Original Article

Sociopolitical Externalities Impacting Worker Health in Washington State's Cannabis Industry

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Abstract

Objectives: The legalization of the production, sale, and possession of cannabis in Washington State in 2012 not only created the framework for a new legal industry, but also for a new regulated labor sector. In addition to typical occupational health and safety hazards associated with chemical and physical exposures, the transition from an illicit to a regulated workplace, the inconsistency between state and federal law, and the production of a unique psychoactive commodity crop that maintains value in the illicit marketplace creates a unique work environment with workplace concerns that are political, economic, and social in nature.
Methods: We conducted a combination of semistructured key informant interviews targeted toward employers, focus groups that engaged employees, and an online survey with cannabis business owners and employees to identify concerns relating to worker health and safety.
Results: In addition to physical and chemical hazards related to their workplace, workers described health concerns that were a result of social, economic, and political forces facing the transitioning cannabis industry and resulting from an inconsistency between state and federal law. Important themes that emerged from these data included the legal and regulatory environment that the cannabis industry faces, cannabis as an agricultural good, crime, gender, cannabis consumption in the workplace, changing worker demographics, and emerging technologies in this rapidly evolving industry.
Conclusions: The unique sociopolitical challenges for occupational health and safety that we identified among cannabis workers in Washington State are especially relevant as other states and nations follow the example of Washington State in legalizing the widespread commercial cultivation, sale, and use of cannabis. As other states and nations legalize, it will be important for employers, public health practitioners, and regulators to recognize how transitioning from an illicit to a legal marketplace impacts worker health. Further, understanding the challenges that result in transitioning a cannabis workforce may be extrapolated in the future to better understand how transitioning other goods and services from an unregulated to a regulated marketplace may impact worker health.

Keywords: cannabis; cannabis legalization; culture; occupational health

Introduction

Cannabis was legalized for adult sale and use in Washington State in 2012, following the passage of state voter initiative 502. Washington and Colorado were the first two states to legalize adult use of nonmedical cannabis, with more than a handful of states following suit despite its illegality at the federal level. Cannabis remains classified as a Schedule 1 controlled substance by the United States Drug Enforcement Agency (United Nations, 1961; Jensen and Roussell, 2016). Prior to legalization in Washington, cannabis was often cultivated, harvested, and processed in remote locations by an off-the-books workforce. The legalization of marijuana has been widely associated with 'job creation'; with estimates ranging broadly from 10 000 jobs in Washington State (Hoagland *et al.*, 2017), to 18 000 in Colorado (Light *et al.*, 2016), to a projected estimate of 280 000 jobs at the national level by 2020 (DeCarcer *et al.*, 2017). However, there is no estimate as to what percentage of these jobs may have already existed in the illicit marketplace without regulation, taxation, or worker protection. Today, a workforce, once accustomed to an unregulated work culture must work with state departments of health, labor, agriculture, ecology, and revenue, while managing discontinuity between federal and state laws.

Prior to legalization, employees worked long hours in sometimes-uncomfortable conditions. It was not uncommon for employees to live in tents for months at a time, using outhouses, drinking bottled water, and relying on generators for power (August, 2013). These conditions existed as a result of cannabis producers avoiding the governmental monitoring that comes with water and power usage, and supplying suitable employee housing in remote locations. While some employers provided comfortable conditions for their employees, others did not, as no regulation stipulated terms of employment and no labor unions negotiated on behalf of workers. Drinking alcohol or consuming marijuana during work hours was considered normal (August, 2013). This lack of oversight and substance use in a male dominated industry contributed to an environment where sexual harassment was common (August, 2013). Though sexual harassment is common in a variety of workplaces, the illicit cannabis industry, was particularly susceptible, as prior to legalization, anyone reporting a workplace infraction would be simultaneously reporting their own participation in an illegal activity.

The illicit nature of cannabis production prior to legalization has led to little institutionalized knowledge around the anthropological context of cannabis workers, their working conditions, and their occupational health and safety. In the fall of 2016, our research team from the University of Washington set out to identify occupational health hazards and safety risks in legal cannabis farms in Washington State, for the purpose of quantifying the nature and extent of occupational health hazards within the industry, and developing guidance to control these hazards. The initial scope of our study was intended to identify chemical physical hazards in the workplace that may affect worker health and safety, specifically exposure to ultraviolet (UV) light radiation. However, after preliminary research, we found that the transition of cannabis from an illicit to an above board marketplace involved unique sociopolitical externalities that interacted with worker health and wellbeing. To fully describe occupational health and safety risk for cannabis farm workers, it is critical to consider the externalities that occur as a result of transitioning from an illicit work culture. The current manuscript examines these social and political factors and their influence on workplace health and safety in Washington State's legal cannabis industry. Though the research team did take measurements on a variety of physical exposures in cannabis farm work, this manuscript distinctly focuses on the sociopolitical externalities that occur in this unique legal context and time period. The University of Washington's Institutional Review Board approved the study design and interview questions. The study was partially funded by Washington State Department of Labor and Industries' Safety and Health Investment Project Grant K-3630.

Methods

This study used a multimethods design to collect qualitative and quantitative data on cannabis farm work. A sequential multimethods approach was utilized in order to help to validate and strengthen initial findings through triangulation, due to small study size. Further, because there is very little research on the occupational health or wellbeing of legal cannabis farm workers, a multimethod approach was used for the purpose of development, to help inform how to measure and sample the study as it went along. Each step of the process informed the next, with field observations informing key informant interviews, key informant interviews informing focus group questions, and the findings of each informing the quantitative survey (Busetto, 2017; Schoonenboom, 2017). The total number of participants in the key informant interviews, focus groups, and online survey study is 76. Participant numbers in the field observation process are

not included in the study totals as their participation informed an understanding of the workflow and process, but was not coded for inclusion in the study results. Because there is very little research on the occupational health or wellbeing of legal cannabis farm workers, an iterative approach was taken with each data collection step informing the next. For example, our field observations informed the construction of the semistructured key informant interview questions, which informed questions prompts designed for the focus groups which then all, collectively, informed the design of our quantitative-based employee survey (Busetto, 2017; Schoonenboom, 2017). Initial study recruitment for cannabis grow operations (or farms), key industry stakeholders and access to farmworkers was coordinated by the Cannabis Alliance, a membership-based Washington State cannabis advocacy organization with members dispersed throughout the state of Washington. All interview and survey questions were reviewed by the Director of the Cannabis Alliance, ensuring that the questions were representative of the concerns and curiosities of the community, without being offensive or overly intrusive. Specific methods for each data collection step are as follows.

Field observations

Cannabis farms were purposively sampled in order to obtain a diversity of farms representing different sizes; growing techniques including indoor, outdoor, and greenhouse cultivation techniques; and geographical representation of eastern versus western Washington. We anticipated there would be regional contrasts given the differences between a more rural eastern Washington with a strong agricultural history, more conservative political base, and greater number of outdoor cannabis farms compared to western Washington's dense population, politically progressive base, and greater number of indoor cannabis farms (Webley, 2013).

Over the summer of 2017, our research team conducted field visits at eight cannabis farms, documenting work process flow for indoor, outdoor, and greenhouse operations. We interviewed 15 farm owners and employees during the field observation process (8 primary conversations with tour leaders, and 7 supplemental conversations with employees) and collected information on division of tasks and workload, along with health and safety concerns employers had for their employees. Much of the field observation was dedicated to understanding how work was performed. Employees and employers were asked how much time was dedicated to engaging in different tasks (watering plants, moving plants, hanging plants, and trimming plants)

and how much time plants spent in different rooms or light phases. One primary and immediate observation was that farms had very distinct work processes, there was no standard model for work process, and much of the process varied greatly depending on whether the cannabis was grown indoors, outdoors, or in greenhouses. The distinct nature of each business model made it clear that future interviews would need to provide space for employees and employers to describe their unique circumstances.

Key informant interviews

We used the information and understanding acquired from the field visits to develop semistructured interview questions for key informants. A convenience sampling approach was used to recruit participants. The study and the call for interviewees were advertised at a local cannabis industry event and were promoted by the Cannabis Alliance. Additionally, owners and managers from previously visited farms were personally asked to participate. All key informants were either owners or managers of cannabis farms. Key informants were contacted via email and scheduled for a 60-min in-person or telephone interviews at their convenience. Interviewees who agreed to an in-person interview were interviewed in a private room at their workplace during their workday or by phone at a time of their convenience. Eight key informant interviews were asked 18 questions using an interview script prepared by the research team. Interviews were recorded and transcribed, and then thematically coded by the lead author through inductive category development. Because cannabis farm work is new to its legal framework and has not been heavily researched, inductive category development was chosen in order to provide opportunity for new or unexpected information (Boyatzis, 1998). An interview script was used for each key informant.

Focus groups

Information from field visits and key informant interviews was used to develop question prompts to use during focus group sessions. We conducted three focus groups, with a total of 19 participants. Two members of the research team moderated each focus group. Focus groups occurred in private rooms at the cannabis farms where the workers were employed. Participants were recruited through contacts previously made during the key informant interview process. Participants were included if they worked directly with the cannabis plant in their day-to-day tasks either tending, harvesting, trimming, or packaging cannabis. Nearly all participants had worked

in the cannabis industry prior to legalization. Upper level management and owners were excluded from focus group participation. Focus groups were between 75 and 90 min in length, and included one 10-person focus group, one 5-person focus group, and one 4-person focus group. Focus group question probes were scripted and semistructured, but adaptive in order to focus on the issues most pertinent to study participants. Participants were encouraged to voice the occupational health, safety, and wellbeing concerns that they had from their experience. Focus groups were conducted during the employees' work hours at the consent of their employer, and participants were provided with a modest gift card reimbursement for their time and participation. Focus groups were recorded and transcribed, and then coded thematically, in part using deductive category development, based on categories developed through the key informant interviews. Inductive category development was also used as focus group participants had unique observations and concerns distinct from those of their employers. Often, in focus groups, one employee would bring up a theme or topic and other members would agree, or the group would come to consensus at large. All focus group participants were asked to name their top occupational health concern, with many agreeing or sharing the same concern.

Online survey

Finally, an online survey was developed and administered using the WebQ survey tool. WebQ is part of the suite of Catalyst Web Tools made available to researchers through the Information Technology division at the University of Washington. A convenience sampling approach was used with the survey link promoted to cannabis farm workers at cannabis-related events using postcard advertisements, through the Cannabis Alliance's email listserv, and through the research team's connections with people in the cannabis industry. Because we had small sample sizes in interviews and focus groups, the survey was aimed at further validating previous responses, by reaching a wider audience throughout Washington's cannabis industry. Participants accessed the online survey via a secure URL.

A total of 49 respondents completed the online survey. Questions identified workers' health and safety risk perceptions using a 5-point Likert scale. The survey asked about the physical and chemical hazards, and issues relating to racism, gender discrimination, and cannabis use during work. For issues like race and gender, participants were asked to state their level of concern as it related to racism or gender discrimination in their industry, ranging from 'not concerned at all,' to 'very

concerned.' Open ended questions on the survey were analyzed similar to key informant questions, however very few participants chose to provide responses to open ended questions.

Data analysis

Results were analyzed and summarized using Microsoft Excel. Analysis used inductive category development to acknowledge repetitive themes where employers and employees had high levels of concern. Qualitative content analysis was used to identify broad categories. It was clear based on the initial analysis that responses had to be separated into two distinct categories: concerns related to physical and chemical exposures, and concerns related to sociopolitical forces. Once physical/chemical and sociopolitical forces were distinguished, the coding process was separated. Subcategories identified as a result of sociopolitical forces were given codes and a code definition, and then interviews and focus group transcripts were analyzed, applying codes as they emerged. The six codes most repetitively discussed among employers and employees are discussed in the Results section, other codes discussed without consensus or repetition were excluded. The coding was done by the research team. Quantitative survey responses were further categorized based on how responses fit into themes previously identified from key informant interviews and focus groups.

Results and discussion

The dominant sociopolitical externalities that emerged from our study, as described by workers and employers in focus groups, interviews, and surveys are discussed in the following sections. Responses from those working within Washington State's Cannabis Industry were broken down into six key sociopolitical themes or forces including: challenges and barriers relating to federal laws and cannabis prohibition; demographic, geographic, and cultural transitions; transitioning from prelegalization; crime; cannabis consumption in the workplace; and gender-related health outcomes.

Challenges and barriers relating to federal laws and cannabis prohibition

Key informant interviews with upper level managers of cannabis farms identified the prohibition of cannabis at the federal level as a barrier to providing the safest workplace possible. Due to cannabis' scheduling as a controlled substance at the federal level, many banks will not provide loans, or often even bank accounts to cannabis businesses (Ormand, 2018). Owners stated

they did not have access to the financial capital to invest in costly physical infrastructure including lifted tables to prevent bending and crouching over plants, light emitting diode lights in grow rooms to reduce UV exposures, standing desks for cannabis trimmers to improve ergonomics, or heating venting and cooling systems to improve ventilation. Though it is true that investment challenges serve as a barrier to investing in safe infrastructure, businesses in other sectors that do have access to capital still choose not to prioritize worker safety. It should be noted that the choice not to invest in safety infrastructure might be related to other factors like competing business priorities. Due to challenges acquiring loans, many owners lease or rent their land or workspace, which reduces their autonomy to make permanent improvements to facility infrastructure.

Workers and owners frequently cited concerns related to respiratory dusts and ventilation. Ventilation is a particularly challenging issue for cannabis businesses, as cannabis farming and processing generates high levels of organic dust, and indoor grow rooms require a great deal of moisture, which can lead to the production of mold and fungus (Green *et al.*, 2018). In some jurisdictions in Washington State, businesses are regulated in odor emissions to their surrounding neighborhood (Interagency Resource for Achieving Cooperation, 2016), which interviewees identified as a barrier to their ability to provide adequate ventilation within the workplace. Employers noted that the federal scheduling of cannabis as a class 1 drug also interferes with employers' ability to learn from research both about plant consumption, as well as occupational health, as many research institutions and funders are unwilling to fund certain types of cannabis research that may conflict with their federal funding streams.

Additionally, some employers expressed little need to develop cannabis specific protocols in relation to safety and harvesting, explaining 'we don't need to rewrite the book,' and 'if we just treat this like regular agriculture, I think people will be fine.' Contextually, these statements were referring to the idea that state and federal entities like the Department of Agriculture and Occupational Safety and Health Administration already have safety regulations and protocols in place, and cannabis farms follow these protocols. While existing protocols can be and are applied to cannabis cultivation, this perspective does not necessarily take into account either the hazards that are specific to cannabis cultivation (Couch and King, 2017), or the fact that agriculture is one of the most dangerous occupations in the United States (Kirkhorn and Garry, 2000; Centers for Disease Control, 2018). Further, procedures around pesticides

and pesticide application have not been tested specifically for application on cannabis as they are for other crops. Indeed, the federal scheduling of cannabis as a class 1 drug specifically prevents federal agencies such as the United States Environmental Protection Agency that develop the pesticide application requirements for other crops from doing so for cannabis. One could argue that the legalization of cannabis actually presents a rare opportunity for a new industry to rewrite the book on agricultural labor.

Demographic, geographic, and cultural transitions—an agricultural good?

Interviewees in urban locations discussed the desire to promote racial and ethnic diversity in their workplaces through hiring practices, despite a predominantly white workforce. Interviewees stated that farms in Eastern Washington tend to employ a more racially dichotomous workforce, of either white males from the cannabis community or Latino/Latina (Latinx) workers from the agricultural workforce, specifically those from an apple or cherry picking background. One interviewee stated that a large number of farm owners employ farm labor contractors who predominantly hire Latinx migrant farmworkers to run their harvest, a practice more common since legalization. Upper level management discussed heavy reliance on Google Translate™ to communicate with Spanish-speaking employees. The agricultural industry has a deep-seated history of inequitable labor practices and exploitative treatment of Latinx agricultural workers (Pearson, 2002). Housing affordability, availability, and adequacy has been a challenge for Latinx agricultural workers in Eastern Washington and throughout the United States (Pearson, 2002; Linares, 2006; Benson, 2008). In considering the increase or entry of a Latinx migratory workforce into cannabis cultivation and production, it is critical to identify how interacting with this crop that sits in a legal gray area may impact people with different types of immigration status—including undocumented workers, and how this legal gray area is communicated to non-English-speaking employees.

Cannabis farm managers from rural Eastern Washington acknowledged an increase in participation from the Latinx agricultural workforce as well as a generally more socially diverse workforce including 'old church ladies' and beyond; people who are interested in participating in some of the highest available wages in rural locations where wages are often low and employment options limited. It may be hypothesized that legalization made cannabis work more attractive to individuals who identified outside of a culture of cannabis consumption, however

more anthropological and ethnographic research would be necessary to validate this claim. More typical are employees who identify as cannabis consumers or enthusiasts and are passionate about moving the cannabis legalization agenda forward: many of these employees acknowledged their willingness to withstand occupational hazards or challenges due to their passion for cannabis and desire to work in this industry.

> 'We're willing to take some hits on [safety related] things…to be a part of something bigger; it's still not totally legal yet.'—Employee in focus group who had expressed concerns related to respiratory dusts.

Employees who identified as cannabis users typically showed a great deal of respect for their employers and reported little hierarchy between their employers and themselves. Together, these attitudes may lead to employees being less willing to demand the occupational health and safety protections that are common in other occupations. One employer reported with humor:

> 'I think all these millenials would work for free on these farms, you're gonna have a hard time unionizing them because they wouldn't change their jobs for anything…I can see them working under horrible conditions because they want to be a part of this industry.'—Farm owner.

In contrast, the Latinx migrant farmworker community has historically relied on unionization for the provision of their most basic human rights (Pearson, 2002), and employees from this demographic were identified by employer interviewees as a group of people with relatively low interest in personal use of cannabis. As the legal cannabis industry moves forward, it is crucial to acknowledge demographic transition and cultural shift, as cultural differences may act as a barrier to employee unionization.

Employees who identified as cannabis consumers and enthusiasts also acknowledged the migratory nature of outdoor cannabis work, recognizing that many cannabis workers still migrated and relied on tent living to pursue cannabis work. Regardless of demographic, as cannabis production embeds itself into an agricultural model, providing adequate housing for all workers is crucial. Given worker exposures to particulate matter, and cannabis odor that is still stigmatized in many communities and contexts, access to laundry facilities is of particular importance for cannabis employees, as it is for other farm workers (Arcury and Quandt, 2011). This simple intervention will reduce not only odor but many of the pesticide exposures taken back to the home (e.g. pesticides residue) (Strong *et al.*, 2009). Many cannabis farm owners and managers seemed to have low levels of knowledge around the working and living conditions for contracted agricultural employees in Eastern Washington. More research is necessary to determine the size and needs of the migratory labor force and Latinx labor force participating in cannabis harvests in Washington State, and how legalization has impacted demographic changes within the industry.

Transitioning from prelegalization

Participants agreed that there was little emphasis placed on occupational health and safety in the cannabis industry prior to legalization. Employers discussed the challenge in bringing safety standards into cannabis grow operations, as many employees had participated in the industry prior to legalization and grown accustomed to a lack of regulations and protections. Some employers discussed 'moving away from party culture,' explaining that some employees worked under the expectation that they could consume intoxicating substances on the job, like cannabis and alcohol, and modifying these expectations required strict enforcement particularly at the beginning of legalization. One employer stated that at the beginning of legalization it was challenging to get workers 'understanding we're here to have fun, but we're not here to party, we're here to work.'

But partying aside, simple tasks that previously were completed without thought of safety or oversight have now transitioned to account for the new risk of workers compensation claims, with one employer explaining 'We don't let people climb on pallet racks anymore, like I used to do. We have ladders, everything is done with 3 points of connection.'

It is clear that some employers showed a willingness to operationalize safety in their workplaces. However, employees observed that issues relating to remnants of the industry's illicit past remained. Some examples included jerry-rigging (to assemble something in a makeshift or flimsy manner, from materials on hand) as a component of their culture, and concerns around electrical issues such as power outlets and extension cords being used in close proximity to water, in ways that do not comply with applicable electrical codes and standards.

As most employees had worked in the cannabis industry prior to legalization, they noted the transition as an adjustment in and of itself.

> 'While this is a new industry, it's not a new business. Before everything was legal, there was a gray area we lived in, nobody inspected us, nobody cared what we were doing. Now that we are legal, agencies can come in and check everything, and it's trying to adjust to that when we've already been doing something for so long in a certain way.'—Cannabis farm employee on transitioning to a legal environment.

Crime

Participants indicated concern around feeling targeted for crime. Employees in particular expressed concern around the assumption that they were likely to be carrying cannabis or cash. In urban environments, concern was expressed around employees walking to their cars at night. There were specific mentions of interactions with the homeless community, who sought out cannabis product in garbage cans and cars outside of cannabis farms or processing facilities, some scraping the thrown out gloves of cannabis workers to collect the resin from the cannabis plant that was left behind on the glove.

> 'They know that this is a cannabis place, they ask for cannabis. We have to be really careful with our garbage. We have to destroy everything, but they will go through the dumpster and find latex gloves and scrape off as much keef as they can. The Seattle police department says that they're there, because we're here.'—Cannabis farm employee on members of the homeless community entering into garbage cans.

Transporting cannabis also came with employee concerns. Employees explained that as cannabis is still illegal in many states throughout the United States, it has a higher cash value outside of Washington State than inside, as legalization has led to a price decline within legalized states (Hunt and Pacula, 2017). This extreme variation in value disquieted workers when they had to go outside the protected confines of the grow operation with large quantities of cannabis, fearing robbery by groups seeking to divert cannabis outside of the Washington marketplace.

> ' It's a danger being on the road with a ton of cannabis. It's federally illegal, you're running the risk of getting in trouble. When we leave Seattle, the danger of riding around with 1000 pounds plus of cannabis, you gotta keep someone in the vehicle at all times, buddy system. It's pretty sketchy, and you can smell the cannabis, everyone knows what you're carrying. And there's no protection for employees, if you get pulled over.'—Cannabis farm employee on transporting cannabis.

Concerns around crime and safety were not only external, but also a component of the workplace. All participants in the focus groups (*n* = 19) identified being generally happy in their current place of work, but all had previously worked in other cannabis businesses and explained that the cannabis industry sometimes 'attracts unusual characters,' from its illicit past, one recounting 'I didn't always feel comfortable speaking up, they were crazy.'

Cannabis consumption in the workplace

Employees and employers acknowledged that many (but not all) employees identify as cannabis enthusiasts and consumers. Survey data showed that 84% (*n* = 37) of respondents had smoked within the last 30 days, with 55% (*n* = 24) of those having smoked every day. Some employers acknowledged a divide, stating that those who came into the industry from an agricultural background rather than from cannabis were less likely to consume. All employers expected sobriety at work, noting that cannabis consumption is not allowed on licensed premises (Washington Authorization Code, 2013, 314-55-520). Employers ranged in approach from having strict zero use policies, to acknowledging the difficulty in enforcing nonconsumption policies, as there are many inconspicuous ways to consume cannabis. Some employers acknowledged having policies that they could not fully enforce, with one employer stating:

> 'It's banned, no use is allowed in the workplace, but I suspect people use at lunch and breaks, but that's not something I can police. If I were to go out there at lunch to try to enforce people not smoking I would lose like 50% of my workforce, so it's a tough line. You know, we want people who know and understand the plant, and care about it, but we also don't want people stoned out of their minds at work. It's a balance.'

Two employers stated they would ask employees to leave work if they were found too intoxicated in the workplace. Employers expressed concern around forgetfulness and sloppy work, as well as the potential for safety hazards due to intoxication. One employer mentioned concern around consumption as the industry evolves; stating that legalization has led to new innovators being willing to participate in the marketplace, and therefore an increase in emerging technologies. This employer projected that mechanization in cannabis work would increase over time, and expressed concern around employees interacting with large machines under the influence with rapidly evolving technologies. Most employers identified appreciation for cannabis enthusiasts, and a desire to employ them, as they considered employees' knowledge of the plant and passion toward the cause served as an asset in the workplace. Focus group participants expressed a commitment to sobriety at work, with one employee explaining that their job in cultivation was too technical and required too much precision and measurement to perform under the influence. Two employees cited working on cannabis farms due to their use of medicinal cannabis, and need to work where their employer would understand medical use.

'As gardeners we try to be sober. There's a lot to think about here. If something were to go wrong I wouldn't want it to be like "oh no, is that because I was high?"'—Cannabis farm employee in focus group.

Gender related health outcomes

Interviewed employers expressed no specific concern toward gender- or sex-related health outcomes, although three employers specifically acknowledged underrepresentation of women in the cannabis industry, and a desire to employ more women.

Female employees of birthing age expressed concern around holding a pregnancy while working at a cannabis farm. Some said they had worked with pregnant people in the past, but their willingness to work would be circumstantial; some expressing concerns around the amount of particulate matter, and general respiratory concerns. Other employees stated they had concern about pesticide exposure for pregnant women. Other employees volunteered a lack of concern around working with cannabis, and using cannabis while pregnant:

> 'We had a pregnant chick here that was a trimmer and she stuck it out great. She loved it. In my personal experience due marijuana has been very medicinal in the pregnancy process, I'd prefer her to be around it then away from it, Its way better than pharmaceuticals. I've known plenty of women who consume marijuana their whole pregnancy they are just fine. I think its an ideal situation to bring your kid into.'—Cannabis farm employee in focus group

There was a wide degree of variation between workers who chose to volunteer information about cannabis use during pregnancy and child raising, indicating that this may be an important group to focus on for more general public health outreach on cannabis use during pregnancy.

Female employees mentioned a general tone of sexism within the industry, with one employee explaining that she experienced a general perception that she was less able to do challenging physical labor or have plant knowledge, compared to her male counterparts.

> 'Just the man woman thing in general. My previous experiences I was "just a girl" in that world, in the male grower and the male buyers and the male everything, and you're just a girl trimming their weed. Stupid misogyny. Even if you're growing it, if something goes wrong it was your fault. It's a little bit harder because I don't have the upper body strength of a dude and there are some things that are harder to do.'—Female cannabis farm employee in focus group.

One interviewee explained that with legalization, more women are coming into the industry, including into leadership positions, although 66% (*n* = 27) of survey respondents were male, 32% were female (*n* = 13). Of these survey respondents, 48% had some level of concern around sexism in the industry, even with a male dominated sample.

Limitations

We acknowledge that this study has limitations and may not be generalizable to all farms and/or all geographical locations where cannabis is grown. Our study was drew from a small sample size, recruited using nonrandomized methods, and explored only cannabis farms located in Washington State. We used purposive and convenience sampling to recruit our study participants. This sampling method may be biased in favor of employers and workers with safer and healthier work environments being more willing to participate than those who may not want their shortcomings exposed. However, the directionality of the bias would suggest that our findings likely underestimate the concerns of the workforce. The study used a mixed methods design in an attempt to describe health and safety concerns and perceptions at all levels (employee, operator, and owner) in the cannabis farming community. The methods choice led to fewer data points in which to increase power and achieve saturation of qualitative data. Despite limitations of sample size, we found it important to capture a unique moment in the history of work transition. This study was limited to Washington State, however many of the unique sociopolitical challenges for occupational health and safety that we identified among cannabis workers likely will be relevant to other jurisdictions that choose to legalize commercial cultivation, sale, and use of cannabis—especially those issues that relate to the transition from an illicit to a legal industry. Lastly, many workers we interviewed reported that the conditions they were currently working in were generally positive, but that they had previously worked in, or knew someone who worked in more challenging conditions. This general positivity may indicate that some of the responses were based off previous work during a prelegal era. Future research is needed to validate the concerns and perceptions voiced by our study participants.

Conclusion

This study was conducted in 2017, 5 years after voters in Washington State legalized the regulated sale of cannabis, and 3 years after sales began in Washington State.

Due to the proximity of legalization in Washington State, most workers who participated in this study had worked both in the legal and regulated, as well as the illicit and unregulated marketplace, and therefore had knowledge not only on their area of work, but the ways in which their work has transitioned through the process of legalization. While legalization has presumably had a net positive influence on the occupational health and safety of cannabis workers, the history of cannabis as an illicit industry has influenced the expectation of many current workers and employers, and many current workers may be accustomed to a workplace without adequate worker health and safety protections. As years follow, it is likely that fewer and fewer cannabis employees will have experienced the illicit work environment, or the transition from illicit to regulated work. This study was able to capture some of the unique circumstances that are created from this specific time in history, though the expectations of both workers and employers around workplace health and safety standards are likely to evolve. While many of the concerns found in this study are not unique to the cannabis workspace, for example crime, sexism, or sexual harassment, the consequences of these issues may be amplified due to a workforce that is not accustomed to worker protections or a regulated work environment. Additionally, as cannabis remains federally illegal, workers may be less likely to report problems in the workplace, in order to protect the forward movement of the industry. This understanding may prove valuable in other currently unregulated or criminalized industries that may enter the legal marketplace in the future.

The politically controversial nature of introducing a psychoactive product into a legal marketplace after decades of prohibition adds to the challenges in identifying best health and safety practices for cannabis farm workers. In speaking with cannabis farm employees and employers, it is clear that individuals working within the cannabis industry continue to experience stigmatization and challenge in managing their new roles in a regulated marketplace. Building a regulatory framework for cannabis businesses was a pioneering effort in Washington State. Many rules and regulations had to be crafted in a short time frame in response to the voter initiative. Often these regulations subsequently had to be revised and readjusted, as the unintended consequences or challenges in implementing and enforcing specific regulations became apparent. Years after the initial legalization in 2012, rules continue to be refined as the industry evolves, causing employees adjust and readjust. Those creating standards relating to worker safety in the cannabis industry will have to be able to educate employees on how to interact with emerging technologies and increased mechanization. Further, occupational health practitioners interacting with the cannabis industry may have to emphasize education relating to cannabis consumption in the workplace. Employees may need education and training specific to the challenges associated with workplace safety in an industry that is more vulnerable to crime than some industries. Finally, the legalization of cannabis may provide labor unions with a unique opportunity to educate workers on how to engage with their rights as employees, and educate employers on how to navigate a transitioning workforce with expanding demographics. Though workers and regulators in the United States are given the unique context of inconsistency between state and federal laws, at an international level, the transition from illicit to regulated still requires unique attention regardless of jurisdiction. In moving an agenda of worker health and safety to the forefront of cannabis work, it will be crucial for occupational health to be considered in relationship to the unique cultural context of the cannabis industry, still deeply entrenched in the process of emergence out of an illicit marketplace.

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Competing interest statement

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