

# Cannabis use is associated with depression severity and suicidality in the National Comorbidity Survey-Adolescent Supplement



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## Introduction

Cannabis usage during adolescence has been an important area of clinical observation, given the sensitive brain maturation that occurs during this period<sup>1</sup>.

The National Comorbidity Survey Replication-Adolescent Supplement (NCS-A) was designed as a national psychiatric epidemiologic survey carried out between February 2001 and January 2004. It focused on adolescents aged 13 to 18 years to estimate the prevalence of DSM-IV mental health disorders among US adolescents and investigate risk and protective factors<sup>2</sup>.

Studies examining the co-occurrence and association of adolescent cannabis use and depression up to this point have varied in results<sup>3-5</sup>.

### Current evidence has claimed that:

- 1) Adolescent cannabis use doesn't typically lead to severe forms of MDD<sup>6</sup>.
- 2) Weekly cannabis use is associated with increased risk for suicidal ideation, with depressive symptoms being a risk factor for cannabis frequency<sup>7</sup>.
- 3) Adolescent lifetime cannabis users are associated with more depressive symptoms than adolescent non-users<sup>14</sup>.
- 4) Lifetime cannabis use is associated with higher rates of MDD in adolescents<sup>15</sup>.

## Objectives

- 1) Investigate the prevalence of MDD in adolescents with lifetime cannabis use
- 2) Explore the association of lifetime cannabis use with MDD severity and symptomatology

## Acknowledgments

Dr. Hinckley designed the study and was involved in analysis and manuscript preparation. Dr. Mikulich was the primary statistician, participated in study design and completed analyses. Ms. He participated in study design and data management. Dr. Bhatia and Mr. Vu participated in analysis review and manuscript preparation. Dr. Merikangas participated in data management and manuscript review. Dr. Sakai participated in study design and manuscript review.

## Method

### Sample

10,123 adolescents aged 13 to 18 between February 2001 and January 2004 in the United States

### Measures

#### Sociodemographic variables

Age, gender, race/ethnicity, region, and urbanicity were assessed.<sup>8</sup> A poverty index ratio was calculated based on family size and the ratio of family income to poverty threshold level, with  $\leq 1.5$  defined as poor<sup>10</sup>.

#### Cannabis use

Modified World Health Organization Composite International Diagnostic Interview (CIDI) assessed for lifetime cannabis use and past 12-month cannabis use. 12-month frequency stratified as: none, occasional ("less than once a month"), moderate ("1-3 days per month" or "1-2 days per week"), and heavy ("3-4 days per week" or "nearly every day").

#### MDD and MDD symptom domains

CIDI assessed for DSM-IV lifetime major depressive disorder (MDD) and past 12-month major depressive episode (MDE)<sup>11,12</sup>. Symptom domains categorized as depressed mood, anhedonia, appetite change, sleep problems, psychomotor agitation or retardation, fatigue, worthlessness, impaired concentration, and suicidal behavior. Suicidality was divided into ideation and attempt. Severe MDD defined as high levels of distress and impairment<sup>10</sup>.

### Statistical analyses

All statistical analyses completed in SAS using Taylor series linearization method.

Bivariate analyses utilizing the Rao-Scott chi-square test to assess association of lifetime cannabis use and the prevalence of MDD symptom domains.

Weighted multivariate logistic regression and ordinal regression analyses were conducted to evaluate cannabis use as a predictor of MDD and cannabis use and MDD as predictors of suicidal behavior. This was adjusted for sociodemographic variables associated with lifetime cannabis use and/or MDD (age, sex, race/ethnicity, and region).

## Results

Hispanic and non-Hispanic White populations as well as populations located in the Western and Midwestern reported greater proportions of lifetime cannabis users than non-users. (Table 1)

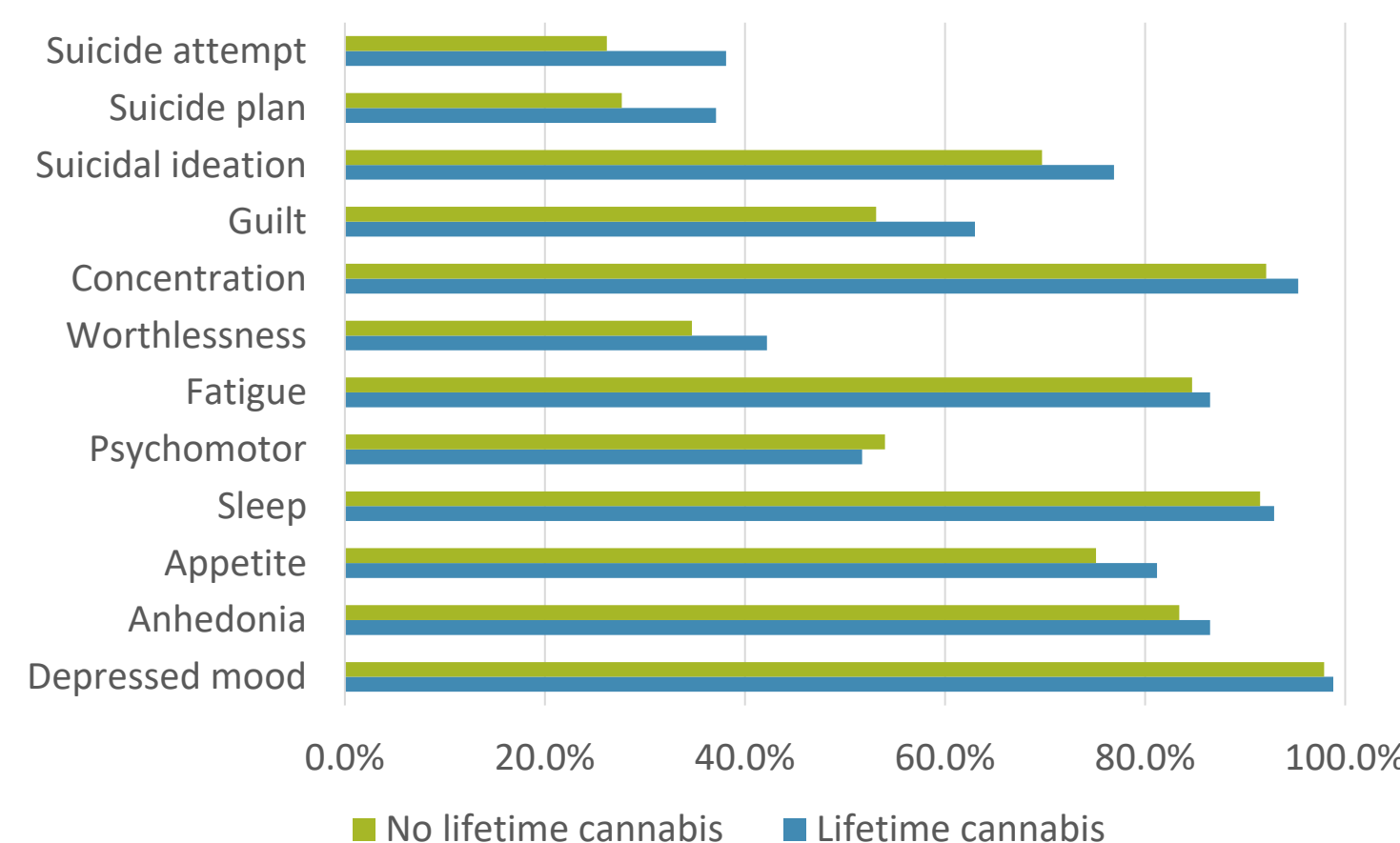
Lifetime cannabis and past 12 month users reported higher rates of mild/moderate and severe MDD than non-user counterparts.

Lifetime cannabis use in adolescents with a lifetime diagnosis of MDD have demonstrated significant rates of appetite changes, suicidal ideations, and suicide attempts. (Figure 1)

Table 1: Demographics by lifetime cannabis use (N=10,123)

|                             | Lifetime cannabis N = 2281 | No cannabis N = 7819 | P-value                    |
|-----------------------------|----------------------------|----------------------|----------------------------|
| Age                         | 16.0 (SE=0.06)             | 15.0 (SE=0.07)       | F (1,42)=208.2, p<0.0001   |
| Gender                      |                            |                      | Chi-sq (1) = 2.24 p = 0.14 |
| Female                      | 1057 (46.3%)               | 4102 (52.5%)         |                            |
| Male                        | 1224 (53.6%)               | 3717 (47.5%)         |                            |
| Race/ethnicity              |                            |                      | Chi-sq (3) = 9.85 p=0.02   |
| Hispanic                    | 487 (21.3%)                | 1420 (18.2%)         |                            |
| Black                       | 348 (15.3%)                | 1602 (20.5%)         |                            |
| Other                       | 132 (5.8%)                 | 489 (6.3%)           |                            |
| Non-Hispanic White          | 1314 (57.6%)               | 4308 (55.1%)         |                            |
| Region                      |                            |                      | Chi-Sq (3)=14.34 p=0.0025  |
| Northeast                   | 397 (17.4%)                | 1466 (18.7%)         |                            |
| Midwest                     | 659 (28.9%)                | 2113 (27.0%)         |                            |
| South                       | 546 (23.9%)                | 2883 (36.9%)         |                            |
| West                        | 679 (29.8%)                | 1357 (17.4%)         |                            |
| Urbanicity                  |                            |                      | Chi-Sq (2) = 4.26 p = 0.12 |
| Metro                       | 1134 (49.7%)               | 3362 (43.0%)         |                            |
| Other urban                 | 729 (32.0%)                | 2572 (32.9%)         |                            |
| Rural                       | 418 (18.3%)                | 1885 (24.1%)         |                            |
| Poverty index ratio         |                            |                      | Chi-Sq (3) = 0.27, p=0.97  |
| $\leq 1.5$ (poor)           | 379 (16.6%)                | 1334 (17.1%)         |                            |
| $\leq 3$                    | 453 (19.9%)                | 1564 (20.0%)         |                            |
| $\leq 6$                    | 696 (30.5%)                | 2399 (30.7%)         |                            |
| $> 6$                       | 753 (33.0%)                | 2522 (32.3%)         |                            |
| MDD lifetime                |                            |                      | Chi-sq (1) = 94.0 p<0.0001 |
| MDD lifetime                | 432 (18.9%)                | 693 (8.9%)           |                            |
| MDD severity lifetime: None | 1849 (81.1%)               | 7126 (91.1%)         |                            |
| Mild/Mod                    | 278 (12.2%)                | 550 (7.03%)          | Chi-sq (2) =140.5 p<0.0001 |
| Severe                      | 154 (6.75%)                | 143 (1.82%)          |                            |

Figure 1: Depressive symptoms in adolescent lifetime cannabis users vs adolescent non-users



## Discussion

The reasoning behind the association between cannabis and depression can be postulated as:

- 1) Cannabis as self-medication for depression<sup>13,14</sup>
- 2) Cannabis use increasing odds of developing depression later in life<sup>15-17</sup>
- 3) Shared environmental factors such as social stressors<sup>13</sup>
- 4) Shared genetic factors such as hereditary risks and cannabis increasing genetic predisposition of depression<sup>18-20</sup>

Consistent with previous literature, cannabis use was found specifically associated with suicidal ideation, independent of presence of major depressive episode<sup>21-23</sup>.

Social context in which cannabis is consumed may increase exposure to other substances, risky behaviors, and consequences of substance use – which may lead to increased suicidality<sup>24,25</sup>.

### Limitations

Due to nature of cross-sectional study design, temporal relationship between cannabis use and MDD not established. Unable to determine causality between cannabis use and MDD/suicidal behavior.

### Future Directions

Additional studies needed to investigate cannabis use and clinical course of adolescents with comorbid MDD

Additional studies needed to elucidate impact of various THC products and concentrations on adolescent neurodevelopment and mental health.

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Additional References Available Upon Request