HHS Public Access

Author manuscript

Drug Alcohol Depend. Author manuscript; available in PMC 2020 March 01.

Published in final edited form as:

Drug Alcohol Depend. 2019 March 01; 196: 14–20. doi:10.1016/j.drugalcdep.2018.11.028.

Beliefs and attitudes regarding prenatal marijuana use: Perspectives of pregnant women who report use

Judy C. Chang[1,2,3,9], **Jill A. Tarr**[1], **Cynthia L. Holland**[1], **Natacha M. De Genna**[7], **Gale A. Richardson**[7], **Keri L. Rodriguez**[3,4], **Jeanelle Sheeder**[5], **Kevin L. Kraemer**[3,6,9], **Nancy L. Day**[7], **Doris Rubio**[3,6,9], **Marian Jarlenski**[10], **Robert M. Arnold**[3,6,8]

[1]Magee-Womens Research Institute, 204 Craft Avenue, Pittsburgh, PA 15213, USA

[2]Department of Obstetrics, Gynecology, and Reproductive Sciences, University of Pittsburgh School of Medicine, 300 Halket Street, Pittsburgh, PA 15213, USA

[3]Department of Medicine, University of Pittsburgh School of Medicine, 1218 Scaife Hall, Pittsburgh, PA 15260, USA

[4]Center for Health Equity Research & Promotion (CHERP), Veterans Affairs Pittsburgh Healthcare System, University Drive, Pittsburgh, PA 15240, USA

[5]Department of Obstetrics, Gynecology, & Pediatrics, University of Colorado School of Medicine, 13065 E. 17th Avenue, Aurora, CO 80045, USA

[6]Center for Research in Healthcare, University of Pittsburgh, 4200 Fifth Avenue, Pittsburgh, PA 15260, USA

[7]Department of Psychiatry, University of Pittsburgh School of Medicine, Pittsburgh, PA, USA

[8]Section of Palliative Care and Medical Ethics, Institute to Enhance Palliative Care, 230 McKee Place, Pittsburgh, PA 15213, USA

[9]Clinical and Translational Science Institute, University of Pittsburgh, 3550 Terrace Street, Pittsburgh, PA, USA

[10]Department of Health Policy and Management, Graduate School of Public Health, University of Pittsburgh, 130 DeSoto Street, Pittsburgh, PA 15261, USA

Abstract

Correspondence: Judy C. Chang, Department of Obstetrics, Gynecology, and Reproductive Sciences, Magee-Womens Hospital of UPMC, 3380 Boulevard of the Allies, Suite 309, Pittsburgh, PA 15213, Phone: 412-641-1441, Fax: 412-641-3170, jchang@mail.magee.edu.

Contributors

JCC, KLR, KLK, NLD, DR, and RMA designed the study and wrote the protocol. JCC, CLH, JAT enrolled participants and performed the data collection. JCC, CLH, JAT, KLR, and JS performed the qualitative data analysis. JS, MJ, NMD, GAR added insights in understanding and contextualizing the thematic findings within the context of the current field of perinatal marijuana research. JCC wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of Interest

The authors have no conflicts of interest to declare.

Objective: With the increasingly permissive legal and social environments regarding marijuana, it is important to understand prenatal marijuana use from the perspective of women who use marijuana. Our objective was to qualitatively describe the marijuana use experiences, beliefs, and attitudes of women who used marijuana during pregnancy.

Methods: We conducted semi-structured interviews with pregnant women who had either reported current marijuana use or had urine testing positive for marijuana. Interviews were transcribed verbatim and analyzed for patterns and themes.

Results: Twenty-five pregnant women who used marijuana during their pregnancies participated in our study interviews. Main themes that emerged from the interviews were that women: 1) reported higher amounts of marijuana use prior to pregnancy and attempted to reduce their use once they realized they were pregnant; 2) used marijuana to help with nausea and appetite changes during pregnancy or to improve mood; 3) described marijuana as “natural” and “safe” compared to other substances such as alcohol, tobacco, other recreational drugs, and prescribed medications; 4) had conflicting opinions regarding whether marijuana was addictive; and 5) were uncertain but had some concerns regarding potential risks of prenatal marijuana use.

Conclusion: Pregnant women who used marijuana in pregnancy held contradictory beliefs about continued use; they reported trying to reduce usage and were worried about potential risks, but also felt that marijuana is more natural and safer than other substances, including prescribed medicines. These findings have implications for how practitioners address prenatal marijuana use and highlight the need for further research on developmental outcomes.

Keywords

Marijuana; Pregnancy; Cannabis; Beliefs; Attitudes; Qualitative

1. Introduction

Marijuana is the most commonly used recreational drug during pregnancy in the US, with an estimated 6.4% of all pregnant women in the 2015 National Survey on Drug Use and Health (NSDUH) reporting first trimester use (Volkow et al., 2017). Over the past decade, there has been a growing liberalization in public acceptance and use of marijuana (Pew Research Center). In the US, marijuana is currently legal for medical or recreational use in 30 states and the District of Columbia. Increased use has similarly been noted among pregnant women, with the proportion of pregnant women reporting past-month marijuana use increasing from 2.4% to 3.9% (a 62% increase) from 2002 to 2014 (Brown et al., 2017). Rates from recent population-based studies using biochemical testing are as high as 12%, and observational cohort studies found 20–34% of patients presenting for prenatal care reported or tested positive for marijuana (Chang et al., 2017; Mark et al., 2016; Mark et al., 2017; Oga et al., 2018). While national rates of prenatal marijuana use have remained stable for older married women, young unmarried pregnant women’s use has increased by 85% from 5.4% to 10% (Oh et al., 2017), suggesting that more research is needed on the reasons for marijuana use in this population of pregnant women.

Accumulating evidence suggests adverse pregnancy and neonatal outcomes for women who use marijuana during pregnancy (Gunn et al., 2016). These include shorter gestation,

spontaneous preterm birth (Dekker et al., 2012; Saurel-Cubizolles et al., 2014), smaller birth weights, stillbirth, NICU admissions (Warshak et al., 2015), and child neurobehavioral consequences such as cognitive, learning, and behavioral problems (Day et al., 1994; Fried et al., 1984; Goldschmidt et al., 2000; Greenland et al., 1982; Hatch and Bracken, 1986; Richardson et al., 2002; Varner et al., 2014). As a result, both the American College of Obstetricians and Gynecologists (ACOG) and the American Academy of Pediatrics (AAP) issued statements to warn pregnant women about potential risks and discourage marijuana use during pregnancy (ACOG, 2015; Behnke et al., 2013).

While there are no theoretical models regarding prenatal marijuana use, the Theory of Reasoned Action (TRA) was the framework used to guide the current study (Fishbein and Ajzen, 1975). The TRA focuses on individual beliefs, attitudes and intentions, as well as the interacting influences of individuals' beliefs about others' attitudes and beliefs about the consequences of the behavior. According to the TRA an individual's intention to perform a behavior predicts engagement in that behavior. In the case of prenatal marijuana use, a pregnant woman's attitudes would be primarily determined by a combination of her beliefs about prenatal use and her expectations about the outcomes associated with prenatal use. Additional influences on her intentions to continue using marijuana during pregnancy would be the perceptions and influence of friends, family, various service providers, and other individuals/groups and motivating/inhibiting factors for the behavior such as fear of legal ramifications if prenatal marijuana use was detected at delivery.

Surveys of general study populations about their marijuana beliefs have noted increased support for legalization, increased self-reported use, and perception of limited or no health risks of marijuana use (Pew Research Center, 2016; Roditis et al., 2016; Jarlenski et al., 2017). However, there have been few studies examining attitudes and beliefs about prenatal marijuana use. A few recent studies have examined perceptions of perinatal marijuana use. One analysis of NSDUH data from 2005 to 2015 showed an increased probability of reproductive-aged women reporting no perceived health risks due to regular marijuana use from 4.6% in 2005 to 19% in 2015 (Jarlenski et al., 2017b). Studies of social media content suggest that there is considerable uncertainty regarding the risk of prenatal marijuana use (Dakkak et al., 2018; Jarlenski et al., 2018). A survey of pregnant women noted that those who continued marijuana use during pregnancy were less likely than those who quit to believe that marijuana poses a risk to the baby (Mark et al., 2017). There are no prior studies of pregnant women's attitudes, beliefs, and experiences about their marijuana use during pregnancy. Such data are crucial to develop motivational interventions regarding prenatal marijuana use, especially at a time when marijuana use may be increasing (ACOG, 2015; Behnke et al., 2013). The aims of the current study were to address the gap in the literature on attitudes and beliefs about prenatal marijuana use, to understand how these drive women's decisions to use marijuana during pregnancy, and to help clinicians and policymakers better address prenatal marijuana use.

2. Materials and Methods

2.1. Study design

The current study was part of a larger observational study examining patient-provider communication regarding substance use during initial prenatal visits (Chang et al., 2017; Holland et al., 2016a; Holland et al., 2016b; Jarlenski et al., 2016). Data collection for the larger study occurred from September 2011 to May 2015. It was approved by the University of Pittsburgh Institutional Review Board and a National Institutes of Health Certificate of Confidentiality was obtained. The current study was added to the larger study in 2012 and was funded by an NIH administrative supplement to focus specifically on prenatal marijuana. An IRB modification for the current study was approved.

Patient participants who completed the first three phases of the larger study and either disclosed marijuana use or had urine testing positive for marijuana at their baseline study visit were invited to participated in two additional study visits (during the second and third trimesters) for semi-structured interviews. Participants for the current study were recruited at the time of the larger study's semi-structured interview (scheduled within 4 weeks of the initial obstetric visit) that focused on the substance use communication during the obstetric encounter. Interested participants signed a separate informed consent form. Interview data collection for the current study occurred from December 2012 through April 2015. Each interview was audio recorded and transcribed verbatim. Transcripts were reviewed by interviewers for accuracy.

Interview topics were based on the TRA and included: attitudes and beliefs regarding marijuana use in general and during pregnancy specifically; perceptions of how obstetric care providers currently address and manage prenatal marijuana use; participant suggestions regarding how to improve pregnancy care and communication regarding prenatal marijuana use; where participants sought information and resources regarding prenatal marijuana use; what information and resources they felt would be helpful to them in making health behavior choices regarding prenatal marijuana use; and their opinions regarding legalization of recreational marijuana. We also asked participants to provide a narrative of their own marijuana use history that included the mode, frequency, and quantity of use before their pregnancy, since realizing they were pregnant, and since their last study visit. For this analysis, we focused on their marijuana use and their beliefs and attitudes regarding prenatal marijuana use. Additionally, urine was collected during these second and third trimester visits for toxicology testing.

2.2. Data analysis

Two investigators coded each transcript separately and then met to compare codes. Coding processes, definitions, and categories were discussed in a constant comparison approach and a final codebook was developed in an iterative fashion and reapplied to all transcripts (Crabtree and Miller, 1992). The coded data were then reviewed by the full investigative team to identify pattern and themes. Investigators used Atlas.ti software (1999–2017) to organize and manage the qualitative coding.

3. Results

3.1. Subject characteristics

Among the patient participants in the larger study, 58 either reported current marijuana use or had urine testing positive for marijuana during the data collection period of the current study. Of these 58, 29 completed all three phases of the larger study (including initial follow up interview within 4 weeks of the recorded first OB visit). Among these 29, 26consented to be enrolled in this portion of the study. Overall, 25 women returned for at least one of these two additional visits; 23 returned for both visits. One enrolled participant was not able to return for any additional visit due to incarceration. Thus, we had 48 interviews from 25 women for this analysis. The flow diagram for the full study including the current supplemental study is illustrated in the Figure[1].

This sample was predominantly in their 20s, African-American, at least high-school educated, and nulliparous. Most self-described themselves as either current (42%) or former (31%) tobacco users. Most did not disclose their marijuana use to their obstetrics provider during their recorded first obstetric visit. Aside from parity, there were no significant differences in demographic characteristics, marijuana disclosure, urine toxicology results or other prenatal substance use between the 32 eligible women who did not enroll in the current study versus the 26 who did; those who participated in the study were less likely to be nulliparous (Table 1).

Among the 25 women who retuned for the additional study visits, 22 had positive urine toxicology for marijuana at the time of their first OB visit. Of the 24 who returned for the second trimester study visit, 23 provided urine for testing and 13 of these tested positive for marijuana. Of the 24 who returned for the third trimester visit, 22 provided urine for testing and 11 were positive for marijuana at this visit.

3.2. Themes

We identified five major themes in our analysis: Women 1) reported using higher amounts of marijuana use prior to pregnancy and attempted to reduce use once they realized they were pregnant; 2) used marijuana to help with nausea during pregnancy or to improve mood; 3) described marijuana as “natural” and “safe” compared to other substances; 4) had conflicting opinions regarding whether marijuana was addictive; and 5) were uncertain but concerned about potential risks of prenatal marijuana use.

3.2.1. Histories of marijuana use.—

All 25 women admitted using marijuana prior to pregnancy. They described living in communities where marijuana use was common. As one woman described, “I mean [laugh] we have been smoking in my family since really young. You know my grandfather was always smoking weed…. So, I’ve been smoking at a very young age. Not regularly until I’d say ‘til about 14 years old….” Among the 18 women who shared details about their first use, they described first using marijuana at a median age of 14 years (range 12–23 years) and almost all described the context of this use as social with

[1]Supplementary material can be found by accessing the online version of this paper at http://dx.doi.org and by entering doi:…

peers/friends. As one woman shared, “Well, when I started it was more of …a recreational thing when I went outside with my friends.”

All 25 women described smoking marijuana as their mode of use, as opposed to other modes such as ingestion or oils. Fifteen women described daily use prior to pregnancy and described amounts ranging from 2–3 hits to 7 blunts (a marijuana cigar made either by rolling marijuana in cigar paper or hollowing out a cigar and filling with marijuana) a day. Almost all use was in the form of blunts; only one person described smoking joints (rolled marijuana in form of a cigarette). Most use was done with at least one other person such as a friend, partner, or family member.

Among those who participated in the second trimester study visit, almost all described having reduced their marijuana use and 10 reported they had quit by that study visit. Nine of these 10 women had urine toxicology confirming negative results; one tested positive for marijuana despite stating she had quit. There were varying interpretations and definitions from the participants as to what “quitting” marijuana meant. Some women’s definition of “quit” was that they no longer used their own money to buy marijuana; others’ definition of “quit” allowed for the inclusion of occasional hits. One woman described her definition of quit: [I] quit, like, ah around April, whenever I was 4 months…I stopped. I like haven’t bought any, I haven’t smoked by myself….It is just if someone I’m with is smoking, I’m totally like “Let me hit that really fast.”

At the third trimester study visit, 11 described quitting and all tested negative for marijuana. The remaining 13 described their intention to quit before delivery due to their perception that a positive test at delivery would trigger the involvement of child protective services. As one woman explained, “I cut back to one blunt like a week, but I’m stopping completely after this week…because they drug test you and everything after you have your child. And I wouldn’t want like [child protective services agencies] or anything to get involved.”

3.2.2. Reasons for use.—The women justified their continued use of marijuana during pregnancy because they perceived this use helped treat nausea, vomiting, or appetite changes related to the pregnancy. As one woman stated, “…I don’t want to smoke marijuana but it helps me not being sick ….” Another woman shared a similar narrative and described being more worried about the baby not getting enough nutrition than its exposure to marijuana: “You’re just basically trying to make sure your baby is okay. Even though smoking isn’t okay, but if I don’t eat then I’m ***really*** [subject emphasis] not going to be okay.” Another reason for continuing to use was to manage stress and improve mood. The women described feeling more able to cope with the various stresses of daily living with marijuana use and looked forward to marijuana use as a method to “calm down” and “tolerate a lot of things.” Described one woman, “When you smoke marijuana, it don’t change what’s going on, but it helps you cope a little bit better.”

3.2.3. Belief that marijuana is natural and safe.—The women described viewing marijuana as “natural” and thus “safe” or “harmless.” They described the perception that because marijuana is “a plant” and “grows from the earth”, it seems less worrisome to them compared to other recreational drugs, such as heroin or cocaine. One woman stated, “I don’t

think marijuana is a drug…It's just a weed. It's not that bad." Another woman stated, "I consider crack cocaine—you shouldn't do that. But marijuana, you can actually grow that…." Another woman explained, "It is from the earth. I don't want to sound like a hippie, but it is from the earth."

Many women noted that although tobacco is also a plant that is grown, they understood there are many known risks related to tobacco use. In contrast, they were unaware of specific risks related to marijuana use. They described general tobacco risks of lung disease and cancer, as well as risks during pregnancy. One woman noted, "Cigarettes can mess with the baby's birth weight and stuff like that… they never had nothing stating that it [marijuana] does anything to anyone." Another woman shared a similar perspective, "Marijuana, nothing ever came up about nothing happening to child on marijuana… As far as cigarettes: health problems, heart problems, breathing…so I felt like that [tobacco] was worse."

The women also perceived marijuana as preferable to prescribed medications to treat conditions such as nausea of pregnancy and depression. While marijuana was viewed as "natural," prescribed medications were viewed as chemicals with risks. As one woman stated, "I don't take medicine. Like I don't take Tylenol….I don't want my body to depend on those type of chemical things." Another echoed this sentiment when specifically talking about anti-depressants, "I would not be on an anti-depressant. People make that seem like 'happiness in a bottle.' I won't venture into stuff like that." Another woman described choosing to use marijuana instead of a prescribed anti-nausea medication because she did not like the medication side effects: "I just couldn't take the medicine…The first time I took it [the medicine], I got sick. It was horrible. Like they had me put this stuff on my tongue and it dissolves. It's supposed to calm down the nausea. It made me sicker." Another described her perception of how marijuana differs from anti-depressants when used to manage depression:

> …Pot elevates your mood, the other ones [anti-depressant medications], they suppress your mood…. I don't take mood stabilizers or anything …The chemicals mess with you. It [anti-depressant medication] just throws you off balance.

3.2.4. Addictiveness of marijuana.—When probed further as to why some considered marijuana not to be a drug, the women focused on the addictiveness potential of marijuana. Participants were divided and conflicted on their opinions regarding whether a person could become addicted to marijuana. Some perceived there was no addictive potential: "It [marijuana] is not addicting; it is just a mind thing…" Another woman concurred, "I don't think it's [marijuana is] that addictive. Like, you should just be able to stop doing that. You might be cranky for a few days…" Some likened any difficulty with quitting to the same challenges faced when breaking any bad habit. For example, one woman described quitting marijuana as similar to cutting out sweets. Another woman described, "It is like my habit of always just, you know, going for it [using marijuana]. So now I have to remind myself [not to use]. But like, after the first couple of days, it is like, it is out of sight, out of mind."

Alternatively, some women described marijuana as an addictive substance. One woman described, "Once I got, you know, addicted to it, it was like ok, I need it now." Others

mentioned how difficult quitting marijuana was for them. Declared one woman, “It is very addictive. Because I stopped smoking it just to see if I could stop smoking it, but I picked it back up….” Another woman described how she would not call marijuana addictive yet recognized her struggle quitting:

> I would have never said I was like addicted to it, like I always thought I could just drop it. But I work two jobs…and I’ll come home and want to smoke. I’m trying to quit but, not really meaning to, I just would [smoke].…

3.2.5. Concern about uncertain risks to baby.—The women expressed mixed feelings and varying levels of concern for potential risks to babies exposed to prenatal marijuana use. All the women expressed a desire for healthy babies and a desire for more robust information regarding potential risks. The women described feeling frustrated about limited information regarding specific risks of prenatal marijuana use to the baby’s development and outcomes. As one woman pointed out, “they don’t really know the effects that marijuana has on your baby.” When asked what potential risks they felt marijuana could cause, the women speculated marijuana smoking could restrict oxygen to the baby, cause respiratory problems (e.g., asthma) or immune disorders (e.g., eczema), or may affect the baby’s brain development. While some downplayed the potential risks (e.g., “The worst thing I found was that it can affect his memory; that’s it though”), others were not comfortable with the possibility of any risk. As one woman stated, “…if it is, you know, killing my brain cells, what is it doing to the baby? And they [babies] haven’t even developed yet, so I’m not even giving them the chance…Some people say weed is good when you are pregnant, but for real, it is not safe.” Another woman echoed the same concern:

> You have people talking in your ear like, ‘Oh I smoked my whole pregnancy, my baby’s fine.’….And you got people in your ear all the time who are like, ‘Just smoke. It’s ok.’ No, it’s not ok. And then on top of that, people are just like, ‘Ah you can feel your baby kicking in slow motion.’ That’s not funny to me. Because your baby really gets affected.

The one perceived risk of prenatal marijuana use about which there was universal agreement was the risk of being reported to child protective services if found using marijuana at the time of delivery. Many women described hearing from health care providers, social workers, friends, and family that a positive urine drug test at the time of delivery would trigger child protective service involvement. They perceived this involvement as negative, as it was felt to be stigmatizing and could interfere with their ability to take the baby home. Explained one woman, “The more you do it [use marijuana], the more chances you are going to have to go through this whole [child protective services] process, going to drug and alcohol classes. And like that is not me, and I don’t even want people to look at me that way.” Said another woman, “…She [my doctor] keeps telling me that [child protective services agency] is going to take my kid if I have a dirty urine.”

4. Discussion

Our study findings add depth to understanding marijuana use during pregnancy and how pregnant women who use marijuana think and feel about this use. Although others have noted that many women continue using marijuana during and after pregnancy (De Genna et al., 2015), few other studies describe trimester-specific patterns of use during pregnancy. All our participants noted that their marijuana use preceded pregnancy and most described cutting down their use during pregnancy, with about 40% stopping use by their third trimester. Data from the Maternal Health Practices and Child Development (MHPCD) cohort study that recruited in the mid-80s from the same region and same type of patient population as our study also found most women who reported prenatal marijuana use decreased or stopped use by their third trimester (Day et al., 1991). Of note, participants' definition of quitting did not always mean completely abstaining. Our participants' varied descriptions of how they viewed "use" and being "quit" highlights the importance of ensuring that clinicians and researchers be specific in how they assess women's use.

Participants in our study also described using larger amounts of marijuana and more were daily users before pregnancy compared to the MHPCD and other past studies. Moving forward, more pregnant woman may use marijuana with expanding legalized use; evidence from Colorado found a 60% increase in the concentration of THC in meconium specimens since legalization of recreational use (Jones et al., 2015).

Our participants' justification that they used marijuana to treat nausea of pregnancy is not surprising as a common medicinal use of marijuana has been treatment of chemotherapy-related nausea and vomiting and other cultures have described use of marijuana to manage pregnancy-related nausea (Carlini, 2004; Dreher et al., 1994; Tramer et al., 2001). One-third of online media addressing prenatal marijuana mentioned marijuana use for treatment of nausea and vomiting (Jarlenski et al., 2018) and employees of Colorado marijuana dispensaries often recommended marijuana to pregnant women experiencing nausea (Dickson et al., 2018). Despite this, no studies have yet demonstrated the effectiveness of marijuana to manage nausea and vomiting of pregnancy. One survey study in British Columbia, Canada noted among the 65% of pregnant women who reported using marijuana to treat their nausea, 93% deemed marijuana to be "effective" for their symptoms (Westfall et al., 2006). However, a recent case report from North Carolina raised the possibility that cannabinoid hyperemesis syndrome may contribute to these symptoms among pregnant marijuana users (Lambert et al., 2016). Indeed, another study from Hawai'i noted that women who used marijuana were more likely to rate their nausea as severe and there was a significant association between severe nausea of pregnancy and pre-pregnancy marijuana use (Roberson et al., 2014). Similarly, our participants' use of marijuana was a regular pre-pregnancy habit, and more than half continued use beyond the first trimester (when nausea is generally worst during pregnancy). In this regard, it is unlikely that nausea of pregnancy fully explains marijuana use during pregnancy.

Similarly, our participants reported that they used marijuana to manage their stress and improve their mood during pregnancy. Perinatal marijuana use is associated with depressive symptoms in other studies (Driscoll et al., 2017; Mark et al., 2016), although it is not clear if

depressed women are more likely to continue using marijuana during pregnancy, or if marijuana users are more likely to be depressed during pregnancy. This association appears to persist in the post-partum, with greater post-partum anxiety and depression in mothers who use marijuana (Ko et al., 2018; Serino et al., 2018). Similarly, stress has been identified as a reason for marijuana use among pregnant and parenting women attending an intervention program for substance use (Latuskie et al., 2018). However, there is evidence that using marijuana as a coping mechanism is linked to cannabis-dependence, and higher levels of stress and depression (Moitra et al., 2015). It is important to note that some pregnant women use marijuana to manage stress and depressive symptoms as this provides an opportunity for health care providers to discuss the lack of evidence supporting marijuana use for treatment of mood disorders and the role of evidence-based treatment.

Our participants' beliefs that marijuana was natural and safe to use during pregnancy correlates with recent analyses of NSDUH data noting greater proportions of reproductive aged women perceiving marijuana use to be safe both outside of pregnancy as well as during pregnancy. Among women surveyed in the 2007–2012 NSDUH, 70% believed that marijuana use once or twice a week had no or little risk (Ko et al., 2015). Jarlenski and colleagues' analyses of NSDUH data trends noted that among pregnant women who had reported marijuana use within 30 days of the survey, the predictive probability of reporting no risks increased from 23.7% in 2005 to 62.6% in 2015 (Jarlenski et al., 2017b). In another community study of pregnant women, women who continued to use during pregnancy were significantly less likely than those who quit to believe that marijuana could be harmful (Mark et al., 2017). While these studies asked women to categorize their perception of risk into categories of no, low, moderate, high and uncertain, our findings highlight that women's beliefs regarding safety and risk are complex (Jarlenski et al., 2017b; Ko et al., 2015). Beliefs regarding marijuana as natural and generally safe were held concurrently with worries about potential risks to their babies, and women differed in their level of concern regarding uncertain or potential risks. Our findings also illustrated conflicting opinions—occasionally within the same individual—regarding whether marijuana is addictive. This confusion or ambivalence suggests that women may not recognize themselves as meeting criteria for marijuana dependence or abuse. In an analysis of NSDUH data from 2007–2012, 18.1% of pregnant and 11.4% of non-pregnant women met criteria for marijuana abuse or dependence (Ko et al., 2015).

Our findings also elucidate that women's perception of safety of prenatal marijuana use was framed within comparisons to known and perceived risks of other substances. Our participants were knowledgeable about known risks of prenatal tobacco and alcohol use (Mamluk et al., 2017; Popova et al., 2017) and often interpreted the lack of evidence regarding risk of prenatal marijuana as a demonstration of safety (Dietz et al., 2010; US Department of Health and Human Services (USDHHS), 2014). What has not been described previously in other studies was their perception that marijuana was safer than prescribed medications. These beliefs parallel a prior Italian study of pregnant women's perception that, despite lack of evidence, herbs and supplements were viewed as safer than prescribed medications (Lapi et al., 2010). Other studies have repeatedly demonstrated women often overestimate the pregnancy risks of commonly prescribed medications (Nordeng et al., 2010a; Nordeng et al., 2010b). These findings suggest that there may be a role for public

health campaigns and greater information from providers about the relatively low risks associated with prescription medications to treat nausea and mood symptoms versus the greater risks of self-medication with marijuana and herbal supplements.

Notably, women's primary perceived risk of marijuana use in pregnancy was a legal risk, not a medical risk. Our participants' concern is not unfounded as (1) obstetric providers often mention policies for mandatory reporting to child protective services when counseling about prenatal marijuana use (Holland et al., 2016a; Holland et al., 2016b) and (2) over one half of pregnancies in the United States occur in states with policies mandating health providers to report of mothers who used substances during pregnancy to child protective services (Jarlenski et al., 2017a). That our participants perceived the involvement of child protective services as punitive and stigmatizing, rather than helpful, is consistent with prior qualitative research focusing on use of other substances in pregnancy (Roberts and Nuru-Jeter, 2010).

As a qualitative study, our study provides an in-depth viewpoint of pregnant women who admit to marijuana use. However, its design does not presume any ability to generalize these findings to other women who use marijuana during pregnancy. Specifically, our participants were young, mostly primiparas, African-American, lower-income women who reside in a region where recreational marijuana use is not legal. Medical marijuana was not legal at the time of the study. Women who live in other regions (particularly those in which recreational marijuana use is legal) and who have other demographic characteristics may describe different experiences, attitudes, and beliefs regarding prenatal marijuana. Our participants were also women who were willing to talk about their prenatal marijuana use and described heavier use during pregnancy use than those reported in earlier studies. Those who use less marijuana may describe different views regarding prenatal use.

Despite these limitations, our study findings have important implications for clinical practice, preventative health communication, policy, and future research. Understanding that women who use marijuana during pregnancy perceive marijuana to be more natural and safe than prescribed medications means that obstetric care providers will need to explore their patients' beliefs and concerns to better assist women in making evidence-based choices. It is evident that pregnant women are concerned about potential risks of prenatal marijuana use. Health information should extend beyond the risk of child protective services involvement and address potential medical and developmental risks. Obstetric care providers need to include discussions of these risks in their prenatal care counseling. Our participants emphasized their desire for healthy pregnancies and children and suggested that learning more about potential health and developmental risks would compel them to quit. Future health communication thus needs to make use of this motivation, as well as provide alternative approaches to address the reasons for women's continued marijuana use, such as stress management, depression, or nausea.

Future research studies are needed to address questions raised by our study findings. Our participants not only described heavier use than that identified in previous cohort studies of prenatal marijuana use, but most were current or former tobacco users and they preferred smoking marijuana in blunts rather than in joints. Blunts are cigar-sized amounts of marijuana rolled in paper made from tobacco leaves. Thus, a woman who smokes blunts is

exposing herself and her fetus to the risks associated with combusted tobacco products, in addition to the marijuana exposure. New studies are needed to examine the effects of prenatal marijuana use on pregnancy and child outcomes, accounting for tobacco co-exposure, as well as the higher amounts of prenatal marijuana use. Further understanding regarding how pregnant women's marijuana beliefs and attitudes correlate with their actual use, and whether and how this use may change during pregnancy, would also be helpful in designing interventions. Finally, our findings are a cautionary tale for researchers using standardized questionnaires and assessments, as our women had varying definitions for what they felt constituted marijuana use and how they defined being "quit." Standard risk categories did not fully reflect their concerns. Future studies may wish to add a qualitative component or other method of ensuring more in-depth and detailed descriptions of individuals' marijuana use patterns, perceptions, and beliefs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

We would like to recognize the wonderful assistance from Ms. Kathleen Smith with proofreading and formatting of the manuscript. Additionally, we thank the clinical staff and administrators from our clinical sites and partners who have continuously supported our team and our work.

Role of Funding Source

This work was supported by the National Institute of Drug Abuse (NIDA R56 DA040617, R01 DA026410, R01 DA026410-S; PI Chang), the Pennsylvania Department of Health (TRK_02-Chang-Magee_2014F), and the Magee-Womens Hospital Volunteer Service Board. The project described was also supported by the National Institutes of Health through Grant Number UL1TR000005. The study sponsors had no role in study design; collection, analysis, and interpretation of data; writing the report; and the decision to submit the report for publication. The content does not necessarily represent the official views of NIDA, the National Institutes of Health, the Pennsylvania Department of Health, or Magee-Womens Hospital of UPMC.

References

ATLAS.ti, 1999–2017 Scientific Software Development, . 7.5 ed. Berlin, Germany.

American College of Obstetricians and Gynecologists, 2015 Marijuana use during pregnancy and lactation. Committee Opinion 126, 234–238.

Behnke M, Smith VC, Committee on Substance Abuse, Committee on Fetus and Newborn, 2013 Prenatal substance abuse: short- and long-term effects on the exposed fetus. Pediatrics 131, e1009–1024. [PubMed: 23439891]

Brown QL, Sarvet AL, Shmulewitz D, Martins SS, Wall MM, Hasin DS, 2017 Trends in marijuana use among pregnant and nonpregnant reproductive-aged women, 2002–2014. JAMA 317, 207–209. [PubMed: 27992619]

Carlini EA, 2004 The good and the bad effects of (−) trans-delta-9-tetrahydrocannabinol (Delta 9-THC) on humans. Toxicon 44, 461–467. [PubMed: 15302527]

Chang JC, Holland CL, Tarr JA, Rubio D, Rodriguez KL, Kraemer KL, Day N, Arnold RM, 2017 Perinatal illicit drug and marijuana use. Am. J. Health. Promot 31, 35–42. [PubMed: 26559718]

Crabtree B, Miller W, 1992 Doing Qualitative Research Sage Publications, Newbury Park, CA.

Dakkak H, Brown R, Twynstra J, Charbonneau K, Seabrook JA, 2018 The perception of pre- and post-natal marijuana exposure on health outcomes: A content analysis of twitter messages. J. Neonatal Perinatal Med 11, 409–415. [PubMed: 29843262]

Day N, Richardson G, Goldschmidt L, Robles N, Taylor PM, Stoffer DS, Cornelius MD, Geva D, 1994 Effect on prenatal marijuana exposure on the cognitive development of offspring at age three. Neurotoxicol. Teratol 16, 169–175. [PubMed: 8052191]

Day N, Sambamoorthi U, Taylor P, Richardson G, Robles N, Jhon Y, Scher M, Stoffer D, Cornelius M, Jasperse D, 1991 Prenatal marijuana use and neonatal outcome. Neurotoxicol. Teratol 13, 329–334. [PubMed: 1886543]

De Genna NM, Cornelius MD, Goldschmidt L, Day NL, 2015 Maternal age and trajectories of cannabis use. Drug Alcohol Depend 156, 199–206. [PubMed: 26429727]

Dekker G, Lee S, North R, McCowan L, Simpson N, Roberts C, 2012 Risk factors for preterm birth in an International prospective cohort of nulliparous women. PLoS One 7, 1–9.

Dickson B, Mansfield C, Guiahi M, Allshouse AA, Borgelt LM, Sheeder J, Silver RM, Metz TD, 2018 Recommendations from cannabis dispensaries about first-trimester cannabis use. Obstet. Gynecol 131, 1031–1038. [PubMed: 29742676]

Dietz P, England L, Shapiro-Mendoza C, Tong V, Farr S, Callaghan W, 2010 Infant morbidity and mortality attributable to prenatal smoking in the US. Am. J. Prev. Med 39, 45–52. [PubMed: 20547278]

Dreher MC, Nugent K, Hudgins R, 1994 Prenatal marijuana exposure and neonatal outcomes in Jamaica: an ethnographic study. Pediatrics 93, 254–260. [PubMed: 8121737]

Driscoll KE, Sit DKY, Moses-Kolko EL, Pinheiro E, Yang A, Ciolino JD, Eng HF, Luther JF, Clark CT, Wisniewski SR, Wisner KL, 2017 Mood symptoms in pregnant and postpartum women with bipolar disorder: a naturalistic study. Bipolar Disord 19, 295–304. [PubMed: 28665044]

Fishbein M, Ajzen I, 1975 Belief, Intention and Behavior: An Introduction to Theory and Research Addison-Wesley, Reading, MA.

Fried P, Watkinson B, Willan A, 1984 Marijuana use during pregnancy and decreased length of gestation. Am. J. Obstet. Gynecol 150, 23–27. [PubMed: 6332536]

Goldschmidt L, Day N, Richardson G, 2000 Effects of prenatal marijuana exposure on child behavior problems at age 10. Neurotoxicol. Teratol 22, 325–336. [PubMed: 10840176]

Greenland S, Staisch K, Brown N, Gross S, 1982 The effects of marijuana use during pregnancy: A preliminary epidemiologic study. Am. J. Obstet. Gynecol 143, 408–413. [PubMed: 7091206]

Gunn JK, Rosales CB, Center KE, Nunez A, Gibson SJ, Christ C, Ehiri JE, 2016 Prenatal exposure to cannabis and maternal and child health outcomes: a systematic review and meta-analysis. BMJ Open 6, e009986.

Hatch E, Bracken M, 1986 Effect of marijuana use in pregnancy on fetal growth. Am. J. Epidemiol 124, 986–993. [PubMed: 3776981]

Holland CL, Nkumsah MA, Morrison P, Tarr JA, Rubio D, Rodriguez KL, Kraemer KL, Day N, Arnold RM, Chang JC, 2016a “Anything above marijuana takes priority”: Obstetric providers’ attitudes and counseling strategies regarding perinatal marijuana use. Patient Educ. Couns 99, 1446–1451. [PubMed: 27316326]

Holland CL, Rubio D, Rodriguez KL, Kraemer KL, Day N, Arnold RM, Tarr JA, Chang JC, 2016b Obstetric health care providers’ counseling responses to pregnant patient disclosures of marijuana use. Obstet. Gynecol 127, 681–687. [PubMed: 26959210]

Jarlenski M, Hogan C, Bogen DL, Chang JC, Bodnar LM, Van Nostrand E, 2017a Characterization of U.S. state laws requiring health care provider reporting of perinatal substance use. Womens Health Issues 27, 264–270. [PubMed: 28129942]

Jarlenski M, Koma JW, Zank J, Bodnar LM, Bogen DL, Chang JC, 2017b Trends in perception of risk of regular marijuana use among US pregnant and nonpregnant reproductive-aged women. Am. J. Obstet. Gynecol 217, 705–707. [PubMed: 28843740]

Jarlenski M, Koma JW, Zank J, Bodnar LM, Tarr JA, Chang JC, 2018 Media portrayal of prenatal and postpartum marijuana use in an era of scientific uncertainty. Dru. Alcohol Depend 187, 116–122.

Jarlenski M, Tarr JA, Holland CL, Farrell D, Chang JC, 2016 Pregnant Women’s Access to Information About Perinatal Marijuana Use: A Qualitative Study. Womens Health Issues 26, 452–459. [PubMed: 27131908]

Jones JT, Baldwin A, Shu I, 2015 A comparison of meconium screening outcomes as an indicator of the impact of state-level relaxation of marijuana policy. Drug Alcohol Depend 156, e104–e105.

Ko JY, Farr SL, Tong VT, Creanga AA, Callaghan WM, 2015 Prevalence and patterns of marijuana use among pregnant and nonpregnant women of reproductive age. Am. J. Obstet. Gynecol 213, 201.e1–201.e10. [PubMed: 25772211]

Ko JY, Tong VT, Bombard JM, Hayes DK, Davy J, Perham-Hester KA, 2018 Marijuana use during and after pregnancy and association of prenatal use on birth outcomes: A population-based study. Drug Alcohol Depend 187, 72–78. [PubMed: 29627409]

Lambert T, Edwards J, Small M, Brown H, 2016 Marijuana in pregnancy; its relationship to nausea, emesis, and hyperemesis. J. Addict. Med. Ther 4, 1021.

Lapi F, Vannacci A, Moschini M, Cipollini F, Morsuillo M, Gallo E, Banchelli G, Cecchi E, Di Pirro M, Giovannini MG, Cariglia MT, Gori L, Firenzuoli F, Mugelli A, 2010 Use, attitudes and knowledge of complementary and alternative Drugs (CADs) among pregnant women: a preliminary survey in Tuscany. Evidence Based Complement. Alternat. Med 7, 477–486.

Latuskie KA, Andrews NCZ, Motz M, Leibson T, Austin Z, Ito S, Pepler DJ, 2018 Reasons for substance use continuation and discontinuation during pregnancy: A qualitative study. Women Birth [Epub ahead of print]. doi: 10.1016/j.wombi.2018.04.001.

Mamluk L, Edwards HB, Savovic J, Leach V, Jones T, Moore THM, Ijaz S, Lewis SJ, Donovan JL, Lawlor D, Smith GD, Fraser A, Zuccolo L, 2017 Low alcohol consumption and pregnancy and childhood outcomes: time to change guidelines indicating apparently 'safe' levels of alcohol during pregnancy? A systematic review and meta-analyses. BMJ Open 7, e015410.

Mark K, Desai A, Terplan M, 2016 Marijuana use and pregnancy: prevalence, associated characteristics, and birth outcomes. Arch. Womens Ment. Health 19, 105–111. [PubMed: 25895138]

Mark K, Gryczynski J, Axenfeld E, Schwartz RP, Terplan M, 2017 Pregnant Women's current and intended cannabis use in relation to their views toward legalization and knowledge of potential harm. J. Addiction Med 11, 211–216.

Moitra E, Christopher PP, Anderson BJ, Stein MD, 2015 Coping-motivated marijuana use correlates with DSM-5 cannabis use disorder and psychological distress among emerging adults. Psychol. Addict. Behav 29, 627–632. [PubMed: 25915689]

Nordeng H, Koren G, Einarson A, 2010a Pregnant women's beliefs about medications--a study among 866 Norwegian women. Ann. Pharmacother 44, 1478–1484. [PubMed: 20736425]

Nordeng H, Ystrom E, Einarson A, 2010b Perception of risk regarding the use of medications and other exposures during pregnancy. Eur. J. Clin. Pharmacol 66, 207–214. [PubMed: 19841915]

Oga EA, Mark K, Coleman-Cowger VH, 2018 Cigarette smoking status and substance use in pregnancy. Matern. Child. Health. J [Epub ahead of print].

Oh S, Salas-Wright CP, Vaughn MG, DiNitto DM, 2017 Marijuana use during pregnancy: A comparison of trends and correlates among married and unmarried pregnant women. Drug Alcohol Depend 181, 229–233. [PubMed: 29107787]

Pew Research Center. Support for marijuana legalization continues to rise, Addict Behav Pew Research Center, Washington DC http://www.pewresearch.org/fact-tank/2016/10/12/support-for-marijuana-legalization-continues-to-rise/

Popova S, Lange S, Probst C, Gmel G, Rehm J, 2017 Estimation of national, regional, and global prevalence of alcohol use during pregnancy and fetal alcohol syndrome: a systematic review and meta-analysis. Lancet Glob. Health 5, e209–e299.

Richardson G, Ryan C, Willford J, Day N, Goldschmidt L, 2002 Prenatal alcohol and marijuana exposure: effects on neuropsychological outcomes at 10 years. Neurotoxicol. Teratol 24, 309–320.

Roberson EK, Patrick WK, Hurwitz EL, 2014 Marijuana use and maternal experiences of severe nausea during pregnancy in Hawai'i. Hawaii J. Med. Public Health 73, 283–287.

Roberts SC, Nuru-Jeter A, 2010 Women's perspectives on screening for alcohol and drug use in prenatal care. Womens Health Issues 20, 193–200. [PubMed: 20457407]

Saurel-Cubizolles MJ, Prunet C, Blondel B, 2014 Cannabis use during pregnancy in France in 2010. BJOG 121, 971–977. [PubMed: 24621183]

Serino D, Peterson BS, Rosen TS, 2018 Psychological functioning of women taking illicit drugs during pregnancy and the growth and development of their offspring in early childhood. J. Dual. Diagn, 1–13.

Tramer MR, Carroll D, Campbell FA, Reynolds DJ, Moore RA, McQuay HJ, 2001 Cannabinoids for control of chemotherapy induced nausea and vomiting: quantitative systematic review. BMJ 323, 16–21. [PubMed: 11440936]

U.S. Department of Health and Human Services (USDHHS), 2014 The health consequences of50 years of progress: a report of the Surgeon General, 2014 U.S. Dept Health and Human Services, Washington, DC https://www.surgeongeneral.gov/library/reports/50-years-of-progress/index.html

Varner M, Silver R, Rowland Hogue C, Willinger M, Parker C, Thorsten V, Goldenberg R, Saade G, Dudley D, Coustan D, Stoll B, Bukowski R, Koch M, Conway D, Pinar H, Reddy U, 2014 Association between stillbirth and illicit drug use and smoking during pregnancy. Obstet. Gynecol 123, 113–125. [PubMed: 24463671]

Volkow ND, Han B, Compton WM, Blanco C, 2017 Marijuana use during stages of pregnancy in the United States. Ann. Intern. Med 166, 763–764. [PubMed: 28418460]

Warshak CR, Regan J, Moore B, Magner K, Kritzer S, Van Hook J, 2015 Association between marijuana use and adverse obstetrical and neonatal outcomes. J. Perinatol 35, 991–995. [PubMed: 26401751]

Westfall R, Janssen P, Lucas P, Capler R, 2006 Survey of medicinal cannabis use among childbearing women: patterns of its use in pregnancy and retroactive self-assessment of its efficacy against ‘morning sickness’. Complement. Ther. Clin. Pract 12, 27–33. [PubMed: 16401527]

Highlights

- Pregnant women who use marijuana have complicated feelings about marijuana.
- Pregnant women who use marijuana believe it to be safer than other substances.
- Women were worried about marijuana's uncertain risks to their pregnancy and child.
- There were mixed beliefs regarding whether marijuana was addictive.
- Women noted prenatal marijuana use risked involvement of child protective services.

Table 1.

Characteristics of supplement study participants versus non-participants among eligible subjects

	Participant in Supplement Study (N=26)	**Did Not Participate in Supplement Study (N=32)**	**P value**
Mean Age Years (range)	26 (19–36)	24 (18–32)	0.070
Race			0.194
White/Caucasian	4 (15%)	10 (32%)	
Black/African American	19 (73%)	19 (59%)	
Latina/Hispanic	1 (4%)	0 (0%)	
Other	2 (8%)	3 (9%)	
Single/Separated/Divorced	13 (50%)	17 (53%)	0.742
Employed	13 (50%)	17 (53%)	0.703
Completed High School or Higher Education	22 (85%)	28 (88%)	0.587
Yearly Income < $10,000/year	18 (69%)	21 (66%)	0.972
Nulliparous	**8 (31%)**	**15 (47%)**	**0.003**
Disclosed Marijuana to Provider in Recorded First OB Visit	9 (35%)	8 (25%)	0.219
First Visit Urine Toxicology Positive for Marijuana	23 (88%)	28 (88%)	0.834
Tobacco Smoker	11 (42%)	16 (50%)	0.802
Former Tobacco Smoker	8 ((31%)	8 (25%)	0.802
Admitted Prenatal Use of Alcohol	3 (12%)	4 (13%)	0.520
Disclosed or Urine Test Positive for Narcotics	1 (4%)	3 (9%)	0.354