Associations Between Psychiatric Disorders and Cannabis-Related Disorders Documented in Electronic Health Records: A Study Using UMC's i2b2 Dataset

**Sri Aishitha** *Second-Year Graduate Student, Health Informatics, BBME  
 University of Missouri, Columbia*

### **Abstract**

Cannabis use has been increasingly associated with a variety of psychiatric disorders, yet documentation and categorization of cannabis use within Electronic Health Records (EHRs) remain inconsistent. This study investigates the relationship between psychiatric disorders and cannabis use, focusing on distinctions between documented cannabis-related disorders (CUD) and social history records of cannabis use in EHRs. Utilizing data from the University of Missouri-Columbia (UMC) i2b2 database, the study examines:

1. The association between CUD and psychiatric disorders.
2. The causative potential of CUD in the onset of psychiatric disorders through longitudinal cohort analysis.
3. The reverse association: whether pre-existing psychiatric disorders increase the likelihood of subsequent CUD diagnosis.

Findings will enhance the accuracy and comprehensiveness of EHR documentation and propose standardized guidelines for recording cannabis use in primary care settings.

### **Introduction**

Cannabis use is an emerging public health issue with significant implications for mental health. Despite growing evidence linking cannabis use to psychiatric disorders such as schizophrenia, depression, and anxiety, EHRs lack standardized documentation of cannabis use and related disorders. In clinical practice, cannabis use is either recorded in social history or diagnosed as a disorder, leading to inconsistencies. This research aims to address these inconsistencies by examining the association between psychiatric disorders and cannabis-related disorders, providing a structured framework for improving EHR documentation.

### **Research Aims**

#### **Aim 1: Association Between CUD and Psychiatric Disorders**

* Analyze the prevalence of psychiatric disorders (schizophrenia, depression, and anxiety) in patients with and without CUD.
* Assess disparities in diagnosis rates and healthcare utilization patterns among these groups.

#### **Aim 2: Does CUD Increase the Risk of Developing Psychiatric Disorders?**

* Conduct a longitudinal cohort analysis to determine if a CUD diagnosis increases the risk of developing psychiatric disorders.
* Identify predictive factors and progression patterns within the dataset.

#### **Aim 3: Do Psychiatric Disorders Increase the Likelihood of Developing CUD?**

* Examine whether pre-existing psychiatric disorders elevate the likelihood of subsequent CUD diagnosis.
* Analyze variations across different psychiatric conditions and patient trajectories.

### **Literature Review**

Several studies have explored the relationship between cannabis use and psychiatric disorders. Key findings include:

* **Cannabis and Schizophrenia**: Meta-analyses by Moore et al. (2007) and Marconi et al. (2016) indicate that regular cannabis users are significantly more likely to develop psychotic symptoms (Odds Ratio [OR] = 3.9).
* **Cannabis and Depression**: Lev-Ran et al. (2014) found a moderate association (OR = 1.62) between cannabis use and depression.
* **Cannabis and Anxiety**: The association remains inconsistent, with studies reporting mixed results (Kedzior & Laeber, 2014; Blanco et al., 2016).
* **Cannabis and Mania**: Gibbs et al. (2015) reported a modest correlation between cannabis use and manic symptoms, though limited by small sample sizes.

### **Methodology**

#### **Data Source**

* **UMC’s i2b2 dataset**, containing de-identified EHR data, including ICD-9/10 diagnosis codes, encounter lists, and problem lists.
* Data stratified by psychiatric conditions (schizophrenia, depression, anxiety, and bipolar disorder).

#### **Analysis Plan**

1. **Data Preprocessing**
   * Clean and preprocess data to remove duplicates and inconsistencies.
   * Stratify patients based on cannabis use documentation.
2. **Statistical Analysis**
   * **Logistic Regression**: Estimate odds ratios for psychiatric disorders in CUD vs. non-CUD patients.
   * **Cohort Analysis**: Evaluate longitudinal data to assess causality.
   * **Interaction Terms**: Explore sex-specific and racial disparities in cannabis use and psychiatric disorders.
3. **Qualitative Assessment**
   * Assess documentation inconsistencies in social history vs. diagnosis records.

### **Key Findings and Correlations**

#### **Odds Ratios of Psychiatric Disorders in CUD vs. Non-CUD Patients**

| **Disorder** | **Odds Ratio (OR)** | **Interpretation** |
| --- | --- | --- |
| Depression | 0.757 | CUD patients are 24.3% less likely to have depression than Non-CUD patients. |
| Anxiety | 0.355 | CUD patients are 64.5% less likely to have anxiety than Non-CUD patients. |
| Schizophrenia | 3.740 | CUD patients are 3.74 times more likely to have schizophrenia than Non-CUD patients. |

#### **Longitudinal Analysis: Impact of CUD on Psychiatric Disorders**

* **CUD diagnosis precedes psychiatric disorder diagnosis in 42% of cases**, indicating a potential causal relationship.
* **18-34 age group** is at the highest risk of developing psychiatric disorders following CUD diagnosis.
* **Race Disparities**: 4,520 Black or African American patients vs. 21,255 White patients documented with cannabis use, suggesting racial differences in cannabis use perception and treatment.

#### **Reverse Association: Do Psychiatric Disorders Increase the Risk of CUD?**

| **Disorder** | **% of Patients Developing CUD** |
| --- | --- |
| Schizophrenia | 22.1% |
| Depression | 17.8% |
| Anxiety | 13.6% |

* **Schizophrenia patients have the highest risk of developing CUD.**
* **Depression and anxiety patients show moderate risk, likely due to self-medication tendencies.**

### **References**

* Marconi A, Di Forti M, Lewis CM, Murray RM, Vassos E. (2016). *Schizophrenia Bulletin, 42(5), 1262-1269.* DOI: 10.1093/schbul/sbw003
* Lev-Ran S, Roerecke M, Le Foll B, George TP, McKenzie K, Rehm J. (2014). *Psychological Medicine, 44(4), 797-810.* DOI: 10.1017/S0033291713001438
* Moore TH, Zammit S, Lingford-Hughes A, Barnes TR, Jones PB. (2007). *The Lancet, 370(9584), 319-328.* DOI: 10.1016/S0140-6736(07)61162-3
* Kedzior KK, Laeber LT. (2014). *BMC Psychiatry, 14:136.* DOI: 10.1186/1471-244X-14-136
* Blanco C, Hasin DS, Wall MM, et al. (2016). *JAMA Psychiatry, 73(4), 388-395.* DOI: 10.1001/jamapsychiatry.2015.3229
* Gibbs M, Winsper C, Marwaha S, et al. (2015). *Journal of Affective Disorders, 171, 39-47.* DOI: 10.1016/j.jad.2014.09.016