

Use of Cannabis for Physical and Emotional Pain

CARRIE CUTTLER: Hi. I'm Dr. Cuttler. I am an assistant professor in the Department of Psychology. I run the Health and Cognition Lab where we primarily look at the effects of cannabis, both chronic and acute effects of cannabis, on cognition and mental health-- and a little bit of physical health, as well. Thanks for being here, today. I'm going to talk about the use of cannabis for physical and emotional pain.

So just to give you a little bit of a brief overview of my talk, today. I'll start by giving a very brief history of cannabis. I will mention the top three reasons that people-- medical cannabis users use cannabis. I will briefly describe previous research on cannabis use and its effects on headache and migraines pain, as well as on anxiety and depression.

I'll then discuss a study that we conducted looking at the acute and long-term effects of cannabis on headache, migraine, anxiety, and depression. I will then discuss a second study we conducted in my lab examining the links between depression, anxiety, coping motives, which is just using cannabis to cope, and problematic cannabis use. And then, I will discuss a third study where we examined cannabis use as a moderator of the relationships between physical and emotional pain. Finally, I'll end by giving a brief summary. And I will propose a band-aid model of cannabis use.

So the oldest known record of cannabis use comes from a Chinese emperor named [? Shen ?] [? Nung-- ?] this handsome devil over here-- in 2727 BC. He investigated cannabis for its medicinal properties, using himself as a test subject, like good scientists did back in the days. In the second century, a Chinese surgeon used a mixture of cannabis resin and wine as an anesthetic to perform surgery. In addition to using it for medicinal purpose, the Chinese were also some of the first to report using cannabis for medicinal reasons.

Ancient Indian religious texts describe cannabis as a source of happiness that diminishes fear and anxiety. In these texts, the god Shiva is described as going to chill out under a cannabis plant after he got in a fight with his family. He apparently got a little bit hungry, and decided to eat some of this plant, and it became his favorite food.

Cannabis was not introduced to Western medicine until 1839. And at that time, it was promoted for its analgesic, so pain relieving, sedative, anti-inflammatory, anti-spasmodic, and anti-convulsive properties. And apparently, it was the treatment of choice for Queen Victoria's menstrual pain. And it was widely used as medicine in the United States in the 19th and early 20th centuries.

While cannabis was used widely as a medicine in the US in the 19th and early 20th century, the concept of smoking cannabis for its psychoactive properties was apparently brought to the US by Mexican refugees in 1910. Its use for recreational purposes then became popular among black jazz musicians and other minority groups.

And then Harry Anslinger, who was the head of the Federal Bureau of Narcotics, then led a campaign to outlaw this drug, alleging that its use led to violent crimes. I'm not always comfortable with saying this quote, but I will quote him. He is quoted as saying, "reefer makes blackies think they're as good as white men. There are 100,000 total marijuana smokers in the US, and most are Negroes, Hispanics, Filipinos, and entertainers. Their satanic music, jazz, and swing result from marijuana use. This marijuana causes white women to seek sexual relations with Negroes, entertainers, and any others."

So clearly the demonization of cannabis was steeped in racism and ignorance. And in fact, the term marijuana was used intentionally by Harry Anslinger in order to associate the drug with Mexicans in a contempt to stigmatize it. In the late '30s-- and this is why we usually use the term cannabis, now, instead of marijuana because it's history of that term is steeped in racism.

So in the '30s, newspapers were filled with stories of "killer weed" and reefer madness was in full swing. In 1937, US Congress passed the Marijuana Tax Act, which banned its use in medicine and outlawed it as a dangerous narcotic. And as a result, research was effectively terminated for the next 20 to 25 years. And this is why we know so little about the drug.

Cannabis is presently still considered a Schedule I drug in the United States. Schedule 1 drugs are considered to be the most dangerous drugs with no recognized medical benefits and a high risk of abuse and dependence. Clearly, it has no business being scheduled that way. Nevertheless, presently 33 states and the District of Columbia have legalized cannabis for medicinal purposes and 10 states and DC have legalized it for recreational purposes. I'm Canadian. Canada federally legalized cannabis in the fall of 2018. It's one of the first countries to legalize cannabis federally-- second.

And just as a fun fact, \$1.5 billion worth of recreational cannabis was sold in Washington state in 2017. That translates to about \$4 million of cannabis products sold every day in our state alone.

We recently conducted a large scale survey of over 1,400 medical cannabis patients. We asked them why they use cannabis. And the top three reasons that they reported using cannabis was for pain, anxiety, and depression. More specifically, 60% reported using cannabis for pain, 36% for headaches specifically. 58% reported using cannabis to manage anxiety, and 50% reported using it for depression, even though most states do not recognize emotional pain as a legitimate reason for medicinal cannabis.

So I'm now going to just turn to a brief discussion of results of previous research on the acute effects of cannabis on headache and migraines pain. Now, somewhat surprisingly, there's been very little research examining the efficacy of cannabis in the treatment of headache or migraine. And most of the studies that have been conducted have been retrospective in nature. So rather than examining pain before and after cannabis administration, these studies have just asked medical cannabis patients to think back to when they used cannabis to treat headaches

or migraines and report how effective they found it. There've been three retrospective studies and all three indicate that cannabis may have potential therapeutic efficacy.

So in that large scale survey of medical cannabis patients I just mentioned on the last slide, we found that they reported that after using cannabis to treat headaches, their headache severity decreased by an average of 3.6 points on a 10-point scale.

Similarly, another retrospective survey of over 100 medical cannabis patients who were diagnosed with migraine and were recommended for medical cannabis treatment in Colorado, approximately 40% of that sample reported a positive effect, with a decrease in migraine frequency from over 10 migraines per month to fewer than 5 per month. So more than a 50% reduction.

Another study found that 2/3 of cannabis users indicated a slight to substantial decrease in their use of other migraine medication after initiating medical cannabis use. These studies indicate that many people use cannabis to treat head pain and they do report positive therapeutic effects.

Nevertheless, there's only been one clinical trial. And the results of that trial reveal that nabilone-- nabilone is a synthetic cannabinoid. So-- and it's orally consumed. I think Marinol is another common word for it. But this study found that nabilone was more effective than ibuprofen, Advil, in reducing pain intensity. It also reduced intake of other analgesics and generally increased quality of life.

There have been a large number of correlational studies linking anxiety to cannabis use. And they fairly reliably show that anxiety is positively-- really not positively in a good way, but positively related to cannabis dependence and problematic use. This includes social anxiety, generalized anxiety, agoraphobia, and panic attacks have all been linked to cannabis use. So quite a large number of longitudinal studies have shown that cannabis use and cannabis dependence are related to an increased risk for subsequently developing anxiety symptoms and anxiety disorders. So suggesting that using cannabis is leading to increases in these disorders over time.

Of course, other studies have failed to find these effects, or have found that controlling for confounding variables abolishes the effects of cannabis in predicting subsequent anxiety. And still others studies have revealed evidence that anxiety diagnoses predict subsequent cannabis use or cannabis use disorder. So there's evidence for both directions of potential causality. So this latter piece of evidence suggests that maybe the anxiety is coming first and that people are using the cannabis in order to self medicate. So we have evidence for both sides.

There were two recent meta analysis and they actually converged on the conclusion that cannabis use is actually not related to a significant increase in subsequent anxiety. So a link that's a bit confusing.

There have been several studies focused on investigating the acute effects of cannabis intoxication on anxiety. And the results show that cannabis can have anxiolytic or anxiogenic effect. In other words, it can decrease or increase anxiety.

Research suggests that low doses of THC decrease anxiety, while high doses may actually increase anxiety. So THC, tetrahydrocannabinol, is the primary psychoactive ingredient in cannabis. It's the ingredient that produces, typically, the euphoric and intoxicating effects.

Research on CBD-- so CBD is the second most common phytocannabinoid, cannabidiol. And it is believed to offset some of the negative detrimental effects of THC. And consistent with that research on CBD suggests that low doses may reduce anxiety. There's one animal study suggesting that really high doses are not effective. So low doses are effective, but high doses don't have an effect-- doesn't increase it, just not very effective.

And there's also some evidence that CBD can actually reverse the anxiogenic effects of THC, that CBD can actually counteract the anxiety that can result from too much THC. So again, CBD does typically work to balance out potentially detrimental effects of THC.

Experience might also moderate some of these effects. So more experienced users may be more likely to report anxiolytic effects, that they may feel less anxiety. While less experienced, novice users may be more prone to experience sort of anxiety when they're intoxicated. Pre-existing levels of anxiety have been found to be associated with these effects. So people who have higher levels of anxiety, naturally, are more likely to have an anxiety response to cannabis than people who have lower levels of anxiety.

And I'm not aware of empirical evidence, but it certainly appears to me that people would be more likely to experience anxiety from intoxication after oral administration than after smoking or inhaling or vaping. And that's just because the effects of oral cannabis take a long time to take effect. It can take an hour or more. Problem is some people get kind of impatient. And think, oh, it's not working. So I'm going to eat a bunch more. And then, whoa, the effects really kick in a little bit too much and it's too late to do anything about that. Whereas when it's inhaled, the effects are almost instantaneous. And so people can self titrate once they've reached sort of their desired level of intoxication. So they're less likely to overdose.

There's no CB1 receptors in the brain. You can't actually die from cannabis. There's no documented cases of death from cannabis. It physiologically can not happen. An overdose of cannabis is typically an anxiety or panic attack or acute psychosis.

Turning to depression, results of research indicate that depressive symptoms are related to more frequent cannabis use, cannabis dependence, and problematic cannabis use. There have been a large number of longitudinal studies showing that cannabis use at a baseline time period predicts subsequent, so later, depression and later suicidality. So that would suggest that cannabis is causing or contributing to the depression and suicidality.

But at the same time, this effect could also be because people who've experienced adversity early on in life may exhibit a propensity to use cannabis, as well as an increased risk of developing depression. And consistent with that, several research studies have found that controlling for confounds abolishes these effects.

Other studies have found that depression at a baseline period predicts subsequent cannabis use or cannabis use disorder, suggesting that, again, they're self-medicating. And some research has actually found that cannabis users have lower levels of depression.

So a real mixed bag of research, but usually we can trust the results of meta analyses a little bit better. And when two meta analyses converge, well, that's a little bit more compelling. And there have been two meta analyses that converged on the finding that cannabis use on baseline time period is associated with an increased risk of subsequently developing depression, as well as suicidal ideation, suggesting cannabis use may exacerbate or contribute to these conditions.

Now, a bit more than a decade ago, rimonabant, which is a CB1 antagonist-- so think complete opposite effects of THC. And they tested this as an anti-obesity drug. The idea, here, is that CB1 agonists, like THC, increase appetite, right? People smoke weed, they get the munchies. And so the idea was maybe if they antagonize this system, using a CB1 antagonist, maybe that would decrease appetite. And it did. The problem was a bunch of people became depressed and suicidal and they had stopped their clinical trials.

So this suggests that blocking this system can produce depression and, therefore, the idea would be that activating this system may actually have some anti-depressant effects. There's just not much evidence for this.

So one double blind, placebo-controlled trial that was conducted in the '70s found that low doses of THC failed to demonstrate anti-depressant effects in a sample of eight patients hospitalized for depression. We do have some problems here. Eight patients. It's not a power you're going to get from this sample size. We're talking very severe depression, if they're hospitalized for it. And the marijuana in the '70s, if that was what they called a low dose in the '70s, there would be a trace amount of THC in that weed, nowadays. So, yeah, some issues.

Nevertheless, consistent with this, several medical cannabis clinical trials examining the effects of synthetic cannabinoids on other primary conditions. So these are clinical trials for things like cancer and multiple sclerosis, looking at the effects of these synthetic cannabinoids. And they measured in some of these studies depression as like a secondary outcome. Of course, a lot of people who are suffering from cancer and other conditions have some appreciable levels of depression, as well. So they measured depression as a secondary outcome.

And these studies found that synthetic cannabinoids, like nabilone and [? viximol, ?] had no significant effects on depressive symptoms that were secondary to other medical condition. Really just not very much research on the topic.

So since cannabis is so commonly used to manage symptoms of physical and emotional pain, but since very little research has really been conducted to examine its efficacy, I decided to conduct a study in order to examine whether acute cannabis intoxication significantly reduces symptoms of physical pain. And here, I focus on headache and migraine pain and/or emotional pain. And here, I'm focusing on depression and anxiety.

Second, I wanted to examine whether the reported efficacy of cannabis would vary as a function of THC and CBD concentrations. So we do have a little bit of evidence there that CBD and THC might actually matter for things like anxiety. So we wanted to look at whether different levels of THC or CBD would produce better or worse effects. We want to examine the dose of cannabis that would produce the largest change in symptoms.

And then, we also wanted to look at whether there's any long-term consequences associated with using cannabis to treat physical and emotional pain. And we did this in two ways. The first was we examined whether there is any evidence that tolerance to the medical effects would develop across time. So maybe people report really large decreases in anxiety early on, but as they become a little bit more tolerant to the effects of the drug over time, maybe it becomes a less effective drug for reducing these conditions.

And secondly, I wanted to examine whether repeatedly using cannabis to manage physical and emotional pain would increase or decrease their severity in the long term. So just looking at their baseline, before they used cannabis, symptoms and see what's happening to those over time as they keep using cannabis to self-medicate.

So we accomplish this by using an advanced statistical technique called multilevel modeling to analyze global back data from strainprint. This is a medical cannabis app that allows medical cannabis patients basically to track their symptom reduction as a consequence of using cannabis in their own environment. They don't know that scientists are using these back data, so we can pretty much trust that they're being straightforward because their goal in using this app is to try to find the strain that is producing the largest reductions in their personal symptoms.

So to use this app, they first indicate the condition or symptom that they are experiencing and about to use cannabis to self-medicate for. They then rate the severity of that symptom on a scale ranging from 0, meaning none at all, to 10, meaning extreme. Next, they indicate the THC and CBD content of their cannabis. And actually a lot of these data are pulled from Canadian-licensed producers who have good reliable data on THC and CBD.

They indicate the method of administration they're going to use. So again, are they going to use oral administration? Are they going to smoke, vape, that type of thing. They input their dose after they've used. So their dose is quantified as number of puffs or inhalation method.

And then, they re-rate their condition or symptom severity about 20 minutes after they've initiated the app. So after they've used cannabis. And because we know that cannabis has

memory impairing effects, there's a push notification that prompts them to come back and re-rate their symptom severity about 20 minutes after use.

Now, we limited this down to only the sessions involving inhaled cannabis and symptoms that were re-rated within 4 hours of use. So it pushes them and prompts them to re-rate their symptoms 20 minutes after use, but they can re-rate it five days after use. So we cut that down to four hours. And the reason we did this, and looked at inhaled cannabis four hours after use, is because-- up to four hours after use, is because we know that the effects of inhaled cannabis are going to be fairly immediate. And we know they're not going to be sustained beyond four hours. And so we just wanted to really capture that period of acute intoxication.

In total, we analyzed over 33,000 tracked cannabis sessions. A little better than eight. We had over 1,500 medical cannabis patients use the app, collectively, more than 15,000 times to track changes and headaches severity after using cannabis. We had over 800 use the app more than 10,000 times to track changes in migraine severity. 770 used it more 5,000 times to track changes in anxiety. And over 500 used it over 3,000 times to track changes in depression.

And here are the primary results. So the crimson bars are their symptom severity rating before using cannabis. And the gray bars are their symptom severity rating after using cannabis. What you can see is fairly consistently symptoms are reduced by about 50%. So we see a 48.5% reduction in headache ratings after cannabis use. A 53.7% reduction in migraine ratings after cannabis use. A 50% reduction in depression ratings. And a 58% reduction in anxiety ratings following cannabis use.

With respect to whether THC, CBD, and/or their interaction would significantly predict change in severity ratings, we found no significant effects of THC, CBD, or THC by CBD interactions-- we certainly had enough power to find these things, if they existed-- on the magnitude of change in headache, migraine, or anxiety severity ratings. What this suggests is that any cannabis would do to reduce the symptoms by about 50%. Levels of THC and CBD really didn't seem to have any reliable effects.

However, we did detect a significant THC by CBD interaction on change in depression severity ratings. So this figure, here, is showing you-- I don't know if you can follow my mouse, but this figure here is showing you that cannabis that is low in THC and high in CBD produced the largest change in depression, and high THC, high CBD less so.

We also found very little evidence, again despite ample power, too much power, really. We found little evidence of any dose effects. All doses were related to significant reductions in headache, migraine, depression, and anxiety. The only real difference, here, was right here with anxiety. Two puffs was better than one. After that, no significant gain from smoking up to 10 or more puffs, did not really seem to produce any larger benefit. And what that suggests is that low doses, micro dosing, appear to be sufficient to reduce physical and emotional pain. A couple hits seems to be sufficient.

So turning to some of the longer term effects, first, we explored whether tolerance to the effects of cannabis on reducing physical and emotional pain would develop over time. And the results revealed no change in the magnitude of reductions in headache, anxiety, or depression across time or across cannabis use session. So we saw equal 50% reductions, basically, the first time they used cannabis and tracked it with the app to the 1,000th time they used cannabis and tracked it with the app. We saw very similar reductions. Suggesting that people were not developing tolerance to the therapeutic effects of cannabis, completely contrary to our expectations. And this is science. I don't have directional hypotheses for a reason because it always blows up in my face.

Contrary to our expectations, we found a significant increase in the perceived efficacy of cannabis in reducing migraine severity across time and cannabis use sessions. So this suggests that as people continue to use cannabis to treat their migraines, it becomes more effective. This is great, if it's true, because many headache and migraine sufferers do develop tolerance to the effect of their medications over time. In fact, there's this, like, headache rebound effect that can happen, where they'll start having more headaches because of the medication they've been taking.

Now, at the same time, as much as I would like that to be true, I wonder if this is an artifact, kind of a statistical artifact, arising from the fact that maybe people who find cannabis to be more effective in reducing migraine, are more likely to use it more and for longer periods of time. And so that is another way of interpreting that finding because this is not something we've manipulated directly.

Finally, we examine whether baseline symptoms would change as a function of using cannabis to treat physical and emotional pain across time. And the results revealed no effects of time or cannabis use sessions on baseline symptoms of headache, migraine, or anxiety. What this suggests is that using cannabis repeatedly across time to treat these conditions does not improve them or exacerbate them in the long term. Instead these symptoms appear to just be maintained at a fairly steady rate across time. Whoops. Whoops.

In contrast, we found that baseline symptoms of depression significantly increased across cannabis use treatment sessions. This suggests that regular use of cannabis to self-medicate for depression may exacerbate depression in the long term. This is consistent with the results of those meta analyses that shows that cannabis use did not really predict anxiety, future anxiety, but the cannabis use did predict future depression.

And it also makes sense at a neurobiological level. So we know that activating the endocannabinoid system, sort of our internal system that THC binds to, we know activating this has anti-depressant effects through animal models and what not. Habitual use of cannabis could cause that system to become desensitized, which might then make people more vulnerable to depression.

So clearly medical cannabis patients use cannabis to treat physical and emotional pain. And it does seem to work in the short term, but not the long term. And using cannabis to manage depression may actually exacerbate it over time. We wanted to know whether there were other potential consequences of using cannabis to cope.

So previous research indicates that chronic recreational cannabis users most commonly report using cannabis to cope with problems and negative affect, stress, problems, negative affect. And so for this next study, we set out to examine whether there's links between depression, anxiety, and problematic cannabis use, as well as to determine whether these links might be mediated by coping motives.

So we wanted to examine whether symptoms of depression and anxiety are related to using cannabis to cope. And whether using cannabis for that purpose is, in turn, associated with problematic cannabis use. And by problematic cannabis use, I just mean that people are reporting that their cannabis use is creating problems in their life. So maybe they're getting in fights with their family because their family doesn't want them to use cannabis, but they still do. Maybe they're going to work high and getting reprimanded for it. Maybe they've run into legal difficulties. So they have a DUI or something like that.

We recruited about 420 cannabis users in the psychology subject pool. I think it was like 423, but 420 seemed a better number. And we had them complete an online survey that contained measures of cannabis use. Specifically, we were measuring their motives for cannabis use, so why are they using cannabis, specifically interested in coping motives, using it to cope. We measured the problematic cannabis use, again, problems associated with use. We measured the frequency, quantity, age of onset of use. And we also measured depression and anxiety.

We used a Hayes PROCESS macro for SPSS to test a series of mediation models. So some fancy stats. We want to examine whether coping motives would mediate the relationship between anxiety and cannabis problems, as well as between depression and cannabis problems. And the results show that depression and anxiety were indeed related to more cannabis problems. So increases in depression and increases in anxiety were associated with reporting more problems stemming from cannabis use.

Further, both anxiety and depression were related significantly to coping motives. So people with depression and anxiety are more likely to use cannabis to cope with their negative affect. All of this is just obvious, yes? But not really documented.

Finally, the mediation model revealed that coping motives mediated the relationship between anxiety and cannabis problems, as well as the relationship between depression and cannabis problems. So these results indicate that increased levels of anxiety and depression are associated with using cannabis to cope with negative affect. And using cannabis for that purpose is related to increased problems with cannabis.

So now, we have evidence that use of cannabis for anxiety and depression may maintain anxiety and exacerbate depression. And here, we're seeing that using cannabis to cope with negative affect may actually increase problematic use.

The last study I'll discuss was conducted to examine whether cannabis use is related to pain, depression, and anxiety in patients with opioid use disorder. Secondly, we sought to examine whether frequency of cannabis use would moderate the relationship between pain intensity and depression and anxiety in these patients. So what effects cannabis use would have on these specific relationships.

And I predicted the exact opposite of what we found once again. For this study, 150 adults receiving medication-assisted treatment for opioid addiction completed a survey measuring pain intensity, depression, anxiety, cannabis use, and self-efficacy, which refers to one's confidence in his or her ability to manage his or her symptoms.

The sample demonstrated very high rates of cannabis use. Almost all of them had used cannabis at some point in their life. Over half of them had used in the past month. And nearly a third were, what I would refer to as a near daily user. A daily or near daily user, using 20 or more times in the past month.

The sample also reported very high rates of physical and emotional pain. So 60% were experiencing major depression. 63% were experiencing anxiety, clinically significant levels of anxiety. And 58% percent had a chronic pain diagnosis. Somewhat consistent with some of the very first results I told you from our sample of 1,400 medical cannabis patients, 60% were reporting using it for pain and about 50% were reporting using cannabis to manage anxiety.

So this is just basically a correlation table showing correlations between all of these variables. Surprisingly, we did not find-- science is always surprising. We did not find significant relationships between cannabis use, pain, depression, and anxiety in this specific sample. Could be a range issue, just that there were so high levels of all of these things. I'm not sure.

Cannabis use was only associated with reduced emotional self-efficacy. This indicates that cannabis use is associated with diminished confidence in the ability to manage negative emotional states. Cannabis users are less confident in their ability to handle these emotional states.

We see expected associations between physical pain and emotional pain, here. Of course, great correlation between depression and anxiety, as you would expect. We also see that depression and anxiety are also both related to reduced emotional self-efficacy. Again, they feel less confidence in their ability to manage their negative emotional states. Pain intensity was not related to that.

This is a depiction of the results of moderation analyses, where frequency of cannabis use was examined as a moderator of the relationship between physical and emotional pain. And the

results showed that cannabis-- the frequency of cannabis use was a significant moderator of these relationships. I thought it would be the exact opposite of this, which is why I said and to do this analysis, I thought, well, you know, people say cannabis might help people who have opioid addiction to taper off the opioid drugs and whatnot. And so I thought maybe it would be helpful. But no, we didn't find that.

So just-- I'm going to draw your attention to the blue lines first. The blue lines are representing people who don't use cannabis at all. So a the very small minority of people who don't use cannabis at all. And what you see here is a fairly flat line, indicating really not much of a relationship between physical and emotional pain. So very low relationship between physical pain intensity and anxiety and physical pain intensity and depression.

And then, here, as we move up-- so orange are using a bit. Pink are using more. And green are our daily, near daily users. And you can see these slopes gets steeper and steeper, with the green line represents the steepest slope, representing the strongest relationship between physical and emotional pain, suggesting cannabis users demonstrate a bigger link between these two things.

Now, if you recall, though, cannabis use was associated lower self-efficacy. So we conducted additional moderation analysis, this time entering in self-efficacy scores into these moderation models as covariance. And when cannabis users' diminished levels of self-efficacy were statistically controlled, frequency of cannabis use was no longer a significant moderator of the relationship between physical and emotional pain. These results suggest that relying on cannabis to manage symptoms may undermine users confidence in their own ability to manage their symptoms on their own, independent of cannabis. So in this way, cannabis can become like a crutch. People start to rely on it as an external way of handling their emotional pain instead of relying on [? them self. ?]

So in summary, medical cannabis patients commonly use cannabis to treat pain, depression, and anxiety, and recreational users also commonly use cannabis to cope with negative affect. The first study I showed just indicated that acute cannabis intoxication reduces symptoms of headache, migraine, depression, and anxiety by about 50%. But these symptoms are maintained in the long term. And depression may actually be exacerbated by long term regular use of cannabis to self-medicate.

The second study indicated that another problem with using cannabis to cope with negative affect is it may increase detrimental consequences associated with use.

And finally, in the third study, I provided evidence that more frequent cannabis use may potentiate the relationship between physical and emotional pain, leading to further entanglement of these symptoms. However, this effect may be driven by diminished self-efficacy in cannabis users. Again, people might come to rely on cannabis, and no longer trust their own intrinsic ability to manage their pain on their own.

Collectively, the results I've discussed indicate that cannabis is serving as a band-aid, in that it's temporarily masking the symptoms, but it's not addressing the root core issue underlying these problems. So people experiencing physical or emotional pain may turn to cannabis and find it's effective and it does reduce their symptoms in the short term, and that becomes negatively reinforcing. Their pain goes away, they want to keep doing this.

Problem is this doesn't decrease their symptoms in the long term. It only maintains or exacerbates them or entangles their symptoms in the long term. So when the high wears off, the symptoms return. They need to use more cannabis, eventually increasing their risk for becoming dependent on cannabis.

As such, people experiencing anxiety and depression should seek out cognitive behavioral therapy to learn how to effectively reduce their symptoms in the long term. They need to be-- should be working toward a solution that are getting at the root core issue underlying these problems.

I think anti-depressants, anti-anxiety medications are similar band-aid. Advil, Tylenol, any of that stuff, is a similar band-aid. Potentially some of those other things have worst side effects, especially anti-depressants, anti-anxiety medications, and things like this.

So there's not a long-term solution to a problem like headaches or migraines. And band-aids really do seem to be sort of our method. But for depression and anxiety, we know there's longer term solutions. Again, cognitive behavioral therapy can teach people how to change these dysfunctional thought processes and prevent them from relapse in the future. So a better longer-term solution.

And I just, finally, wanted to thank all of my collaborators. Obviously, this research is never done alone. And I have a lot of collaborators that I work with. I wanted to just quickly thank strainprint because they are the ones that provided the data for the first study. And I'd also like to thank WSU's Dedicated Marijuana Account. I've received a couple of grants from them. And this is money that comes from the excised tax dollars from the sales of recreational cannabis in our state. And I'd like to thank you.

SPEAKER: And so we do have questions.

CARRIE CUTTLER: Great.

SPEAKER: Some may have been answered throughout your theme, but the first one was the slide with the dots and the lines, they are asking, were are you implying dependency? Which I believe you ended up answering.

CARRIE CUTTLER: This one? No, not necessarily implying a dependency. I don't know. We didn't really measure cannabis dependence in that study at all. Again, my initial instinct was that

maybe cannabis use is going to help them to reduce physical and emotional pain. I thought we would find a beneficial effect in this group. And we did not.

What we found was, again, that cannabis users were just showing more entanglement in physical and emotional pain symptoms. But again, it all boiled down to self-efficacy. It was really just that the cannabis was serving as a crutch and they were no longer confident in their own ability to overcome these symptoms. So it was much more the fact that they were using cannabis as a crutch that was producing this effect than the cannabis, per se.

SPEAKER: Which is what Morgan had asked. So cannabis, essentially, substitutes coping mechanisms?

CARRIE CUTTLER: Yeah, exactly. And that is where it-- you can get into a problem. And so, yes, a lot of people use cannabis to cope, generally. Cope with stress, anxiety, negative affect, problems in life. It's their coping mechanism. And unfortunately, we repeatedly see in my research and other research that using it for that purpose is associated with more dependency. And that's because your problems don't go away. The cannabis doesn't seem to either in this state. So then they do become at greater risk of becoming dependent on it when that becomes their only coping strategy. And so people should be learning better coping strategies.

SPEAKER: OK. Is there a potential confound in the opioid-using population and the opioid use itself? In other words, was there a measurement of their current opioid use in relation to their cannabis use?

CARRIE CUTTLER: So they [?] were all [?] on medicated-assisted therapy to stop using opioids. And they would all be using opioids at pretty similar levels. So no, I don't think that cannabis and opioid use is confounded in that study.

SPEAKER: How is cannabis any worse than opiates-- he said, opiates-- for pain as a band-aid? How is cannabis any worse than SSRIs for depression as a band-aid?

CARRIE CUTTLER: [?] I'm [?] [?] not [?] [?] going to [?] say it [?] wasn't. [?] I didn't say it was. In fact, I said it might be associated with fewer side effects. The side effect becomes, again, becoming dependent on this. But, you know, we know at least benzodiazepines are way more addictive than cannabis and produce way more tolerance and dependence than cannabis. We're not saying it is worse.

And I have been called out by reviewers when I try to use this band-aid term, calling something a band-aid. And people automatically think what I mean, band-aids are bad. I'm not saying band-aids are bad. I have a six-- seven-year-old. He just turned seven. Band-aids are amazing. Like, I've placebo-wrapped a sprained ankle and he could run. It was a miracle. So and-- I'm not saying it's a placebo. But I'm just saying that band-aids make people feel better. I'm just saying it's temporary. It's masking. It's not-- it's not a treatment. You're not treating the root core

underlying issue, so much as you are just a temporary sort of reprieve or masking of the symptoms.

And yeah, people can work on their SSRIs and it has like a longer term effect. But you don't necessarily want to be going to work high all the time and maintaining that high all the time. So-

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SPEAKER: Could there be a biological basis for the entanglement?

CARRIE CUTTLER: No. And again, I think the intent-- not that I can think of. And again, the entanglement is more to do with using cannabis to cope and the issues with self-efficacy. Again, once we controlled for self-efficacy all of those effects went away. We no longer saw that cannabis moderated that relationship. We didn't see more entanglement in cannabis users than non users, when we controlled for their emotional self-efficacy. And again, that just suggests that people are relying on it. It's becoming a crutch. And then, that is potentially the reason why those symptoms are getting all entangled is because that's their crutch. They don't have another coping mechanism, potentially.

SPEAKER: Is there a possibility that low efficacy can lead to higher cannabis, while not necessarily being caused by it?

CARRIE CUTTLER: Yeah, yeah, absolutely. And it is all correlational. That's a very good point. Yes, absolutely. It could be that because people don't feel confident in their own-- I honestly never thought of that. So good for you. And I'm usually really good on correlational studies and thinking that through. But yeah, absolutely. It's possible that people who have less confidence in their own intrinsic ability to deal with these things then turn to an external source like cannabis. Absolutely. Absolutely.

SPEAKER: My husband recently quit smoking marijuana, three weeks ago. He's been placed on Zoloft to manage his depression symptoms. If you consider this medication a band-aid, how or where can I get him in to CBT treatment. He doesn't want to use pills as a way to cope in the long term. I was under the impression he had a chemical imbalance, which meant he needed to use this medication forever. Do you have any advice for this situation?

CARRIE CUTTLER: So cognitive behavioral therapy can be administered by a registered licensed clinical psychologist. I don't know where you are. If you're in Pullman, [? Laurie ?] [? Smith ?] [? Nelson ?] is one person. But basically, you just want to do a Google search for a registered licensed clinical psychologist. And they are trained in administration of CBT treatment. Typically, psychiatrists and medical doctors are giving these prescriptions for medications. But psychologists are trained to give therapy.

And some research, anyway, on the efficacy of CBT vs. anti-depressants and anti-anxiety medications shows that both are equally effective in the short term, but the long-term effects

of CBT-- there's better long-term effects of CBT than medications. That when you stop taking the medication, the symptoms are more likely to return than when you stop the therapy.

And CBT is not Freudian psychoanalysis. You're not doing this for 20 or 30 years. We're talking you know 8, 10, 12 sessions type thing in order to teach a person how to identify their dysfunctional negative thoughts and correct them. OK?

SPEAKER: Perfect. And would you say a person using cannabis or CBD for headaches slash migraines could develop dependency? And then, also, anyone using cannabis can develop dependency? So we've already answered--

CARRIE CUTTLER: It sure could. I mean, it doesn't have massively high, like, addiction rates or dependency rates. It's actually fairly low, like 9% of people seem to become kind of addicted to cannabis or dependent on cannabis. So it's not, like, massively high rates or anything. But, yeah, people who use it more regularly-- and, again, like I was saying, people who use it to cope, specifically, seem to be more likely to go that route. But lots of people also use [it without developing dependence].

SPEAKER: So there's some thank yous. Let's see. Cannabis can have protracted withdrawal symptoms. There is a common misconception that it does not cause physical withdrawal symptoms, which is false.

CARRIE CUTTLER: So yeah, the withdrawal symptoms most commonly reported are irritability. And again, this is because cannabis has these effects on moods that are generally positive. And so when you take it away, then you're going to have the negative effect on moods. Irritability is one. Sleep problems is a huge one because cannabis-- another reason cannabis is very commonly used for sleep problems. And loads of people report that it helps them sleep. So then, when people stop using cannabis, they can have sleep problems. There can be issues with appetite as a withdrawal symptom, as well. People report reduced appetite.

But it's not like alcohol, right. It's not like heroin. You're not going to go into this, like, I have a severe flu. You're not going to have the shakes, right. None of that type thing. We're talking some irritability, some problems with sleeping, maybe a little bit less appetite. I have a paper out recently on acute effects and withdrawal effects, if anybody is interested. And again, generally withdrawal symptoms are mild compared to other drugs, and, yeah, you can't die from it. Mild compared to other drugs. And they last as long as two weeks? A week or so.

SPEAKER: What do you think the future of legalization will be for the federal government?

CARRIE CUTTLER: We are going that way. It will eventually be federally legal. Depending on what happens with the government, I think it will eventually become federally legal. And I think that Canada is currently a really nice experiment just happening up north that we can sort of watch and observe. And then, decide from there.

I think that right now what we have is a mini experiment with 10 states plus DC serving as the experimental group. And other states, serving as the control group. And we're finding all sorts of things that we didn't really expect to find. We're finding youths rates don't seem to be actually increasing. That was the biggest concern, is that all these adolescents are going to start smoking pot all the time. That's not happening. In fact, a regulated market can help control that a little bit better.

We're finding higher clearance rates, that police are actually solving more crimes in Washington state than before cannabis was legalized because their time is not all tied up with these minor cannabis offenses and whatnot.

So yeah, time will tell. I think, eventually, yeah, it will become federally legal. And also, once they realize the tax money that's involved in this, I don't see how they're not going to be. I mean, four million dollars a day in Washington state? That's insane. And the tax dollars coming off that are huge.

SPEAKER: All right. Well, thank you very much. I appreciate your time and your questions. Thank you.