Self-Harm and Cannabis Use

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Thom Dunn

Self-harm and suicide are of considerable concern to psychiatrists and others treating mental illness. In 2019 more than 47,500 Americans died by suicide and a million more were estimated to have attempted [1]. Indeed, suicide rates and prevalence of self-harm are steadily increasing in the United States [2, 3] and are at historic highs. Among the many variables associated with self-harm and suicide is substance misuse [4, 5]. Given the prevalence of cannabis use among many demographic groups, it is useful to understand its relationship, if any, with self-harm. This chapter will review the literature regarding self-harm and suicide and cannabis use and includes a case study of 36-year-old man who stabbed himself in the chest while intoxicated on high-potency cannabis.

Paramedics were called to a man who had stabbed himself. They reported finding the patient "in a supine position with a knife in his chest all the way up to the knife handle." His injuries included a lacerated lung, pericardial trauma, a large diaphragm injury, and a through-and-through stomach injury. Urine drug screen was not initially performed upon admission (16 h later, presence of opioid and benzodiazepines were detected. THC was not part of the panel). Psychiatry was called to assess the patient. Mr. C and his wife reported that he was a 36-year-old man who was with a high-functioning executive with a graduate degree. His psychiatric history was significant only for social anxiety managed by his primary care provider with daily citalopram 20 mg and alprazolam 0.5 mg as needed. Neither the patient nor his wife reported depression nor stressors in the days or weeks preceding this event. That evening he reported feeling upbeat and positive. An intermittent cannabis (flower) user, Mr. C decided to unwind that evening by using a legally acquired, high potency form of the drug. Hours later his wife would be awakened to

T. Dunn (✉)
Behavioral Health Services, Denver Health, Denver, CO, USA

Psychological Sciences, University of Northern Colorado, Greeley, CO, USA
e-mail: thom.dunn@unco.edu

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"maniacal laughing" from the TV room. She came down to find Mr. C confused and acting strangely. After she left the house to call 911, he stabbed himself in the chest with a large kitchen knife. He said he had no idea what made him stab himself, that it was impulsive, and that in no way he was trying to kill himself.

A growing number of Americans view cannabis as no more harmful than alcohol and its use (either for purported medicinal uses or recreationally) has been legalized in more than half of US states [6]. Legal cannabis procured from a dispensary in particular is often viewed to be even safer than illicit cannabis [7]. However, there are known deleterious effects associated with cannabis use. As highlighted in Chap. 4, psychiatric sequelae have been associated with its use. For example, a 2014 meta-analysis of 31 studies pooling data of more than 100,000 adults found that after controlling for confounds there is a small magnitude association of cannabis use and anxiety [8]. This is noteworthy when considering the gentleman in this chapter's case study. He reported a history of social anxiety that was sufficiently impairing that he would sometimes pre-medicate with a benzodiazepine during social events. This level of anxiety persisted despite regularly taking citalopram. The literature suggests that cessation of cannabis use may be necessary for Mr. C's anxiety to remit. Certainly his safety evaluation becomes more complicated if he chooses to continue to use cannabis. He may get into a vicious cycle of feeling that he needs cannabis to help curb anxiety, yet will always have anxiety as long as he continues its use.

Association between cannabis use and self-harm (including suicide) must be considered in the context of depression. While there is a literature examining the association between cannabis and depression, there are heterogeneous conclusions. For example, Gobbi and colleagues (2019) performed a meta-analysis of 11 studies with more than 23,000 adolescents making a compelling argument that regular cannabis users have an increased risk of developing major depressive disorder and suicidal ideation [9]. These findings are in contrast, however, to a 2012 study involving Swiss conscripts finding no association between cannabis and depression [10]. Such studies are methodologically complicated and it is not surprising there are conflicting findings in the literature. One interpretation of the heterogeneity is that there is sufficient evidence of an association between cannabis use and depression that, particularly for adolescents, those with risk factors for mood disorders should be cautious about its use. Mr. C had no family history of major depressive disorder, nor did he report previous episodes of a major depressive episode.

When directly examining links between suicide and cannabis use, this literature too has mixed findings. For example, returning to the Swiss conscript dataset, a 2018 analysis found no association with cannabis use and self-harm when confounding variables were controlled for [11]. However, there is other quite compelling evidence to the contrary. A 13-year longitudinal study of more than 2000 Norwegian youths found that individuals in their 20s who had 11+ uses of cannabis in the previous year were at nearly a three times higher risk for death by suicide, even after potential confounds were controlled for [12]. A 2019 meta-analysis found a pooled odds ratio of 3.46 when measuring the association between cannabis use and suicide attempts [13]. This may not be surprising as most studies note that cannabis use itself is associated with well-known risk factors for suicide, including

lower socio-economic status, abuse and neglect in childhood, as well as other psychiatric comorbidities [14].

It is reasonable to ask whether cannabis use is merely associated with other factors that drive suicidal behavior. In a rigorous study, however, van Ours and colleagues (2013) examined 30 years of data from more than 1200 individuals in a New Zealand birth cohort study [15]. They used a bivariate mixed proportional hazard model to study cannabis use and suicidal ideation. This framework modeled the transitions into cannabis use and into suicidal ideation to form a fully simultaneous system. Using this model, cannabis use is permitted to impact on the onset of suicidal ideation and suicidal ideation is also permitted to impact on cannabis use. The unobserved heterogeneity terms as they correlate with each transition rate then can be measured. The result is a reliable estimate of the **causal** impact of cannabis use on suicidal behaviors as well as examining causal direction. That is, answering the question whether it is cannabis use that drives suicidal behavior, or do individuals experiencing suicidal ideation seek out the substance [15]? From this remarkable analysis, the authors draw several conclusions interesting to psychiatrists and others who treat mental illness. First, there is a causal effect between using cannabis many times a week and suicidal behavior in susceptible men. Earlier and heavier use predict younger age of first suicidal thoughts. Second, in both men and women, suicidal ideation does not lead to increased cannabis use, presumably as a means to cope [15]. Mr. C, in our case, did endorse using cannabis many times a week, but never endorsed suicidal thinking nor previous suicide attempts.

Mr. C, however, had engaged in serious self-harm while intoxicated on high-potency cannabis. There are other cases reported of similar episodes, albeit typically associated with an onset of psychosis. An Italian group reports a man with "massive" cannabis use that led to a psychotic state while intoxicated on cannabis and self-amputation of his penis and testicles [16]. A gruesome French report describes a gentleman without any psychiatric history actively using high-potency cannabis who then attempted to amputate his arm, self-enucleated both eyes, and then impaled himself on a fence before exsanguinating to death [17]. However, in the case of Mr. C, his self-harm presented as being impulsive while intoxicated on high-potency cannabis. Indeed, Escelsior and colleagues (2021) performed a meta-analysis of cannabis and self-harm involving 16 studies and more than 19,000 individuals, concluding that cannabis use and self-harm are related and theorize that it is increased *impulsivity* during intoxication that can make some users dangerous [18]. They speculate that this could be due to the effects of cannabis impairing neocortical areas that typically inhibit impulsivity, namely the prefrontal cortex, the anterior cingulate gyrus, nucleus accumbens, and the amygdala [18]. High-potency cannabis may exacerbate this effect.

While 36 states have legalized medical cannabis, Colorado (along with Washington) was first to permit its legal use for adults desiring its recreational effects in 2012 [19]. Other states have since followed. However, each state regulates cannabis differently. Legal access to cannabis ranges from highly restrictive permitting only a small number of plants cultivated specifically for an individual to treat a medical condition, to a robust recreational dispensary industry selling high-potency

product, as is the case for those of us practicing in Colorado. We certainly perceived an uptick in cannabis use-related problems soon after its recreational availability, such as self-inflicted injuries. Others appreciated an increase in medical complications such as cyclical vomiting and children presenting to emergency departments after unintended ingestion [20]. While we firmly believed that Mr. C was not intentionally trying to end his life, his self-harm was quite severe. Fortunately, his wife was awake and able to call for help. His living in an urban area meant quick access to the emergency medical services and to a trauma center. However, had he died from his self-inflicted injuries, it is quite likely his death would have been classified as a suicide, regardless of his intent. It is possible that there have been deaths attributed to suicide that were instead severe and impulsive self-harm (without intent to die) while intoxicated with cannabis. Colorado suicide data suggests a possible relationship between cannabis and self-harm in those whose deaths were classified as suicide. Figure 13.1 shows data from the Colorado Department of Public Health and Environment violent death reporting system. The percentage of deaths by suicide from 2008 to 2018 who also had positive toxicology findings for cannabis are shown. There is a pronounced and steady increase in percentage positive for cannabis in suicides after Colorado legalized its recreational use in November 2012. Indeed, the average percentage of persons dying by suicide from 2008–2012 who were also positive for cannabis was 7.80%. Following recreational legalization and 5 years thereafter, the average was 18.83%. This is a meaningful and statistically significant increase when using an independent samples t test: $t(9) = -6.20$, $p < 0.001$. This finding is consistent with a 2020 study that wonders whether increased potency found in recreational cannabis is related to self-harm [21]. Their dataset is compelling, as they evaluated insurance claims for more than *75 million individuals*, noting that there was an association between cannabis use and self-harm in men 40 years and under in states that have legalized recreational use. No association was found in states that did not legalize recreational use.

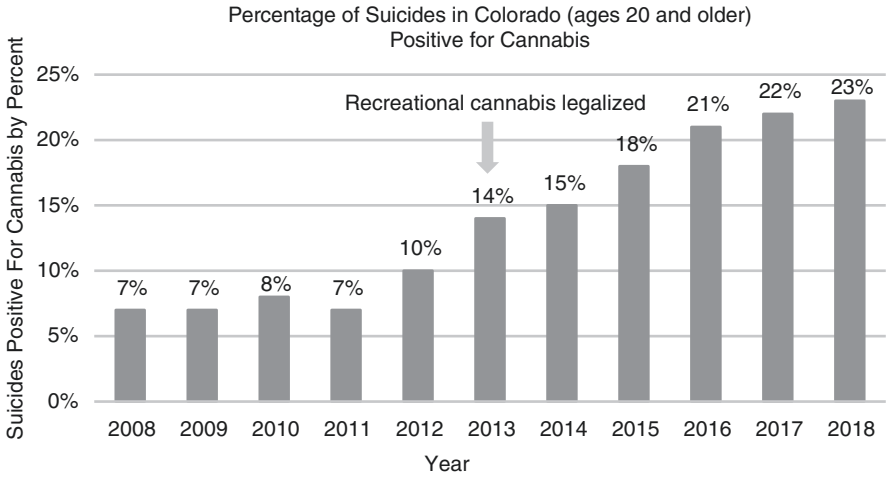

Fig. 13.1 Percentage of persons dying by suicide in Colorado who tested positive for cannabis by year, 2008 through 2018

Colorado kept its liquor stores and dispensaries open during the Covid-19 lockdown. With the "perfect storm" of physical distancing, economic downturn, and limited access to social opportunities, some researchers worry about increased suicide mortality [22]; the disturbing trend of increasing percentages of cannabis positive people among Colorado suicides is likely, unfortunately, to continue.

Treatment Approaches

Given the perception of cannabis as relatively safe, psychiatrists should counsel their patients about the dangers of its use. For some individuals it can provoke psychosis, depression, and anxiety. Indeed, for some patients, treating depression and anxiety may be complicated by ongoing cannabis use. Treatment plans should address cannabis use and caution given to patients that if they are seeking relief from many psychiatric conditions that they may have to abstain from cannabis.

When evaluating for risk of danger to self, there should be more attention paid to cannabis use. Infrequent use of a low potency product does not have the same risk as heavy (many times a week) use. High-potency cannabis is likely more dangerous and those who live in states that permit recreational sales should be aware of this. For some patients, part of their safety planning and means restriction may also need to address cannabis use for high-risk patients. Young men with frequent high potency use who have additional risk factors are at increased risk for suicide. A cautious approach to managing such individuals during times of crisis is encouraged.

Mr. C was evaluated almost daily during his 13-day hospital admission. His history and behavior before the incident was corroborated by his wife, other family members, and friends. He was consistently found to be euthymic, free from thoughts of self-harm, and appropriately concerned about the events that required hospital admission. There was no indication of psychiatric decompensation, acute stress disorder, nor modifiable risk factors for self-harm. He was warned that our team believed that intoxication of high-potency cannabis was the likely culprit and urged abstinence. He agreed with our conclusion and asked for outpatient resources for psychotherapy which we provided. Several weeks following his discharge he was readmitted for complications related to his surgical repair (infection and fluid collection). He has had no further contact with any of our behavioral health providers.

Summary

Numerous studies have sought to examine the relationship between cannabis use and self-harm. This is a complicated relationship with numerous moderating variables and confounds. This literature is almost exclusively correlational in nature and only a single study convincingly weighs in on cause and effect. Further, it is a heterogeneous literature comprising studies with large sample sizes (one cited earlier has an n of more than 75 million), meta-analyses, longitudinal data, and involves cannabis users from many different counties. Well-designed studies using similar

methodologies have disparate findings. It is difficult to definitively answer the question whether risk of self-harm, including suicide, rises with cannabis use.

However, despite the heterogeneity of this literature, there are **compelling reasons** to conclude that cannabis use, particularly high potency forms of the drug, is associated with an increased risk of self-harm. As the clinical case from this chapter illustrates, had Mr. C simply refrained from high-potency cannabis the evening he stabbed himself, the odds that he would have engaged in self-harm are vanishingly small. The suicide data presented earlier from Colorado before and after the legalization of recreational cannabis is quite concerning. Not only are persons who have died by suicide positive for cannabis significantly higher after legalization, but the positivity rates have also steadily risen every year. There is no reason to believe—particularly with concern about the mental health effects of the Covid-19 pandemic—that this trend will change. Finally, it would be reassuring if the literature consistently showed no relationship between cannabis use and self-harm. It does not. There are convincing studies suggesting this relationship. Indeed, one study argues cogently for a cause-and-effect relationship between heavy cannabis use and self-harm in some men. At present, there is enough scholarship to raise an alarm that cannabis may be associated with self-harm. We should treat our patients with this in mind.

Highlights Box 13.1 Key Points for Patient Psychoeducation

- The literature examining the relationship between self-harm and cannabis use is almost entirely correlational in nature.
- It is a heterogeneous literature often with conflicting findings.
- Despite its heterogeneity, there are convincing studies finding an association between cannabis use and increased risk for self-harm.
- A single study finds a causal effect between heavy cannabis use and self-harm in men.
- The same study demonstrates that cannabis use does not increase with suicidal thoughts in men and women.
- In Colorado, deaths classified both as suicide and positive for cannabis nearly tripled following the legalization of recreational cannabis.
- Higher potency cannabis is associated with higher rates of self-harm.

Highlights Box 13.2 Key Points in Treatment and Management

- Despite Americans' perception that cannabis (particularly varieties that are sold legally) is safe, there is significant evidence showing some users may experience anxiety, psychosis, depression, and self-harm.
- This perception may lead some patients to not report their cannabis use to a global query about whether they use illicit substances.
- Psychiatrists and other mental health clinicians should also not work under this misperception; cannabis use may be associated with anxiety that is

refractory to treatment, a contributor to psychosis and depression, as well as self-harm (including suicide).
- When assessing those who endorse cannabis use, it is important to understand whether the patient is using a high or low potency substance, how frequent is the use, and whether onset of the signs and symptoms of mental illness is temporally related using the drug.
- Even for those who do not misuse cannabis, its users may still be at increased risk of self-harm.
- Safety assessments regarding risk for self-harm should routinely incorporate questions about cannabis use (beyond just whether substance misuse is part of the clinical case).
- Frequent and/or high-potency cannabis use, particularly in men, should raise the index of suspicion during safety evaluations.

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