

# **The impact of adolescent cannabis use, mood disorder and lack of education on attempted suicide in young adulthood**

Suicide is one of the leading causes of death worldwide among young people. One of the strongest predictors of completed suicide is a previous suicide attempt (1). Suicide attempts are more frequent among young people, and a suicide attempt may be a marker of a lasting trajectory of adverse mental and physical problems into middle adulthood (1,2). There is limited evidence for factors during the adolescent period and the period of transition to young adulthood that increase the risk of attempted suicide. We used a prospective cohort study design incorporating clinical interviews to determine what factors measured at ages 12-15 years are associated with attempted suicide reported at ages 19-24 years.

The methods for the baseline adolescent study have previously been described (3). Using a stratified random sampling technique, 743 students in eight mainstream schools were screened for psychopathology. Adolescents who scored above threshold on the screening instruments or who indicated the presence of significant suicidal ideation (N=140) were invited to attend for interview, along with a group of 174 controls matched for gender, school and school year. 84.3% adolescents from the "at risk" category and 54% of the control group attended for a semi-structured clinical interview, along with a parent or guardian. All 212 young people who were interviewed as young adolescents were invited to take part in a follow-up interview eight years later. Follow-up information was obtained on 168 participants (79% follow-up rate). There were no differences between responders and non-responders in age, gender, parental socio-economic status, "at-risk" status at baseline, or diagnosis of psychiatric disorder at baseline.

We collected exposure information at interview on: family and childhood risk factors (family history of psychiatric illness and experience of childhood trauma, i.e. physical/sexual abuse or witnessing domestic violence); adolescent risk factors (psychopathology, cannabis use and alcohol use); young adult risk factors (psychopathology, cannabis use, self-harm, education level and employment status). The outcome measure was lifetime suicide attempts at 19-24 years old.

Ten percent of participants had made a suicide attempt at some point in their lives up to age 19-24 years. The mean age of those attempting suicide was 20.6 years. Fifty-three percent of those who reported a suicide attempt were female. Hierarchical logistic regression models showed that adolescent mood disorder and adolescent cannabis use, young adult mood and anxiety disorders, and a low level of

education were the most strongly predictive factors for making a suicide attempt when the effects of family psychiatric history, childhood trauma, alcohol use and other psychopathology were taken into account.

Adolescent mood disorder and adolescent cannabis use both independently increased the odds of a suicide attempt 7-fold (OR=7.0, 95% CI: 1.4-34.3; OR=7.5, 95% CI: 1.2-43.8), while young adult mood and anxiety disorders both independently increased the odds of an attempt 11-fold (OR=11.7, 95% CI 1.8-73.9; OR=11.1, 95% CI: 21.0-57.9). Young adults with only secondary-level education had an 8-fold increase in the odds of a suicide attempt compared to those with third-level education (OR=8.0, 95% CI: 1.1-54.4).

There is evidence that substance use disorders in adulthood increase the risk of suicidal behaviours. Here we show that any use of cannabis in the early adolescent period is a strong independent predictor of attempted suicide in young adulthood. We know that significant brain maturation continues to occur during adolescence, particularly in limbic structures such as the hippocampus; and within the prefrontal cortex important processes such as synaptic pruning, myelination and programming of neurotrophic levels are occurring at this time (4). Regular cannabis use can lead to grey matter volume reduction in a range of brain areas, including the medial temporal cortex, the parahippocampal gyrus, the insula and orbitofrontal regions (5). There is evidence of a linear association between the age at onset of cannabis use and both white matter integrity and grey matter volume, suggesting that the earlier the onset of use, the greater the toxic effects on the brain (5,6). Neuroimaging studies of people who have attempted suicide show structural and functional brain changes that are in keeping with those found in cannabis users (7). It is possible that cannabis use in early adolescence, at a vulnerable time for neurodevelopment, leads to or exacerbates ongoing dysfunctional brain changes that prime young people for a maladaptive trajectory towards young adulthood. Those most at risk for attempted suicide may have experienced accumulating risk exposures throughout childhood and adolescence and in young adulthood may lack adequate problem solving skills, as possibly indexed here by low levels of education.

The increasing awareness among the mental health community that we need to focus on early clinical intervention to protect against the worst effects of emotional distress among our young people, both on a personal and

an economic level (8), can only be acted on when we can reliably identify which young people are most at risk. The available evidence suggests that the specialist treatment of psychiatric disorder in adolescence alone is insufficient for the prevention of future suicide attempts (9). We need a more tailored approach to youth mental health and a greater awareness of the different contingencies involved in the pathway to suicidal behaviours such as accumulating risk from adolescent cannabis use, adolescent mood disorders and a lack of education.

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