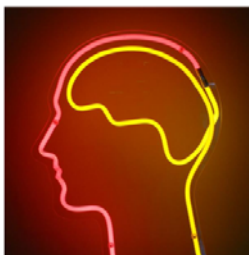


Welcome to the *Positive Choices* Webinar Series

The maturing adolescent brain:
Implications for the prevention of drug
and alcohol problems.

Presented by: Dr Louise Newton

Thursday 1st September, 2016



For more information
or to register, see
www.positivechoices.org.au/resources/webinars/



Available on demand

Siobhan Lawler

Lesson planning with Positive Choices. How to engage your students with evidence-based drug education. Watch now.



Available on demand

Dr Cath Chapman

Co-occurring mental health and substance use disorders and how they affect young people. Watch now.



Available on demand

Dr Nicola Newton & Dr Lexine Stapinski

How parents and schools can protect against drug related harms. Watch now.



Drugs and Alcohol

Get the facts, Stay smart, Stay safe

What is *Positive Choices* ?

www.positivechoices.org.au

- Central access point for trustworthy, up-to-date drug and alcohol information and educational resources
- Learning resources, factsheets, videos, and games to engage young people with drug education
- Access to classroom-based drug prevention programs that are proven to reduced drug-related harms



Teacher Resources ▶



Parent Resources ▶



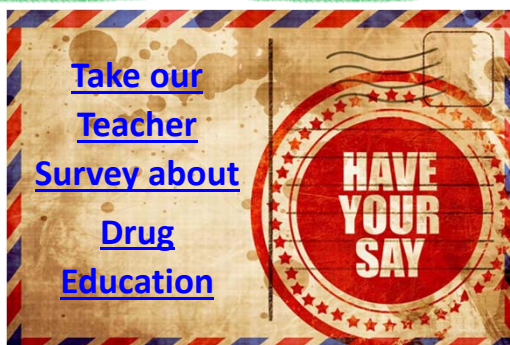
Student Resources ▶

Developed by NDARC and NDRI, in consultation with teachers, parents and students. funded by Australian Department of Health.

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We need your help to guide our ongoing improvements to Positive Choices.



Tell us what resources you find most useful, what could be improved, and what you want to see more of on Positive Choices.



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The maturing adolescent brain: Implications for the prevention of drug and alcohol problems

Dr Louise Mewton



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Outline

1. The brain under construction

2. Adolescent drug and alcohol use

3. The effects of drug and alcohol use on the adolescent brain

4. New directions for prevention and treatment



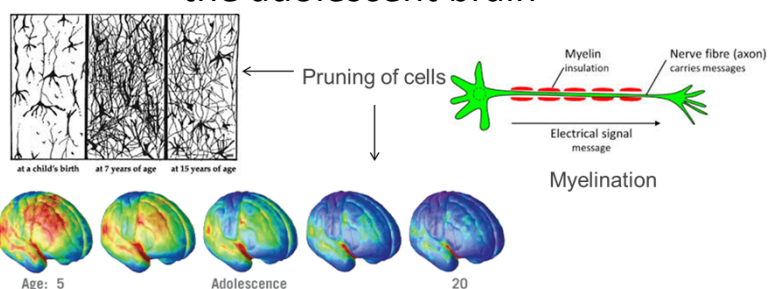
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The brain under construction



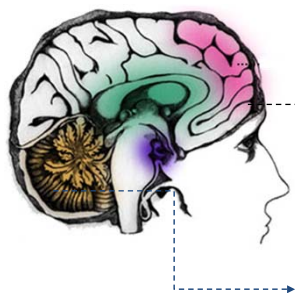
Until the age of 25 there are massive changes in the adolescent brain



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The brain under construction



Frontal Cortex

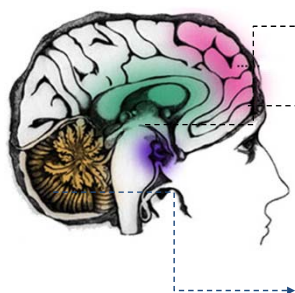
The frontal cortex is often referred to as the "CEO" of the brain, because it is the part responsible for planning, strategy and judgement. Recent research shows that this area undergoes a growth spurt at around the ages of 11-12, followed by a period of pruning and organising of the new connections during the teen years.



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The brain under construction



Corpus Callosum

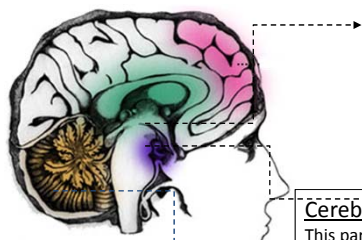
This is a cable of nerves that connects the two hemispheres of the brain and is believed to be involved in creativity and problem solving. It appears to change and grow significantly through adolescence.



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The brain under construction



Cerebellum

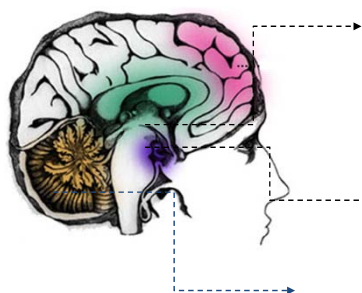
This part of the brain has long been thought to be involved with the coordination of muscles and physical movement. It is thought to be involved in the coordination of thinking processes as well. New research has shown that it is an area that undergoes dynamic change during the teenage years.



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The brain under construction



Amygdala

This area of the brain is associated with emotional and automatic "gut" responses. New imaging studies suggest that teenagers, when asked to interpret emotional information, use this reactive part of the brain rather than the more "thinking" frontal region. This may be why teenagers have trouble regulating emotions.



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The brain under construction



This is why we see characteristic adolescent behaviours like risk-taking, impulsivity, deficits in planned thinking & **drug and alcohol use**

TEEN-AGE MOUSE



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Adolescent drinking

- 1 in 5 Australians aged 16-17 years drink alcohol at least weekly
- 19-23% have “binged” in the last week (5+ drinks in one sitting)
- 1 in 5 do not drink at all

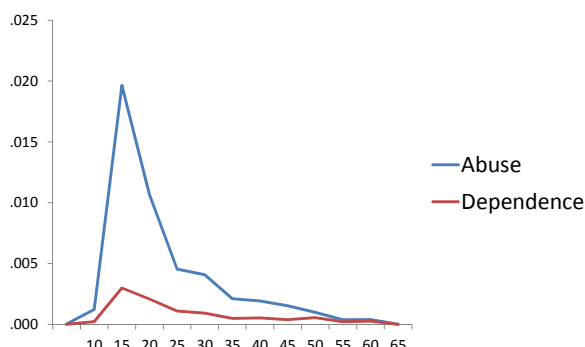


2004 National Drug Strategy Household Survey

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Adolescent drinking

Alcohol use disorders have their onset in adolescence



2007 Australian National Survey of Mental Health and Well-being

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Adolescent cannabis use

- 3.4% of 12 year olds have ever used cannabis
- By the age of 17:
 - 29.2% have ever used cannabis
 - 1 in 10 past month cannabis use
 - 6.6% past week cannabis use



2011 Australian School Students' Alcohol and Drug Survey

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Drug use (12-17 year olds)

- Amphetamines: 2.9%
- Cocaine: 1.7%
- Ecstasy: 2.7%
- Heroin: 1.6%



2011 Australian School Students' Alcohol and Drug Survey

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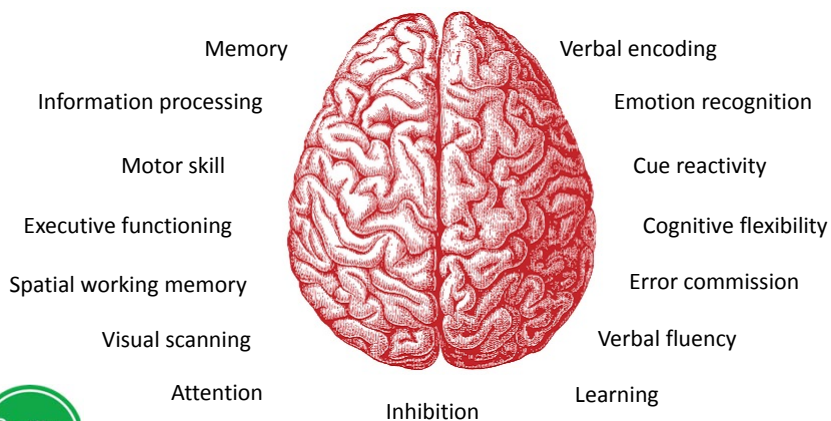
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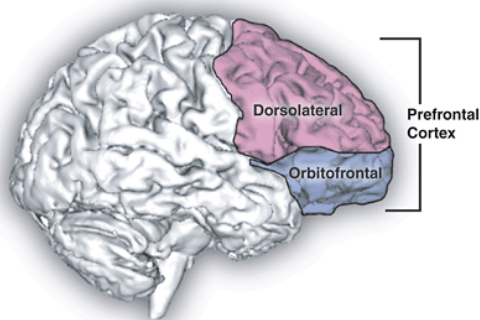
Cognitive task performance



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Structural brain differences

Prefrontal cortex (=executive functioning)

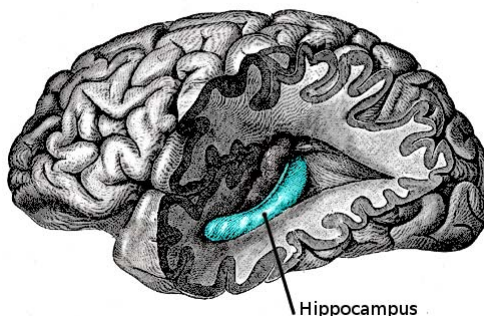


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Structural brain differences

Hippocampus (=memory... black outs)

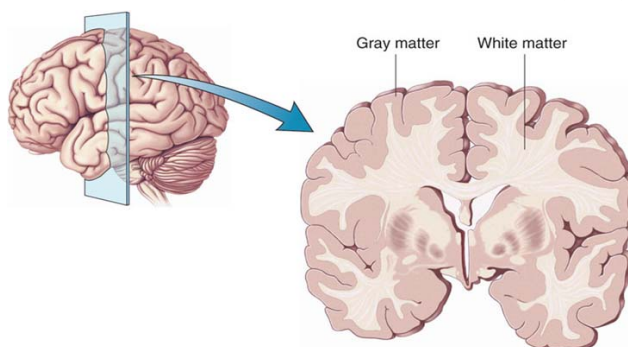


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Structural brain differences

White matter volume and integrity



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But....

- Most studies are looking at really heavy users
- Most are cross-sectional
 - Does drug use cause these abnormalities or do these abnormalities cause drug use?
 - Do other factors (i.e., socio-economic status) cause both drug use and brain abnormalities?
- The evidence base is still small



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Binge drinking study

- Adolescents tend to “binge” drink (high quantities infrequently)
- What effect does this have on the adolescent brain?
- 160 adolescents from Sydney, recruitment ongoing
- Early results show structural changes related to binge drinking



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ABCD Study

- Announced in 2015
- 10,000 kids aged 9-10 across the US
- Follow up over a decade
- Comprehensive assessments every 2 years (including MRI and cognitive tasks)
- Online/telephone follow up every 3-6 months



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It's not all doom and gloom...

How can we use our expanding knowledge of the brain to discover novel prevention and intervention strategies?



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Inhibitory control training

The “Beer Go-No Go” task:
Only press the space bar when you see the
letter ‘F’, do not press the space bar when
you see the letter ‘P’



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Inhibitory control training



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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, functioning, **alcohol use**, symptoms of mental illness



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Any questions or
comments?



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