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Perceptions and Attitudes of Healthcare Students Towards Marijuana

Carrie Crosby
Eastern Washington University

Perceptions and Attitudes of Healthcare Students Towards Marijuana

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Masters of Science

in

Dental Hygiene

in the

College of Graduate Studies

Eastern Washington University

by

Carrie Crosby RDH, BSDH, MSDH(c)

March 2018

Major Professor: Rebecca Solberg

Perceptions and Attitudes of Healthcare Students Towards Marijuana

OF Carrie Crosby

APPROVED BY

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MASTER'S THESIS:

Perceptions and Attitudes of Healthcare Students Towards Marijuana

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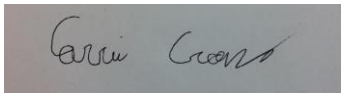
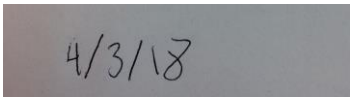
Signature 

Date 

Human Subjects Approvals

TO: Carrie Crosby
FROM: Dr. Theresa J. Martin – Chair, Institutional Review Board
DATE: October 9, 2017
SUBJECT: Perceptions and Attitudes of Healthcare Students Towards Marijuana (HS-5380)

Human subjects protocol HS-5380 entitled "Perceptions and Attitudes of Healthcare Students Towards Marijuana" has been approved as an exemption from federal regulations under CFR Title 45, Part 46.101(b) (1-6).

A signed and approved copy of your application will be forwarded to you via campus mail. However, you are granted permission to begin your research.

Student research qualifying for an exempt IRB review is valid for a period of one year. If subsequent to initial approval, the research protocol requires minor changes, the Office of Grant and Research Development should be notified of those changes. Any major departure from the original proposal must be reviewed through a Change of Protocol application submitted to the IRB before the protocol may be altered. Please refer to HS-5380 on future correspondence as appropriate as we file everything under this number.

Cc: HS-5379 file
Rebecca Stolberg, Dept Chair/IRB rep
Ann O'Kelley Wetmore, RPI
Ruth Galm
Graduate Office

HS-5380

Application for Non-Exempt Research
EWU Institutional Review Board for Human Subjects Research

Expedited request ☒ (Return application, signed + 2 copies (3 in total) to the Office of Grant and Research Development, 210 Showalter (SHW)
Full request ☐ (Return application, signed + 14 (15 in total) to the Office of Grant and Research Development, 210 Showalter (SHW)

Status: ☐ Administrator ☐ Faculty ☒ Graduate Student ☐ Staff ☐ Undergraduate

Principal Investigator (PI): Carrie Crosby RDH BS Title: Graduate Student OGRD - SHW 210 SEP 26 2017 Rec'd - Grants Office Department: Dental Hygiene Address: 5420 W Barnes Rd, Apt 366, Spokane WA 99208 Phone number: (509) 464-9753 E-mail: Crosby.carrie@gmail.com	*If PI is a student, complete this section:* Responsible Project Investigator (RPI) *(faculty/staff sponsor)*: Rebecca Stolberg, Interim Department Chair Public Health and Health Service Administration Department: Public Health / Health Service Administration / Dental Hygiene Address/Mail stop: 310 N Riverpoint Blvd Spokane WA 99201 Campus phone number: (509.828.1489) E-mail: rstolberg@ewu.edu

For students only: Is this research being done to meet a course, thesis or other academic requirement? ☒ Y ☐ N
If yes, please specify: This thesis is for the graduation requirements of the DH program
If not, why is it being done?

Title of Project: Perceptions and Attitudes of Healthcare Students Towards Marijuana

Project anticipated start date: October 9, 2017 Anticipated termination date: November 20, 2017

Funding: ☒ Non-funded ☐ Internal funding ☐ External funding
Funding agency (if applicable):
Grant or Contract Number:

Abstract: Recreational and medical marijuana or marijuana is now legal in the state of Washington. With this change, perceptions of marijuana use have also shifted (Amrock, Lee, & Weitzman, 2016). The study will explore students' perceptions of their role in the treatment of patients who use marijuana. With an unknown number of recreational users in Washington State, a determination of future healthcare providers' perceptions is warranted.

Participants will be informed of their rights to participate if they wish. A small incentive, of a Sonicare® toothbrush won through a raffle, will be provided to participants. Emails will be acquired from department chairs and program directors. An online survey will be emailed to students via Qualtrics® and anonymity will assured via the Qualtrics® program. The survey will be available through the months of October and November 2017.

I certify that the information provided above is accurate and the project will be conducted in accordance with applicable Federal, State and university regulations:

PI Signature: Carrie Crosby Date: 9/26/17

Submit this original, signed + appropriate number of copies for request type to the Office of Grant and Research Development, Showalter 210 (SHW)

Recommendations and Action:	Date	Approve/Disapprove
RPI Signature: Ann O'Kelly-Wilmer *(Signature needed only if PI is a student)*		(A) D
IRB Rep. or Dept. Chair Signature: Rebecca L Stolberg *(Signature needed only if PI is a student)*		(A) D
IRB Signature: Theresa J Martin		(A) D

☐ Subject to the following conditions:

Period of approval: 10/9/17 to 10/8/18

Rev 9/26/2017

TITLE OF THESIS This needs thesis title

Abstract

Perceptions of marijuana were studied in healthcare students at EWU. It was found that most students had an average self-reported knowledge of marijuana use. Marijuana comes in several forms such as, edibles, smoked, patches, and lotions. With its recent legalization in Washington State, sales tax alone has accumulated $400 million dollars in the past 3 years. With this increase in use an examination of healthcare students was warranted. Most students also felt there was a need for more education on marijuana and that their current knowledge level was not enough to be competent when talking with patients about use. Overall, participants felt both smoked and smokeless marijuana were harmful to health and understood the increased risk for cancer with smoked use. This need for research was also paired with a desire to discuss this topic with patients. Many areas are understudied in relation to marijuana use. Major areas in need of study include the following: perception based on state of practice, self-responsibility, and years of practice. Educational models need to be formed based on history, systemic effects, perceptions and types used. Educating healthcare professional students on how to bring this topic up with patients' needs to be addressed as well. Future models should include the use of case studies, mock patients, interprofessional education, and role playing.

Acknowledgements

I would first like to thank my thesis advisor, Rebecca Stolberg, RDH, MSDH of the Dental Hygiene Department at Eastern Washington University. She consistently allowed this paper to be my own work, but steered me in the right the direction whenever she thought I needed it.

I would also like to thank the experts who were involved in the validation survey for this research project: Elizabeth Tipton Ph.D. Without her passionate participation and input, the validation survey could not have been successfully conducted.

I would also like to acknowledge Lisa Bilich RDH, BS, MEd of the Dental Hygiene Department at Eastern Washington University as the second committee member of this thesis, and I am gratefully indebted to her for her very valuable comments on this thesis.

Finally, I must express my very profound gratitude to my family (Richard, Kathy, Darin Gina, & Chris) and to my soon to be husband Ben for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

Carrie Crosby RDH, BSDH, MSDH(c)

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Introduction / Literature Review

Introduction to the Research Question

Recreational and medical marijuana or cannabis is now legal in the state of Washington. With this change, perceptions of marijuana use have also shifted (Amrock, Lee, & Weitzman, 2016). Historically, marijuana use has been related to physical symptoms such as dry eyes, increased heart rate, and respiratory effects (Joshi & Ashley, 2016). The study explored students' perceptions of their role in the treatment of patients who use marijuana. With an unknown number of recreational users in Washington State, a determination of future healthcare providers' perceptions is warranted.

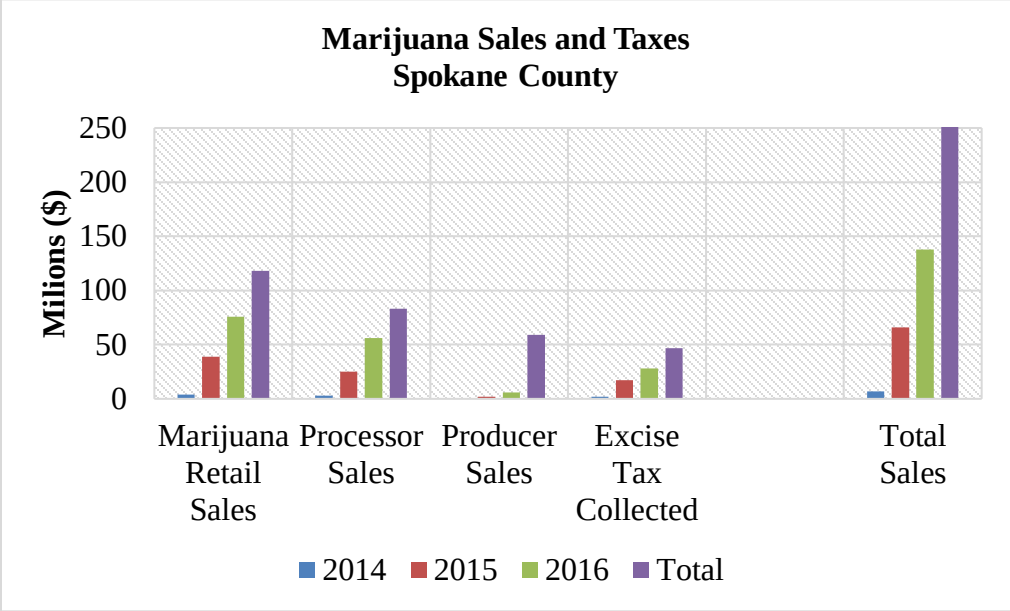
**For this paper, the term marijuana will be used in place of cannabis*

Statement of Problem

The purpose of this study is to examine what healthcare students experience and perceive to be risks with marijuana use. This study explored students' perceptions of their role in the treatment of patients who use marijuana. Recreational marijuana has been legal in Washington state since 2012 (Initiative measure no. 502 concerns marijuana.2012). Sales of marijuana in Spokane county have risen 975% from 2014 to 2015, and 194% from 2015 to 2016 (The Kush Guide, 2017). See Figure 1. This same pattern is evident throughout Washington state, with sales rising from $49 million to $486 million to $1,109 million from 2014 to 2016 respectively (The Kush Guide, 2017). See Figure 2. This increase in sales shows an increase in legal marijuana use. In 2013 an estimated 19.8 million Americans used marijuana. This number is up slightly from 18.9 million individuals in 2012 (Substance Abuse and Mental Health Services

Administration, 2013). Within the year of 2013, 8.1 million individuals reported daily or almost daily use (Substance Abuse and Mental Health Services Administration [SAMHSA], 2013). Some states have legalized recreational marijuana: Washington, Oregon, Colorado, California, Nevada, Alaska, Massachusetts, and Maine (E. Republic, 2017). Many other states have also legalized medical marijuana. The criteria for medical marijuana varies from state to state (Wilkinson, Yarnell, Radhakrishnan, Ball, & Cyril D'Souza, 2016). Conditions such as PTSD, cancer, HIV/AIDS, and glaucoma can all be qualifiers for medical marijuana (Wilkinson et al., 2016). See Figure 3.

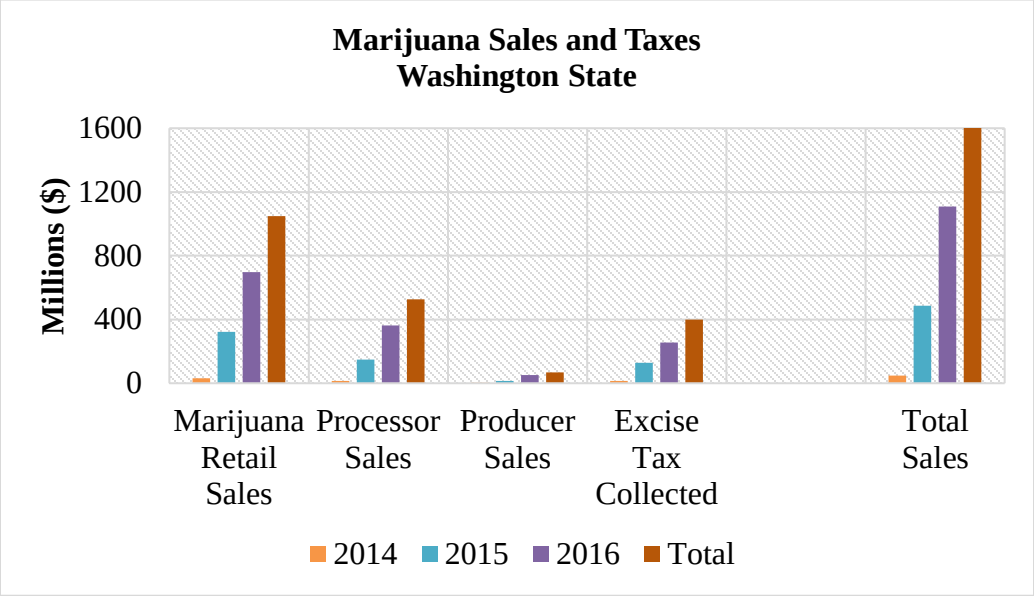
Figure 1. Marijuana sales and tax collected by Spokane country 2014-2016



The above figure and note are adapted from The Kush Guide (2017).

This increase in sales shows an increase in legal marijuana use. With this shift in use due to the legalization of marijuana products, it is important to examine what healthcare students perceive to be risk factors with this substance.

Figure 2. Marijuana sales and tax collected by Washington State 2014-2016



The above figure and note are adapted from The Kush Guide (2017).

Figure 3. Qualifying medical condition for marijuana prescription by U.S. state

Qualifying condition	AK	AZ	CA[a]	CO	CT	DC	DE	HI	IL	MA[a]	MD	ME	MI	MN	MT	NH	NJ	NM	NV	NY	OR	RI	VT	WA
Cancer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Glaucoma	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X		X
HIV/AIDS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cachexia	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X		X	X	X	X
Pain	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nausea	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X
Seizures/ epilepsy	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Multiple sclerosis	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hepatitis C		X				X	X		X	X	X	X	X		X		X	X				X		
Crohn's disease		X			X				X	X	X	X	X		X	X	X	X		X		X		X
Agitation in Alzheimer's		X				X	X		X		X	X	X		X	X					X	X		
Amyotrophic lateral sclerosis		X				X	X		X	X		X	X	X	X	X	X	X		X				
Posttraumatic stress disorder		X			X		X					X	X					X	X		X			
Arthritis			X															X						
Parkinson's disease					X				X									X		X				

The following Figure and note are adapted from Annual Review of Medicine (Wilkinson et al., 2016, p. 456)

Are healthcare students aware of both systemic and psychological side effects of marijuana use? Are healthcare students comfortable talking about marijuana use with

their patients? Do healthcare students personally use marijuana? One assumption of this study is that healthcare students are not aware of all risk factors, and may believe it to be a healthy product.

Overview of Research

The chemical makeup of marijuana includes 9-tetrahydrocannabinol (THC) and other compounds. Its effects on the brain and systemic health will be examined. Phyto-Cannabinoids, or cannabinoids, are psychoactive compounds (Sadhir, 2016). Cannabinoids work by activating CB1 and CB2 receptors, located in the central and peripheral nervous systems (Sadhir, 2016). These receptors are associated with memory, cognition, reward, anxiety, pain perception, and movement (Sadhir, 2016).

The female marijuana plant contains THC and over 100 more compounds (Sadhir, 2016). The main cannabinoids include THC, Cannabidiol (CBD), and Cannabinol (CBN) (Sadhir, 2016). Marijuana is used in many forms, including smoking, vaporization, and oral use (Madras, 2015). According to Sadhir, marijuana leaves can contain 0.5% to 5% THC, where hash oil can contain 2-20% THC (Sadhir, 2016). Hash oil is a concentrated form of marijuana, and is smoked in a similar manner to the dried leaves (Sadhir, 2016). According to Leafly, many strains of marijuana can contain as much at 29% THC (Leafly, 2017). The main difference between types of smoked marijuana depends on the temperature at which it is inhaled (Madras, 2015). High temperature or combustion prepared marijuana is considered smoked marijuana (Madras, 2015). Low temperature marijuana prepared without combustion is considered vaporized marijuana (Madras, 2015). CBD has been found to have neuroprotective, analgesic, sedative, anti-emetic, anti-spasmodic, anti-anxiety, and ant-inflammatory properties

(Sadhir, 2016). Preliminary research shows CBD to be useful in medicinal settings; it is in this context that the benefits are seen in treating seizures, inflammation, and other conditions (Madras, 2015).

Absorption of cannabinoids depends on many factors, such as dose, route of administration, and vehicle (Sadhir, 2016). When smoked, it is absorbed through the lungs, and travels to the brain via the bloodstream (Sadhir, 2016). This path leads to effects within seconds or minutes (Sadhir, 2016). This differs from oral ingestion. With oral ingestion, the THC first passes through the liver, which prolongs the onset and effects of the THC over several hours (Sadhir, 2016).

THC and other cannabinoids are lipophilic in nature (Sadhir, 2016). Lipophilic refers to a molecule's avoidance of water. This leads to deposition in adipose and other fatty tissues (Sadhir, 2016). The liver is responsible for metabolizing THC (Sadhir, 2016). This is accomplished through hydroxylation by way of the Cytochrome P 450 Complex proteins (Sadhir, 2016). When liberated from adipose and other fatty tissues, 80-90% of cannabinoids are excreted from the body within 5 days (Sadhir, 2016). This is significant because cannabinoids have the potential to stay in the body for many weeks. Therefore, current toxicity is difficult to measure.

Many forms of marijuana are available for purchase, including dried leaves, concentrates, edibles, patches, and lotions (Leafly, 2017). Dried leaves can be used in a rolled device such as a blunt or joint, or in a vaporizer. Edible marijuana products include baked goods, oil drops to add to drinks, candies, drinks, and others (Leafly, 2017). Concentrates, also called shatter, rosin, BHO, CO2, wax, crumble, honey oil, dabs, hash, tincture, or capsules, are all marijuana extracts (Leafly, 2017). Patches and lotions are

applied to the skin, and activate CB2 receptors; in this application THC does not reach the blood stream (Leafly, 2017).

Systemic health effects of marijuana. Those who smoke marijuana have been shown to demonstrate wheezing, shortness of breath, cough, excess phlegm production, bronchodilation, and other symptoms (Martinasek, McGrogan, & Maysonet, 2016). The oral effects of marijuana use include higher Decayed Missing and Filled (DMF) scores (and index used by dental professionals to measure areas of decay), xerostomia, and marijuana stomatitis (Cho et al., 2005). Both hazardous effects and benefits of marijuana have been found. For example, when smoked, marijuana has been shown to increase risk for esophageal and lung cancer (Martinasek, 2016). Madras has also synthesized through in vivo and in vitro studies, that fertility has been reduced through poor sperm motility and spermatogenesis (Madras, 2015). The benefits of marijuana use include reduced eye pressure for individuals with glaucoma, and reduced pain for individuals with multiple sclerosis (Madras, 2015). In general, most studies have cited a lack of research of the effects of marijuana (Cho et al., 2005; Martinasek et al., 2016). Because marijuana is a schedule one drug, to study it in a clinical setting, permissions from the Drug Enforcement Agency (DEA), Food and Drug Administration (FDA) and National Institute on Drug Abuse (NIDA) are required. The difficulty in obtaining these permissions is the main reason for the lack of research on marijuana. Only further research will fill this gap.

Psychological effects of marijuana. In "Medical Marijuana and the Mind," the reported effects of THC can vary from individual to individual depending on dose and genetic vulnerability (2010). While some individuals have claimed marijuana helps with

anxiety, after use it has been documented that anxiety and panic attacks have increased (Medical Marijuana and the Mind, 2010). The use of marijuana in individuals with certain psychological conditions has been studied in small sample size studies (Madras, 2015). There is currently little evidence marijuana use is therapeutic for individuals with sleep disorders (Madras, 2015). Per Madras, cognitive functioning can be limited or increased depending on the task. Some forms of learning and memory are increased with cannabinoid use, and working memory can be decreased (Madras, 2015).

Perceptions of marijuana use. "Marijuana was generally perceived to be the least harmful, least addictive, and most socially acceptable, with electronic cigarettes and hookah closely following" (Berg et al., 2015, p. 86). This perception may start to shift further, with more states legalizing marijuana. Madras showed "prevalence of cannabis use increases when perceived risk of use decreases" (p. 15, 2015). Marijuana has been perceived to be less harmful than traditional cigarettes by college students (Berg et al., 2015). Marijuana was also perceived to be less addictive than cigars and other tobacco products in Berg's study. This perception of low risk associated with marijuana use has not been stagnant either. Merrill showed that the perception that marijuana use had no risk to health increased from 2009 through 2013 for students in 6th, 8th, 10th, and 12th grade (Merrill, 2015).

As Merrill found, a low perception of harm can lead to an increase in use of marijuana (Merrill, 2015). Through changes in perceptions of marijuana use, the potential exists for marijuana use to increase over time. With this potential increase in usage, it will be important to have healthcare providers who understand and can discuss this topic with patients.

Demographics of marijuana users. Marijuana has been used around the world for the past 5,000 years, and its use has varied from medical to religious and recreational (Adrian, 2015). In 2015, 22.2 million individuals used marijuana in the U.S., mostly by men (National Institute on Drug Abuse, 2017). There are currently 32 marijuana retailers in Spokane county alone; together they generated $28 million in excise taxes in 2016 (The Kush Guide, 2017). This is up from $17 million in 2015 and $2 million in 2014 (The Kush Guide, 2017). This infers the potential increase of marijuana use among medical and recreational marijuana users.

Scope of practice. Access to patients is not limited to standard physicians. Other healthcare professions provide care to patients. Using this knowledge, the Principal Investigator (PI) aims to discover the range of knowledge about marijuana from a variety of healthcare professionals.

Dental hygiene. Dental Hygiene (DH) is a profession with a scope of practice that varies from state to state. Some of the procedures a Dental Hygienist might perform include prophylaxis, local anesthesia, topical anesthesia, sealant placement, rootplaning and restorative filling placement (American Dental Hygiene Association, 2017). While visiting the dental office, a patient will often spend an hour per appointment, twice a year, with a DH. This extensive and consistent time with a DH builds rapport with patients and allows the DH to see oral signs of marijuana use such as higher DMF scores, xerostomia, and marijuana stomatitis (Cho et al., 2005). Marijuana use can affect the DH's treatment plan for the patient. In this treatment model, DHs are put in an easier position to bring up marijuana use and its risk factors with patients, while maintaining relevant and useful conversation with patients. The American Dental Hygienists

Association (ADHA) research agenda was revised in 2016 and many areas of needed research were listed (Lyle, 2016). Further marijuana research would facilitate achievement of ADHA's goal to enhance education models for dental hygienists (Lyle, 2016). This study could serve to inform the development of new curricula in relationship to marijuana use (Lyle, 2016). Under basic science and clinical decision support tools, dental hygienists would be able to apply a base knowledge about marijuana use to patient care.

Occupational therapy. Occupational Therapy (OT) is defined as the "habilitation, rehabilitation, and promotion of health and wellness for clients with disability- and non–disability-related needs" (Kannenberg et al., 2015, p. 1). In relation to marijuana, OTs have a unique opportunity to work with patients. OTs focus on daily routine and habits, including the habitual use of marijuana (Opp, 2017). OT not only helps patients with drug use, they also take the next step in helping patients recover from drug use (Opp, 2017). With this scope of practice OTs not only educate patients, but they have the unique opportunity to guide patients in critical thinking about their lifestyle choices.

Physical therapy. Physical Therapy (PT) focuses on the restoration, maintenance, and promotion of optimal physical function (American Physical Therapy Association, 2017a) [APTA]. PTs encounter patients rehabilitating, habilitating, improving performance, and injury preventing (APTA, 2017a). The American Physical Therapy Association (APTA) recognizes the need for education of PTs about marijuana. It is not recommended PTs encourage the use of marijuana in their patients, it is however recommended that PTs know the risks associated with marijuana use. This allows for

further education of their patients (American Physical Therapy Association, 2017b). Madras cited that marijuana use in HIV patients reduces neuropathic pain (Madras, 2015). This same usage of marijuana also leads to reduced cognitive functioning, and ability to follow treatment guidelines (Madras, 2015). If a patient is using marijuana the potential exists for reduced motivation for health improvement. In surveying PT students in this study, a thorough understanding of the attitudes and base knowledge of these students can be acquired for the future training of this professional.

Health services administration. Health administration professionals can administer, manage healthcare systems; such as hospitals (Public Health Online, 2017). While health services administration (HSAD) professionals do not always work directly with patients, they lead and change policy that affects patients, and how their healthcare professionals address and treat them (Public Health Online, 2017). If a hospital adds an educational program on the risks and benefits of medical marijuana use, a HSAD professional could be the coordinator of such a program. When all levels of healthcare professionals are educated, patient health can also improve.

Public health. Public health (PH) can be defined as, "the science and art of preventing disease, prolonging life, and promoting health through organized efforts and informed choices of society, organizations, public and private communities, and individuals (Eastern Washington University, 2017b). With this scope of practice PH professionals can work in many of the following roles: health education; emergency management directors; administrative service managers; occupational health; safety professionals; environmental scientists; community planners; health and safety engineers; and supervisors of fire and prevention services (Eastern Washington University, 2017b).

Just like HSAD professionals, PH professionals could work with a community and bring about change that could educate the public. PH professionals have a wide scope of practice that allows them to address many health concerns including marijuana use.

Communication sciences and disorders. A Communication Sciences and Disorders (CMSD) degree enables professionals to help patients with speech, language, swallowing, and hearing impairments (Eastern Washington University, 2017a). It has been found that marijuana exposure can impair neurodevelopment in fetuses; thus, resulting in neurophysiological and behavioral abnormalities later in life. (Calvigioni, Hurd, Harkany, & Keimpema, 2014). With this finding, it is expected that CMSD professionals will work with the children who were exposed to marijuana early in life. Because of this potential exposure, CMSD professional should have a thorough understanding of marijuana and its effects on the developing brain.

Regional initiatives in dental education (RIDE). Dental professionals have a unique opportunity to see signs of marijuana use, and see patients who are experiencing the positive or negative effects of marijuana use. The RIDE program, through EWU and University of Washington (UW), is an innovative program that trains future dentists in rural and/or underserved areas in hopes of retaining them in those rural areas that so desperately need dentists. RIDE provides a unique opportunity for future dental professionals to work with patients in rural communities and those who previously may not have had easy access to health professionals (Eastern Washington University, 2017c). This new connection with patients provides opportunities to initiate discussions about marijuana use, and its impact on systemic and psychological health.

Need for study. The Surgeon General has several goals pertaining to marijuana use in the United States, and should be examined further. In 2008, 94.3% of adolescents aged 12 to 17 years refrained from using marijuana for the first time. (U.S. Department of Health and Human Services, 2010). The U.S. government would like to see this number increase to 96.3% by 2020. In an Australian study of 378 nurses and healthcare professionals, a majority reported welcoming more education on marijuana and other illegal drugs and their treatment (Happell, Carta, & Pinikahana, 2002). While this study does not directly pertain to adolescents or nurses in Australia, it does aim to see healthcare professionals trained in the risks and side effects of marijuana use. This education of healthcare professionals could benefit the population.

Summary

Marijuana use is increasing in the U.S. The surgeon general wishes to increase prevention in teenagers. Looking at perceptions of healthcare students may provide educators an idea of the outlook this next generation has in relationship to marijuana use. Educating healthcare students may in turn educate the general population. Increased education on marijuana could help the public make educated decisions on marijuana use. Marijuana has physiological, systemic, and oral effects on the body. Increased states with legalized marijuana calls for more research on the topic, thus allowing educators to better educate their students.

Methodology

Research Method and Design

A mixed study design was used, incorporating 5-point Likert scale questions and an open-ended question. Quantitative data allowed the reporting of frequencies, averages, and percentages (Joyner, 2013). In researching the trend of growing marijuana use, qualitative data from personal opinions may be useful in future studies pertaining to this topic as well as provide the framework for education and content guidelines for health science curriculum. An online survey of 21 questions was completed because it was an expedient way to collect data. This allowed easy access to data gathering for the PI and easy response capability for participants.

Procedures

Human subject's protection/informed consent. After approval was granted from Eastern Washington University (EWU) Institutional Review Board (IRB), each participant received an introductory email explaining:

- The study
- Verification of approval by the EWU IRB
- Confirmation of the anonymity of the survey
- Availability to quit the survey at any time
- Information about the participant prize drawing
- Web link to survey

Sample source, plan, sample size, description of the setting. This study was conducted online, using Qualtrics™. For this study students in the healthcare disciplines

at EWU were asked to participate. Participants had to be enrolled in one of the following disciplines: DH; OT; PT; HSAD; PH; Communication Sciences and Disorders; and (RIDE). This sample was a convenience sample. These professions were selected for their potential and current involvement with patients who use marijuana. Those who use and do not use marijuana were included. All healthcare profession students in each program were invited to participate.

The PI contacted department chairs and program directors with a letter of introduction to the thesis research (See Appendix A) and permission for students to participate. If permission was granted, email addresses were requested from programs, with a clear understanding that those email addresses were only for the use of this study and remained confidential, known only to the PI. Students from the programs as noted above were sent an email with a link to the Qualtrics™ site. See Table 1 for a breakdown of student totals by program, degree, and desired response rates.

Table 1

Projected Response Rates by Program

		Response Rates	
Program	N	30%	40%
Dental Hygiene	106	31	42
Physical Therapy	75	22	30
Occupational Therapy	95	28	38
Health Services Administration/Public Health	48	14	19
Communication Sciences and Disorders	115	34	46
RIDE	8	2	3
	447	134	178

Variables. Participants' attitudes impacted their answers to survey questions. Other variables such as participant willingness to participate impacted response rates as well.

Instruments. Participants completed the survey found in Appendix B. Number values are related to participant responses as follows: 1 = Very High or Strongly Agree, 2 =High or Agree, 3 = Moderate or Neutral, 4 = Low or Disagree, 5 = Very Low or Strongly Disagree. Survey questions covered topics such as self-reported knowledge of the systemic and psychological effects of marijuana use. Participants were also asked about their level of comfort when discussing marijuana use in their patients and about their personal use or nonuse of marijuana. An open-ended comment section was also available. All participants could skip questions at their own preference, and were able to quit the survey at any time. These questions were reviewed by DH graduate faculty at EWU, and changes were made per feedback. Qualtrics™ was used to implement the survey. Qualtrics™ was used to create, distribute, and analyze surveys. The data was exported to a Microsoft Excel™ spreadsheet as a .CSV file. Minitab was used to process and analyze data.

Reliability and validity. Evaluation of the survey instrument to determine reliability and validity was achieved through appraisal by a random sample of adults taking the survey via Qualtrics™. Feedback was obtained from EWU graduate faculty and revisions were made as to ambiguity of any questions.

Equipment. The survey data was stored on the PI's password protected personal computer. Direct access to survey results was also accessible to Dr. Elizabeth Tipton, third member of this thesis committee and statistician, at EWU.

Steps to implementation. The first step was an expedited IRB approval. After this, the survey was distributed to participants via email. The email addresses were acquired through department chairs and program directors. The Qualtrics™ survey link was sent to participants and included a description of the study and its significance. Included was the EWU IRB approval and details regarding study confidentiality (See Appendix C). As an incentive, participants completing the survey were entered into a drawing for a Sonicare™ toothbrush. To be eligible for the drawing, the respondent needed to enter their email at the end of the survey that kept their identity anonymous by separating it from their survey responses. The respondents were ensured survey anonymity by responding in this manner. Email addresses were deleted after the winner was drawn and notified.

Two weeks after the original email, a second email reminder was automatically sent by the Qualtrics™ program to all respondents who had not already completed the survey. The survey remained open for two more weeks before a third email reminder was sent, and then closed. The surveys were available to participants for six weeks. In the event survey times needed to be adjusted due to academic schedules, participants were not able to be identified due to differing time frames, regardless of when they filled out the survey.

Summary

This study focused on healthcare students at EWU. Participants were informed of their rights to participate if they wished. A small incentive, of a Sonicare™ toothbrush won through a raffle, was provided to one participant. Emails were acquired from department chairs and program directors. An online survey was emailed to students via

Qualtrics™. The survey was available through October and mid November 2017. Results were evaluated primarily through Mann-Whitney Wilcox tests to determine associations of survey answers with age, sex, and education levels.

Results

Description of Sample

This survey was sent out to 447 potential participants in seven disciplines at EWU. Of these potential participants, 139 (31%) opened the link, and *N* = 120 (26%) completed all parts of the survey. For data analysis, only data from participants who completed all parts of the survey were included in the analysis. Participation varied by program: DH had *n* = 60 (56%), PT: *n* = 13 (17%), OT: *n* = 15 (15%), HSAD/PH: *n* = 7 (14%), CMSD: *n* = 19 (16%), & RIDE: *n* = 6 (75%). See Table 2.

Table 2

EWU Healthcare Program Participants

		Completed	
Program	N	n	%
Dental Hygiene (DH)	106	60	56.60
Physical Therapy (PT)	75	13	17.33
Occupational Therapy (OT)	95	15	15.79
Health Services Administration (HSAD)& Public Health (PH)	48	7	14.58
Communication Sciences	115	19	16.52
RIDE	8	6	75.00
Totals	447	120	26.85

Statistical Analysis

A non-parametric, Kruskal-Wallis test was used to evaluate responses to age Question 1: “How would you rate your knowledge on the systemic effects of cannabis / marijuana?” The age groups were readjusted to balance the data. All participants in the

group ≥ 45 were added to the group ≥ 35. This allowed for statistical tests to be used while achieving statistical significance.

Participants reported their knowledge of marijuana, program, age, education level, sex, and marijuana use. DH had the highest response rate (60/120, 50%), and ≤24 the most common age group (73/120, 60%). Most students had an Associates or Bachelor's degree (88/120, 73%), and most were women (107/120, 89%). Marijuana use was reported in a fourth of respondents (31/120, 25%). See Table 3.

Table 3

Participants' Demographics compared to Self-Reported Knowledge

		Knowledgeable						Unknowledgeable			
		Very		Somewhat		Moderate		Somewhat		Very	
	N	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Program											
DH	60	2	3.3	10	16.7	24	40	20	33.3	4	6.7
PT	13	-	-	1	7.7	7	53.9	2	15.4	3	20.1
OT	15	2	13.3	3	20	6	40	3	20	1	6.7
HSAD	6	-	-	-	-	4	66.7	1	16.7	1	16.7
Com/PH	20	2	10	4	20	7	35	5	25	2	10
RIDE	6	1	16.7	-	-	3	50	1	16.7	1	16.7
Age (years)											
≤24	73	3	4.1	11	15.1	34	46.6	17	23.3	8	11
25-34	33	3	9.1	5	15.2	10	30.3	11	33.3	4	12.1
35-44	10	-	-	1	10	5	50	4	40	-	-
≥ 45	2	-	-	1	50	1	50	-	-	-	-
No Answer	2	1	50	-	-	1	50	-	-	-	-
Education Completed											
Some College	31	2	6.5	2	6.45	12	38.7	9	29	5	16.1
Associates	35	1	2.9	7	20	15	42.9	11	31.4	1	2.9
Bachelors	53	4	7.6	8	15.1	23	43.4	12	22.6	6	11.3
Masters	1	-	-	-	-	1	100	-	-	-	-
Sex											
Female	107	3	2.8	15	14	47	43.9	30	28	12	11.2
Not Female	13	4	30.8	3	23.1	4	30.8	2	15.4	-	-
Marijuana Use											
Yes	31	5	16.1	9	29	14	45.2	2	6.5	1	3.2
No	89	2	2.3	9	10.1	37	41.6	30	33.7	11	12.4
Totals	120	7	5.8	18	15	51	42.5	32	26.7	12	10

Number values are related to participant responses as follows: 1 = Very High or Strongly Agree, 2 =High or Agree, 3 = Moderate or Neutral, 4 = Low or Disagree, 5 = Very Low or Strongly Disagree. Participant responses for self-rating knowledge of marijuana had an average of 3.2. When participants were asked, "I feel I have had enough education on cannabis / marijuana to be competent in discussing it with patients," their responses had an average of 3.59. When participants were asked, "I would benefit from more education on the risks and side effects of cannabis / marijuana use," their responses had an average of 1.54. See Table 4.

Table 4

EWU Healthcare Program Participants Responses, Including Mean, Median and Mode from Questions 1-13, 15, 16

Question	Mean	Median	Mode
1. How would you rate your knowledge on the systemic effects of cannabis / marijuana?	3.2	3	3
2. Cannabis / Marijuana use can lead to dry mouth.	1.78	2	1
3. Cannabis / Marijuana use can lead to dry eyes.	1.9	2	2
4. Cannabis / Marijuana use can lead to increased risk of oral cannabis stomatitis (Inflammation of oral tissues and white growths in the oral cavity)	2.38	2	3
5. Smoked cannabis / marijuana use can lead to increased risk of irritated lung / esophageal tissue.	1.85	2	1
6. Smoked cannabis / marijuana use can reduce the perception of pain.	2.4	2	2
7. Smoked cannabis / marijuana use can lead to increased risk of cancer.	1.67	2	2
8. Cannabis / Marijuana use can lead to increased anxiety levels.	2.4	2	2

9. Smoked cannabis / marijuana use can lead to decreased short-term cognitive function.	1.93	2	2
10. I currently feel comfortable talking with patients about their cannabis / marijuana use.	2.55	2	2
11. The use of **smoked** cannabis / marijuana is detrimental to the overall health of an individual.	2.34	2	2
12. The use of **smokeless** cannabis / marijuana is detrimental to the overall health of an individual.	3.12	3	3
13. Cannabis / Marijuana is likely to lead to the use of other illicit drugs.	3.15	3	2
14. Do you personally use cannabis / marijuana?	*-	-	-
15. I would benefit from more education on the risks and side effects of cannabis / marijuana use.	1.54	1	1
16. I feel I have had enough education on cannabis / marijuana to be competent in discussing it with patients.	3.59	4	4

*yes/no question

Questions 2 through 9 asked participants if they agree that marijuana leads to symptoms such as dry eyes, mouth, and short-term cognitive dysfunction. The highest level of agreement was for Question 7: “Smoked cannabis / marijuana use can lead to increased risk of cancer”, with which 113 of 120 (94%) participants agreed (see bold red text in both Tables 5&6). The least agreed upon question was Question 4: “Cannabis / Marijuana use can lead to increased risk of oral cannabis stomatitis (Inflammation of oral tissues and white growths in the oral cavity)”, with which 61/120 (51%) participants agreed (see bold blue text in both Tables 5&6).

Table 5 shows the number of participants who agreed at any level with both compared questions, with total number who agreed with each individual question shown on the diagonal. It was found that participants agreed on Questions 5 & 7 most commonly

92/120 (77%) (see bold green text in both parts of Table 5). The second most agreed upon questions were 2 & 7 91/120 (76%). Three-quarters or more of participants agreed with the following combinations of questions: 2&3, 2&7, 3&7, 5&7, 7&9 (see red shaded boxes in both Tables 5&6). Fewer than two-fifths of participants agreed with the following combinations: 4&6, 4&8 (see blue shaded boxes in both Tables 5&6).

Table 5

Participants Agreement to Questions 2-9, Totals

Totals								
	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Q2	97	87	54	81	54	91	66	78
Q3		94	54	82	57	88	63	77
Q4			**61**	57	45	57	41	55
Q5				97	65	**92**	64	82
Q6					69	66	50	62
Q7						**113**	71	87
Q8							76	68
Q9								93

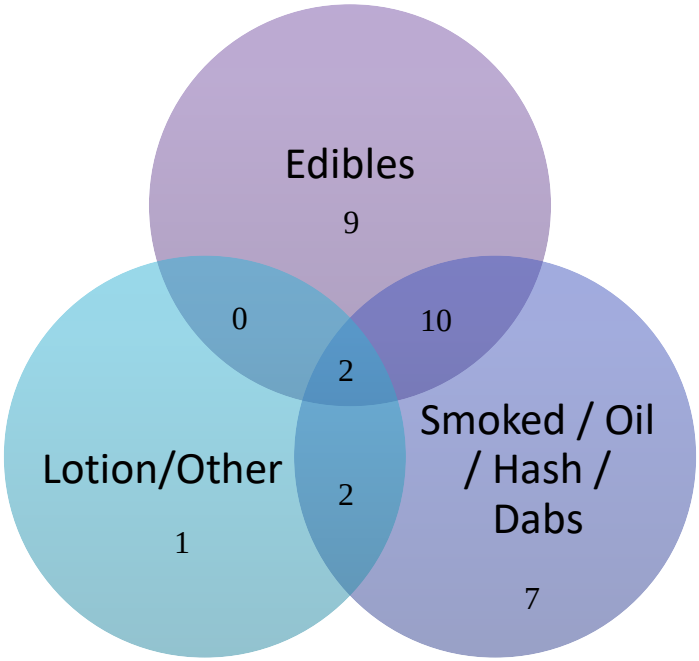
Table 6

Participants Agreement to Questions 2-9, Percentages

% out of total sample								
	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Q2	81%	73%	45%	68%	45%	76%	55%	65%
Q3		78%	45%	68%	48%	73%	53%	64%
Q4			**51%**	48%	38%	48%	34%	46%
Q5				81%	54%	**77%**	53%	68%
Q6					58%	55%	42%	52%
Q7						**94%**	59%	73%
Q8							63%	57%
Q9								78%

Of those participants who used marijuana, 67% reported use of smoked marijuana (includes Oil/Hash/Dabs), 67% reported the use of edibles, and 16% reported other use (includes lotion & patches). Use of all three was selected by 6% of participants. See Figure 4.

Figure 4. EWU Healthcare Program Participants Responses, Marijuana Use by Type



Figures 5, 6, 7, & 8 compared self-reported knowledge and age. For the ≤24 age group, the average response was 3.22, the median was 3, and the standard deviation was .9753. For the 25-34 group, the average response was 3.24, the median was 3, and the standard deviation (SD) was 1.1465. For the ≥ 35 group, the average response was 3.17, the median was 3, and the standard deviation was .7177. It was found that there is no correlation between age and self-reported knowledge. Responses did not vary significantly (*p*=.910) between each age group. See Figure 5,6,7,8.

Figure 5. Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana" compared to the age group ≤24. (MiniTab, 2018)

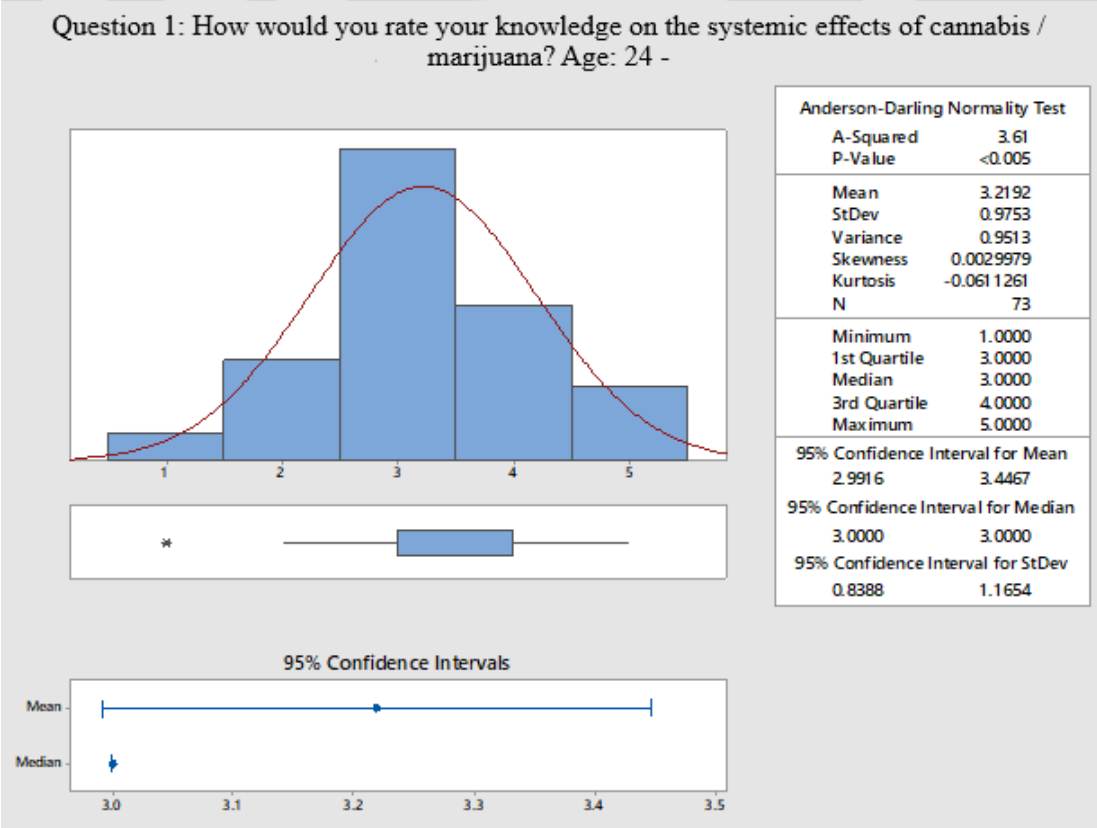


Figure 6. Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana" compared to the age group 25-34. (MiniTab, 2018)

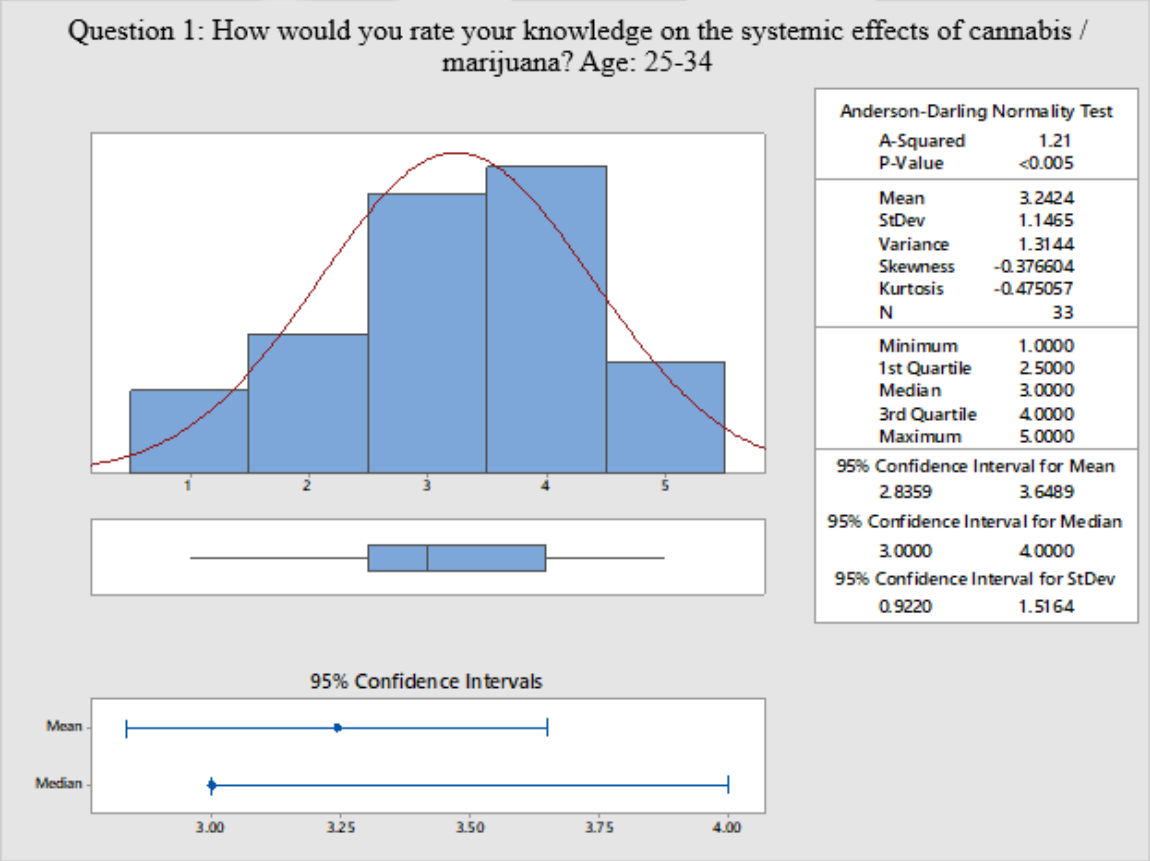


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Figure 7. Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana" compared to the age group ≥ 35. (MiniTab, 2018)

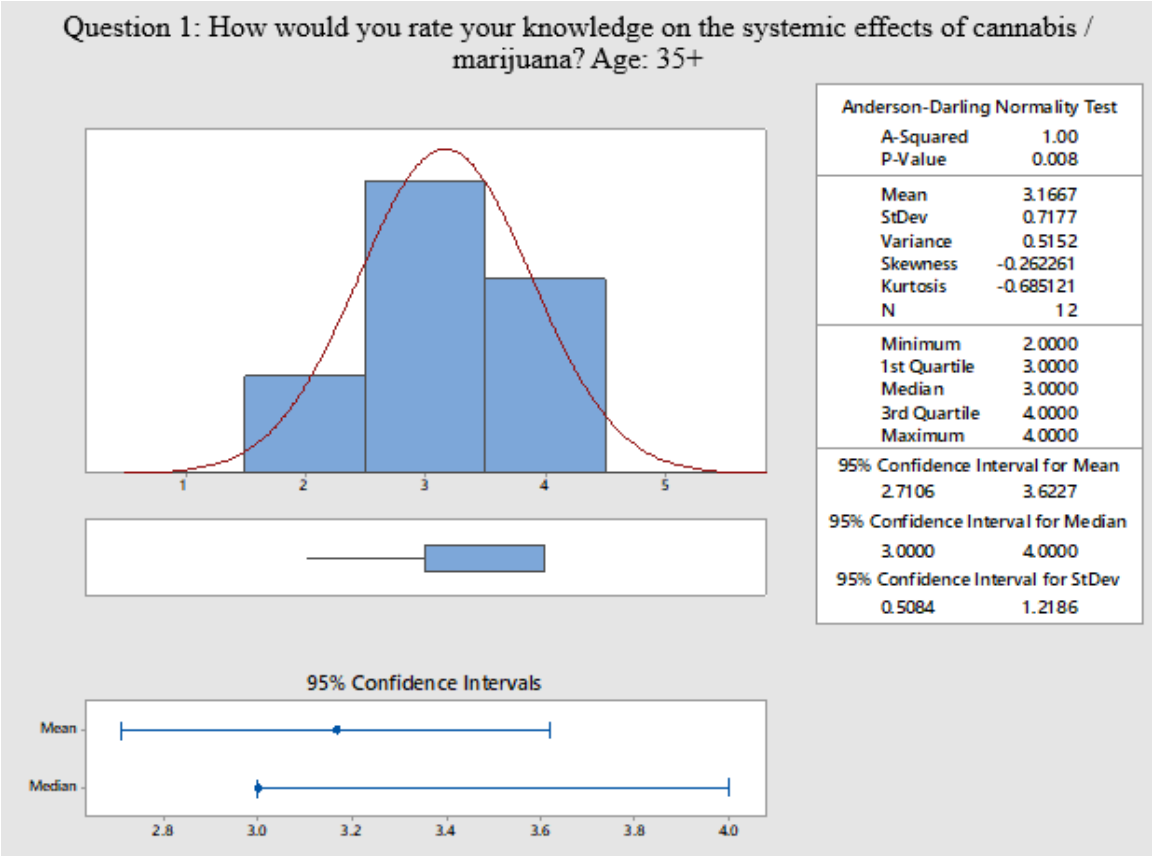


Figure 8. Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana" compared to age. Kruskal-Wallis Test. (MiniTab, 2018)

Kruskal-Wallis Test: Question 1: How would you rate your knowledge on the systemic effects of cannabis / marijuana? Sorted by Age.

Descriptive Statistics

Recoded Q19: Age	N	Median	Mean Rank	Z-Value
24 -	73	3	58.9	-0.23
25 - 34	33	3	61.5	0.39
35 +	12	3	57.5	-0.21
Overall	118		59.5	

Test

Null hypothesis	H_0: All medians are equal
Alternative hypothesis	H_1: At least one median is different

Method	DF	H-Value	P-Value
Not adjusted for ties	2	0.17	0.918
Adjusted for ties	2	0.19	0.910

A non-parametric, Kruskal-Wallis test was used to evaluate responses to highest completed education and Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana?" The education groups were readjusted to balance the data. All participants in the group master's degree were added to the group bachelors. This allowed for statistical tests to be run while achieving statistical significance.

For those with some college, the median was 3. For the group Associate degree, the median was 3. For the group Bachelor's degree, the median was also 3. It was found that there is no correlation between self-reported knowledge and completed education. Responses did not vary significantly (p=.448) between each group. See Figure 9.

Figure 9. Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana" compared to completed education. Kruskal-Wallis Test. (MiniTab, 2018)

Question1: How would you rate your knowledge on the systemic effects of cannabis / marijuana? Sorted by highest completed education.

Descriptive Statistics

Q18: Completed Degree	N	Median	Mean Rank	Z-Value
1 - SC	31	3	66.9	1.19
2 - Assc.	35	3	57.6	-0.58
3 - Bach.	54	3	58.7	-0.52
Overall	120		60.5	

Test

Null hypothesis H_0: All medians are equal
Alternative hypothesis H_1: At least one median is different

Method	DF	H-Value	P-Value
Not adjusted for ties	2	1.44	0.486
Adjusted for ties	2	1.60	0.448

A non-parametric, Mann Whitney test was used to evaluate responses to marijuana use and Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana?" For the group that answered no (n = 89) to marijuana use, the average self-reported score was 3.43, the median was 3, and the standard deviation was .9165. For the group that answered yes (n = 31) to marijuana use, the average self-reported score was 2.51, the median was 3, and the standard deviation was .9616. It was found that there is a correlation between self-reported knowledge and

marijuana use. It is significant at $p < .0005$. Those who had any use of marijuana were more likely to rate their self-knowledge as high. See Figures 10,11,12.

Figure 10. Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana" compared to no past cannabis / marijuana use. (MiniTab, 2018)

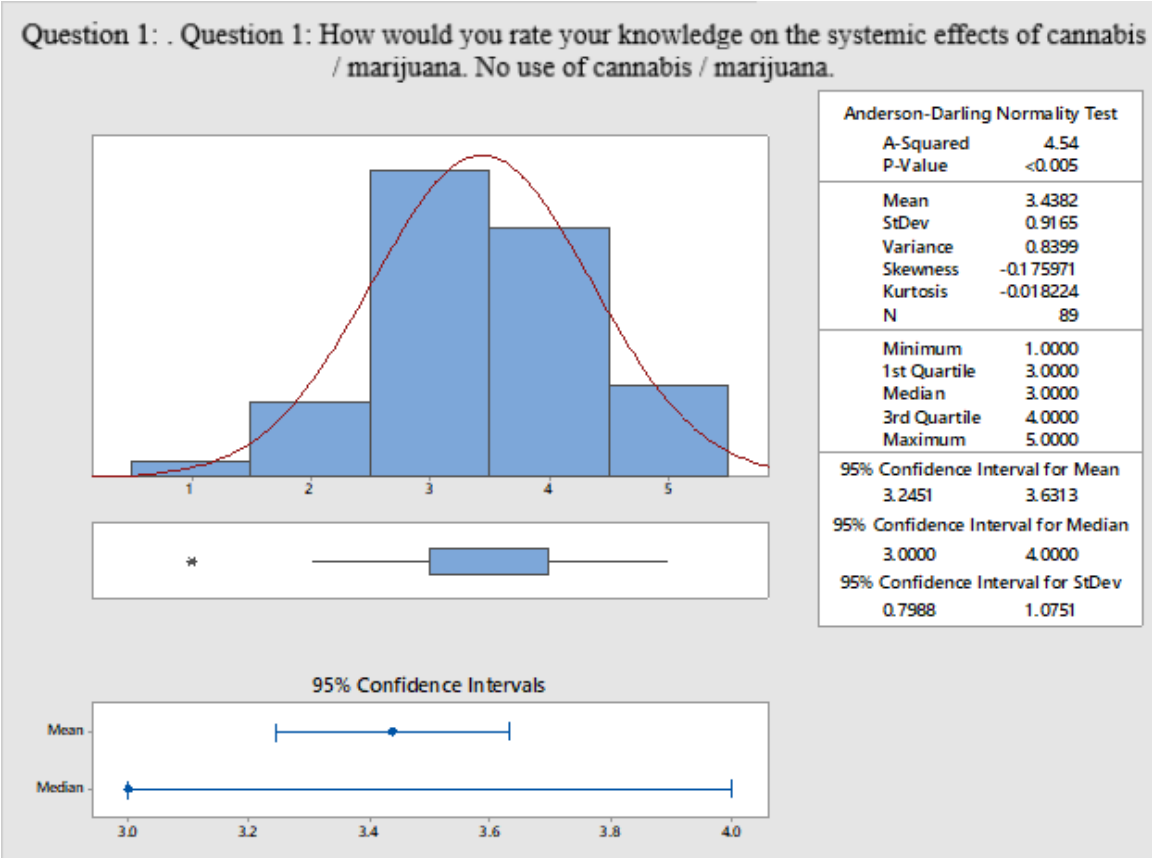


Figure 11. Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana" compared to reported cannabis / marijuana use. (MiniTab, 2018)

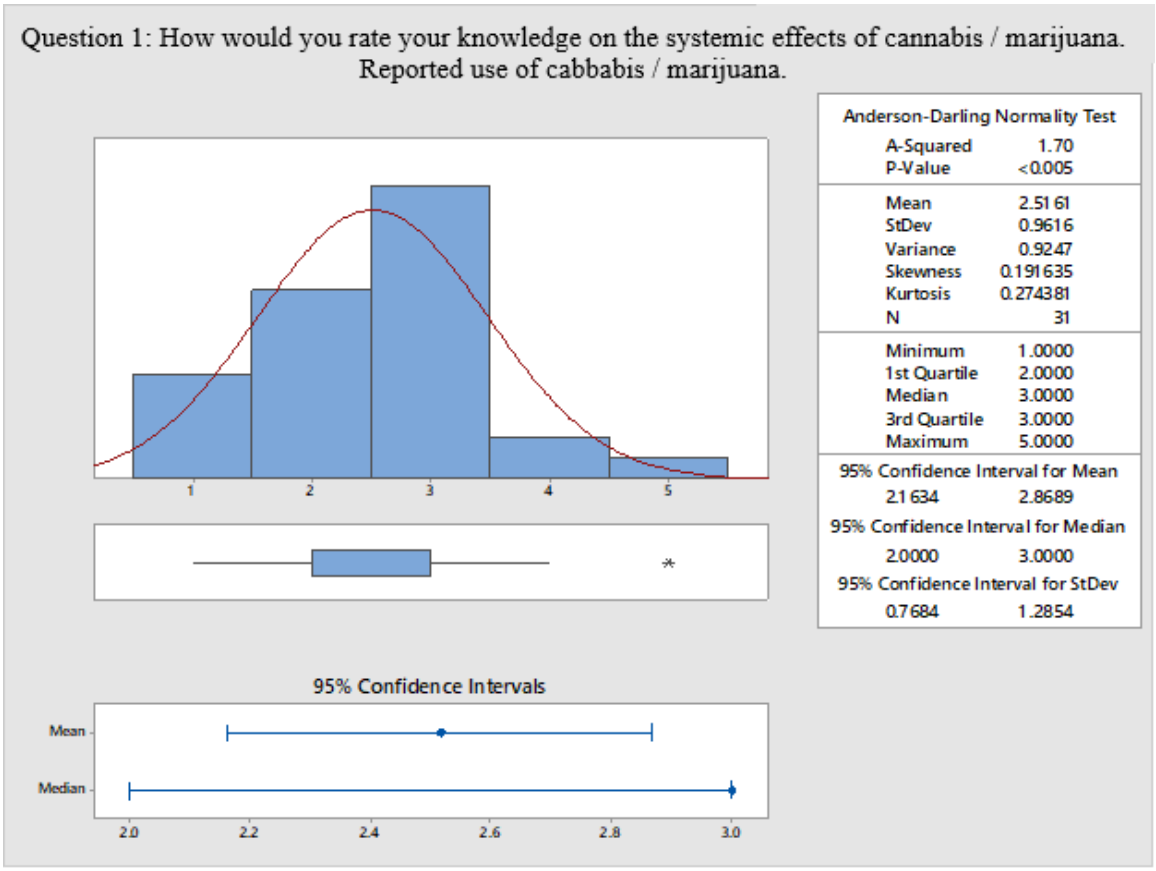


Figure 12. Question 1: "How would you rate your knowledge on the systemic effects of cannabis / marijuana" compared to cannabis / marijuana use. Mann Whitney Test. (MiniTab, 2018)

Question 1: How would you rate your knowledge on the systemic effects of cannabis / marijuana. Compared to cannabis / marijuana use.

Method

η_1: median of Recoded Q1: Rate Systemic Kn_No
η_2: median of Recoded Q1: Rate Systemic K_Yes
Difference: $\eta_1 - \eta_2$

Descriptive Statistics

Sample	N	Median
Recoded Q1: Rate Systemic Kn_No	89	3
Recoded Q1: Rate Systemic K_Yes	31	3

Estimation for Difference

Difference	Lower Bound for Difference	Achieved Confidence
1	1	95.04%

Test

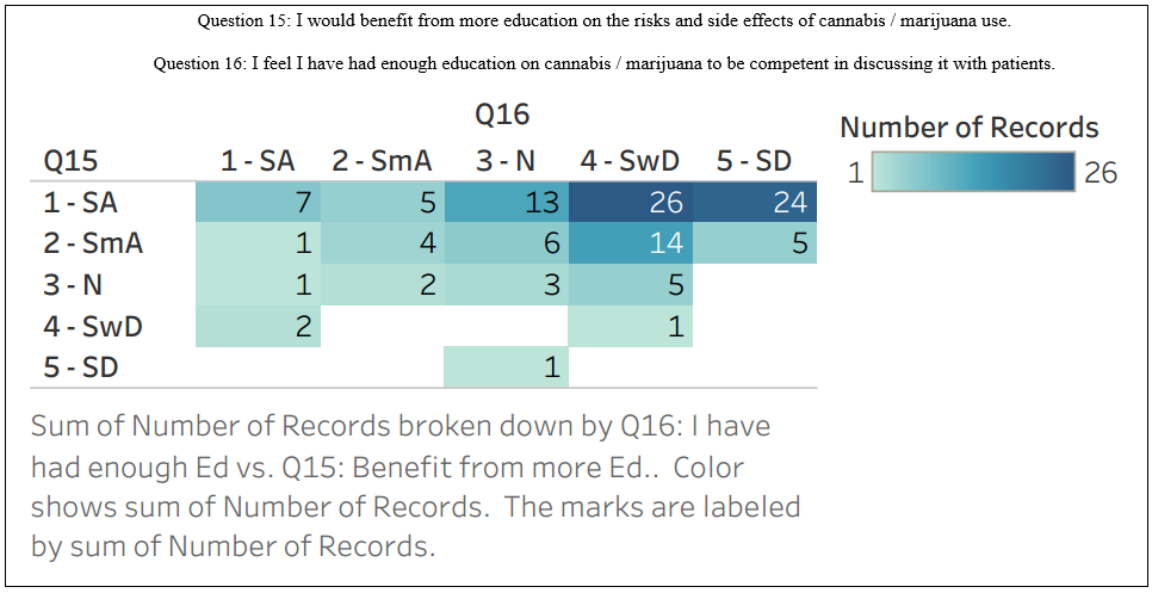
Null hypothesis $H_0: \eta_1 - \eta_2 = 0$
Alternative hypothesis $H_1: \eta_1 - \eta_2 > 0$

Method	W-Value	P-Value
Not adjusted for ties	6078.00	0.0000162750689283
Adjusted for ties	6078.00	0.0000059290858147

An ordinal, Spearman-Rho test was used to evaluate responses to "Question 1: How would you rate your knowledge on the systemic effects of cannabis / marijuana?" and "Question 7: Smoked cannabis / marijuana use can lead to increased risk of cancer."

A positive correlation of .169 was found. As self-reported knowledge went up, so did the belief that smoked marijuana use can increase the risk for cancer. This weak relationship is only suggestive, and more data is needed before a conclusion can be made. A heat plot was used to organize responses from "Question 15: I would benefit from more education on the risks and side effects of cannabis / marijuana use," and "Question 16: I feel I have had enough education on cannabis / marijuana to be competent in discussing it with patients." Those who felt they would benefit from more education also felt they did not have enough education on marijuana. This was significant at $p < .0005$. See Figure 13.

Figure 13. Question 15: "I would benefit from more education on the risks and side effects of cannabis / marijuana use." Compared to Question 16: "I feel I have had enough education on cannabis / marijuana to be competent in discussing it with patients." Heat Plot. (MiniTab, 2018)



A non-parametric, Mann Whitney test was used to evaluate responses to Question 13: "Cannabis / Marijuana is likely to lead to the use of other illicit drugs" and Question 14: "Cannabis / Marijuana use." For the group that answered no (n = 89) to marijuana

use, the average self-reported score was 2.75, the median was 3, and the standard deviation was 1.2181. It was found that there is a negative correlation between marijuana use and belief that marijuana could lead to other illicit drug use. It is significant at $p < .0005$. Those who had any use of marijuana were more likely to think marijuana use did not increase risk for cancer. See Figures 14,15.

Figure 14. Question 13: "cannabis / marijuana is likely to lead to the use of other illicit drugs" compared with no cannabis / marijuana use. (MiniTab, 2018)

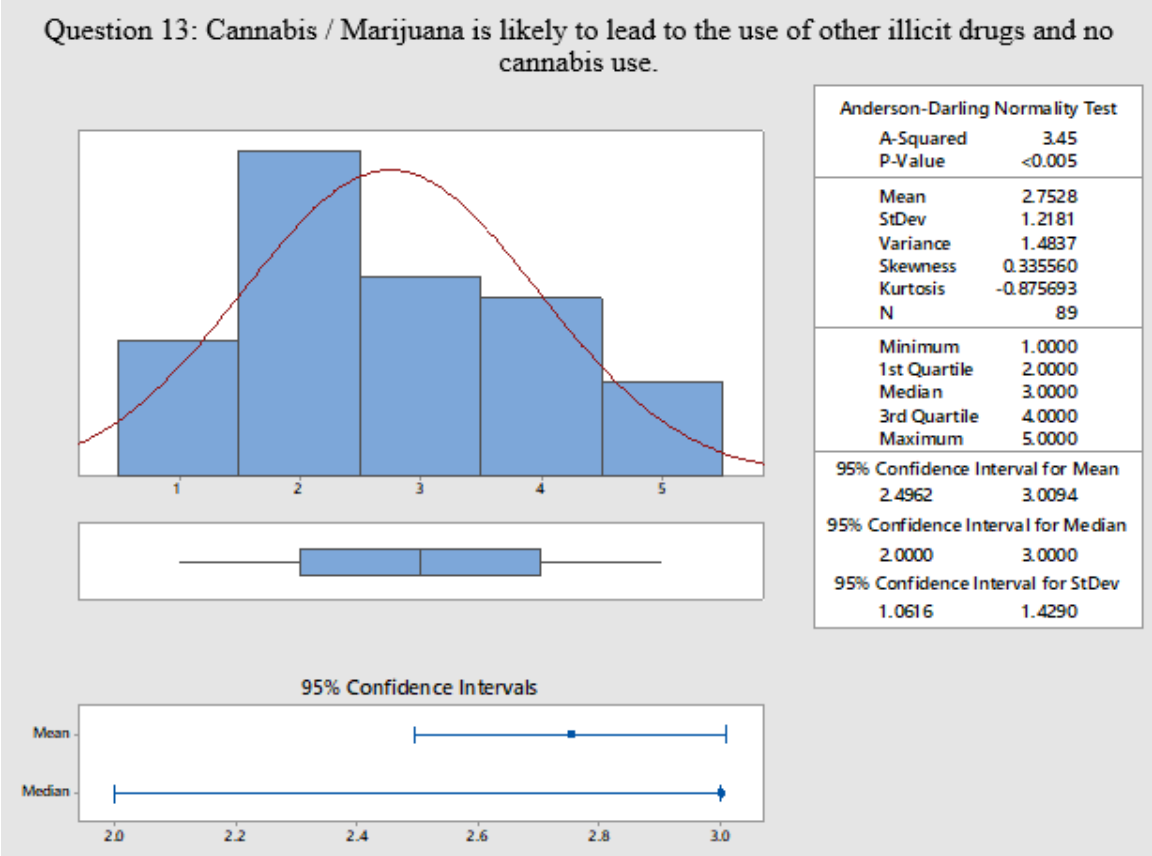


Figure 15. Question 13: "cannabis / marijuana is likely to lead to the use of other illicit drugs" compared with cannabis / marijuana use. (MiniTab, 2018)

Question 13: cannabis / marijuana is likely to lead to the use of other illicit drugs compared with cannabis / marijuana use.

Method

η_1: median of Recoded Q13: Use of Other Il_No
η_2: median of Recoded Q13: Use of Other I_Yes
Difference: $\eta_1 - \eta_2$

Descriptive Statistics

	Sample	N	Median
Recoded Q13: Use of Other Il_No	89	3
Recoded Q13: Use of Other I_Yes	31	5

Estimation for Difference

Difference	Upper Bound for Difference	Achieved Confidence
-2	-1	95.04%

Test

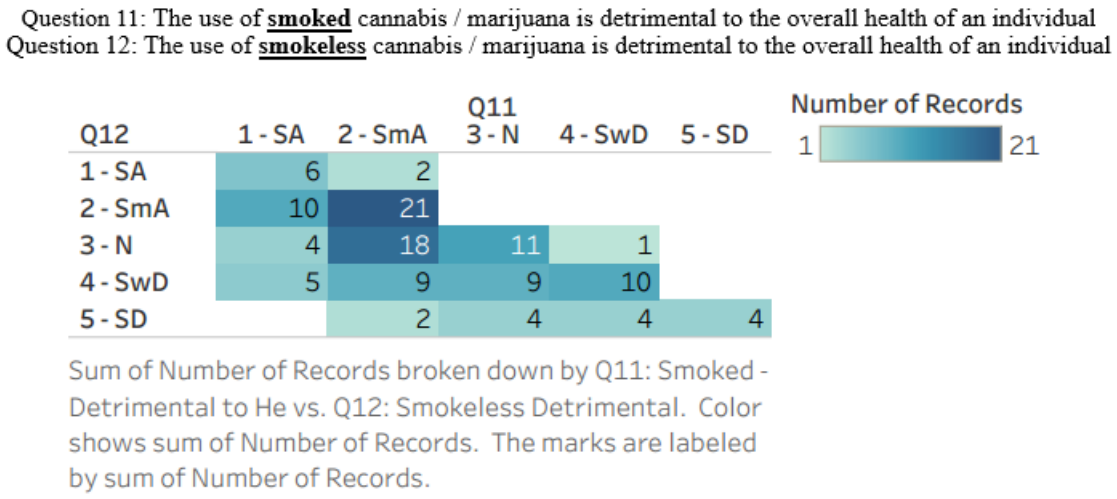
Null hypothesis $H_0: \eta_1 - \eta_2 = 0$
Alternative hypothesis $H_1: \eta_1 - \eta_2 < 0$

Method	W-Value	P-Value
Not adjusted for ties	4504.50	0.000
Adjusted for ties	4504.50	0.000

A non-parametric, Kruskal-Wallis test was used to evaluate responses to Question 11: "The use of **smoked** cannabis / marijuana is detrimental to the overall health of an individual" and Question 12: "The use of **smokeless** cannabis / marijuana is detrimental to the overall health of an individual". It was found that there is a positive correlation of *r*

= .617. This is significant at p <.0005. Participants who rated smoked marijuana as detrimental were also likely to rate smokeless as detrimental. See Figure 16.

*Figure 16. Question 11: "The use of **smoked** cannabis / marijuana is detrimental to the overall health of an individual" compared to Question 12: "The use of **smokeless** cannabis / marijuana is detrimental to the overall health of an individual." Heat Plot. (MiniTab, 2018)*



Discussion

Summary of Major Findings

This survey closed with a 26% response rate. An excellent (above 50%) response rate was acquired by the DH and RIDE programs, while a good response (around 20%) rate was acquired from PT, OT, HSAD/PH, and CMSD. Self-reported knowledge of marijuana was moderate across all demographics, and was significantly higher in those who reported marijuana use. Participants across all groups felt they did not have enough education to be competent when talking to patients about marijuana, and felt they should have more education on the topic. DH students assess for risk of oral and esophageal cancer, and with knowledge of patient marijuana use, they may more accurately determine this risk. Knowledge of marijuana use allows dental hygienists to accurately complete a caries risk assessment; patients with marijuana use often suffer from dry mouth and therefore are at a higher risk for carious lesions in the dentin. This study aligns with the ADHA's research agenda, in that further promotes educational models. It also aligns with the APTA's recognized need for further education on marijuana (2017b). Health educational programs are a major part of a PH or HSAD professionals' roles, and education for these professionals would allow for smoother implementation of educational programs (Eastern Washington University 2017b & & Public Health Online, 2017). No call to action on marijuana education exists for Communication Disorder professionals or OT. The results also align with Happell's study on a need for more

specific educational programs to enhance skills, when treating patients, with substance use like marijuana (2002).

Discussion

Demographics. This study included mostly female healthcare professionals under the age of 34 with an Associate's degree or higher. This sample is not representative of healthcare professionals or the general population. Perceptions of established healthcare professionals across the all ages, degrees and gender should be explored further, and how their perceptions affect their interactions with patients regarding marijuana use. With no correlation between age / education and self-reported knowledge, it can be assumed that there is a deficit of knowledge across generations and groupings.

Marijuana use. Current or past use of marijuana was associated with self-reported increased knowledge. It is possible participants felt they knew more about marijuana because of exposure to it. It is expected marijuana sales will continue to increase in Washington State (The Kush Guide, 2017) With more sales, it is also expected that the number of users will also increase. This increased population of users is expected to have high self-reported knowledge of marijuana. Question 13 asked participants about use and risk for cancer, while question 14 asked about current use. A comparison of Question 13 & 14 illustrated those who had any use of marijuana were more likely to think marijuana use did not increase the risk for cancer. Upon further review, question 13 was not worded clearly. Participants could have interpreted question 13 implied either causation or a correlation between marijuana use and cancer risk. Since this is unclear, further data is needed to determine any correlation between these two topics. Berg (2015) showed marijuana was perceived to be less harmful to health

compared to cigarettes, cigar products, smokeless tobacco, hookah and electronic cigarettes. Merrill (2015) also demonstrated use of marijuana decreased its perception of harm. Marijuana use is expected to increase in Washington State due to legalization, and this study along with the Berg (2015) and Merrill (2015) studies indicate that many new users will perceive marijuana to be less harmful.

Perceptions. Question 1 asked about self-reported knowledge and question 7 ask about marijuana use and cancer risk. When comparing these, there was a weak positive relationship between self-reported knowledge and the belief that smoked marijuana use can contribute to cancer risk. This weak relationship could have several causes. Some participants could have disagreed because they felt marijuana use can help with nausea associated with cancer treatment. Other participants could have felt it only contributed to one or two types of cancer. Merrill (2015) showed that perception of harm from marijuana is reduced among users. Due to these discrepancies, a more detailed survey on perceptions is needed before a conclusion can be made. Questions 15 and 16 asked about current need for education on marijuana. These questions were reverse-coded to increase validity. As students clearly indicated lack of education on this topic, an educational module or curriculum would help to better educate students on this topic. A majority of respondents strongly agreed with the statement, "I would benefit from more education on the risks and side effects of cannabis / marijuana use," indicating additional courses would benefit them. Further education could include interprofessional education, role paying or a healthcare team challenge model. A continuing education course for faculty could be beneficial as well. More informed faculty are better equipped to educate students on the latest marijuana research information. Most respondents disagreed with

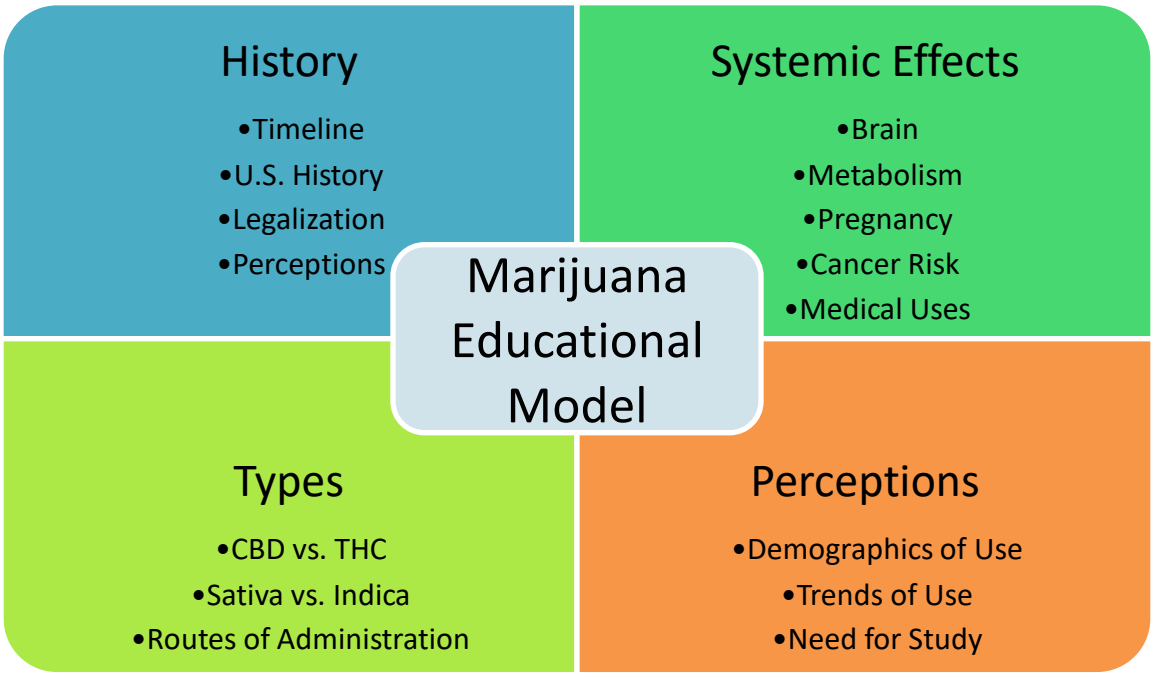
the statement, “I feel I have had enough education on cannabis / marijuana to be competent in discussing it with patients.” No other research has been published that looks at healthcare students’ education on marijuana use and its side effects. This study’s initial data collection shows a perceived gap in educational programs.

Systemic effects. Questions 11 and 12 compared perceived risk between smoked and smokeless marijuana. Most participants felt both smoked and smokeless marijuana were detrimental to health. Within this question another commonality emerged - those who felt smoked was detrimental and smokeless was not. Since participants were split on this topic, an educational program should educate participants on marijuana products and the side effects associated with each type. An exhaustive search of the literature showed no research on differences between perceptions of harm from smoked and smokeless versions of marijuana. With Question 7 being the most agreed upon question, the assumption is participants understood smoked marijuana was detrimental to health. The least agreed upon question was Question 4: “Cannabis / Marijuana use can lead to increased risk of oral cannabis stomatitis (Inflammation of oral tissues and white growths in the oral cavity).” This could possibly be because participants were unsure of what cannabis stomatitis was. This denotes the importance of further education on this topic. Questions 6 & 8 also had lower rates of agreement. A mixed response has been found in research comparing marijuana use and perception of pain. Madras showed marijuana use has helped with short-term pain in those with HIV/AIDS, though no long-term use studies have been done (2015). This could explain the mixed response rate from participants on Question 6. Question 8 also deals with a subject that is understudied. Madras also showed that minimal long-term dosing of marijuana can help reduce risk for

anxiety and depression, but high doses increase the risk for depression or anxiety possibly by down-regulating CB1 receptors (2015). It is not fully understood how marijuana use affects anxiety levels. This data implies students have varied views on the side effects, and have little in the existing research to help them develop valid evidence-based practices. See Figure 17 below for possible educational model by topic.

When educating healthcare students on marijuana many models could be included. These models could include any of the following: interprofessional education, role paying, healthcare team challenge model, case studies, & mock patient simulation. Many of these models could include multiple professions at once, and could allow for collaboration between professions. Role playing or healthcare team challenge could allow healthcare professional students to interact with a patient who uses marijuana. This interaction could lead to critical thinking and informed decision making.

Figure 17. Recommended educational model for marijuana.



Limitations

This survey addressed a controversial topic, which could have dissuaded some students from participating. Berg concluded that a similar online study of perceptions toward illicit drugs did not have lower turnout due to the subject matter, but due to the low response rates of online surveys (2015). Berg studied opinions of college-aged students, but did not focus on healthcare students (2015). This study's focus on healthcare students may have produced a different set of results. The fear of admitting marijuana use may still discourage students from participating.

Healthcare program curricula have a high student time commitment, which leaves students little time for additional activities. One drawback in this survey was the inability to look at all healthcare professions. Professions such as Nursing, General Medicine, Optometry, Oncology, and Pediatrics would provide a more thorough understanding of perception by profession. Once more information is acquired, a plan can be made about the application of educational models.

As the PI personally knew the participants in the DH and RIDE program, this could have led to the increase in response rates. Contacting healthcare students at EWU proved difficult because some programs did not operate within a cohort system (HSAD & MPH). HSAD & MPH do not have distinct cohort programs (students do not enter as a group and go through together cohesively like the others). They take classes at different times and have less connection to each other. In addition, these two programs have students who work full-time during the day and attend school at night. Personal visits to each program may have been a valuable tool to increase participation.

A response rate of 26%, is consistent with FluidSurveys' (2014) average. Online survey response rates can be increased. In this study, personal visits to each program could have increases response rates. The PI did not organize site visits due to time restraints.

Recommendations/Suggestions for Future Research

It is warranted to look at differences in perceptions between students and established practitioners. It is important to ask, does experience in practice change opinions and knowledge level of marijuana use? Perhaps there is a bias based on number of years of practice that could influence a practitioner's perceptions of marijuana. Perceptions of marijuana should be explored within each of the professions as well. Research could compare views based on state of practice and scope of practice. For example, will healthcare professionals from states with legal marijuana like Washington and Colorado have a different opinion than healthcare professionals from states with illegal marijuana like Texas or Virginia?

This study did not explore the healthcare student's personal feeling of responsibility. The following question could be asked in further studies: "Do you feel it is your responsibility to discuss marijuana use with your patients?" Further explorations of healthcare professionals could show differing areas of need based on area of specialization. A future survey should include Nursing, General Medicine, Optometry, Oncology, and Pediatrics.

Preparing healthcare professional students to educate their patients on marijuana involves multiple areas of expertise. For one, students should know the four major areas regarding marijuana. See figure 17. Understanding the stigma associated with its use will

also prepare students to appropriately use motivational interviewing when conversing with patients. Students should also be prepared to explain side effects, and impacts on treatment for their respective field.

Conclusions

With a response rate of 26%, this study followed the trend that online surveys receive low response rates. Self-reported knowledge of marijuana was moderate across all demographics, suggesting the need for more educational models. Participants felt smoked and smokeless marijuana were detrimental to health and recognized the increased risk for cancer with marijuana use. Future research should explore state of practice, self-responsibility, and years of practice in relation to perceptions of marijuana. Further research on systemic and mental effects of marijuana will lead to development of better educational models. Proposed educational models could include the following topics: history, systemic effects, perceptions, and types. Healthcare students also need help when breaching the topic of marijuana use. The use of case studies, mock patients, interprofessional education, and role playing could further learning in healthcare students.

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Appendices

Appendix A

Department Chair and Program Director Letter

Hello Department Chair and Program Director,

My name is Carrie Crosby and I am a Master's student in the Dental Hygiene program. I am requesting your students' participation in my thesis study. I am conducting a survey of healthcare students and their perceptions and attitudes of marijuana use in their patients.

This study has received IRB approval October 9th, 2017 (IRB approval # 5380) If you have any concerns or questions about this approval, you may contact my thesis committee chair, Rebecca Stolberg (rstolberg@ewu.edu or 509-828-1298). You may also contact Ruth Galm, EWU Human Protections Administrator at (509) 359-6567.

I am requesting a complete list of your student emails. Emails will be used to send out the survey link. This link will be uniquely tied to the survey and email address. However, it is not possible to connect the email address with the responses, thus participation in this survey is anonymous and completely voluntary. In addition, email addresses will remain confidential, known only to me as the PI and Dr. Elizabeth Tipton, and only used for the purposes of this thesis study.

Let me know if you have any questions. I look forward to hearing from you soon.

Thank you for your consideration,

Carrie Crosby, RDH BS

Appendix B

Perceptions and Attitudes of Healthcare Students Towards Marijuana Questionnaire

1. How would you rate your knowledge on the systemic effects of cannabis / marijuana?

Very High	Somewhat High	Moderate	Somewhat Low	Very Low

2. Cannabis / Marijuana use can lead to dry mouth.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

3. Cannabis / Marijuana use can lead to dry eyes.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

4. Cannabis / Marijuana use can lead to increased risk of oral cannabis stomatitis (Inflammation of oral tissues and white growths in the oral cavity)

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

5. Smoked cannabis / marijuana use can lead to increased risk of irritated lung / esophageal tissue.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

6. Smoked cannabis / marijuana use can reduce the perception of pain.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

7. Smoked cannabis / marijuana use can lead to increased risk of cancer.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

8. Cannabis / Marijuana use can lead to increased anxiety levels.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

9. Smoked cannabis / marijuana use can lead to decreased short-term cognitive function.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

10. I currently feel comfortable talking with patients about their cannabis / marijuana use.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

11. The use of **smoked** cannabis / marijuana is detrimental to the overall health of an individual.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

12. The use of **smokeless** cannabis / marijuana is detrimental to the overall health of an individual.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

13. Cannabis / Marijuana is likely to lead to the use of other illicit drugs.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

14. Do you personally use cannabis / marijuana?

Yes	No

(Drop down) If so, in the last six months, how often have you used cannabis / marijuana?

Daily	Weekly	Monthly	1-3 times	None

(Drop down) Is it for medicinal or recreational use?

Recreational	Medicinal	Both

(Drop down) What kind of cannabis / marijuana do you use?

Smoked	Edibles	Combination	Other (please specify): ____

15. I would benefit from more education on the risks and side effects of cannabis / marijuana use.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

16. I feel I have had enough education on cannabis / marijuana to be competent in discussing it with patients.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

17. How old are you?
    - ≤24
    - 25-34
    - 35-44
    - ≥ 45
    - Choose not to answer
18. What gender do you identify as?
    - Female
    - Male
    - Fill-In
19. What is your program?
    - Dental Hygiene
    - PT
    - OT
    - Health Science Administration
    - Public Health
    - Communication Sciences and Disorders
    - Regional Initiatives in Dental Education (RIDE).
    - Other: Fill In
20. What is your highest completed education?
    - Some college
    - Associates
    - Bachelors
    - Masters
    - Doctorate
    - Other: Fill In
21. Any comments, questions or concerns you have about this survey or marijuana?

Appendix C

Participant Intro letter.

Hello fellow healthcare student,

My name is Carrie Crosby, and I am a Master's student in the Dental Hygiene program. I am conducting a survey of healthcare students and their perceptions and attitudes of marijuana use in their patients. Your participation is strongly encouraged.

Please complete this survey by clicking this link (links varied per participant) and choosing the answers that best fits. Responses are needed by November 19th, 2017. This link is uniquely tied to this survey and your email address. However, it is not possible to connect your email address with your responses, thus your participation in this survey is anonymous and completely voluntary. **There is no possibility of your survey responses being connected to EWU student services, admission, financial aid, nor your major department.** You may omit answering any question and may stop at any time for any reason. The time anticipated to complete this survey is less than 10 minutes.

In appreciation for your time and effort, you may enter a drawing for a free Sonicare™ Power Toothbrush after completing the survey. The survey program, Qualtrics™, de-links the survey from your email address so your **anonymity is assured** while entering the drawing.

If you have any concerns about your rights as a participant in this research or any complaints you wish to make, you may contact Ruth Galm, EWU Human Protections Administrator at (509) 359-6567. If you do not wish to receive further emails from us, please click the link _____ and you will be automatically removed from our mailing list.

Thank you for your consideration, Carrie Crosby, RDH BS

Curriculum Vita

Carrie Crosby

5420 W Barnes Rd | Spokane, WA 99208 | 509 464-9753 | ccrosby@eagles.ewu.edu

Education

MS in Dental Hygiene — In Progress

- Eastern Washington University, Cheney, WA

BS in Dental Hygiene — Completed June 2016

- Eastern Washington University, Cheney, WA
- Psychology Minor

Work Experience

EWU Clinical Instructor, EWU DH Program — August 2016 – Current

- Instructs Junior and Senior students in Clinic, Lab and Tutoring sessions
    - Clinical Instrumentation, Dental Anatomy, Periodontology I & II

Private Practice, Dr. Ashley Ulmer — October 2016 – Current

- Applies A.D.P.I.E.D. process to patient care on a weekly basis

Individual Tutor, EWU Plus Program, Cheney, WA — June 2012 – December 2014

- Tutored Individuals in Chemistry and Algebra

Server, Glacier Village Café, East Glacier Park, MT — June 2014 – September 2014

- Managed money, seated clients, took orders, and bussed tables.

Poultry Judge, Rockford County Fair — September 2012 – Current

- Judged Poultry according to the American Poultry Association Standard

Violin Instructor June 2008 – September 2013

- Instructed elementary-aged children on violin and viola

Academic/Teaching Experience

Graduate Practicum, EWU DH Program Spring Semester 2018

- Didactic course work with senior undergraduate students
    - DNHY 484S Advocacy & Ethics
- Administrative practicum: involved planning, calibrating and running mock boards for senior students
    - DNHY 452S: Calibrated dental hygiene faculty on how to assess and grade mock board patients

Teaching Assistant, EWU DH Program September 2015 – June 2016

- Guided underclassmen in learning restorative techniques

Scholarly Activities

Clarion Competitor, Minneapolis, MN April 2016

- Competed on a national scale for a health care team challenge
- Collaborated with PT, MPH and HSAD students as a health care team to help fictional Native American Patient, with mental, oral and physical needs

Professional Associations

Eastern WA Dental Hygiene Association Membership Chair June 2016 – Current

- Encourages RDH's to join American Dental Hygiene Association and Washington Association Dental Hygiene Association
- Reaches out to community of Dental Hygienists, via email and mail, to promote ADHA membership

TITLE OF THESIS

Community Service

Volunteer, High School Orchestra, Mt. Spokane High School Mead, WA 2011 – 2016

- Performed orchestral pieces with high school students to assist learning
- Contributed over 40 hours of volunteer work

Honors and Awards

Graduate Student Assistantship, EWU August 2016 – May 2018

- Selected 2 years in a row, provided 20 hours of work to school per week for each 15-week semester
- Developed tutoring program within EWU Dental Hygiene program

Cum Laude, EWU

June 2016

- Graduated with BS in Dental Hygiene

Vice-President, EWU Class of 2016, EWU DH Program September 2013 – June 2016

- Led class in planning events and fundraisers