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Attitudes, Knowledge and Beliefs on Marijuana use in Pregnant Women in Undergraduate Nursing Students

Jordyn Witkins
jordyn.witkins@uconn.edu

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Jordyn Witkins

Ruth Lucas, PhD, RNC, CLS

University of Connecticut

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Abstract

Introduction: Due to the decriminalization of marijuana use by states in the United States, marijuana use has drastically increased in the general populations and in women who are pregnant. During prenatal care, nurses provide education about pregnancy and fetal development.

Objective: This study explore the attitudes, knowledge and beliefs of undergraduate nursing students on marijuana use for individuals and during pregnancy.

Method: The study design was cross-sectional survey with 15-question survey using Likert scale and yes/no questions. Nursing students and non-nursing undergraduate students responses were compared.

Results: Sixty-four nursing students (female, n=50) completed the survey. Nursing students in comparison to the population as a whole agreed that marijuana use was okay ($M = 64$, $SD = 11.515$), $t(63) = 47.7803$, $p = .0001$, was okay for the general population ($M = 64$, $SD = 1.25$), $t(63) = 22.765$, $p = .0001$, and for use during pregnancy ($M = 64$, $SD = 7.93$), $t(63) = 47.678$, $p = .0001$. In comparison to non-nursing students, nursing students were significantly more supportive of general marijuana use $t(111) = -2.03$, $p = .045$ and use during pregnancy $t(111) = -2.35$, $p = .020$ but not in their belief on the effect on the fetus.

Discussion: Nursing students significantly approve of marijuana use in both the general population and during pregnancy but demonstrate a lack of knowledge related to effect marijuana has on fetal development or the infant. As future providers, nursing student's understanding of the therapeutic use of marijuana should be addressed throughout their curriculum.

Attitudes, Knowledge and Beliefs on Marijuana use in Pregnant Women in Undergraduate Nursing Students

While our culture is changing every day, it still remains relevant that marijuana is a highly used drug. The prevalence of marijuana use in the United States is at an all-time high, with 22.2 million people using the drug in one month according to the 2015 National Survey on Drug Use and Health (National Institute on Drug Abuse, 2019). It is estimated that almost two million adolescents and seven million young adults are current users (Borodovsky et al., 2017). Marijuana is a highly controversial topic but yet, somehow it becomes even more controversial when discussing it in conjugation with pregnancy. The latest statistics estimate that approximately 6% of women report using marijuana. The proposed study seeks to discover the attitudes, beliefs and knowledge of marijuana use in the undergraduate nursing student population at the University of Connecticut. This population was chosen specifically because they are of childbearing age, they will become pregnant (or have a partner who is pregnant) within the near future, and in the future, they will be a trusted resource for information about marijuana use by individuals and by women who are pregnant. Therefore, it is critical to understand them as individuals, their opinions on marijuana, identify how likely it would be for them as future health care providers to use marijuana for recreation and while pregnant for symptom management. Also, it is important to understand their beliefs and knowledge about marijuana use to identify gaps in knowledge or issues of bias towards individuals who use marijuana.

Literature Review

General Information About Marijuana

The National Institute on Drug Abuse defines marijuana as a drug that is derived from either the *Cannabis Sativa* or *Cannabis Indica* plants (National Institute on Drug Abuse, 2018). One of the 13 psychoactive components of marijuana that is responsible for acting on the brain is Tetrahydrocannabinol (THC). The National Institute on Drug Abuse reports that THC binding to receptors in the brain cause short term effects. Some side effects can include, altered senses, changes in mood, impaired body movement, impaired memory, difficulty with thinking and problem solving and altered sense of time (National Institute on Drug Abuse, 2018). The long-term effects of marijuana are unknown and are considered a grey area knowledge.

Why is Marijuana Used

Medical marijuana is essentially the same formulary as recreational marijuana, but it is used for medical purposes and must be cultivated in a licensed facility. Medical marijuana is used to treat different health conditions including Alzheimer's disease, cancer, Crohn's disease, epilepsy, pain, muscle spasms, eating disorders, etc. (Bhandari, 2018). Medical marijuana can be smoked or brewed into a tea or be mixed into foods, known as edibles, such as brownies, cookies, or candy. However, even though marijuana is used to treat the above health conditions, it is not supported to treat seizures and chronic pain.

Other research suggests that marijuana helps to manage seizures in children. This thought started because the FDA approved Epidiolex which is made from a cannabinoid, marijuana's active ingredient, as a therapy for people who suffer from seizures (Bhandari, 2018). Marijuana is also believed to help with chronic pain because its active ingredient, cannabinoid, resembles chemicals that help the body with pain and appetite. As of right now, there are several studies that show that marijuana can treat chronic pain. Several studies are ongoing to evaluate the effect of marijuana use with patient-reported symptoms and treating insomnia under naturalistic

conditions (Stith et al., 2018; Vigil et al., 2018). Vigil et al., are also exploring the best form of raw natural medical cannabis. In Stith et al., the study explored using a cellphone application called "The Releaf App" (Stith et al., 2018). The app was used by 2300 users to measure the self-reported effectiveness and side effects of medical cannabis used under naturalistic conditions. In each session, the users self-administered medical cannabis, provided information about why they were taking medical cannabis, the amount of cannabis they consumed and if they experienced any side effects. The users also rated their pain severity on a scale of 1-10.

The result of the Releaf App study was that the individuals who responded on the Releaf App used cannabis primarily to treat health symptoms such as pain, anxiety, and depressive conditions. The individuals self-reported that the cannabis help to reduce their symptoms significantly, with mean reductions between 2.8 and 4.7 points on the pain scale. The study also found that "higher pre-dosing symptom levels were associated with greater reporter symptom relief, and users treating anxiety or depression related symptoms reported significantly more relief than users with pain symptoms" (Stith et al., 2018, p. 1). In conclusion, this study found that cannabis is associated with significant improvements in self-reported symptom relief for treating different health conditions but that it also has frequent positive and negative side effects.

Similarly, Vigil et al. (2018) also used the Releaf App, but asked individuals to describe their raw marijuana use. The Releaf App measured fundamental characteristic of raw, natural medical cannabis flowers. The investigators found the cannabis flowers were associated with changes in perceived insomnia under naturalistic conditions. In Vigil et al., there were 406 individuals with a specified condition of insomnia completed 1056 medical cannabis administration sessions using the Releaf App (Vigil et al., 2018). With the app, they could record real-time ratings of how they perceived their insomnia before and after they consumed medical

cannabis, any side effects that they experience, and product characteristics. This study found that Releaf App users symptoms severity reduced while using the cannabis on average of -4.5 on a 0-10-point visual analogue scale (Vigil et al., 2018). All things considered, both studies found that patients experience statistically and clinically significantly therapeutic benefits when they used cannabis for symptoms ranging from chronic pain to insomnia.

Risks of using Marijuana in Pregnancy

Currently, 1 in 20 women report marijuana use during pregnancy (CDC, 2018). In a self-report, 2-5% of women admit to using marijuana during pregnancy, but in young poverty populations, this number is larger at 15-28% (Krening & Hanson, 2017). It is important to note that self-reported studies are not the most reliable, especially when dealing with topics that have legal implications. Therefore, these stats provide usable information but should not be considered a completely accurate statistic

Due to the marijuana use during pregnancy having legal and health implications, there is limited research. However, there are risks of marijuana use during pregnancy to the fetus (American College of Obstetricians and Gynecologists, 2018). As marijuana is a teratogen and based on the transmission route, is combined with other chemicals. These include babies being born smaller and/or stillbirth (American College of Obstetricians and Gynecologists, 2018).

Long term effects are more challenging to determine. Lawmakers have trouble explaining to mothers why they should be avoiding marijuana, if the effects on the fetus is unclear. In addition, the evidence is insufficient as to the classification of marijuana and the anticipated impairments. Auer et. al. (2018) studied the long-term effects in 3385 people from Coronary Artery Risk Development in Young Adults (CARDIA) study. The participants were studied from 1985 up until 2011 in three categories, verbal memory (Rey Auditory Verbal Learning Test),

processing speed (Digit Symbol Substitution Test) and executive function (Stroop interference

Test). Out of all of the study participants, 11.6% (392 people) reported continuous use of

marijuana into their middle age period of life (Auer et. al., 2018). The 392 people preformed at a

much lower level in verbal memory, processing speed and executive function in comparison to

the reference values for all of these categories. People actively using marijuana at the time of

testing preformed worse in verbal memory and processing speed. Therefore, Auer et. al. (2018)

concluded that people exposed to marijuana in their previous life were not strongly correlated

with processing speed and/or executive function, but with verbal memory.

Many of these presumed psychological effects on the fetus are suspected to occur

because of the dopaminergic effects of THC in marijuana (Dong et.al., 2018). Other studies have

presented evidence that significantly correlates neurodevelopmental, and cognitive/emotional

functioning deficits due to marijuana use during pregnancy (Chasnoff, 2017). Both marijuana

and the other chemicals can directly cross the placenta, therefore acting directly on the fetus

(Dong et.al., 2018). This information suggests potential negative effects on an infant over time.

Dong, et. al. (2018) have presented evidence that the exposure to cannabinoid substances

in utero can have a significant negative impact on the immune function of the fetus throughout

their lifespan. To describe in detail, in utero, a fetus is dependent on the shift from the use of

Th1cells to the Th2 cell. T helper 2 cells play a role in antibody responses, the development of

eosinophils, and the inhibition of macrophages (Sykes et. al. 2012), while T helper 1 cytokines

have many functions including "upregulating the IL-12 receptor and inhibiting the growth of Th2

cells" (Sykes et. al. 2012, p. 6). According to Sykes et. al. (2012), many studies have supported

that this balance between Th1 and Th2 cells in the fetus have been critical to the development of

the fetus' immune system and the prevention of preterm labor. Exposure to Hu-210 (a synthetic

cannabinoid) has been correlated to abnormally low levels of Helper T cells in the peripheries of the adult male rat offspring (Dong et.al., 2018).

Both Th1 and Th2 cells regulate the expression of FAAH, which is the abbreviation for fatty acid amide hydrolase. This enzyme (FAAH) "hydrolyzes the endocannabinoid anandamide and related amidated signaling lipids" (Ahn et. al., 2009, p. 1). The endocannabinoid substances that FAAH hydrolyzes will then active the CB1 and CB2, which are a specific G-protein coupled receptor (GCPR) (Ahn et. al., 2009). In the discussion of marijuana use and pregnancy, it is important to note that THC *will* active these receptors. CB1 and CB2 receptors are found on a variety of cells, all of these being cells involved with regulating the immune system. Wolfson et.al. (2016) found that the activation of both CB2 and CB1 receptors in pregnant mice (but more so CB2) resulted in an increase in total levels of IL-10, which is an anti-inflammatory cytokine that is critical to fetal development. Therefore, marijuana use can cause a decrease in the normal inflammatory processes of the body.

To move deeper into the effects of THC on the fetal immune system, Lombard et. al. (2011) researched the effects of THC on mice intraperitoneally. Four different pregnant mice were used, two treated with THC and two used as a control, both of which had about ten pups. The researchers then aseptically removed thymic lobes from the pups at 16 weeks' gestation. The TUNEL method was used to evaluate the samples which revealed that "acute perinatal exposure to THC induces apoptosis and alterations in T cell subsets of the fetal thymus" (Lombard et. al., 2011, p. 3). While many studies included in this paper have already acknowledged the effects of THC on T cells (Dong et.al., 2018 & Sykes et. al. 2012), Lombard et. al. (2011) presented significant information regarding the thymus. Lombard et. al.'s (2011) research revealed the source of the T cell abnormality, which is the death of the cells in the thymus (apoptosis). The

apoptosis of the thymus occurred because of the activation of CB1 and CB2 receptors by marijuana, directly proving the adverse effects of marijuana on the thymus and immune function in general.

If a woman is using marijuana during pregnancy it is encouraged that she tells her medical provider as soon as possible. The American College of Obstetricians and Gynecologists (2018) advice pregnant women do not use marijuana. Instead, ACOG suggest telling the obstetrician- gynecologist (OB-GYN) of the morning sickness and that the provider will potentially suggest diet or lifestyle changes. If these don't work, there are also many medications that are FDA approved to treat nausea and/or vomiting during pregnancy.

Marijuana Policies and Regulations

The contradicting laws between different states in the United States have altered the way people view marijuana and its' risks. The following states have fully legalized marijuana, as well as decriminalized its' use; The District of Colombia, Washington, Oregon, California, Colorado, Nevada, Illinois, Maine, Massachusetts, Vermont and Alaska. In Michigan, marijuana is fully legal, but it is not yet decriminalized. Legal status of marijuana is mixed in, Montana, North Dakota, Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, New Mexico, Arizona, Utah, Hawaii, Florida, Georgia, Virginia, West Virginia, Kentucky, Indiana, Ohio, Maryland, New Jersey, Delaware, Pennsylvania, New York, Connecticut, Rhode Island and New Hampshire. Mixed legality means that some these states only legalized medicinal marijuana or have terms to their law. In some states such as Virginia and Iowa, CBD is the only form of medical marijuana that is legal. Eight states considered marijuana fully illegal, and there , these states are; Idaho, Kansas, Wyoming, South Dakota, Wisconsin, Tennessee, Alabama and South Carolina. Lastly, three states have decriminalized marijuana, but still consider it fully illegal. These states are,

Nebraska, Mississippi and North Carolina (DISA Global Solutions, 2020). Due to the fact that marijuana is illegal on the federal level, therefore a constant tension for criminalization between the states.

Colorado, being one of the first states to legalize marijuana for recreational use, provides good information as to these attitudes and beliefs. In 2015, Colorado residents were asked about their perceived risk of marijuana use, their access to marijuana and their perception of how acceptable marijuana use is, in comparison to states without legalization of medical marijuana. The results found that the perceived risk of smoking marijuana is significantly decreased for Coloradans compared to other states. In addition to this, participants from Colorado reported low rates of disapproval of marijuana use for adult individuals. All of this information was readily available, as it was found Coloradans were more willing to report their marijuana use (Scheumrmeyer et al., 2014).

To further complicate the legality of marijuana use are gaps between state and national laws, recreational and medicinal use, and use in pregnant women. Currently, there are no laws that prevent individuals and women who are pregnant from buying or using marijuana. In states that have legalized marijuana, all state-level criminal penalties involving marijuana have been removed, including use during pregnancy (Chasnoff, 2017). However, with the increase use of marijuana in pregnancy, health care professionals and legislators have identified a need to add amendments to the existing laws to protect fetuses. In 2015, the American Medical Association, provided a statement for the cautionary use of any type of marijuana in pregnant women. Following the AMA, the Committee on Obstetric Practice of the American College of Obstetricians and Gynecologists advised professionals against "the use of marijuana for medicinal purposes during preconception, pregnancy, and lactation" (Chasnoff, 2017, p. 3). The

discussion of whether marijuana use during pregnancy should be illegal is heavily influenced by

the ongoing issue of: is the drug use of a pregnant woman considered child abuse? Many of the

decisions of past legal trials were based on the answer to a very controversial question: is a fetus

considered a child?

Presently, Connecticut does not have a law that defines marijuana use in pregnant women

as child abuse. Instead, Connecticut's Judicial Branch has a Child Abuse Law Library which

contains 11 sections. These sections range from "duty to report child abuse" (Child Abuse and

Neglect in Connecticut, 2017, p. 1) to "false reports of child abuse" (p. 1). However, there is one

section that references protocols for women who are pregnant. Section 17a-710 of the

Connecticut General Statute states (2017): "It shall be the policy of the Department of Mental

Health and Addiction Services to develop and implement treatment programs for pregnant

women of any age with substance use disorders and their children" (p. 45). The statute places the

Department of Mental Health and Addiction Services to be responsible for a case manager to

develop parenting classes, outreach services, hospital care specific to addiction, home visitation,

vocational training to aid in employment and a housing component for parents (Connecticut

General Statue, Section 17a-710, 2017, p. 45). While all of the initiatives listed in section 17a-

710 of the Con. Gen. Statues illustrate a thought-out plan to help mothers who are struggling

with addiction, nothing is protecting the fetus from exposure by law. Due to the uncertainty of

the long-term effects of marijuana, Krening and Hanson (2017) note that it is difficult to create

laws regulating marijuana use and marijuana use during pregnancy.

Nurse's Role in Marijuana Use in the General Population and during Pregnancy

Nurses are one of the most trusted profession, therefore, patients come to appointments

and trust that nurses will answer their questions. It is the nurse's responsibility to be current on

the marijuana laws in their state, their patient's current use, and any conditions the patient has that may make marijuana dangerous to them, or ones that could potentially qualify them for medical marijuana use. The National Council of State Boards of Nursing (NCBSN) has created a Marijuana Regulatory Guidelines Committee to create a comprehensive literature review, current legislation and nursing implications on marijuana. This serves as a resource for nurses to guide their practice. The NCBSN reports side effects of marijuana to be increase heart rate, dizziness, increased appetite, hallucination, dry mouth/dry eyes and anxiety (NCBSN, 2018). In terms of pregnancy, the source reports that there is no reliable data to prove negative neurodevelopmental outcomes on neonates (NCBSN, 2018). It can be presumed that nurses share these beliefs. Therefore, when nurses are caring for patients, they will use this information for educational teaching. However, nurses' personal beliefs will also unconsciously bias their treatment.

As for a pregnant woman who is attending doctor's appointments, nurses are a source of information and learning. Nurses are the ones who provide reliable information and, in this instance, will provide education on the impact of using marijuana during pregnancy. The Association of Women's Health Obstetric Neonatal Nurses (AWHONN) released a position statement in 2018 regarding marijuana use during pregnancy. The organization dedicates an entire section to the role of the nurse in this topic, explaining that the nurse must stay up to date on the laws and regulations as well as the effects on the fetus (Association of Women's Health Obstetric Nurses, 2018). AWHONN also asserts that it is the nurse's job to encourage a pregnant woman discontinues marijuana use during pregnancy and while breastfeeding (2018). In addition to this, during every prenatal visit, nurses need to ask about drug use, specifically marijuana. Nurses need to remember that if they do identify marijuana use during pregnancy, it is their role to educate their patient in a way that does not make them feel judged or attacked (stigma).

Women will not continue with their prenatal care if they perceive being judged or stigmatized (Association of Women's Health Obstetric Nurses, 2018).

This study addresses the increasing use of marijuana in the general population and in pregnant women by focusing on the attitudes, beliefs and knowledge of nursing students, who are becoming trained to be part of this honorable profession. The opinions of this specific population are important, because they will be educating their social network (peers, families, social media presence) and patients in the near future on this topic. This study aims to answer the research question: What are the attitudes, beliefs and knowledge of undergraduate nursing students at UConn?. The outcome of this study will guide future interventions in the general population and in childbearing age women and men to address gaps in understanding about marijuana and develop alternative treatments for women experiencing pregnancy symptoms.

There are no other studies that report how nursing students or undergraduate students in general perceive drugs.

Materials and Methods

Design

A survey of 15 questions created and completed via the UConn software Qualtrics.

Sample and Setting

The sample population for this study is undergraduate nursing students at the University of Connecticut, this includes both students who are enrolled in the four-year bachelor's program and CEIN program. Students were excluded that were not in the nursing program at the University of Connecticut, or who are graduate students. The participants must be able to read and write in English to participate.

Data Collection

A link to the survey was posted in the UConn Daily Digest, as well as sent out to the nursing list-serv for all four cohorts, as well as the CEIN program. The announcement was posted once a week until the 50 participants had been reached. The survey was simultaneously collected with another honors students whose population focus was non-nursing students. The survey link remained active until 100 participants had fully completed the questionnaire (50 nursing and 50 non-nursing participants).

The survey was developed with the main focus in mind, of attempting to understand the attitudes, beliefs and knowledge of marijuana use in undergraduate students. The questions were created after an extensive literature review, in attempt fill the new found gaps in the current literature.

Once a potential participant clicked on the announcement link, the consent form was presented. Consent for the survey was obtained before the participant began the survey. The survey did not ask any demographics question that would identify the participants, and all responses were anonymous. The survey had two parts, which together, took about ten minutes to complete. The first part asked questions about age, class standing, major, undergraduate student status and gender identity. These items were collected by either a checklist or a fill in the blank. The second part asked questions about marijuana use including opinions on marijuana use, opinions on marijuana use while pregnant, opinions on the clinical usefulness of marijuana, and if he/she/they knew someone who is using marijuana. Another question asked about if the Department of Children and Family Services should be involved in a case in which a pregnant woman is using marijuana. The questions used 5-point Likert scales, fill in, and yes/no answers. See appendix A for questions used in the questionnaire.

Data analysis

Descriptive statistics were used to describe the sample, one sample t-tests to report the relationships for the nursing students' answers and independent t-tests were used to explore the relationship between nursing and non-nursing majors. To better understand the overall knowledge of nursing students, we combined the four knowledge questions related to general population, the three questions related to pregnancy, and all seven questions together (Appendix A). The answers to these questions were clustered and compared between class ranks, and gender.

<div align="center">**Results**</div>

We recruited from the 600 UConn Nursing students and 67 students responded. In Table *1*, we describe the characteristics of the population and of the 49 non-nursing student population which were recruited by another honors nursing student. A total of 155 students responded, 23 responses (16%) did not finish the entire survey, 9 responses (39.1%) only consented to the survey, without providing their major, and 14 responses (60.8%), 10 nursing, and 4 non-nursing, stopped at gender identity. Five students were excluded from the analysis, two students finished the survey without providing their major and age, three nursing students did not provide their class cohort. The final sample included 113 participants, 64 nursing students and 49 non- nursing students, to be used in the analysis. The analysis will first address the responses from the nursing students and then compare their responses to the non-nursing students (Table *1*).

The characteristics of the nursing students who responded were 78% female (Table 1), age range 18 and 27, with a single outlier at 52 years, 20.3% freshman, 17.2% sophomores, 20.3% juniors, 28.1% seniors and 14.1% super senior, which included students in the CEIN program. Out of all the nursing students surveyed, 95.3% of people knew someone who used marijuana, and 10.9% knew someone who used marijuana while pregnant.

Beliefs of Nursing Students About Marijuana Use

The data was analyzed as separate questions and then as clustered questions. For the 7 questions, first nursing students agree/strongly agree that marijuana use is appropriate for the general (not pregnant) populations (82.8%) (Table 2). For pregnancy and infant, 9.4% agree/strongly agree that marijuana use is appropriate to manage pregnancy symptoms, 4.7% agreed that marijuana no effect the fetus, and 15.6% agree that marijuana has no effect on the newborn. For 92.2% of students, they demonstrated their knowledge that women experience pregnancy related symptoms (Table 2). Lastly, 18.8% of nursing students believe women should be reported to social services for using marijuana while pregnant (Table 2). In comparison to the general population use, of nursing students agree or strongly agreed that pregnant women can use marijuana to manage their pregnancy related symptoms (**Error! Reference source not found.**).

Three clustered questions were created: total marijuana beliefs (named:Total_MJ). , individual marijuana beliefs (named: Individual_MJ) and pregnancy/fetus/newborn beliefs (named: Pregnant_Fetus_MJ). The Total_MJ variable was comprised of both Individual_MJ and Pregnant_Fetus_MJ. The Individual_MJ question included the following questions; "I believe pain can be managed with marijuana" and "There is nothing wrong with using marijuana to treat symptoms one may be experiencing". The Pregnant_Fetus_MJ variable was comprised of the following questions; "I believe pregnant women can use marijuana to manage their pregnancy-related symptoms", "I believe that marijuana has no effect on newborn infant after birth" and "marijuana has no effect on fetal development".

T-tests were run on the sample and were found significant for each clustered question. The t-test was run on a 95% confidence interval, which would make the alpha of this test 0.05.

Nursing students in comparison to the population as a whole agreed that marijuana use was okay (M = 64, SD = 11.515), t(63) = 47.7803, p = .0001, was okay for the general population (M = 64, SD = 1.25), t(63) = 22.765, p = .0001, and for use during pregnancy (M = 64, SD = 7.93), t(63) = 47.678, p = .0001. There was no significance for class standing Total_MJ variable (p=0.270), Individual_MJ variable, (p=0.585), Pregnant_Fetus_MJ variable, (p=0.482), and for gender Total_MJ variable (p=0.270), Individual_MJ variable, (p=0.422), Pregnant_Fetus_MJ variable, (p=0.791). (Table *3*).

Comparison of Beliefs Between Nursing and Non-Nursing Students

A comparison between the nursing and non-nursing students across the three questions was conducted. The t-tests between non-nursing and nursing students are as follow: Individual_MJ, t(111) = -1.49, p = 0.137, Pregnant_Fetus_MJ, t(111) = -2.03, p = .045 and Total_MJ, t(111) = -2.35, p =.020 (Table 5). In comparison to non-nursing students, nursing students were significantly more supportive of general marijuana use and use during pregnancy but not in their belief on the effect on the fetus.

Discussion

The population of nursing students' surveyed show surprising results in relation to marijuana use during pregnancy. Nursing students demonstrated a significant difference in their responses compared to the general population in accepting the use of marijuana for general use, in pregnancy and overall. More nursing students than expected believed that marijuana use was appropriate and safe during pregnancy. In addition, more nursing students believed that marijuana use did not pose any threats to the fetus, or a newborn baby. Class rank did not make a difference for any of these variables, meaning that more education did not play a role in these opinions. Before conducting the study, the assumption was that all nursing student would be in

opposition to marijuana use during pregnancy, however this was not the case. In similar fashion, gender did not make a difference in any of the questions related to marijuana use during pregnancy. However, it is important to note that the nursing student population was not very diverse in gender, as it was predominately female.

As evident by the data, nursing students' perception of marijuana was significantly different than those non-nursing. In general, nursing students think more positively of marijuana use during pregnancy. In addition, they think less of the negative effects on both the fetus, and the baby once he/she is born. This is surprising, because nursing students take an entire course on pregnancy and newborns. This course includes information on teratogens, complications and abnormalities of the fetus/newborn baby.

The data presents a concern that must be addressed, and this includes looking into the marijuana education programs in the UConn School of Nursing, as well as other nursing schools. It is important for nursing educators to present valid, and concise information as to the dangers of using marijuana while pregnant. These facts must be related to both the effects on the pregnant mother, as well as the effects on the fetus, and long-term the newborn baby. These findings affect healthcare as a whole, because many of these students will begin practicing as registered nurses in just a short time. As previously mentioned, unconscious bias will affect the way a health care practitioner cares for a patient. In addition, health care provider education is extremely important, and if a nurse or a doctor lacks accurate education on marijuana, it will impede their ability to properly educate their patients. This is not quality care. In the future, this could result in a large knowledge gap between both the general public and health care providers.

As the review of the literature shows, people's opinions on marijuana use change based on the state they live in. This occurs because of the different laws regarding recreational and

medicinal marijuana in each state. People who live in states which have legalized recreational marijuana, are less likely to think criminally of marijuana use. For example, people in states such as Colorado where recreational marijuana is legalized, will have very different views than people who live in Connecticut, where these laws do not exist.

Limitations

Although this study presents valuable information, there are limitations that exist. The first limitation is the results are only a reflection of 64 nursing students, which is only 10% of the total possible recruits. Therefore, the results may not be generalizable to the entire population of the UConn School of Nursing. In addition, the results are not generalizable due to the differences in marijuana use across the entire country, or even world. As this was conducted in a state where recreational marijuana use is criminalized, the nursing students' results cannot be generalized to a state where recreational marijuana is not criminalized.

Another limit exists with the availability of articles available in relation to the topic of concern. Due to legality purposes, and the recent up rise of marijuana use, there are not very many published studies that present results about the effects of marijuana and its effects on the fetus/newborn baby. This may have swayed people's answers to the survey, because they do not have concrete evidence to base their opinions off of.

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Appendix A

A. Questionnaire used to collect data

A.

What is your age? (provide a value in the space below), you may also fill in "no response"

Are you currently an undergraduate student? (choose one)
○ Yes
○ No
○ No Response

What is your major? (fill in), you may also fill in "no response"

What is your class standing? (choose one)
○ Freshman
○ Sophomore
○ Junior
○ Senior
○ Super Senior and Up
○ No Response

What is your gender identity? (choose one)
○ Male
○ Female
○ Transgender man / transman
○ Transgender woman / transwoman
○ Genderqueer / gender non-conforming
○ Decline to state
○ Additional Identity (fill in)

B.

lease fill in the following based off of your opinion of the statement below:

believe pain can be managed with marijuana.
○ Strongly agree
○ Agree
○ Neutral
○ Disagree
○ Strongly disagree

Please fill in the following based off of your opinion of the statement below:

There is nothing wrong with using marijuana to treat symptoms one may be experiencing.
○ Strongly agree
○ Agree
○ Neutral
○ Disagree
○ Strongly disagree

Do you know someone who has used marijuana?
○ Yes
○ No
○ No Response

If you answered yes to the question above, what reasons did they use it for? (check all that apply)
☐ Nausea/Vomiting
☐ Pain management
☐ Recreation/Pleasure
☐ Prescription
☐ Stress
☐ I do not know anyone who has used marijuana
☐ No Response

C.

Please fill in the following based off of your opinion of the statement below:

Women who are pregnant may experience nausea and other pregnancy related symptoms.
○ Strongly agree
○ Agree
○ Neutral
○ Disagree
○ Strongly disagree

Please fill in the following based off of your opinion of the statement below:

Women who are pregnant may experience aches and pains.
○ Strongly agree
○ Agree
○ Neutral
○ Disagree
○ Strongly disagree

Please fill in the following based off of your opinion of the statement below:

I believe pregnant women can use marijuana to manage their pregnancy-related symptoms (pain, nausea/vomiting, discomfort, etc).
○ Strongly agree
○ Agree
○ Neutral
○ Disagree
○ Strongly disagree

Marijuana has no effect on fetal development.
○ True
○ False
○ No Response

D.

I believe that marijuana has no effect on newborn infant after birth (e.g., no withdrawal symptoms)
○ True
○ False
○ No Response

Do you think women who use marijuana should be reported to the Department of Children and Family Services or criminally reprimanded?
○ Yes
○ No
○ No Response

Do you know someone who has used marijuana while they were pregnant?
○ Yes
○ No
○ No Response

If you answered yes to the question above, what reasons did they use it for? (check all that apply)
○ Nausea/Vomiting
○ Pain management
○ Recreation/Pleasure
○ Prescription
○ Stress
○ I do not know anyone who has used marijuana while pregnant
○ No Response

Appendix B

Table 1
Description of Characteristics

Question	Total N	Nursing Students	Non-Nursing Students
Class standing			
Freshman	23	13	10
Sophomore	19	11	8
Junior	24	13	11
Senior	37	18	19
Super senior	10	9	1
Gender			
Male	26	14	12
Female	84	50	34
Transgender/Transqueer	1	0	1
Other	1	0	2
Total	113	64	49

Table 2.
Nursing Students Response to the Question

Nursing Students
N=64

Average Scores for Each Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Nothing Wrong with Using Marijuana to Treat General Symptoms	34.4	48.4	12.5	4.7	
I believe pain can be managed with marijuana	34.4	60.9	4.7		
Belief that Women May Experience Pregnancy Related Symptoms	71.9	20.3	4.7	3.1	
Belief that Women Can Use Marijuana to Manage their Pregnancy-Related Symptoms	3.1	6.3	26.6	43.8	20.3

	Yes	No	No response
Do you know someone who uses marijuana	95.3	4.7	
Marijuana has no effect on fetal development	4.7	71.9	20.3
Marijuana has no effect on newborn infant after birth	15.6	65.6	18.8
Should Women Using Marijuana be Reported to the Department of Children and Family Services	18.8	46.9	34.4

Table 3
Nursing Students Response to Clustered Questions

Clustered questions	N	M	SD	t	df	p
Individual_MJ						.000
Total	64	3.5781	1.25742	22.765	63	0.422
Gender						0.585
Class						
Pregnancy_MJ						
Total	64	7.9375	1.33184	47.678	63	.000
Gender						0.791
Class						0.482
Total_MJ						
Total	64	11.5156	1.92718	47.803	63	.000
Gender						0.564
Class						0.270

Table 4

Comparison between Nursing and Non-Nursing Students for Clustered Study Variables

Questions	Measurement				
Belief that Women Can Use Marijuana to Manage their Pregnancy-Related Symptoms	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Nursing Students (n = 64)	3.1	6.3	26.6		20.3
Non-Nursing Students (n = 49)	2.0	4.1	36.7	32.7	24.5
	Yes	No	No Response		
Marijuana has No Effect on Fetal Development					
Nursing	4.7	71.9	23.4		
Non-nursing	0	63.3	36.7		
Marijuana has no Effect on Newborn Infant After Birth					
Nursing	15.6	65.6	18.8		
Non-nursing	6.1	57.1	36.7		

Table 5

Comparison between Nursing and Non-Nursing Students for Clustered Study Variables

Logistic parameter	Nursing Students N=64		Non-Nursing Students N=49		T-Value	p
	M	SD	M	SD		
Individual_MJ	3.58	1.26	3.96	1.40	-1.50	0.137
Pregnant_Fetus_MJ	7.94	1.33	8.41	0.16	-2.03	0.045
Total_MJ	11.52	1.93	12.37	0.27	-2.35	0.020