared psychological, biological, social, or environmental risk factors cause both conditions

Source: National Comorbidity Guidelines
Internalising and externalising

- **INTERNALISING**
  - Depression
  - Dysthymia
  - GAD
  - Social phobia
  - Specific phobia
  - Panic disorder

- **EXTERNALISING**
  - Antisocial PD
  - Alcohol dep
  - Cannabis dep
  - Other drug

- Came out of the childhood/adolescent literature
- Have been replicated internationally: Australia, Brazil, Chile, China, France, Germany, Greece, India, Italy, Japan, the Netherlands, NZ, Nigeria, Turkey, UK, US
- Stable over time
- Thought disorder dimension may also be added
- Links with personality
- High correlations between dimensions

The P-Factor

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- P-FACTOR
The P-Factor

- Fully explains relationship between internalising and externalising
- High predictive utility
- Higher scores associated with
  - More life impairment
  - Greater familiality
  - Worse developmental histories
  - More compromised childhood brain function


Analogy with intelligence
Prevention – CLIMATE Schools

Alcohol  Psychostimulants

Cannabis  Anxiety & Depression

CLIMATE Schools Combined

CLIMATE Schools Substance Use  CLIMATE Schools Mental Health  CLIMATE Schools Combined

Source: Teesson et al. (2014) BMC Psychiatry, 14: 32
CLIMATE Schools Combined

18-month follow-up:
- Reducing the use and harmful use of alcohol and cannabis
- Reducing substance use related harms,
- Reducing levels of anxiety,
- Reducing levels of depression, and
- Increasing knowledge of alcohol, cannabis, anxiety and depression.

Source: Teesson et al. (2014) BMC Psychiatry, 14: 32

Reductions in Internalising

Source: Mewton et al. (2014) Behaviour Research and Therapy, 63: 132-138
P-Factor outcomes

Reductions in Internalising

Source: Mewton et al. (2014) Behaviour Research and Therapy, 63: 132-138
Common Neurobiology

- Meta-analysis of 193 imaging studies
- Focused on a range of mental illnesses: schizophrenia, bipolar disorder, depression, obsessive-compulsive disorder, anxiety, substance use disorders
- A loss of grey matter in the dorsal anterior cingulate cortex (dACC) and bilateral anterior insula
- Areas important for executive functioning

Adolescent mental illness

Emergence and peak in mental disorders during adolescence
One in five adolescents have a mental illness that will persist into adulthood

- ADHD, conduct disorder
- Anxiety disorders
- Mood disorders
- Schizophrenia
- Substance abuse
- Any mental illness

Source: Lee et al. (2014) *Science*, 346(6209): 547-549

Adolescent brain development

Developmental course of brain maturation during adolescence
Behavioral attributes are paralleled by hormonal and neurobiological changes that target specific brain regions and cell populations

Source: Lee et al. (2014) *Science*, 346(6209): 547-549
Adolescent mental illness

“Exacerbations in these imbalances by biological, environmental, and genetic factors may contribute to a risk for mental illness.”

Source: Lee et al. (2014) Science, 346(6209): 547-549

Adolescent substance use

Frontal Cortex
The frontal cortex is the area of the brain responsible for planning, strategy and judgement.

Amygdala
This area of the brain is associated with reward and automatic “gut” responses.
Adolescent brain development

Substance use → Prefrontal development → Mental illness → Prefrontal development → Substance use

Cognitive training

- Using video games or other devices to build prefrontal areas
- Aims to enhance cognition through repetitive training on cognitive tasks
- Improvements in cognition translate to:
  - Improvement in functioning
  - Improvement in symptoms
Cognitive training

Promising as an intervention

- Schizophrenia
- Bipolar disorder
- ADHD
- Major depression
- Anxiety
- Substance use disorders

But what about as a prevention strategy?


Cognitive training

Pilot study 1:

- 15 adolescents (~13 years) experiencing social, emotional and behavioural problems

- Brain training intervention: 30-40 minute battery of brain training tasks, five days a week, for five weeks

- Training group showed improvements in IQ, inhibition, test anxiety, and teacher-reported behaviour, attention and emotional symptoms

Cognitive training

Pilot study 2:

• 14 young people (15-35 years) at clinical high risk for psychosis

• Brain training intervention: 40 hours online brain training tasks over 8 weeks

• Improvements in cognition, reductions in positive symptoms


The Brain Games study

• 220 adolescents aged 16-24 years at risk for developing a mental illness

• Intervention: Executive functioning tasks, 5 days per week over 5 weeks

• Control: tasks which do not focus on executive functioning, 5 days per week over 5 weeks

• Assessments: cognition, personality, alcohol use, functioning, symptoms of mental illness
The Brain Games study

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Thank you

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