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# Determining Manager Detection Confidence and Their Desire for Cannabis Impairment Detection Training

**Steven Boyd, CSP, CIT, OHST, SMS**  
Capitol Technology University (USA)

**Drew Hinton, PhD, CSP, CHMM, EMT**  
Capitol Technology University (USA)

## Abstract

This article examines the differences between federal, state, and jurisdictional recreational cannabis laws and how these differences are creating challenges and risks for organizations. Research for this article was conducted by surveying 118 managers and supervisors from varying businesses across the U.S. to gauge their perspective on training needs when determining and confronting potential cannabis impairment in the workplace. Realizing managers and supervisors may not be knowledgeable of rapidly evolving state, district and jurisdictional cannabis laws, a brief training was provided to managers and supervisors, after which they were asked to answer some of the same questions to see if their responses were affected. This research revealed that managers and supervisors overwhelmingly want impairment detection training, access to Subject Matter Experts (SME's), and resource material when needing to determine potential cannabis impairment in the workplace. This research also revealed that managers and supervisors have a very low confidence level in their ability to detect cannabis impairment in an employee. Gender plays a role in manager and supervisor stress level and desire for access to resource material to detect cannabis impairment. Organizations that review and amend their drug and alcohol policies to align and comply with changing cannabis laws, educate employees on the dangers of working while impaired, and develop robust cannabis impairment detection training for managers and supervisors will be

best positioned to comply with state, district and jurisdictional law, and most importantly, keep their employees safe within the workplace.

*Keywords:* Cannabis Impairment Standard, Cannabis Detection Training, Workplace Safety and Cannabis

## 1. Introduction

As states, districts, and jurisdictions across the U.S. continue the trend of legalizing recreational cannabis, thus enacting laws prohibiting and or limiting employers' ability to test for cannabis use, organizations are faced with challenges as to how to keep their employees safe in the workplace. Managers and supervisors are the leaders in organizations that carry out and enforce drug and alcohol policies, yet there is a lack of studies that gauge manager and supervisor perception and/or feelings towards cannabis detection training needs and their comfort level when needing to confront employees for potential cannabis impairment in the workplace.

### 1.1. Statement of the Problem

The aim of this study is to help provide guidance to organizations as to the amendment of their drug and alcohol policies, and to determine if managers and supervisors feel education and training should be a strong component of organizational drug and alcohol policies to ensure employee safety. This study addresses the following:

- Would managers and supervisors' welcome or want to participate in cannabis impairment training?
- Would managers and supervisors feel stress or be uncomfortable when needing to determine potential cannabis impairment in an employee?
- Do managers and supervisors feel confident in their ability to detect cannabis impairment in an employee?

The answers to these questions will help organizations when they amend their drug and alcohol policies pertaining to cannabis use. Cannabis is currently illegal at the federal level in the U.S. (see Appendix E). Since 2012, 23 states, as well as the District of Columbia and Guam, have legalized recreational cannabis. A 2023 Quest Diagnostics study revealed that post-accident cannabis drug tests have increased each year since 2012 [1]. With increased legalization resulting in increased use of cannabis, combined with no national standard to gauge cannabis impairment, employers will need to find a way to detect cannabis impairment in an employee to ensure the safety of employees working within the workplace.

## 2. Theory

With states, districts and jurisdictions passing laws to legalize recreational cannabis, organizational drug and alcohol policies will, in most cases, require amendment to ensure they

comply with these new cannabis laws. These amendments will need to ensure compliance with the laws, while ensuring they lead to keeping employees safe within the workplace.

This research will help provide guidance to organizational leaders responsible for developing, managing and maintaining drug and alcohol policies. This research will provide an understanding of manager and supervisor sentiment pertaining to education of employees on the dangers of cannabis use in the workplace and the need for cannabis impairment detection training for managers and supervisors to ensure the safety of employees within the workplace.

### 3. Hypotheses

Several hypotheses were explored in this research.

**Null Hypothesis:** Managers and supervisors would feel more comfortable having access to a Drug Recognition Expert (DRE) or Subject Matter Expert (SME) when faced with determining employee impairment in the workplace.

**Alternative Hypothesis:** Managers and supervisors would not feel more comfortable having access to a Drug Recognition Expert (DRE) or Subject Matter Expert (SME) when faced with determining employee impairment in the workplace.

**Null Hypothesis:** Managers and supervisors will feel stress when needing to confront employees to determine potential impairment.

**Alternative Hypothesis:** Managers and supervisors will not feel stress when needing to confront employees to determine potential impairment.

**Null Hypothesis:** Managers and supervisors who receive training, and that have access to resource material on how to detect employee impairment, will feel less stress when needing to confront employees to determine potential impairment.

**Alternative Hypothesis:** Managers and supervisors who receive training, and that have access to resource material on how to detect employee impairment, will not feel less stress when needing to confront employees to determine potential impairment.

**Null Hypothesis:** Managers and supervisors will feel confident with their current level of training that they will be able to detect signs of potential cannabis impairment in an employee.

**Alternative Hypothesis:** Managers and supervisors will not feel confident with their current level of training that they will be able to detect signs of potential cannabis impairment in an employee.

**Null Hypothesis:** Managers and supervisors will feel that their organization should conduct pre-hire cannabis testing for safety-sensitive employees, regardless of if the organization is not federally required to test.

**Alternative Hypothesis:** Managers and supervisors will feel that their organization should not conduct pre-hire cannabis testing for safety-sensitive employees, regardless of if the organization is not federally required to test.

**Null Hypothesis:** Managers and supervisors will feel that their organization should conduct pre-hire cannabis testing for non-safety sensitive employees, regardless of if the organization is not federally required to test.

**Alternative Hypothesis:** Managers and supervisors will feel that their organization should not conduct pre-hire cannabis testing for non-safety sensitive employees, regardless of if the organization is not federally required to test.

#### 4. Significance of the Study

Currently, there are a lack of studies that gauge manager and supervisor perceptions of how they feel about managing cannabis impairment in the workplace. This study will allow organizational leaders to understand manager and supervisor sentiment towards managing cannabis impairment in the workplace.

This study will identify the following manager and or supervisor perceptions:

- Do managers and supervisors want access to a Drug Recognition Expert (DRE) or Subject Matter Expert (SME) when needing to determine if an employee is impaired in the workplace?
- Do managers and supervisors feel stress when needing to confront employees to determine potential impairment?
- Do managers and or supervisors that have impairment detection training and access to resource material have less stress when needing to determine impairment of an employee?
- Do managers and supervisors feel confident with their current level of training to detect cannabis impairment in an employee?
- Do managers and supervisors feel that their organization should conduct pre-hire cannabis testing for safety-sensitive employees regardless that their organization is not federally required to test?
- Do managers and supervisors feel their organization should conduct pre-hire cannabis testing for non-safety sensitive employees regardless that their organization is not federally required to test?

Understanding manager and supervisor sentiment will help organizational leaders when amending their drug and alcohol policies.

By incorporating manager and supervisor sentiment when amending drug and alcohol policies, managers and supervisors will be more receptive and motivated to implement and manage organizational drug and alcohol policies to a higher degree.

## 5. Literature Review

In order to understand how managers and supervisors might feel about cannabis impairment training in the workplace, in conjunction with the legalization of recreational cannabis within states, districts, and jurisdictions, it is necessary to explore the literature from several angles. First, this article will discuss how lack of consistent legalization and lack of cannabis impairment standards serve as the source of uncertainty and frustration for managers and supervisors. This article will then examine how legalization and cannabis impairment shows up in DUI statistics, as well as some of the physical signs of impairment that would be discussed in training. Finally, this article examines literature which discusses the issue of manager and supervisor cannabis impairment training directly.

### 5.1. Lack of Consistency and Lack of Standards Causes Significant Problems

Two major issues are significant challenges for managers and supervisors who are concerned about cannabis impairment in the workplace and changes in federal, state, and jurisdictional recreational cannabis laws. The first major challenge is the complete lack of consistency, from state to state, in cannabis laws, combined with the reality that cannabis is still a federal Schedule I drug and thus illegal. The second major challenge, stemming from the first, is that this means there is a complete lack of a nationally recognized cannabis impairment standard, and very little understanding of cannabis impairment in general. These two issues are extremely relevant to the research at hand.

With several states at various levels of legalization of medicinal and/or recreational cannabis, companies which cross state borders are particularly challenged to adhere to appropriate laws and treat their employees fairly. To illustrate this issue, DISA, a third-party administrator that offers safety and compliance solutions for businesses, publishes a map regularly which lists the status of cannabis legalization across the country, seen below [2]. According to DISA, there are currently only four states within the U.S. that cannabis is currently fully illegal, and they are: Idaho, Wyoming, Kansas, and South Carolina. But other variants include:

- Cannabis is fully legal and decriminalized.
- Medical cannabis is legal and decriminalized.
- Medical cannabis is legal but not decriminalized.
- Cannabis is fully illegal and decriminalized.
- CBD is legal but not decriminalized.
- Cannabis is fully illegal and not decriminalized.

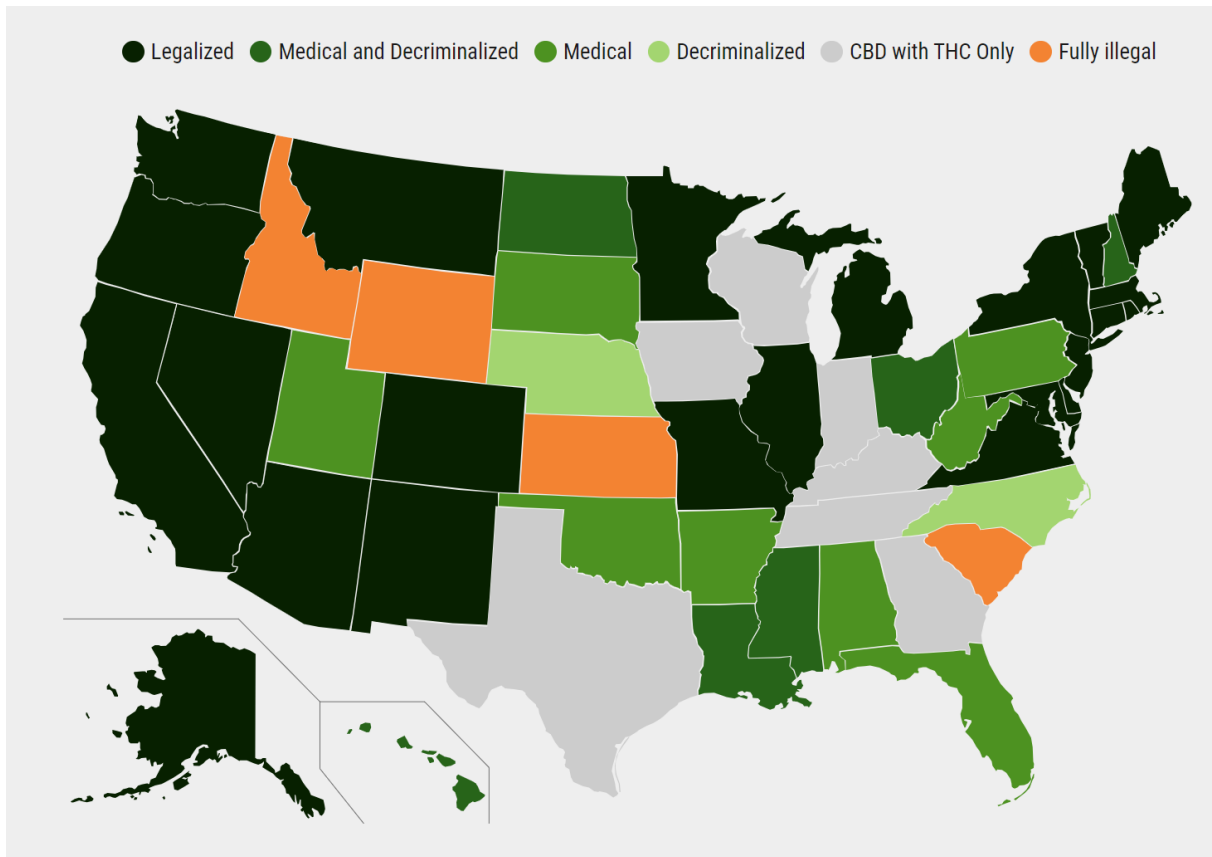


Fig. 1. Source DISA Marijuana Legality by State Map [2]

These varying state laws can create confusion for businesses operating within the U.S., and especially if an organization operates in multiple states within the U.S. Additionally, cannabis laws are changing rapidly, and several states have recreational cannabis on the ballot where voters will be deciding if cannabis should be legal in their state. The constantly shifting nature of cannabis legalization from state to state makes it all the more important for large companies to have flexible policies which consider managers' and supervisors' opinions to maximize buy-in.

The other major challenge for managers and supervisors handling cannabis-related issues is that there is a complete lack of a nationally recognized cannabis impairment standard. Little research has been done on the impairing effects of cannabis on the human body. This is mostly due to cannabis being classified as a Schedule I drug by the Federal Government and the need for federal licenses to obtain, store and use cannabis for research purposes. What is currently known is that when a person uses cannabis, the level of cannabis detected in their system is not closely related to their level of impairment. Psychoactive effects of delta-9-tetrahydrocannabinol ( $\Delta$ 9-THC), which causes impairment, begin immediately after smoking cannabis and typically reach peak levels within 30 minutes, with impairment lasting hours after last ingestion e.g., approximately 4-6 hours [3].

Current cannabis testing methods can detect cannabis within a person's system within minutes after smoking cannabis to several weeks after use. Testing levels peak almost immediately after ingestion and then drop off rapidly. It has been reported that test levels of cannabis can drop as

much as 80-90 percent from peak testing levels within 30 minutes from last ingestion. This means that a person could be impaired by cannabis but tested at a low level. Conversely, a person could test positive days to weeks after cannabis ingestion but would not be impaired. Current testing methods do not allow for a reliable correlation between when cannabis was consumed to actual impairment. Current testing methods are a great indicator that a person has consumed cannabis, but a poor indicator of the length of time since cannabis was consumed [3].

Due to limited research and current testing methods, there is currently no nationally recognized cannabis impairment standard to indicate impairment, like that of Blood Alcohol Concentration (BAC). This makes issues of pre-employment testing complex, and also makes impairment testing impossible. As a result, training for managers and supervisors to see the side effects of impairment is the current best option for managing impairment issues in the workplace while also adhering to state laws regarding cannabis-related workplace discrimination (see Appendix D).

Concerns about these two challenges have been voiced for over a decade. A 2015 report published in the *Workplace Health & Safety Journal* discussed the difficult position employers were in when caught between federal laws prohibiting cannabis use and state laws that have legalized cannabis. This was an early example of scholars noting that there was currently no nationally recognized cannabis impairment standard, meaning that the detection of cannabis metabolites in an employee's system could not indicate acute cannabis impairment and would be inadequate to prove impairment [4].

## 5.2. Recreational Cannabis Legalization and Increased Safety Issues

For many managers and supervisors, understanding the real-world impact of cannabis impairment could save lives. There is a clear correlation between cannabis legalization and a decrease in the public's ability to operate heavy machinery: vehicular accident rates increase with legalization. These phenomena can be best explored in Colorado and Washington, where legalization was earliest and thus the window for gathering cannabis-related data is the longest. Driving accident records provide insight into the effects of cannabis use on individuals operating heavy machinery, depending on reflexes, and utilizing decision making skills.

In November of 2012, voters passed Colorado Amendment 64, which led to recreational legalization in December 2012 and state-licensed retail sales by January 2014. A study from the Colorado Division of Criminal Justice conducted in 2021 revealed that cannabis use, identified by Colorado State Patrol Officers in DUI events, increased from 12% in 2014 to 31% in 2020. Citations issued for strictly cannabis DUI events increased from 6.3% in 2014 to 8.7% in 2020. Citations for cannabis and alcohol or other drugs increased from 5.7% in 2014 to 22.7% in 2020. Traffic fatalities involving cannabis increased 140% from 2013 to 2019 [5]. These are all significant statistics that show a concerning increase in cannabis-related safety issues.

Washington voters passed Initiative 502 (I-502) legalizing recreational cannabis in the State of Washington effective December 6, 2012. Data from the Washington Traffic Safety Commission

(WTSC) involving 6,721 drivers involved in a fatal crash from 2008 to 2017 indicates that drivers testing positive for cannabis metabolites more than doubled from before I-502 took effect. Drivers involved in a fatal crash and who tested positive for cannabis averaged 8.8% positivity rate for the 5-years prior to I-502 taking effect and 18% cannabis positivity rate for the 5-years after I-502 took effect [6].

Similarly, after the Canadian legalization of recreational cannabis in 2018, Canadian emergency room visits grew by 233%, indicating being impaired by cannabis has an effect on drivers' safety and safety of the public in general [7].

### 5.3. Seeing The Physical Impacts of Cannabis Use

It is also worth considering what some of the bodily symptoms of cannabis impairment are, to understand the issues that might be of concern to managers and supervisors in the workplace. A driving study conducted by the Iowa College of Engineering at the National Advanced Driving Simulator (NADS) in 2014 examined how alcohol and cannabis consumption affected driving capabilities. Results of the study showed cannabis and alcohol were significantly associated with impaired driving lateral control. While cannabis and alcohol affected lateral control, alcohol also affected lane departure and acceleration. It should be noted that cannabis and alcohol usage combined had an additive effect on impairment [8].

Cumulative studies from the Iowa College of Engineering from 2010-2020 have revealed acute usage of inhaled cannabis affects drivers lateral and longitudinal control of the vehicle. Their studies have also revealed that regular cannabis users who were not under the influence of cannabis exhibit slower driving speeds and steered less than participants who did not use cannabis. This exhibited behavior indicates prolonged cannabis use may affect long term driving behaviors of cannabis users [9].

In a July 2020 report by the National Institute on Drug Abuse it was reported that cannabis THC alters functioning of the hippocampus in the brain which impairs thinking, ability and ability to learn. THC also affects the cerebellum which affects balance, coordination and reaction time. These effects can create safety concerns for employees working in the workplace and especially in safety-sensitive positions that require strong motor coordination and focus [10].

In 2021, Dr. Leah Hitchcock and her team studied cannabis concentrate and its effect on motor impairment. Participants were administered cannabis concentrate and asked to perform an arm speed exercise and a leg withdrawal exercise. Participants in the arm speed exercise resulted in arm speed slowing 15% immediately after cannabis concentrate use and remained impaired one hour after use 16%. Participants of the leg withdrawal exercise resulted in leg speed slowing 6% one hour after cannabis concentrate use. Participants of the balance exercise resulted in balance decreasing immediately after cannabis concentrate use but not at one-hour post use. These results demonstrate the further need to widen the range of types of cannabis consumption and the effects of each on their own right [11].

A September 2023 CNN report demonstrated that cannabis use leads to an increased rate of vehicle crashes. Patients who were transported to the hospital and tested positive for cannabis



approximately 90% arrived at the hospital by ambulance as compared to approximately 40% of patients when no alcohol or cannabis was present. The report also noted that the severity of crashes, and the need for longer, more intensive treatment, increased with cannabis presence. After the Canadian legalization of recreational cannabis in 2018, Canadian emergency room visits grew by 233% indicating being impaired by cannabis has an effect on drivers' safety and safety of the public in general [7].

#### 5.4. Current Recommendations and Standards of Manager and Supervisor Training

There has been interest in, and recommendations for, manager and supervisor cannabis impairment training for years, even before cannabis legalization gained momentum in the US. A 2015 report published in the *Workplace Health & Safety Journal* discussing the difficult position employers are in when caught between federal laws prohibiting cannabis use and state laws that have legalized cannabis argued that manager and supervisor training was the best way for managers and supervisors to detect articulable signs of impairment. This report recommended manager and supervisor training focused on detecting behavioral change and instructed on how to document changes in employee behavior. The report argued that, when employers trained managers and supervisors on how to detect signs of cannabis impairment, they could use physical tests as a backup, rather than relying on them when there was still a lack of impairment testing standards [12].

In May and June of 2020, the National Safety Council (NSC) conducted a survey of 350 human resource managers, managers and safety professionals that worked for U.S. employers with 50 or more employees. Of the 350 survey participants 116 were identified as managers. 87% of respondents indicated a need for manager and supervisor impairment training. 60% of respondents indicated they felt they were able to detect impairment in an employee. Survey respondents were asked what they believe were anticipated barriers to implementing manager and supervisor impairment training. The top two barriers identified were cost of training and time required for training.

Survey participants were asked what they believe the benefits would be for implementing manager and supervisor impairment training. The top two benefits identified were manager and supervisor increased confidence and increased health and wellness of employees.

The National Safety Council survey revealed that most managers and supervisors feel impairment detection training is needed and welcomed. They also feel training will have an impact on reducing injuries in the workplace [13].

The National Safety Council also recognized the need for manager and supervisor impairment detection training and developed a 60-minute e-learning course for managers and supervisors to raise response capabilities and confidence levels of managers and supervisors when addressing workplace impairment. Having properly trained managers and supervisors leads to an improved safety culture and brings other benefits like reduced workers compensation costs to the organization. The National Safety Council's impairment e-learning course consists of the following:

- "The importance of recognizing and responding to impairment."

- “Supervisor responsibilities when recognizing impairment.”
- “Common causes of impairment (alcohol, cannabis, fatigue, mental distress and more).”
- “Common signs and symptoms of impairment.”
- “The NSC's original six steps to respond to potential impairment.”
- “Other considerations, including human resources involvement, prevention, laws and regulations [14].”

Still, while the NSC works toward advising companies on manager and supervisor cannabis impairment training, there are no national standards or national programs which offer such training. Nor is there even a significant body of literature exploring whether managers and supervisors would like such training. These questions thus spurred the research presented in this article.

### 5.5. Summary of Literature Review

Many of the challenges faced by managers and supervisors relating to cannabis impairment stem from the lack of consistency in laws from state to state, as well as a lack of cannabis impairment standards. New laws enacting employee cannabis protections are limiting employers in their ability to institute blanket cannabis testing programs, which is in direct conflict with many employers' drug and alcohol policies. These new laws will require employers to amend their current drug and alcohol policies so as not to discriminate against employees. At the same time, the physical effects of cannabis impairment are serious enough that the NSC and others recommend training for managers and supervisors: the questions that emerge from this literature relate to how managers and supervisors themselves feel about the importance of such training.

## 6. Methodology

This research required a minimum of 100 participants. In order to participate in the research, participants were required to be at least 18 years of age with no maximum age limit. Participants could be male or female, working full or part time, and having the responsibility of managing or supervising at least one direct report, all living and working within the United States. Participants could not be prisoners, vulnerable groups, nor minors. Nor could respondents be affiliated with drug or alcohol manufacturers, distributors, representatives or in any way related to family members who work in these industries. Participation in the survey was strictly voluntary and participants were not compensated in any way. Participants for the survey were recruited through email and social media e.g., LinkedIn, Facebook, and Twitter.

The research was conducted using a single electronic survey conducted through SurveyMonkey. The research results included a total of 118 participants, all of which acknowledged that they met the research population's background requirements. The survey consisted of 40 questions, with 15 questions pertaining to this study, of which five questions were asked again, after brief training and information were provided to participants. The 40-question survey, and brief training, took approximately 22 minutes to complete.

This research was designed to evaluate manager and supervisor sentiment towards training needs pertaining to detecting cannabis impairment in employees within the workplace. Questions evaluated managers' and supervisors' sentiment towards cannabis training needs, in which managers and supervisors were asked some of the same questions after brief training to determine if their sentiment would change.

The research survey started on March 20, 2023, and concluded on April 15, 2023. Participants were asked to complete the research survey to help gain an understanding of managers and supervisors' sentiment towards training needs. Organizations can use this information to amend their drug and alcohol policies to not only be compliant with state, district, and jurisdictional laws but to ensure buy-in from managers and supervisors who are tasked with managing organizational policy.

### 6.1. Data Collection Questions

Participants for this article's research study completed 10 survey questions. Four questions were geared towards developing the survey profile and six questions pertained to manager and supervisor perceptions of their comfort level in detecting intoxication, confronting employees and feeling confident in their training as it pertained to cannabis. The survey questions, which can be found in (Appendix A), were administered as follows: questions one through four required participants to choose from a set of questions to gather facts about the participants e.g., age, gender, location, and type of business in which they work.

Questions five through ten were administered using a 7-point Likert scale. The 7-point Likert scale was chosen to allow participants the ability to have a neutral position, and also account for a more accurate picture of manager and supervisor perceptions as compared to participants using a less specific 5-point Likert scale. Managers and supervisors answered survey questions, in which they then took part in brief cannabis training and sharing of resource material, and were then asked to answer question number five, seven, eight, nine, and ten again to see if the brief training and sharing of resource material influenced manager and supervisor responses.

### 6.2. Data Analysis

Significant effort was given to ensure the reliability of the data collected. Prior to taking the survey, respondents were required to acknowledge that they were at least 18 years of age and currently managing or supervising at least one employee. As respondents answered the survey questions, they were required to answer each question, or the survey would not allow them to continue. By ensuring each question was answered, this added to the validity of the data when results were compared against each other.

Data gathered from respondents in this qualitative research was analyzed using the following methods: ANOVA test to test for the mean of more than two variables and t-test to test for the mean of two variables. These two test methods were used to analyze the variance and statistical significance between manager and supervisor responses to survey questions before and after

they received brief training and access to information to educate respondents on cannabis law. The p-value of these two tests allowed for the understanding of the significance and effect on respondent outcomes before and after training. Manager and supervisor responses to survey questions post training were used to accept or reject the null hypothesis. Responses with a value of 50 percent or greater resulted in acceptance of the null hypothesis and responses with a value of 49 percent or less resulted in acceptance of the alternative hypothesis. Understanding the differences in the data identified patterns and themes of respondent sentiment. That sentiment was then compared against reviewed literature allowing for inference when developing a conclusion to this article.

## 7. Results

For this research study, 118 managers and/or supervisors were surveyed with a minimum age requirement of 18 years of age and supervising at least one employee. Initial questions related to demographic information to create the Respondents' Profile:

### Questions 1-4

1. Please indicate which grouping best represents the year you were born.

1997 - 2012	1981 - 1996	1965 - 1980	1955 - 1964	1946 - 1954
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Please indicate your gender.

Male	Female
<input type="checkbox"/>	<input type="checkbox"/>

3. Please indicate in which state you reside.

4. Please indicate which work environment most closely represents the majority of the team members in which you supervise.

Warehousing and Distribution Environment	Manufacturing Environment	Construction Environment	Office Setting Environment	Restaurant or Retail Environment
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Respondents' Profile

A total of 118 respondents participated in the survey. The vast majority were males (n = 94; 80%) and nearly half (n = 56; 47% were middle-aged adults (43 – 58 years of age). The respondents came from 28 different states, with the majority residing in Wisconsin (n = 34; 29%). Respondents worked mainly in the warehousing and distribution sector (n = 66; 56%), followed by office setting (n = 19; 16%) and manufacturing (n = 12; 10%).

TABLE I: Profile of Respondents

<b>Variable</b>	<b>Frequency</b>	<b>Percent (%)</b>
<b><i>Age group</i></b>		
18-26 years old	2	2
27-42 years old	38	32
43-58 years old	56	47
59-68 years old	22	19
<b><i>Gender</i></b>		
Male	94	80
Female	24	20
<b><i>Work environment</i></b>		
Warehousing and distribution	66	56
Office setting	19	16
Manufacturing	12	10
Construction	5	4
Others	16	14
<b><i>State</i></b>		
Wisconsin	34	29
Texas	10	8
California	7	6
New Hampshire	7	6
Iowa	6	5
Illinois	6	5
Massachusetts	5	4
Florida	4	3
Pennsylvania	4	3
Ohio	3	3
Michigan	3	3
Colorado	3	3
Minnesota	3	3
Nevada	3	3
New Jersey	2	2

Georgia	2	2
Maine	2	2
Missouri	2	2
Kentucky	2	2
New York	2	2
Arizona	1	1
Indiana	1	1
Tennessee	1	1
Kansas	1	1
Vermont	1	1
Maryland	1	1
Connecticut	1	1
Rhode Island	1	1

#### Question No. 5

*Please indicate your level of agreement with the following statement: Workplaces should give supervisors access to a Drug Recognition Expert (DRE), or the equivalent impairment Subject Matter Expert (SME), when they are faced with determining suspected impairment of an employee.*

The following figure shows that 89% managers and supervisors somewhat agree, agree, or strongly agree that having access to a Drug Recognition Expert (DRE), or the equivalent impairment Subject Matter Expert (SME), when they are faced with determining suspected impairment of an employee would be helpful. This strong agreement showed a decline of three percent to 86% after managers and supervisors were introduced with brief training and educational information. On the other hand, a slight increasing trend was shown from the calculated mean scores from pre to post training. The mean score was 5.83 ( $SD = 1.157$ ) in pre-training and 5.85 ( $SD = 1.152$ ) in post-training. However, the difference between the two mean scores was not significant since the p-value is not less than 0.05 ( $t(117) = -0.201, p = 0.841$ ) (see Table II). Therefore, the brief training and educational information did not change manager and supervisor level of agreement on giving supervisors access to a Drug Recognition Expert (DRE) when they are faced with determining suspected impairment of an employee.

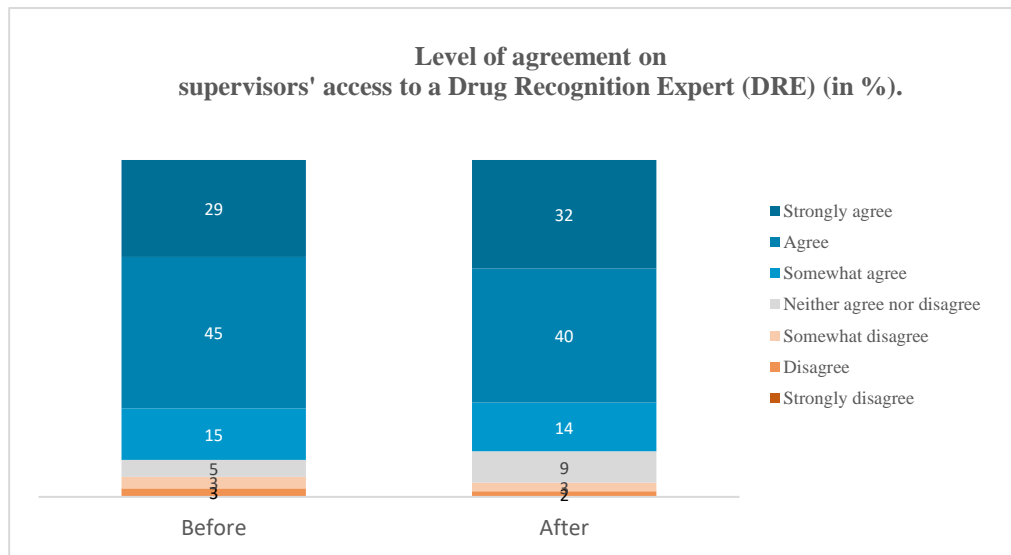


Fig. 2. Agreement Level on Access to DRE before and After Training

TABLE II: Difference in Mean Scores and Paired T-Test Before and After Training

	T3B	Mean	Std. deviation	Mean difference	Paired t-test		
					t	df	p-value
Before	89%	5.83	1.157	-0.017	-0.201	117	0.841
After	86%	5.85	1.152				

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree.*

Further analysis was conducted to see the level of agreement on giving supervisor access to a DRE across the respondents' profile. The proportions and mean scores who agreed to this statement were consistently high above 80% and above 5, respectively, across age and gender. However, this strong agreement among age group and gender did not show any significant difference, in both pre and post training.

TABLE III: Summary Statistics and Significant Differences Before and After Training

		Before						After					
						<u>ANOVA/t-test</u>						<u>ANOVA/t-test</u>	
	n	T3B	Mean	SD	statistic	p-value	T3B	Mean	SD	Statistic	p-value		
<b>Age group</b>													
<=42 years old	40	88%	5.80	1.16	1.057	0.351	90%	5.85	1.00	1.795	0.171		
43-58 years old	56	91%	5.96	1.13			86%	6.00	1.25				
59-68 years old	22	86%	5.55	1.22			82%	5.45	1.10				
<b>Gender</b>													
Male	94	87%	5.80	1.21	-0.605	0.547	84%	5.79	1.22	-1.125	0.263		
Female	24	96%	5.96	0.91			96%	6.08	0.83				

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree; SD: Standard deviation; ANOVA is used to compare mean differences between 3 groups; t-test is used to compare mean differences between 2 groups.*

Question No. 6

*Please indicate your level of agreement with the following statement: Confronting employees who are exhibiting signs of cannabis impairment, to determine if impairment testing is necessary, can be stressful.*

The following figure shows that 83% of managers and supervisors somewhat agree, agree, or strongly agree that confronting employees who are exhibiting signs of cannabis impairment, to determine if impairment testing is necessary, can be stressful. Only about 10% of managers and supervisors somewhat disagreed, disagreed, or strongly disagreed with this statement.

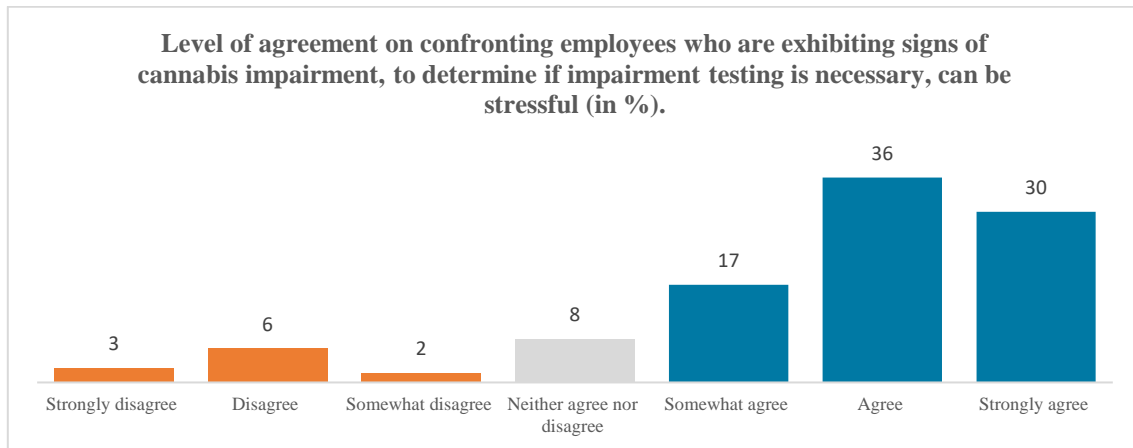


Fig. 3. Agreement Level That Confronting Employees Can Be Stressful



Further analysis was conducted to see the level of agreement on confronting employees who are exhibiting signs of cannabis impairment, to determine if impairment testing is necessary, can be stressful across the respondents' profile. The agreement levels on this statement are consistently high among age group and gender. Young adults and males tend to give higher agreement, but no significant differences were found by age group and gender.

TABLE IV: Summary Statistics and Significant Differences Before and After Training

	n	T3B	Mean	SD	ANOVA/t-test	
					statistic	p-value
<b>Age group</b>						
<=42 years old	40	88%	5.60	1.45	0.067	0.936
43-58 years old	56	79%	5.57	1.70		
59-68 years old	22	82%	5.45	1.22		
<b>Gender</b>						
Male	94	80%	5.45	1.62	-1.594	0.114
Female	24	92%	6.00	1.02		

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree; SD: Standard deviation; ANOVA is used to compare mean differences between 3 groups; t-test is used to compare mean differences between 2 groups.*

Question No. 7

*Please indicate your level of agreement with the following statement: Receiving training, and access to resource material, on how to detect articulable signs of cannabis impairment would lessen your level of stress when determining if impairment testing of an employee is necessary.*

The following figure shows that 88% managers and supervisors somewhat agree, agree, or strongly agree that having access to training and resource material on how to detect articulable signs of cannabis impairment would lessen stress level when determining if impairment testing of an employee is necessary. The proportion who agreed remained unchanged after the introduction to brief training and educational information. It is interesting to note that the proportion who strongly agreed to this statement had decreased from 31% in pre-training to 19% in post-training. This decline is also visible in their associated mean scores. The mean score was 5.85 (*SD* = 1.238) in pre-training and 5.63 (*SD* = 1.225) in post-training. This difference in mean scores between pre and post training was found to be significant ( $t(117) = 2.361, p = 0.020$ ) (see Table V). Therefore, the brief training and educational information has changed manager and supervisor level of agreement on receiving training and access to resource material on how to detect articulable signs of cannabis impairment would lessen manager and supervisor stress level when determining if impairment testing of an employee.

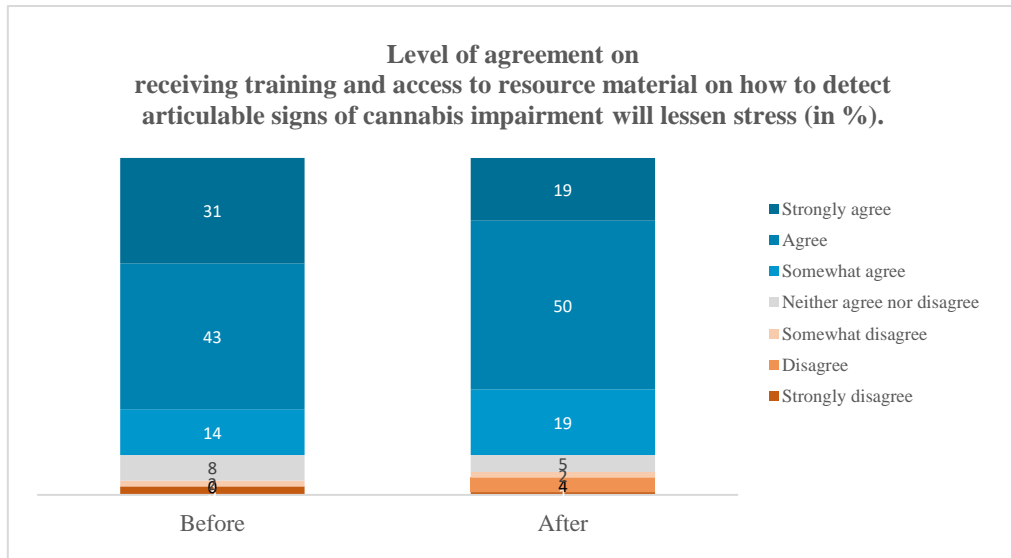


Fig. 4. Agreement Level on Access to Resource Material Will Lesson Stress

Before and After Training

TABLE V: Difference in Mean Scores and Paired T-Test Before and After Training

	T3B	Mean	Std. deviation	Mean difference	Paired t-test		
					t	df	p-value
Before	88%	5.85	1.238	0.220	2.361	117	0.020
After	88%	5.63	1.225				

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree.*

Further analysis was conducted to see the level of agreement on receiving training and access to resource material on how to detect articulable signs of cannabis impairment to lessen stress level across the respondents' profile. The proportions and mean scores who agreed to this statement were consistently high above 80% and above 5, respectively, across age and gender. However, this strong agreement among age group and gender did not show any significant difference, in both pre and post training.

TABLE VI: Summary Statistics and Significant Differences Before and After Training

		Before						After					
						<u>ANOVA/t-test</u>						<u>ANOVA/t-test</u>	
	n	T3B	Mean	SD	statistic	p-value	T3B	Mean	SD	Statistic	p-value		
<b>Age group</b>													
<=42 years old	40	88%	5.75	1.61	1.791	0.171	90%	5.83	1.38	1.454	0.238		
43-58 years old	56	91%	6.05	0.98			89%	5.63	1.07				
59-68 years old	22	82%	5.50	0.96			82%	5.27	1.28				
<b>Gender</b>													
Male	94	86%	5.79	1.32	-1.046	0.298	85%	5.53	1.33	-1.684	0.095		
Female	24	96%	6.08	0.83			100%	6.00	0.59				

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree; SD: Standard deviation; ANOVA is used to compare mean differences between 3 groups; t-test is used to compare mean differences between 2 groups.*

Question No. 8

*Please indicate your level of confidence with the following statement: With my current level of impairment training, I feel confident I can detect articulable signs of cannabis impairment in an employee.*

The following figure shows that only 9% of managers and supervisors somewhat agree, agree, or strongly agree that managers and supervisors feel confident in their current ability to detect articulable signs of cannabis impairment in an employee. The proportion who agreed to this statement had increased to 14% after managers and supervisors were introduced to brief training and educational information. This increase is also visible in their associated mean scores. The mean score was 2.86 (*SD* = 1.249) in pre-training and 3.45 (*SD* = 1.083) in post-training. The difference in mean scores between pre and post training was found to be significant ( $t(117) = -5.881, p < 0.0001$ ) (see Table VII). Therefore, the brief training and educational information has changed manager and supervisor confidence level to detect articulable signs of cannabis impairment in an employee.

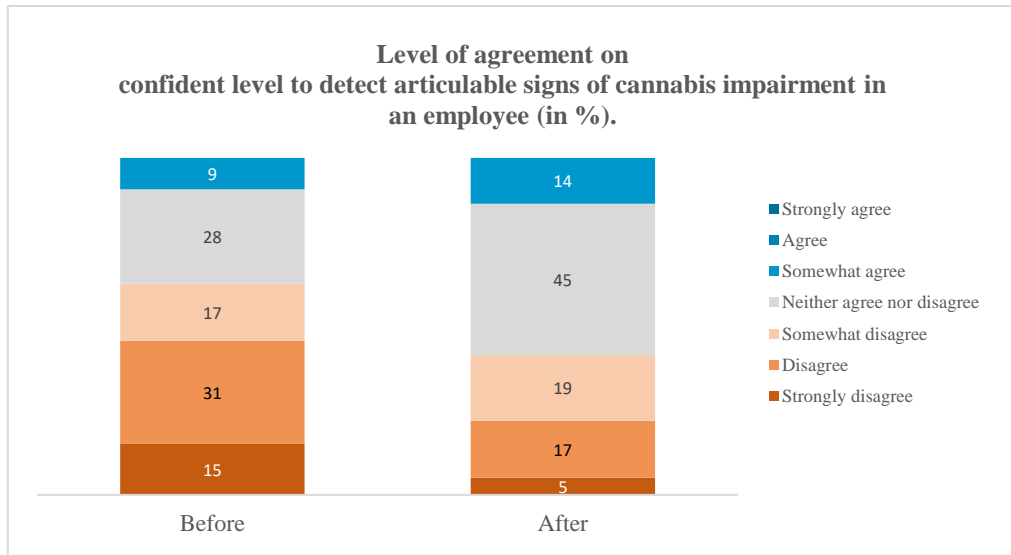


Fig. 5. Agreement Level on Confidence to Detect Cannabis Impairment

Before and After Training

TABLE VII: Difference in Mean Scores and Paired T-Test Before and After Training

	T3B	Mean	Std. deviation	Mean difference	Paired t-test		
					t	df	p-value
Before	9%	2.86	1.249	-0.593	-5.881	117	<0.0001
After	14%	3.45	1.083				

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree.*

Further analysis was conducted to see the level of agreement on feeling confident to detect articulable signs of cannabis impairment in an employee across the respondents' profile. The increasing trend in people’s confidence level after managers and supervisors were introduced to brief training and educational information not only observed by total respondents but also across age group and gender. A significant difference in managers and supervisors’ confidence level was found by age group in pre-training ( $F = 4.579, p = 0.012$ ) but not in post-training ( $F = 2.681, p = 0.073$ ) where young adults indicated higher confidence levels than middle-aged and older adults. Females appeared to have a higher confidence level than males in both pre and post training based on their mean scores, however these differences were not statistically significant.

TABLE VIII: Summary Statistics and Significant Differences Before and After Training

		Before						After					
						<u>ANOVA/t-test</u>						<u>ANOVA/t-test</u>	
		n	T3B	Mean	SD	statistic	p-value	T3B	Mean	SD	Statistic	p-value	
<b>Age group</b>													
<=42	years old	40	18%	3.33	1.16	4.579	0.012	20%	3.65	1.00	2.681	0.073	
43-58	years old	56	4%	2.64	1.21			7%	3.48	0.93			
59-68	years old	22	9%	2.55	1.30			18%	3.00	1.45			
<b>Gender</b>													
Male		94	12%	2.82	1.29	-0.631	0.529	13%	3.40	1.10	-0.891	0.375	
Female		24	0%	3.00	1.06			17%	3.63	1.01			

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree; SD: Standard deviation; ANOVA is used to compare mean differences between 3 groups; t-test is used to compare mean differences between 2 groups.*

Question No. 9

*Please indicate your level of agreement with the following statement: Organizations that hire employees to work in safety-sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing.*

The following figure shows that 65% of managers and supervisors somewhat agree, agree, or strongly agree that organizations that hire employees to work in safety-sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing. The proportion who agreed to this statement had decreased to 48% after managers and supervisors were introduced with brief training and educational information. This decrease is also visible in their associated mean scores. The mean score was 4.90 (*SD* = 1.937) in pre-training and 4.19 (*SD* = 2.027) in post-training. The difference in mean scores between pre and post training was found to be significant ( $t(117) = 4.305, p < 0.0001$ ) (see Table IX). Therefore, the brief training and educational information has changed manager and supervisor agreement level on conducting pre-hire cannabis testing for organizations that hire employees to work in safety-sensitive positions.

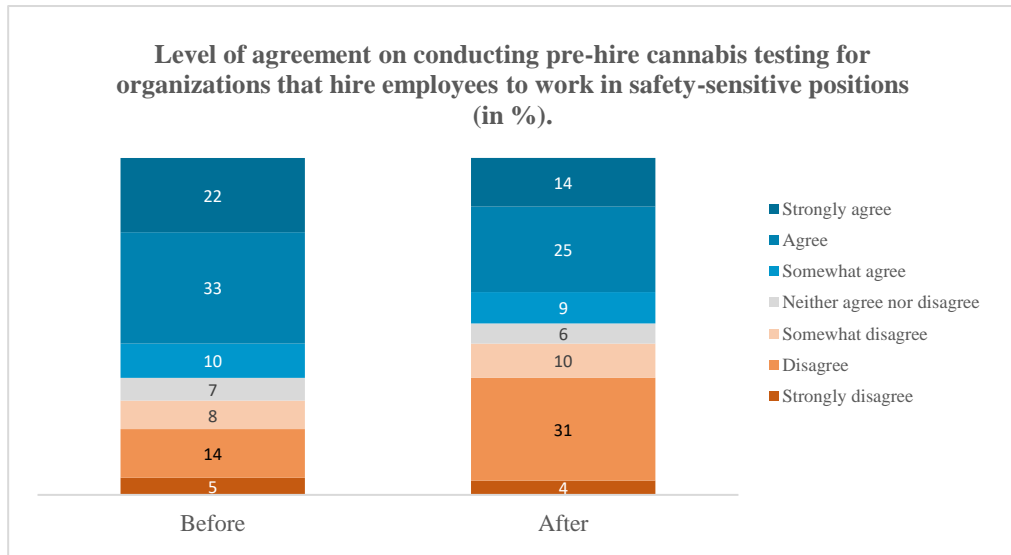


Fig. 6. Agreement Level on Conducting Pre-Hire Cannabis Testing on Safety-Sensitive Employees Before and After Training

TABLE IX: Difference in Mean Scores and Paired T-Test Before and After Training

	T3B	Mean	Std. deviation	Mean difference	Paired t-test		
					t	df	p-value
Before	65%	4.90	1.937	0.703	4.305	117	<0.0001
After	48%	4.19	2.027				

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree.*

Further analysis was conducted to see the level of agreement on conducting pre-hire cannabis testing for organizations that hire employees to work in safety-sensitive positions across the respondents' profile. The decreasing trend in agreement level towards this statement after managers and supervisors were introduced to brief training and educational information not only observed by total, but also across age group and gender. Middle-aged adults had the highest agreement level in pre-training while older adults had the highest agreement level in post-training. Young adults consistently had the lowest agreement level compared to other age groups. Males tend to respond with more agreement to this statement in both pre and post training than females. However, no significant differences were observed by age group and gender in both pre and post training.

TABLE X: Summary Statistics and Significant Differences Before and After Training

		Before						After					
						<u>ANOVA/t-test</u>						<u>ANOVA/t-test</u>	
	n	T3B	Mean	SD	statistic	p-value	T3B	Mean	SD	statistic	p-value		
<b>Age group</b>													
<=42 years old	40	53%	4.43	2.11	1.844	0.163	45%	4.00	2.09	1.708	0.186		
43-58 years old	56	73%	5.16	1.86			46%	4.05	2.08				
59-68 years old	22	68%	5.09	1.72			64%	4.91	1.69				
<b>Gender</b>													
Male	94	67%	4.94	1.94	0.419	0.676	50%	4.19	2.03	-0.036	0.971		
Female	24	58%	4.75	1.96			46%	4.21	2.04				

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree; SD: Standard deviation; ANOVA is used to compare mean differences between 3 groups; t-test is used to compare mean differences between 2 groups.*

Question No. 10

*Please indicate your level of agreement with the following statement: Organizations that hire employees to work in non-safety sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing.*

The following figure shows that 50% of managers and supervisors somewhat agree, agree, or strongly agree that organizations that hire employees to work in non-safety sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing. The proportion who agreed to this statement had decreased to 38% after managers and supervisors were introduced to brief training and educational information. This decrease is also visible in their associated mean scores. The mean score was 4.22 (*SD* = 1.970) in pre-training and 3.68 (*SD* = 1.956) in post-training. The difference in mean scores between pre and post training was found to be significant ( $t(117) = 3.381, p = 0.001$ ) (see Table XI). Therefore, the brief training and educational information has changed manager and supervisor agreement level on conducting pre-hire cannabis testing for organizations that hire employees to work in non-safety sensitive positions.

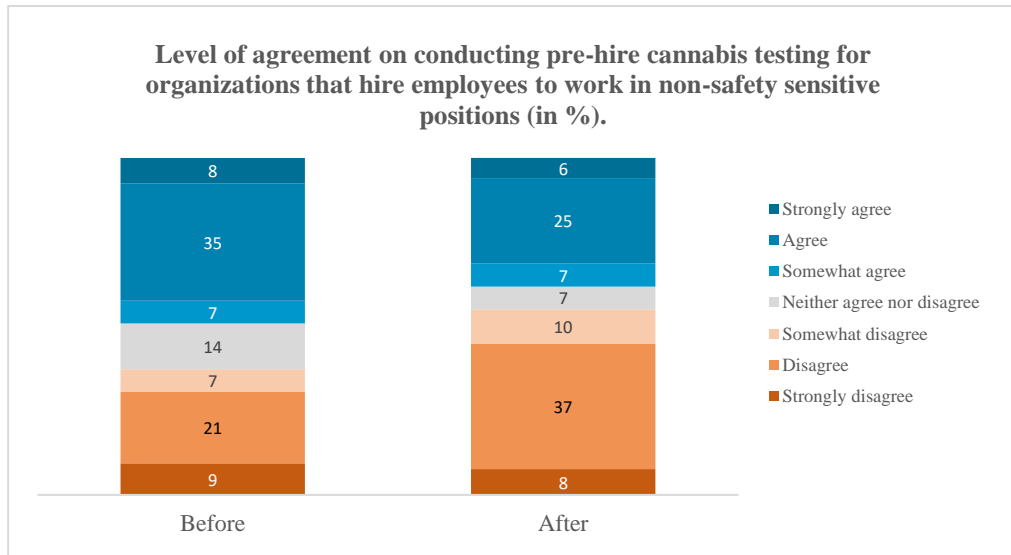


Fig. 7. Agreement Level on Pre-Hire Cannabis Testing on

Non-Safety Sensitive Employees before and After Training

TABLE: XI Difference in Mean Scores and Paired T-Test Before and After Training

	T3B	Mean	Std. deviation	Mean difference	Paired t-test		
					t	df	p-value
Before	50%	4.22	1.970	0.542	3.381	117	0.001
After	38%	3.68	1.956				

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree.*

Further analysis was conducted to see the level of agreement on conducting pre-hire cannabis testing for organizations that hire employees to work in non-safety sensitive positions across the respondents' profile. Significant differences were observed by age group in both pre and post training. Middle-aged adults showed the highest agreement level in pre-training while older adults showed the highest agreement in post-training. Young managers and supervisors consistently showed the lowest agreement level in both pre and post training. Males consistently indicated stronger agreement than females in both pre and post training, but a significant difference between males and females was only observed in pre-training only ( $t = 2.033, p = 0.044$ ).



TABLE XII: Summary Statistics and Significant Differences Before and After Training

		Before						After					
						<u>ANOVA/t-test</u>						<u>ANOVA/t-test</u>	
		n	T3B	Mean	SD	statistic	p-value	T3B	Mean	SD	statistic	p-value	
<b>Age group</b>													
<=42	years old	40	33%	3.50	1.95	4.863	0.009	25%	3.13	1.81	3.746	0.027	
43-58	years old	56	63%	4.73	1.83			41%	3.75	1.98			
59-68	years old	22	45%	4.23	2.02			55%	4.50	1.90			
<b>Gender</b>													
Male		94	53%	4.40	1.92	2.033	0.044	39%	3.77	1.98	0.967	0.336	
Female		24	33%	3.50	2.04			33%	3.33	1.88			

*T3B (top 3 boxes): total respondents who selected somewhat agree, agree, or strongly agree; SD: Standard deviation; ANOVA is used to compare mean differences between 3 groups; t-test is used to compare mean differences between 2 groups.*

## 8. Conclusions

### Question No. 5

*Please indicate your level of agreement with the following statement: Workplaces should give supervisors access to a Drug Recognition Expert (DRE), or the equivalent impairment Subject Matter Expert (SME), when they are faced with determining suspected impairment of an employee.*

Of the managers and supervisors surveyed, 86% somewhat agree, agree, or strongly agree that having access to a Drug Recognition Expert (DRE), or a cannabis Subject Matter Expert (SME) when determining cannabis impairment in an employee would be helpful.

- 90% of managers and supervisors 42 years of age and younger somewhat agree, agree, or strongly agree that having access to a Drug Recognition Expert (DRE), or a cannabis Subject Matter Expert (SME) when determining cannabis impairment in an employee would be helpful.
- 86% of managers and supervisors between 43-58 years of age somewhat agree, agree, or strongly agree that having access to a Drug Recognition Expert (DRE), or a cannabis Subject Matter Expert (SME) when determining cannabis impairment in an employee would be helpful.

- 82% of managers and supervisors between 59-68 years of age somewhat agree, agree, or strongly agree that having access to a Drug Recognition Expert (DRE), or a cannabis Subject Matter Expert (SME) when determining cannabis impairment in an employee would be helpful.
- 84% of male managers and supervisors somewhat agree, agree, or strongly agree that having access to a Drug Recognition Expert (DRE) or cannabis Subject Matter Expert (SME) when determining cannabis impairment in an employee would be helpful.
- 96% of female managers and supervisors somewhat agree, agree, or strongly agree that having access to a Drug Recognition Expert (DRE) or cannabis Subject Matter Expert (SME) when determining cannabis impairment in an employee would be helpful.

**Null Hypothesis:** Managers and supervisors would feel more comfortable having access to a Drug Recognition Expert (DRE) or Subject Matter Expert (SME) when faced with determining employee impairment in the workplace.

**Alternative Hypothesis:** Managers and supervisors would not feel more comfortable having access to a Drug Recognition Expert (DRE) or Subject Matter Expert (SME) when faced with determining employee impairment in the workplace.

**CONCLUSION = ACCEPTANCE OF THE NULL HYPOTHESIS**

#### Question No. 6

*Please indicate your level of agreement with the following statement: Confronting employees who are exhibiting signs of cannabis impairment, to determine if impairment testing is necessary, can be stressful.*

Of the managers and supervisors surveyed, 83% somewhat agree, agree, or strongly agree that they would feel stress when confronting employees to determine if they were impaired by cannabis in the workplace.

- 88% of managers and supervisors 42 years of age and younger somewhat agree, agree, or strongly agree that they would feel stress when confronting employees to determine if they were impaired by cannabis in the workplace.
- 79% of managers and supervisors between 43-58 years of age somewhat agree, agree, or strongly agree that they would feel stress when confronting employees to determine if they were impaired by cannabis in the workplace.
- 82% of managers and supervisors between 59-68 years of age somewhat agree, agree, or strongly agree that they would feel stress when confronting employees to determine if they were impaired by cannabis in the workplace.
- 80% of male managers and supervisors somewhat agree, agree, or strongly agree that they would feel stress when confronting employees to determine if they were impaired by cannabis in the workplace.

- 92% of female managers and supervisors somewhat agree, agree, or strongly agree that they would feel stress when confronting employees to determine if they were impaired by cannabis in the workplace.

**Null Hypothesis:** Managers and supervisors will feel stress when needing to confront employees to determine potential impairment.

**Alternative Hypothesis:** Managers and supervisors will not feel stress when needing to confront employees to determine potential impairment.

**CONCLUSION = ACCEPTANCE OF THE NULL HYPOTHESIS**

Question No. 7

*Please indicate your level of agreement with the following statement: Receiving training, and access to resource material, on how to detect articulable signs of cannabis impairment would lessen your level of stress when determining if impairment testing of an employee is necessary.*

Of the managers and supervisors surveyed, 88% somewhat agree, agree, or strongly agree that having access to training resource material would lessen their stress when determining if employees were impaired by cannabis in the workplace.

- 90% of managers and supervisors 42 years of age and younger somewhat agree, agree, or strongly agree that having access to training resource material would lessen their stress when determining if employees were impaired by cannabis in the workplace.
- 89% of managers and supervisors between 43-58 years of age somewhat agree, agree, or strongly agree that having access to training resource material would lessen their stress when determining if employees were impaired by cannabis in the workplace.
- 82% of managers and supervisors between 59-68 years of age somewhat agree, agree, or strongly agree that having access to training resource material would lessen their stress when determining if employees were impaired by cannabis in the workplace.
- 85% of male managers and supervisors somewhat agree, agree, or strongly agree that having access to training resource material would lessen their stress when determining if employees were impaired by cannabis in the workplace.
- 100% of female managers and supervisors somewhat agree, agree, or strongly agree that having access to training resource material would lessen their stress when determining if employees were impaired by cannabis in the workplace.

**Null Hypothesis:** Managers and supervisors who receive training, and that have access to resource material on how to detect employee impairment, will feel less stress when needing to confront employees to determine potential impairment.

**Alternative Hypothesis:** Managers and supervisors who receive training, and that have access to resource material on how to detect employee impairment, will not feel less stress when needing to confront employees to determine potential impairment.

**CONCLUSION = ACCEPTANCE OF THE NULL HYPOTHESIS**

#### Question No. 8

*Please indicate your level of confidence with the following statement: With my current level of impairment training, I feel confident I can detect articulable signs of cannabis impairment in an employee.*

Of the managers and supervisors surveyed, 14% feel somewhat confident, fairly confident, or strongly confident that with their current level of training that they can detect cannabis impairment in an employee.

- 20% of managers and supervisors 42 years of age and younger feel somewhat confident, fairly confident, or strongly confident that with their current level of training that they can detect cannabis impairment in an employee.
- 7% of managers and supervisors between 43-58 years of age feel somewhat confident, fairly confident, or strongly confident that with their current level of training that they can detect cannabis impairment in an employee.
- 18% of managers and supervisors between 59-68 years of age feel somewhat confident, fairly confident, or strongly confident that with their current level of training that they can detect cannabis impairment in an employee.
- 13% of male managers and supervisors feel somewhat confident, fairly confident, or strongly confident that with their current level of training that they can detect cannabis impairment in an employee.
- 17% of female managers and supervisors feel somewhat confident, fairly confident, or strongly confident that with their current level of training that they can detect cannabis impairment in an employee.

**Null Hypothesis:** Managers and supervisors will feel confident with their current level of training that they will be able to detect signs of potential cannabis impairment in an employee.

**Alternative Hypothesis:** Managers and supervisors will not feel confident with their current level of training that they will be able to detect signs of potential cannabis impairment in an employee.

**CONCLUSION = ACCEPTANCE OF THE ALTERNATIVE HYPOTHESIS**

Question No. 9

*Please indicate your level of agreement with the following statement: Organizations that hire employees to work in safety-sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing.*

Of the managers and supervisors surveyed, 48% somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of safety-sensitive employees when not federally required to do so and when state, district and jurisdictional laws allow for testing. This is down from 65% before brief training was offered showing that educating managers and supervisors on the lack of a nationally recognized cannabis impairment standard influenced their response.

- 45% of managers and supervisors 42 years of age and younger somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of safety-sensitive employees when not federally required to do so and when state, district, and jurisdictional laws allow for testing.
- 46% of managers and supervisors between 43-58 years of age somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of safety-sensitive employees when not federally required to do so and when state, district, and jurisdictional laws allow for testing.
- 64% of managers and supervisors between 59-68 years of age somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of safety-sensitive employees when not federally required to do so and when state, district, and jurisdictional laws allow for testing.
- 50% of male managers and supervisors somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of safety-sensitive employees when not federally required to do so and when state, district and jurisdictional laws allow for testing.
- 46% of female managers and supervisors somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of safety-sensitive employees when not federally required to do so and when state, district, and jurisdictional laws allow for testing.

**Null Hypothesis:** Managers and supervisors will feel that their organization should conduct pre-hire cannabis testing for safety-sensitive employees, regardless of if the organization is not federally required to test.

**Alternative Hypothesis:** Managers and supervisors will feel that their organization should not conduct pre-hire cannabis testing for safety-sensitive employees, regardless of if the organization is not federally required to test.

**CONCLUSION = ACCEPTANCE OF ALTERNATIVE HYPOTHESIS**

Question No. 10

*Please indicate your level of agreement with the following statement: Organizations that hire employees to work in non-safety sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing.*

Of the managers and supervisors surveyed, 38% somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of non-safety sensitive employees when not federally required to do so and when state, district and jurisdictional laws allow for testing. This is down from 50% before brief training was offered showing that educating managers and supervisors on the lack of a nationally recognized cannabis impairment standard influenced their response.

- 25% of managers and supervisors 42 years of age and younger somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of non-safety sensitive employees when not federally required to do so and when state, district, and jurisdictional laws allow for testing.
- 41% of managers and supervisors between 43-58 years of age somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of non-safety sensitive employees when not federally required to do so and when state, district, and jurisdictional laws allow for testing.
- 55% of managers and supervisors between 59-68 years of age somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of non-safety sensitive employees when not federally required to do so and when state, district, and jurisdictional laws allow for testing.
- 39% of male managers and supervisors somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of non-safety sensitive employees when not federally required to do so and when state, district, and jurisdictional laws allow for testing.
- 33% of female managers and supervisors somewhat agree, agree, or strongly agree that organizations should conduct pre-hire cannabis testing of non-safety sensitive employees when not federally required to do so and when state, district, and jurisdictional laws allow for testing.

**Null Hypothesis:** Managers and supervisors will feel that their organization should conduct pre-hire cannabis testing for non-safety sensitive employees, regardless of if the organization is not federally required to test.

**Alternative Hypothesis:** Managers and supervisors will feel that their organization should not conduct pre-hire cannabis testing for non-safety sensitive employees, when not federally required to test.

**CONCLUSION = ACCEPTANCE OF THE ALTERNATIVE HYPOTHESIS**

## Conclusions Summary

As more and more states, districts and jurisdictions across the U.S. legalize recreational cannabis resulting in increased cannabis use and impairment, coupled with the lack of a national cannabis impairment testing standard, organizations are faced with challenges on how to keep their employees safe in the workplace. This research study surveyed 118 managers and supervisors from across the U.S. and from various industries. This research revealed that managers and supervisors overwhelmingly welcome the following:

- Manager and supervisor access to Drug Recognition Experts or Subject Matter Experts.
- Manager and supervisor access to training and resource material.

This research also revealed the following:

- Managers and supervisors have an extremely low confidence level with their current level of training that they can detect cannabis impairment in an employee.
- Managers and supervisors feel confronting employees to determine potential impairment can be stressful.

It is important to note that female managers and supervisors indicated they feel more stress when confronting employees and want access to resource material and subject matter experts more than male managers and supervisors. Younger managers and supervisors did not support conducting pre-hire testing for non-safety sensitive positions as compared to older managers and supervisors.

As organizations amend their drug and alcohol policies to align with various state, district, and jurisdictional cannabis employee protection laws for off-duty cannabis use, they should strongly consider developing and implementing training for employees on the dangers of being impaired by cannabis in the workplace and robust manager and supervisor training on the detection of cannabis impairment of employees to ensure the safety of their employees in the workplace. It is advisable to conduct robust training for each group of employees at initial hire and annually thereafter.

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9. Please indicate your level of agreement with the following statement. Organizations that hire employees to work in safety-sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing.

Strongly Disagree    Disagree    Somewhat Disagree    Neither Agree nor Disagree    Somewhat Agree    Agree    Strongly Agree

10. Please indicate your level of agreement with the following statement. Organizations that hire employees to work in non-safety sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing.

Strongly Disagree    Disagree    Somewhat Disagree    Neither Agree nor Disagree    Somewhat Agree    Agree    Strongly Agree

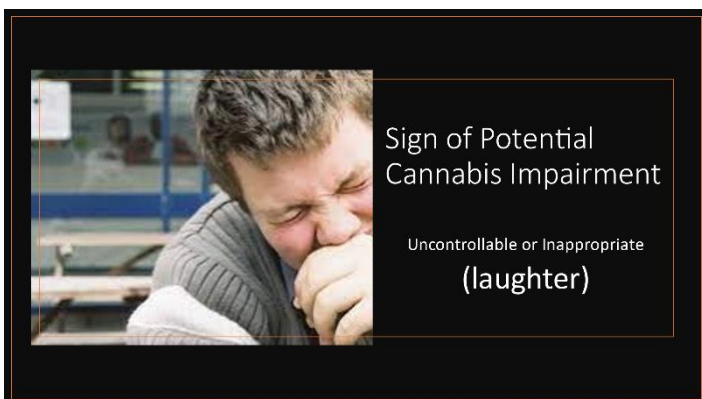
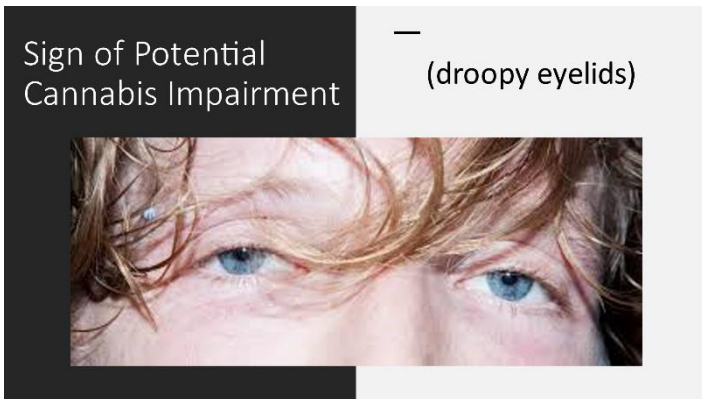
**Appendix B**


The following training and educational material were administered to managers and supervisors halfway through the survey:

**Signs of Cannabis Impairment**

The following represent examples of potential signs of cannabis impairment. It is important to note that one sign by itself does not prove cannabis impairment. If you observe an employee exhibiting multiple “articulable” signs of cannabis impairment, in conjunction with noticeable changes in employee behavior, you may decide to send that employee for reasonable suspicion testing. As the supervisor of direct reports, or a direct report, you are in the best position to identify changes in an employee’s behavior. Please take a moment to review the following examples of potential cannabis impairment:







Sign of Potential Cannabis Impairment  
(unusually talkative)



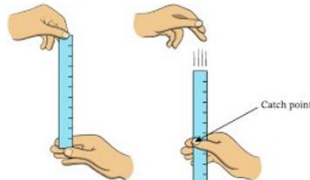
Tired Feeling Or (lethargic)

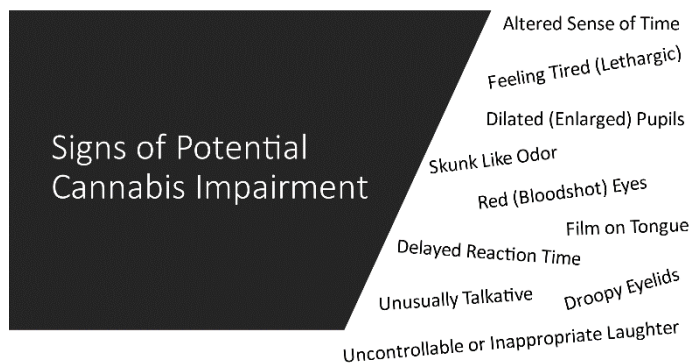
Sign of Potential Cannabis Impairment



Sign of Potential Cannabis Impairment  
(altered sense of time)

Sign of Potential Cannabis Impairment  
(delayed reaction time)





### What We Know About the Effects of Alcohol on The Human Body

The effects of alcohol on the human body have been studied for decades and associations between levels of alcohol consumption and degrees of impairment have been well established. A person's peak blood alcohol concentration (BAC) is determined by the rate and quantity of alcohol consumed, as compared to the fairly steady rate in which the body eliminates alcohol e.g., elimination on average is .015 BAC per hour. As alcohol is metabolized by the body, it does so at a fairly constant rate so that little trace of alcohol can be detected 24-hours after consumption. Numerous studies have compared the effects of alcohol on human factors such as risk taking, reaction time, decision making, attention and more. These studies have shown a direct correlation between a person's BAC and observed impairment. Due to these numerous studies, and the ability to show a direct correlation between a person's BAC and impairment, the Federal government was able to develop a national impairment standard to gauge alcohol impairment. That standard is .08 g/ml BAC (non-DOT regulated persons). Any person(s) having a BAC of .08 g/ml or higher would be considered impaired. The higher the BAC the greater the level of impairment.

### What We Know About the Effects of Cannabis on The Human Body

Little research has been done on the impairing effects of cannabis on the human body. This is mostly due to cannabis being classified as a Schedule I drug by the Federal Government and the need for federal licenses to obtain, store and use cannabis for research purposes. What is currently known is that when a person uses cannabis, the level of cannabis detected in their system is **not** closely related to their level of impairment. Psychoactive effects (which cause

impairment) begin immediately after smoking cannabis and typically reach peak levels within 30 minutes, with impairment lasting hours after last ingestion e.g., approximately 4-6 hours.

Current cannabis testing methods can detect cannabis within a person’s system within minutes after smoking cannabis to several weeks after use. Testing levels peak almost immediately after ingestion and then drop off rapidly. It has been reported that test levels of cannabis can drop as much as 80-90 percent from peak testing levels within 30 minutes from last ingestion. This means that a person could be impaired by cannabis but test at a low level. Conversely, a person could test positive days to weeks after cannabis ingestion but would not be impaired. Current testing methods **do not** allow for a reliable correlation between when cannabis was consumed to actual level of impairment. Current testing methods are a great indicator that a person has consumed cannabis, but a poor indicator of the length of time since cannabis was consumed and actual impairment. Due to limited research and current testing methods, **there is currently no nationally recognized cannabis standard to indicate impairment**, like that of alcohol BAC.

### Appendix C

The following questions were retaken by survey managers and supervisors after receiving the above brief cannabis impairment detection training.

5. Please indicate your level of agreement with the following statement. Workplaces should give supervisors access to a Drug Recognition Expert (DRE), or the equivalent impairment Subject Matter Expert (SME), when they are faced with determining suspected impairment of an employee.

Strongly Disagree    Disagree    Somewhat Disagree    Neither Agree nor Disagree    Somewhat Agree    Agree    Strongly Agree

7. Please indicate your level of agreement with the following statement. Receiving training and access to resource material on how to detect articulable signs of cannabis impairment would lessen your level of stress when determining if impairment testing is necessary of an employee.

Strongly Disagree    Disagree    Somewhat Disagree    Neither Agree nor Disagree    Somewhat Agree    Agree    Strongly Agree

8. Please indicate your level of confidence with the following statement. With my current level of impairment training, I feel confident I can detect articulable signs of cannabis impairment in an employee.

Not at all Confident    Slightly Confident    Somewhat Confident    Fairly Confident    Completely Confident

9. Please indicate your level of agreement with the following statement. Organizations that hire employees to work in safety-sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing.



Strongly Disagree    Disagree    Somewhat Disagree    Neither Agree nor Disagree    Somewhat Agree    Agree    Strongly Agree  
                                                                       

10. Please indicate your level of agreement with the following statement. Organizations that hire employees to work in non-safety sensitive positions, and when organizations are not federally required to test, should conduct pre-hire cannabis testing.

Strongly Disagree    Disagree    Somewhat Disagree    Neither Agree nor Disagree    Somewhat Agree    Agree    Strongly Agree  
                                                                       

**Appendix D**

<b>Major State/District/Jurisdiction Prohibitions on Cannabis Testing and Employee Protections.</b>	
<b>California</b>	The 2023 passage of Assembly Bill No. 2188 prohibits employers from taking adverse action against an employee in hiring, termination, or any other condition of employment for cannabis use outside of the workplace and off duty hours unless that employee works in the construction trade or cannabis use would violate federal contracts or federally designated safety-sensitive position [15].
<b>Connecticut</b>	Connecticut’s 2022 Act Concerning Responsible and Equitable Regulations of Adult-Use Cannabis (Public Act No. 21-1) prohibits employers from disciplining employees and denying employment to applicants for off-duty recreational cannabis use, unless they have a written drug and alcohol policy prohibiting off-duty recreational cannabis use and that policy is shared with current employees and applicants for employment. Connecticut employers that have a written drug and alcohol policy that prohibits off-duty cannabis use can take adverse action against employees as long as the employer clearly defined their cannabis policy, and it was shared with employees and prospective employees. The Act also allows employers to take adverse action against an employee, regardless of whether they have a policy or not, if the employee is in a safety-sensitive position like that of the Department of Transportation (DOT) [16].
<b>District of Columbia</b>	The 2023 Cannabis Employment Protections Amendment Act (C.E.P.A.A.) prohibits employers from taking personnel actions against employees that use cannabis off-premises and during non-work hours unless they are designated as safety-sensitive or federal contract statute prohibits employee cannabis use. The Act requires employers to provide notice to employees of the Act’s employee protections upon hire. The Act will force private employers to change their drug

	<p>and alcohol policies if they previously conducted pre-employment cannabis testing of non-safety-sensitive employees [17].</p>
<p><b>Montana</b></p>	<p>Under the 2021 Montana Marijuana Regulation and Taxation Act (MMRTA), employers are prohibited from taking adverse action against an employee for off-duty cannabis and are prohibited from refusing to hire prospective employees for off-duty cannabis use. The act does include, however, a long list of exceptions that allow for punitive action from an employer, such as ‘the use of marijuana conflicts with a bona fide occupational qualification that is reasonable related to the individual’s employment’ and ‘the employer is a nonprofit organization that, as one of its primary purposes or objectives, discourages the use of marijuana by the general public [18].’</p>
<p><b>Nevada</b></p>	<p>Nevada’s 2017 Regulation and Taxation of Marijuana Act prohibited employers from terminating employees for off-duty cannabis use and employers that terminate employees for off-duty cannabis use may be required to pay damages to terminated employees. Employers in the State of Nevada operated under the assumption they could not terminate employment based on an employee’s use of recreational cannabis while off-duty and not on working hours [19].</p> <p>However, the 2021 Nevada Supreme Court decision in <i>Ceballos v. NP Palace, LLC</i> ruled that, because cannabis was still illegal at the federal level, employers could legally discriminate against, test and punish employees for off-duty recreational cannabis use [20].</p>
<p><b>New Jersey</b></p>	<p>The 2021 New Jersey Cannabis Regulatory Enforcement Assistance and Marketplace Modernization Act (CREAMMA) prohibits an employer from taking adverse action against an employee if they use cannabis or have cannabis metabolites in their system from use while off-duty and not within work hours. CREAMMA does allow employers to test employees for cannabis use if there is reasonable suspicion of an employee being impaired while on duty or during work hours. CREAMMA does not prohibit employers from testing employees for cannabis in order to meet federal contract requirements or Department of Transportation (DOT) requirements [21].</p>
<p><b>New York</b></p>	<p>New York’s 2021 Marijuana Regulation and Taxation Act (MRTA) removed cannabis from New York’s Controlled Substance Act. Upon removal from the Controlled Substance Act, regulation of cannabis fell under the management of New York’s Liquor Authority, such that cannabis is now regulated like that of other consumable products e.g., alcohol. New York’s MRTA law prohibits employers from testing employees for cannabis unless it is required by federal law, or an employee exhibits articulable signs of cannabis impairment within the workplace. The law prohibits employers from refusing to hire or terminate</p>

	an employee for cannabis use outside of the workplace. In addition to prohibiting cannabis testing of employees, MRTA requires the Office of Court Administration to expunge records of cannabis-related criminal offenses [22].
<b>Rhode Island</b>	The 2022 Rhode Island Cannabis Act gives employment protections for employees who use cannabis outside of work hours. The Act prohibits employers from taking disciplinary action, including firing an employee for cannabis use outside of the workplace, unless they are federally regulated employees or would adversely affect a federal contract [23].
<b>Vermont</b>	Vermont’s 2018 Act 86 legalized recreational cannabis in the state of Vermont and put restrictions on employers with respect to testing employees for cannabis. Employers are prohibited from randomly testing employees for cannabis unless federally required to do so. Employers are also prohibited from testing employees for cannabis after an incident in the workplace unless there is sufficient probable cause that cannabis may have played a part in the incident [24].

**Appendix E**

<b>Major Federal Laws, Cases, and Statutes Relating to Cannabis in the Workplace.</b>	
<b>1970</b>	The Federal government passed the Comprehensive Drug Abuse Prevention and Control Act of 1970, more commonly known as the Controlled Substances Act, which categorizes cannabis as a Schedule I drug, therefore making it illegal to manufacture, distribute or possess cannabis [25].
<b>1988</b>	The Drug Free Workplace Act requires Federal agency contractors and grantees to certify they will provide a drug-free workplace as a condition of receiving a contract [26].
<b>1991</b>	The Omnibus Transportation Employee Testing Act was enacted by Congress to protect the public that utilize the nation’s transportation system. The Act requires employees working in the safety-sensitive positions, as defined by the Department of Transportation (DOT), to test those employees for alcohol and controlled substances [27].
<b>1999</b>	Title 49 § 113 of the Federal Motor Carrier Safety Administration (FMCSA) Act requires employers who employ commercial drivers to develop a written

	<p>drug and alcohol policy on the misuse of alcohol and controlled substances in the workplace [28].</p>
<b>2009</b>	<p>October 19, 2009, Deputy Attorney General David Ogden set forth clarification and guidance for federal prosecutor enforcement priorities pertaining to illegal drugs including marijuana. Federal prosecutors were given “plenary authority with regard to federal criminal matters,” and their core priority is focused on significant traffickers of illegal drugs and marijuana and not marijuana cases that adhere to state laws [29].</p>
<b>2009</b>	<p>On October 22, 2009, the Department of Transportation issued a compliance notice in response to the Department of Justice memorandum, which issued guidelines to federal prosecutors on how to manage medical marijuana in states that legalized medical marijuana. Included in the response was the statement:</p> <p>“We want to make it perfectly clear that the DOJ guidelines will have no bearing on the Department of Transportation’s regulated drug testing program. We will not change our regulated drug testing program based upon these guidelines to Federal prosecutors. The Department of Transportation’s Drug and Alcohol Testing Regulation – 49CFR Part 40, at 40.151e - does not authorize “medical marijuana” under state law to be a valid medical explanation for a transportation employee’s positive drug test result [30].”</p>
<b>Aug 2013</b>	<p>Attorney General James Cole issued a memo to federal prosecutors to serve as a guide in exercising investigative and prosecutorial discretion when dealing with cannabis related activities. The Cole Memorandum supports Attorney General David Ogden’s Memorandum from 2009 in that federal prosecutors will review cannabis cases on a case-by-case basis and should focus their time on larger scale cannabis cases where profit is the goal [31].</p>
<b>2015</b>	<p>In the Colorado Supreme Court case <i>Coats v. Dish Network</i>, a quadriplegic employee sued for wrongful termination after he tested positive for medical cannabis that was used legally during off-the-clock hours. Though his actions were legal at the state level, according to C.R.S. 24-34-402.5, employees must agree to the “unlawful prohibition of legal activities as a condition of employment”, and the employer argued that the federal law superseded state law. The case was founded against Mr. Coats, and his termination was upheld [32].</p>
<b>Jan 2018</b>	<p>Attorney General Jeff Sessions issued a memo rescinding the Cole Memorandum. The Sessions Memorandum removed restrictions on federal prosecutors put forth by the Cole Memorandum and advised federal prosecutors</p>

	<p>to follow the rule of law that was established in the 1980’s. The Sessions Memorandum gives control back to federal prosecutors to decide how to spend their limited resources when dealing with cannabis cases [33].</p>
<p><b>2020</b></p>	<p>On February 18, 2020, the Department of Transportation (DOT) issued a compliance notice pertaining to whether safety-sensitive employees subject to DOT’s drug testing requirements can use Cannabidiol (CBD) products. The DOT requires tests for marijuana but not CBD. Safety-sensitive employees subject to DOT’s drug testing requirements are cautioned about using CBD products as the Food and Drug Administration (FDA) does not certify levels of THC in CBD products. Any CBD product containing 0.3% THC is classified as a Schedule I drug under the Controlled Substance Act. DOT response:</p> <p>“The Department of Transportation’s Drug Alcohol Testing Regulation, Part 40, does not authorize the use of Schedule I drugs, including marijuana, for any reason. Furthermore, CBD use is not a legitimate medical explanation for a laboratory-confirmed marijuana positive result. Therefore, Medical Review Officers will verify a drug test confirmed at the appropriate cutoffs as a positive, even if an employee claims they only used a CBD product. It remains unacceptable for any safety-sensitive employee subject to the Department of Transportation’s drug testing regulations to use marijuana. Since the use of CBD products could lead to a positive drug test result, Department of Transportation regulated safety-sensitive employees should exercise caution when considering whether to use CBD products [34].”</p>
<p><b>Dec 2022</b></p>	<p>President Biden signed into law the Medical Marijuana and Cannabidiol Research Expansion Act (HR 8454) otherwise known as the Cannabis Research Bill. The Act clears the way to ease restrictions on organizations that use cannabis for research purposes. The Act does not reclassify cannabis and cannabis remains a Schedule I drug currently. The Act is intended to further research on the potential benefits and risks of using cannabis as a drug, streamline the DEA process for using cannabis for research purposes, expand additional sources of cannabis for research purposes and allow doctors to discuss with patients the potential benefits and risks of cannabis as a treatment drug. The Act is viewed by some as the beginning of the Federal government potentially easing restrictions on cannabis [35].</p>

**Author Contributions**

Steven Boyd was the investigator for this research. Steven is a doctoral student at Capitol Technology University and conducted this research as part of his degree program. Steven conducted the survey, reviewed the data from this research and wrote this document with all applicable findings, literature, and recommendations.

Dr. Drew Hinton is an Adjunct Professor and OSH Advisory Board Member at Capitol Technology University and serves as Steven's dissertation chair. Dr. Hinton assisted with reviewing the article and providing advice on final revisions.