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Conflict and Social Control among Cannabis Growers
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Abstract:	Aims Illegal drug markets are often assumed to be violent and predatory due to the absence of third-party enforcement. While cannabis markets are generally considered to be relatively more peaceful, there has been little investigation of the levels of conflict and victimization among small-scale cannabis growers, particularly under different cannabis policy and enforcement settings. This paper explores prevalence and predictors of conflict and social control among small-scale cannabis growers. Methods The data were obtained from an online convenience survey of small-scale cannabis growers from 13 countries (Austria, Canada, Denmark, Finland, France, Germany, Israel, New Zealand, Portugal, Switzerland, United Kingdom, United States, and Uruguay) from August 2020 to September 2021 (N = 5,667). Key measures collected included the types of victimization due to cannabis growing, the perpetrators of these predatory actions, reasons for the conflict, and the grower's response to being victimized. Multivariate logistic regression models were used to identify predictors of different types of victimization and social control responses among cannabis cultivators. Results Most growers (76%) never directly experienced violence or other victimization related to their cannabis cultivation. However, about one-quarter of growers had been victimized at some point, mostly involving theft, with physical violence rare. Growing outdoors, growing with others, growing more plants, and being a more seasoned grower increased the risk of victimization. Growers who were motivated by profit were more susceptible to theft. Surprisingly, growers in legal recreational jurisdictions experienced greater levels of theft and violent victimization than growers in illegal jurisdictions. Nonviolent social control responses predominated among the growers, mostly characterized by toleration but also avoidance and negotiation. Conclusion While most growers reported no victimization, a substantial minority did so, largely theft rather than violence, and typically did not report employing retaliatory violence. Social control responses were mostly nonviolent. These findings varied under different cannabis policy and enforcement environments. Cannabis legalization does not eliminate opportunities for theft and violence related to cannabis cultivation.

Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Ethics approval

☒ The authors declare that they have obtained ethics approval from an appropriately constituted ethics committee/institutional review board where the research entailed animal or human participation.

Curtin University (Australia) Human Research Ethics Committee, HRE2019-0542, Aug-6-2019

Humboldt State University (USA) Institutional Review Board for the Protection of Human Subjects, IRB 19-133, Mar-9-2020

☐ The authors declare that the work reported herein did not require ethics approval because it did not involve animal or human participation.

Funding sources

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Dear Editors,

Thank you for the opportunity to revise and resubmit our manuscript. We thank the editors and reviewers for their thoughtful comments, and believe the manuscript is tighter and cleaner for that. Our specific responses are highlighted in red after each comment.

Sincerely,

Eric L. Sevigny

EDITOR COMMENTS

The words in the abstract (conflict victimisation, violence) are strong words, and I wonder whether in the Methods section of the Abstract, including the actual questions (or a summary of the variables) would assist here. My point is that under victimisation, the categories are theft, vandalism, and violence. Theft and vandalism are much less affect-laden than 'violence'. Putting in a sentence with the types of measures collected will also assist making better sense of the Results in the Abstract. Thank you for this suggestion. We added the following sentence to the Methods section of the abstract: "Key measures collected included the types of victimization due to cannabis growing, the perpetrators of these predatory actions, reasons for the conflict, and the grower's response to being victimized."

My other comment is in relation to police/authorities as the source of the victimisation (Table 2). Given police/authorities represent 17% of any victimisation and 30% of violent victimisation, how do these map against the 'social control responses'? (which are retaliation, negotiation, avoidance, toleration, and legal mobilisation, and other). Do all of these fall into 'other' or toleration? (maybe this is discussed in the text, as I said I did a quick read through). To directly answer this question, I provide below a crosstab of the perpetrator identified as police/authorities with the social control response. Obviously, we can only do this for the victimization subsample of N = 1378. As you can see, the responses to police/authority victimization are heterogeneous, and do not fall mainly into one or two categories. Though interesting, we did not present bivariate analyses in the paper due to space concerns and the complexity of comparing multiple response measures from differing subsamples with variable amounts of missingness. Our multivariate analyses accommodate missingness and these associations in a more rigorous way.

Response	Perpetrator: Police/authorities			
	No	Yes	Missing	Total N
Retaliation	75.3	23.4	1.3	154
Negotiation	79.4	17.6	2.9	102
Avoidance	71.4	25.4	3.2	374
Toleration	69.2	12.9	17.9	604
Legal mobilization	76.1	19.6	4.3	92
Other response	46.2	46.2	7.7	13
Missing	47.2	10.1	42.8	159
Total %	68.8	17.0	14.2	1378

On a related matter, I see in the results the term "mobilising the police" as one response but this is not listed explicitly as a measure of social control response in the methods. We used that phrase as a proxy for legal mobilization, but to avoid confusion we changed the phrase to "legal mobilization" in the two instances we used "mobilizing the police."

GUEST EDITOR COMMENTS

This article has received two very strong reviews and there is no doubt that this article provides an extremely valuable asset to the special edition. Thanks. Below I have listed some very minor editorial comments largely around phrasing for your consideration prior to publication.

1. On p4 the line "such toleration, negotiation etc" should be "such as toleration etc" Fixed.
2. On p8 the phrasing of male and nonmale grates slightly. I understand that it is not uncommon to use this phrasing in statistical data. I wonder if you had considered calling one group 'male' and the other group 'female and non-binary'? Later (p12) this you do refer to the group as female/non-binary, so it seems like it should be possible. We agree this can come across poorly, so we changed the relevant part to read: "Male measures whether the grower identified as male versus female/nonbinary. We aggregated female and nonbinary because less than 1% of respondents in the main sample (n = 45) identified as the latter, and victimization risk for female and nonbinary gender groups is likely to be more similar compared to males."
P10. The sentence beginning "Most of the victimised growers experienced theft (18.8%) is slightly confusing. Would something like "Theft was the kind of victimisation most likely to be experienced by ..." We changed the sentence to read: "Theft victimization was most common (18.8%), particularly theft of crops (17.2%)."
p11 - Like reviewer 2, I did not find the fact that police were relatively frequently listed as perpetrators partiuclarly surprising. Why did the team find it so surprising? Perhaps the finding is not so surprising as it is notable. Either way, we deleted the word and led with "Police…"
P11. I found the 2 sentences about 'salience of victimisation' difficult to follow. What is meant by salience of victimisation - how significant or serious it was, or how much it impacted on the victim? We agree these sentences could have been clearer. We revised the first ("It is also noteworthy that growers were relatively more successful in identifying the perpetrators of violent acts than perpetrators of theft or vandalism.") and second ("Overall, nonresponse was comparatively high on these items, although missingness varied by victimization type.") sentences as indicated.
P13. The sentence beginning "Lastly, growing for ideological reasons" was a bit difficult to follow. We simplified the sentence to "Lastly, growing for ideological reasons significantly increased the odds of victimization by 23% to 52%."
p.14 As noted by the corresponding author, the article is long. I accept the justification that this kind of work needs to be fully described, however this section (predictors of social control) did feel like it contained some unnecessary repetition, for example around the reporting on age. We deleted the following sentence because it was not an important detail: "Specifically, a one standard deviation increase in age (~15 years) was associated with a .02 decrease in the probability of retaliation and a .04 increase in the probability of avoidance." The following sentence was shortened considerably as well to:

"These effects were small, however, with a standard deviation increase in the number of lifetime grows predicting a .02 decrease in the probability of a negotiation or avoidance response."

p15. I was surprised here to read that victimisation was most likely to be committed by strangers and was 'fairly common' for it to be committed by drug market actors. Factually, I think you are perfectly correct here, but I suppose it's that when I was reading that part of the descriptive results (p11) what really jumped out at me was that 4 fifths (the vast majority) of the victimisation was NOT committed by drug market actors and (I think) that friends and family were actually MORE likely to be the perpetrators than drug market actors and that actually for these proximal contacts the reason for conflict was often around pressure to come out of the market. I was very much hoping to come back to this in the discussion and hear more about it, so it just felt a bit disappointing to summarise this 'key finding' as that victimisation was most likely to happen by strangers and fairly common amongst drug market actors. We agree this nuance was not elucidated well in the discussion. We revised the relevant section to read as follows: "We also found that the perpetrators of predatory actions were mostly unknown to the growers, which is consistent with the predominance of theft victimization. Also, while drug market actors were involved in only about one-fifth of victimization incidents, growers were actually more likely to be victimized by friends and family. By comparison, victimization of growers by legal authorities (e.g., crop eradication, seizures) occurred least often, in about one-sixth of incidents." We hope this better summarizes this aspect of our findings.

P17. 'Together, these finding suggest' should be findings. Fixed.

p19 'was positively associated with a retaliatory' I think should be 'were positively' Fixed.

P19-20 The final phrase of the article 'cannabis police space' I was a bit unclear on what it meant. Thanks for catching this. Changed to "cannabis policy space."

REVIEWER #1

I think this is a very strong article, it will make a great contribution to the special issue. Every section is good and I particularly liked the inclusion of studies from agriculture and the use of Jacques' theoretical framework. Thank you!

REVIEWER #2

The data derives from a complex but impressive methodology that generated a very significant sample size. I am not qualified to comment on the mode of analysis in any detail but obvious limitations of the study are well noted and the results are persuasive and the narrative appropriate (though I was not as surprised to find police /local govt representatives being perpetrators in 17% of incidents). As the Guest Editor also noted this, we deleted the "Surprisingly…" modifier at the beginning of the sentence.

The findings are a solid contribution to the drugs/violence literature confirming most assumptions but with some interesting asides. The diversity of jurisdictions sampled is of course a great strength. Thanks.

It is of course a shame that those who committed the victimization - particularly thefts - cannot be surveyed to ascertain motives and there may be scope for more speculation based on the data. Given the main targets, perhaps profit orientation provides 'legitimacy' for targeting; and a legalised jurisdiction removes any loyalty arising from the shared status of being in an illegal market - although

this would not fit with increased victimization of those growing for ideological reasons. Thank you for these insights. They provide some potential avenues for future research with these data.

Conflict and Social Control among Cannabis Growers

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Abstract

Aims - Illegal drug markets are often assumed to be violent and predatory due to the absence of third-party enforcement. While cannabis markets are generally considered to be relatively more peaceful, there has been little investigation of the levels of conflict and victimization among small-scale cannabis growers, particularly under different cannabis policy and enforcement settings. This paper explores prevalence and predictors of conflict and social control among small-scale cannabis growers.

Methods – The data were obtained from an online convenience survey of small-scale cannabis growers from 13 countries (Austria, Canada, Denmark, Finland, France, Germany, Israel, New Zealand, Portugal, Switzerland, United Kingdom, United States, and Uruguay) from August 2020 to September 2021 (*N* = 5,667). Key measures collected included the types of victimization due to cannabis growing, the perpetrators of these predatory actions, reasons for the conflict, and the grower's response to being victimized. Multivariate logistic regression models were used to identify predictors of different types of victimization and social control responses among cannabis cultivators.

Results – Most growers (76%) never directly experienced violence or other victimization related to their cannabis cultivation. However, about one-quarter of growers had been victimized at some point, mostly involving theft, with physical violence rare. Growing outdoors, growing with others, growing more plants, and being a more seasoned grower increased the risk of victimization. Growers who were motivated by profit were more susceptible to theft. Surprisingly, growers in legal recreational jurisdictions experienced greater levels of theft and violent victimization than growers in illegal jurisdictions. Nonviolent social control responses predominated among the growers, mostly characterized by toleration but also avoidance and negotiation.

Conclusion -While most growers reported no victimization, a substantial minority did so, largely theft rather than violence, and typically did not report employing retaliatory violence. Social control responses were mostly nonviolent. These findings varied under different cannabis policy and enforcement environments. Cannabis legalization does not eliminate opportunities for theft and violence related to cannabis cultivation.

Keywords

Cannabis cultivation, victimization, drug markets, violence, social control

CRediT Author Statement

Eric L. Sevigny: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Visualization. **Gary Potter**: Conceptualization, Methodology, Investigation, Writing – reviewing and editing. **Chris Wilkins**: Conceptualization, Investigation, Writing – reviewing and editing. **Monica J. Barratt**: Methodology, Investigation, Data Curation, Writing - review and editing. **Thomas Friis Søgaard**: Investigation, Writing – reviewing and editing. **Pekka Hakkarainen**: Investigation, Writing – reviewing and editing. **Jodie Grigg**: Methodology, Data Curation, Writing - review and editing. **Marie Jauffret Roustide**: Writing - review and editing.

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Declaration of Conflicting Interests

All authors have no conflicts of interest or other declarations.

Introduction

Like other prohibited goods and services, the market for illegal drugs operates as a 'stateless' system, lacking third-party enforcement of contracts and property rights (Wilkins, 2001). Without access to formal institutions of dispute resolution, drug market participants cannot call upon the police, courts, or official mediators in cases of theft, fraud, destruction or loss of property, or other disagreements. Absent such recourse, violence is often held up as the primary method of conflict resolution in the drug trade (Friman, 2009; Goldstein, 1985; Reuter, 2009).

While the nature and extent of drug market violence remains contested (Coomber, 2015; Dickinson, 2017; Jacques & Wright, 2008; Reuter, 2009), researchers generally agree that not all market types or segments are equally prone to violence (Bouchard et al., 2021; Morselli et al., 2017). Illegal cannabis markets, for instance, are often viewed as more peaceful than other drug markets, such as those for heroin, cocaine, and methamphetamine (Paoli et al., 2015; Reuter, 2009; Søgaard et al., 2021). It has been argued that a key reason for the relative peace of cannabis markets is the long-term shift away from large-scale, commercial operations run by criminal enterprises toward small-scale, local, and indoor cultivation focused on social supply (Ancrum & Treadwell, 2017; Belackova & Zabransky, 2014; Decorte, 2010; Potter & Klein, 2020; Weisheit, 2011). According to this argument, organized criminal groups have a comparative advantage in the use of violence (Bouchard et al., 2021) and are more likely than small-scale growers to employ it as a means of maintaining social control and competitive advantage (Reuter, 2016; Wilkins & Casswell, 2003).

It has also been argued that lower levels of conflict in illegal cannabis markets can be explained by the fact that participants are often embedded in friendship networks and cultural groups that emphasize tolerance, cooperation, and sharing, and that these established norms mitigate the violence, predation, and deception endemic in other profit-driven drug markets (Dickinson, 2017; Hammersvik, 2015; Sandberg, 2013). Moreover, small-scale indoor cultivation within closed networks presents less risk for opportunistic predation (Belackova & Zabransky, 2014).

Given the paucity of rigorous studies investigating violence and conflict in cannabis markets, the evidence on these interconnections remains inconclusive (Athanassiou et al., 2023). Moreover, we know even less about other predatory behaviors that may be more deeply embedded in cannabis cultures, including crop theft and property vandalism, as well as the responses to such victimization (Potter & Klein, 2020; Reuter, 2016). Jacques and Wright (2008, 2011, 2013) have elaborated a conflict theory of retail drug markets that emphasizes the predominance of nonviolent outcomes, such as toleration, negotiation, and avoidance (see, e.g., Jacques & Moeller, 2023). How these factors may operate upstream in the market among cannabis growers remains unclear. It would therefore be valuable to understand the nature and extent of conflict and social control among cannabis growers.

Complicating such an inquiry is the heterogeneity of cannabis markets under alternative enforcement and policy regimes. For instance, drug market research suggests that indiscriminate and repressive drug market crackdowns can spur elevated levels of systemic and spillover violence (Castillo & Kronick, 2020; Jacques & Allen, 2015; Lessing, 2017), even in retail cannabis markets (Moeller & Hesse, 2013). Moreover, with proponents of drug liberalization highlighting the benefits of eliminating illegal markets, including

reductions in systemic violence, a growing number of national and subnational jurisdictions have legalized cannabis cultivation and distribution for medical and/or adult recreational use (Decorte et al., 2020). Although the evidence is inconclusive regarding the effects of cannabis liberalization on aggregate (e.g., state-level) and localized (e.g., around dispensaries) crime rates (e.g., Athanassiou et al., 2023; Callaghan et al., 2023; Thacker et al., 2021), the few studies that have examined conflict more directly among cannabis market participants suggest that liberalization tends to reduce such harms (Belackova et al., 2018; Gavrilova et al., 2019; Jacques et al., 2016). In short, this body of evidence suggests that a 'softer' regulatory and enforcement approach toward cannabis could mitigate much of the conflict, violence, and disorder observed in these markets.

Against this backdrop, the current study investigates conflict and social control among small-scale cannabis growers from 13 countries based on a large-*N* online survey fielded in 2020-21. We had three main objectives for this study. First, we sought to describe the nature and extent of market-related victimization among cannabis growers, including information on the perpetrators, underlying reasons for the conflict, and the formal and informal social control measures taken in response to predation. Second, we sought to predict the risk of grower victimization as a function of grower demographics, cultivation practices, motivations for growing, and the overarching legal and enforcement environment. Third, we sought to predict the social control response among victimized growers as a function of the type of predation, knowledge of the perpetrator, and the underlying reason for the conflict, while also controlling for the aforementioned factors. This study contributes to an emerging body of literature on conflict and its management in cannabis markets in the context of ongoing cannabis liberalization.

Methods

Data

The data used in this study were collected by the Global Cannabis Cultivation Research Consortium (GCCRC) through an online Qualtrics survey using the International Cannabis Cultivation Questionnaire 2 (ICCQ 2). Building on GCCRC's previous ICCQ 1 survey (Barratt et al., 2012; Barratt et al., 2015), the current ICCQ 2 survey ran between August 2020 and September 2021 in 18 countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Georgia, Germany, Israel, Italy, Netherlands, New Zealand, Portugal, Switzerland, UK, USA, and Uruguay) in 12 languages. Ethical approval for the survey was granted by the Human Research Ethics Committee of Curtin University, Perth, Australia, with additional ethical approval obtained through national or institutional review processes where required. Potential respondents were directed to the online ICCQ 2 survey (https://worldwideweed.nl/) using a broad-based recruitment strategy to maximize respondent heterogeneity. These strategies included internet ads, social media, outreach to cannabis associations and grower forums, traditional television/radio and print media, direct marketing (email, post), flyers, and related efforts. The ICCQ 2 includes a Core module of 40 questions fielded by all respondents (e.g., growing experience, methods and scale of growing, reasons for growing), plus 12 optional modules covering a range of additional topics (e.g., growing for medical purposes, cannabis activism, harvesting and processing methods). Teams in each country chose which modules to field, with some modules also requiring respondents to deliberately 'opt in' before answering additional questions.

Over the 14-month data collection period, 19,444 respondents initiated the online survey. After screening for and removing duplicates, pilot surveys, and surveys with very low response rates (i.e., <10% of Core module questions), we retained N = 19,444 – 3,855 = 15,589 respondents. Then, after applying project-wide eligibility criteria (i.e., aged 18+, grew cannabis within past 5 years, resided in one of the 18 target countries, and validly answered ≥50% of the Core module questions), we retained N = 15,589 – 4,110 = 11,479 respondents, which constitutes GCCRC's core international dataset for the ICCQ 2. Additional data management procedures included translating free text responses from other languages to English and upcoding free text responses into existing, amended, or new response options. We employed automated translation services with quality control provided by research team members with relevant language fluency. Upcoding was directed by module leads, with quality control provided by the GCCRC data subteam.

Sample

The current study uses data from both the Core module and Module 1 on 'Conflicts and victimization,' comprised of six questions. Respondents from 13 countries (N = 6,663) were eligible to complete supplementary Module 1.[1] Respondents from 10 countries (Austria, Denmark, France, Germany, Israel, New Zealand, Portugal, UK, USA, and Uruguay) were automatically filtered to Module 1, whereas respondents from 3 countries (Canada, Finland, and Switzerland) had to opt into the module. Module response rates were higher for the former group of countries (87.2%; range: 69.0-94.7%) than the latter (76.4%; range: 58.2-82.5). Overall, the main analytic sample for this study includes the 5,667 respondents who validly answered the first Module 1 question on lifetime victimization related to cannabis growing,[2] representing 85.1% of all potential Module 1 respondents and 49.4% of core international dataset respondents. The distribution of the sample by country from largest to smallest was United States (28.6%), Denmark (13.5%), Germany (12.6%), France (10.7%), Finland (7.8%), Canada (7.3%), United Kingdom (5.5%), Uruguay (4.2%), New Zealand (3.2%), Switzerland (2.9%), Portugal (1.9%), Israel (1.2%), and Austria (0.7%).

Measures

We describe our measures in two subsections. First, we focus on Module 1 variables measuring conflict and social control constructs related to cannabis cultivation, including victimization, knowledge of the perpetrator, reason for the conflict, and social control response. Descriptively, we report on these measures to describe the nature and extent of these behaviors. These measures were also used as dependent and/or independent variables in multivariate analyses, depending on the specific model. Second, we describe the operationalization of additional covariates from the Core module that are used in all multivariate analyses, including grower demographics, cultivation practices, motivation for growing, and the legal environment. Further details on variable operationalization are provided in Supplementary File 1.

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[1] Module 1 was not fielded in Australia, Belgium, Georgia, Italy, or Netherlands.
[2] Note that 100 respondents who either did not know or refused to answer the initial lifetime victimization question were excluded from this study.

Conflict and Social Control Variables

We measured lifetime victimization related to cannabis cultivation using four non-mutually exclusive indicator variables. *Theft victimization* measures theft of crops, equipment, or money. *Vandalism victimization* captures the destruction or sabotage of crops or equipment. *Violent victimization* comprises threats of violence or intimidation, extortion or blackmail, being forced to stop growing, or experiencing actual physical violence. *Any victimization* measures lifetime experience of any type of aforementioned predation. These measures serve as dependent variables in the first set of regression analyses, with the first three also serving as independent variables in the second set of regression analyses.

We captured the identity of the perpetrator of the last predatory action targeting the grower using four non-mutually exclusive indicator variables. *Proximal relation* captures close personal associates such as friends, family members, and neighbors. *Distal contact* covers acquaintances, locals, strangers, and other socially remote individuals. *Market actor* identifies individuals engaged in criminal or drug market activity, including gangs, drug sellers, other cannabis growers or grower partners, and cannabis buyers. *Police/authorities* identifies law enforcement or other government officials as the perpetrator. These measures serve as independent variables in the second set of regression analyses.

We measured the reason for the last conflict related to cannabis growing using five non-mutually exclusive indicator variables. *Stolen property/crops* captures conflict related to the robbery or theft of money, drugs, or growing equipment. *Cannabis exchange issues* measures disagreements over money, the quality or quantity of transacted cannabis, and the sharing or social supply of cannabis. *Cannabis cultivation issues* measures conflicts related to external pressure to either continue or discontinue growing cannabis, or to problems emanating from the illegal status of cannabis cultivation. *Interpersonal issues* measures feuds and conflicts with other people, including family and business partners. *Other reason* is a remnant category capturing an assortment of reasons not described above. We examine the last indicator descriptively, but do not include it in the multivariate analyses. The other four measures serve as independent variables in the second set of regression analyses.

We operationalized the social control response to the most recent victimization using six non-mutually exclusive indicator variables. Conceptualization of these measures draws upon conflict theory of illegal drug markets (Bouchard et al., 2021; Jacques & Wright, 2011, 2013). *Retaliation* involves acts of violence and vandalism, the reclamation of stolen property and recovery of losses by force or deception, or directly engaging others to facilitate these types of vengeful actions. *Negotiation* involves reaching a compensation/settlement agreement for incurred losses or otherwise peacefully reclaiming stolen property/goods. *Avoidance* is characterized by ceasing further personal or business interactions with the perpetrator, or to exiting the market altogether by ceasing to grow cannabis. *Toleration* refers to simply doing nothing or to implementing actions such as replanting/relocating a crop or target-hardening a grow operation. *Legal mobilization* refers to enjoining government actors and resources—mainly law enforcement but also the courts and regulatory officials—in dispute resolution. *Other response* is a remnant category for other social control measures not described above. We examine the last indicator descriptively, but do not include it in the multivariate analyses. The other five measures serve as dependent variables in the second set of regression analyses.

Other Independent Variables

We operationalized several grower demographic measures. *Age* measures how old the grower was at the time of the survey. *Male* measures whether the grower identified as male versus female/nonbinary. We aggregated female and nonbinary because less than 1% of respondents in the main sample (*n* = 45) identified as the latter, and victimization risk for female and nonbinary gender groups is likely to be more similar compared to males. *Educational attainment* measures the highest level of schooling completed across three ordinal categories: less than high school, high school or equivalent, and college or advanced degree. *Urbanicity* measures whether the grower lived in an urban, suburban, or rural setting.

We captured grower cultivation practices using four measures. *Grows outdoors* indicates whether the grower typically grows all or part of their cannabis crop outside versus exclusively indoors. *Grows with others* indicates whether the grower cultivated their most recent crop with others versus growing exclusively alone. *Typical grow size* measures the total number of plants (seedlings, mature, and mother) typically sown per crop. *Lifetime grows* measures the overall number of crops respondents have grown in their lifetimes.

We operationalized three non-mutually exclusive variables capturing motivations for growing cannabis. *Profit/compensation* motive measures whether the respondent reported growing to earn a profit or to pay for their own cannabis and/or other drug use. *Ideological* motive measures whether cannabis was grown for any professed political, environmental, fair trade, countercultural, spiritual, or human rights purpose. *Risk reduction* motive measures whether cannabis was grown to avoid contact with criminals or because growing is viewed as less risky than buying cannabis.

We operationalized four variables to measure the legal and enforcement environment under which the grower operates. *Cultivation law* captures the respondent's understanding of the legality of cannabis cultivation in their home jurisdiction, including whether it is prohibited, legal for medical purposes only, or legal for any adult/recreational purpose. *Legally compliant grow* indicates whether the respondent's most recent grow was both legal and in full compliance with local laws versus being either illegal or not in compliance with local laws. *Enforcement risk* measures the respondent's perception of getting caught for growing cannabis, measured on a six-point ordinal scale ranging from 'none' (i.e., growing in a legal market) to 'very high.' *Prior police contact* indicates whether the grower has ever come into contact with law enforcement due to cultivating cannabis.

Analytic Approach

We performed both descriptive and multivariate analyses to better understand the patterns and predictors of conflict and social control among cannabis cultivators. Descriptively, we report prevalence distributions for key conflict and victimization measures for both the main sample of cannabis growers (*N* = 5,667) and the subsample of growers who were ever victimized due to their cannabis growing (*N* = 1,378). We then report two sets of multivariate logistic regression analyses. First, we investigate predictors of lifetime victimization among the main sample of cannabis growers, focusing on four outcomes: any victimization, theft victimization, vandalism victimization, and violent victimization. Second, we investigate predictors of social control responses among the subsample of victimized cannabis

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growers, focusing on five outcomes: retaliation, negotiation, avoidance, toleration, and legal mobilization. Due to the potential bias and inefficiency of listwise deletion, (17.7% and 50.2% of cases would be dropped from the first and second set of regressions, respectively), we used multiple imputation to handle missing data in a statistically robust manner. All analyses were conducted using Stata SE 18.0 (StataCorp, 2023b).

Multiple Imputation of Missing Data

Multiple imputation (MI) is a state-of-the-art method for addressing missing data. MI works by generating m complete datasets, analyzing these datasets using a common statistical model, and then pooling the results into single set of parameter estimates in a manner that approximates a complete case analysis while accounting for imputation uncertainty (Little & Rubin, 2019; Woods et al., 2021). We employed multiple imputation by chained equations (MICE) to fill in missing values via an iterative sequence of steps (Azur et al., 2011; White et al., 2011). First, missing values for all independent and dependent variables used in our analyses were randomly sampled from their respective distributions of observed values to serve as initial placeholders. Second, the placeholder values for x_1 (i.e., the variable with the least amount of missing data) were set back to missing, predicted from all other variables in the imputation model, and then replaced with these new imputations. This cycle was repeated for each additional variable, $x_2...x_i$, with missing data. Third, this process was repeated for a total of 40 cycles, with imputations being updated at each cycle. We chose 40 cycles as the burn-in period based on preliminary analyses and inspection of trace plots that showed imputation means and standard deviations stabilized by the 40th iteration. Fourth, at the end of the burn-in period, a final imputed dataset, m, was created. Fifth, steps 1-4 were repeated to produce a total of $m = 145$ imputed datasets. This number, m, was chosen to maximize the replicability of our least stable regression model based on the two-stage procedure outlined by von Hippel (2020).

A key advantage of MICE is that the imputation model can be fully customized to different types of variables and data generating processes (DGP). Our imputation model used (augmented) binary, multinomial, or ordinal logistic regression for categorical variables and predictive mean matching (using five nearest neighbors) for skewed continuous variables. To overcome the problem of perfect prediction with categorical outcomes, the data were augmented if needed by adding a few temporary observations with small weights (Royston & White, 2011). Our imputation model also omitted variables that were selectively measured among the victimization subsample from being used to impute variables measured across the entire sample, as this would violate the DGP and lead to convergence issues. A standard assumption of MI is that the data are missing at random (MAR), meaning that missingness can be fully accounted for by the observed information in the dataset. The plausibility of the MAR assumption can be improved with the use of auxiliary variables that correlate with overall missingness or with an incompletely observed variable (Collins et al., 2001). Our imputation model therefore incorporated several auxiliary variables that met these conditions, including the Module 1 screener, world region, race (i.e., White vs non-White), and reason for missingness indicators (see Supplementary File 1 for a description of, and justification for using, these auxiliary variables). Multiple imputation diagnostics examining observed versus imputed variable distributions did not identify obvious problems with the imputation model (Eddings & Marchenko, 2012).

Logistic Regression Modeling

We used multivariate logistic regression with cluster robust standard errors (by country) to analyze the series of binary victimization and social control outcomes, controlling for a range of theoretically and empirically relevant covariates (Long & Freese, 2014). All parameters and model statistics were combined and adjusted to account for variability between imputations (Little & Rubin, 2019). For each model, we report the omnibus test of significance (based on the F rather than χ^2 statistic under MI), the fraction of missing information (FMI), and the concordance (C) statistic. FMI provides an estimate for each coefficient of the total variance increase due to missing data. The largest FMI provides a rule-of-thumb criterion for MI reproducibility, which is satisfied if $m \geq 100$ x FMI (StataCorp, 2023a). To assess logistic regression model fit, we consider a C-statistic of $0.7 \leq C < 0.8$ to be acceptable and $0.8 \leq C < 0.9$ to be excellent (Giancristofaro & Salmaso, 2003). We also examine the presence of multicollinearity using the variance inflation factor (VIF), where VIF < 3 is preferred and VIF < 5 is acceptable.

When presenting the results of the logistic regression analyses, we report odds ratios (ORs) in the tables. We adopted a $p < .05$ criterion for determining statistical significance of predictors. Discussion of specific effects implies holding all other variables constant. To aid interpretation in certain instances, we reported average marginal effects (AMEs), calculated as the change in predicted probability of the outcome associated with a defined change in the values of a target independent variable (Klein, 2014; Long & Freese, 2014).

Results

We start by presenting pre-imputation descriptive results on the nature and extent of conflict and victimization, both to present the data at a finer level of granularity than was included in the imputation model and to understand patterns of nonresponse on these key measures. Next, we present descriptive statistics for both the main sample (N = 5,667) and victimization subsample (N = 1,378), stratified by complete case versus multiply imputed data. Lastly, we present a series of MI logistic regression estimates predicting lifetime victimization and social control responses.

Nature and Extent of Conflict and Social Control among Cannabis Growers

As shown in Table 1, about one-quarter of growers reported lifetime victimization related to cannabis growing. Theft victimization was most common (18.8%), particularly theft of crops (17.2%). Vandalism was less common, reported by about one in every thirteen growers (7.4%), mostly involving the destruction or sabotage of crops (7.2%). Personal aggression in the form of violence and coercion was directed at nearly one in ten growers (9.7%), with physical threats (5.1%) and forced stoppage of cultivation (5.1%) being the most common violations. Notably, reports of actual physical violence were rare (2.2%). In short, most victimization of cannabis growers involved the theft of a valuable illegal commodity. Other types of victimization, especially physical violence, were much less prevalent.

[INSERT TABLE 1 ABOUT HERE]

Focusing on the most recent perpetrator, Table 2 shows that distal contacts were implicated in four out

of ten (39.5%) victimization incidents, mostly involving strangers (36.0%). Proximal relations were identified in one-third (33.3%) of cases, typically involving friends or family (22.4%). Drug market actors were implicated in about one-fifth (19.3%) of cases, with one of every twelve (8.2%) incidents reportedly instigated by organized criminal groups or gangs. Police or government authorities were identified as the perpetrator in one-sixth (17.0%) of incidents, with the perpetrator going unidentified one-seventh of the time (14.2%). Perpetration varied across types of victimization. Proximal relations and drug market actors were relatively more likely to commit violent acts, whereas distal contacts were more likely to engage in theft and vandalism. In comparison, police/authorities were more likely to be identified as perpetrators of vandalism and violence. It is also noteworthy that growers were relatively more successful in identifying the perpetrators of violent acts than perpetrators of theft or vandalism.

[INSERT TABLE 2 ABOUT HERE]

Table 3 shows that both stolen property/crops (28.2%) and problems linked to cannabis cultivation (25.8%) were the most common sources of conflict among growers, each occurring in more than one-quarter of incidents. Interestingly, pressure to discontinue growing was the most common cultivation-related source of conflict, noted as a factor in one-fifth (20.0%) of predatory actions. By comparison, cannabis exchange issues (8.7%) and interpersonal issues (4.3%) were less common sources of conflict among cannabis growers. Overall, nonresponse was comparatively high on these items, although missingness varied by victimization type. Specific types of conflict were closely linked to certain victimization types. For instance, both cannabis exchange and interpersonal issues were more closely linked to violent victimization, whereas cannabis cultivation issues were more prevalent with both vandalism and violent incidents. Intuitively, stolen property/crops was the most common factor for theft victimization.

[INSERT TABLE 3 ABOUT HERE]

Table 4 shows that toleration is by far the most common response (43.8%) to victimization, which mostly translates to simply doing nothing (39.6%). Avoidance, whether ceasing further contact with the perpetrator or ceasing to grow altogether, was the next most common response, occurring in roughly two out of seven (27.1%) incidents. Retaliation was the third most frequent social control response, reported in one-ninth (11.2%) of cases, with direct violence or vandalism representing the modal (4.1%) retaliatory response. Negotiation (7.4%) and legal mobilization (6.7%) were the least common responses to victimization by cannabis growers. Overall, nonresponse was generally lower for these items (11.5%), but also followed similar patterns across victimization types. Notably, when growers were targeted with violence or coercion, responses of retaliation, negotiation, avoidance, and legal mobilization were all relatively more likely. The one exception was toleration, which was more common when growers were victimized by theft and vandalism.

[INSERT TABLE 4 ABOUT HERE]

Descriptive Sample Statistics

Table 5 presents descriptive statistics for the two samples used in our multivariate analyses, reporting the

percentage missing for each variable, as well as both complete case and multiply imputed means and standard deviations.[3] Across both samples, we discern no troubling statistical deviations in summary statistics, affirming previous imputation diagnostics. We focus our discussion here on the summary statistics from the multiply imputed main sample.

The typical respondent in our sample was a mid-aged (median [M] = 41) male (84.3%) urbanite (42.3%) living in Europe (55.5%) and possessing a high school but not college/advanced degree (48.8%). At the same time, our sample was also diversely represented by age (1st-3rd quartiles [Q] = 31-55), gender (15.7% female/nonbinary), geography (30.7% suburban, 26.9% rural), world region (40.1% Americas, 4.4% other), and education (14.2% without a high school diploma, 36.9% with a college/advanced degree).

The typical cannabis grower in our sample is an experienced (M = 7 lifetime grows), small-scale (M = 9 plants) cultivator, who prefers to grow alone (81.5%) and outdoors (52.5%). The generally small-scale character of the growers in our sample is also evident in cultivation experience (Q = 3-20 lifetime grows) and typical crop sizes (Q = 4-18 plants per crop).

[INSERT TABLE 5 ABOUT HERE]

Motivationally, most of the growers in our sample grew to reduce the risks of interacting with criminal elements and/or purchasing cannabis illegally (57.3%), but a sizable number also reported growing for ideological reasons (36.3%). In contrast, relatively few growers reported a profit/compensation motive (8.4%) for cultivating cannabis, which is consistent with the predominance of small-scale cultivation practices in our sample.

With respect to the legal environment, most growers lived in a jurisdiction where cannabis cultivation remained illegal (63.5%) versus being legal for recreational (23.9%) or medical-only (12.6%) cultivation. Notably, about one-quarter (25.8%) of growers reported being in legal compliance with local cultivation laws and regulations. Lastly, mean enforcement risk most closely corresponded to 'low risk' on the ordinal scale, and relatively few growers reported having prior police contact (13.2%).

In summary, the picture that emerges about this sample is that it represents a demographically broad cross-section of society, and tends to be comprised of committed, small-scale growers whose own cultivation is motivated more by risk minimization than tangible economic benefits. Although key differences exist, our sample is not dissimilar to population-level characteristics of small-scale cannabis growers observed from other data sources (Aguiar & Musto, 2022; Azofeifa et al., 2021; Barratt & Lenton, 2015; Wadsworth et al., 2022).

Predictors of Victimization among Cannabis Growers

The multiply imputed logistic regression results investigating lifetime victimization among cannabis growers are presented in Table 6. For all outcomes, omnibus model tests were statistically significant ($p <$ .001) and the C-statistic indicated acceptable goodness of fit (.75 ≤ C ≤ .77). Also, all VIFs were less than 5

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[3] Note that the variable distributions reported in Table 5 will be dissimilar to those reported in Tables 2-4 due to missing data and different base Ns.

(maximum VIF = 3.03), indicating acceptable levels of multicollinearity. FMI indicates that the increase in total variance attributable to missing data would have been as much as 6% to 24% across models, and that there were an adequate number of imputed datasets, *m*, for MI reproducibility (e.g., 145 ≥ .24 x 100). When presenting results in Table 6, we rescaled the variables for *typical grow size* and *lifetime grows* by a divisor of 10 to improve interpretability.

Demographically, gender and urbanicity were not significantly related to any type of victimization, whereas age was inversely associated with both vandalism and violence. In each case, a one standard deviation increase in age, about 15 years, was associated with a significant yet small .02 decrease in the probability of victimization. Relative to those without a high school diploma, growers with a college/advanced degree had 24% lower odds of experiencing violence. Otherwise, education had null effects across victimization outcomes.

Cannabis cultivation practices were consistently linked to victimization. Growing outdoors nearly tripled the odds of both theft (OR = 2.74) and vandalism (OR = 2.76) but was not significantly linked to violence. Growing with others significantly increased the odds of theft by 31% but was not a significant factor for other types of victimization. Larger grows and more experience with growing both significantly increased the odds of all types of victimization, but these effects were small. For instance, a standard deviation increase in the number of plants per crop (~39 plants) raised the probability of any victimization by .04, and a standard deviation increase in the number of lifetime grows (~28 crops) raised the probability of any victimization by .03. Results for specific types of victimization were comparable or smaller.

[INSERT TABLE 6 ABOUT HERE]

The specific motivations for growing cannabis that we examined in this study tended to be associated with increased victimization risk. Growing for profit/compensation was associated with 28% greater odds of theft but was not significantly linked to vandalism or violence. In contrast, growing to reduce unwanted external market risks significantly increased the odds of vandalism and violence by 41% and 29%, respectively, but had null effects for theft. Lastly, growing for ideological reasons significantly increased the odds of victimization by 23% to 52%.

The legal environment was consistently linked to victimization. Relative to illegal jurisdictions, growers in adult recreational markets experienced 72% greater odds of both theft and violence, but effects were null for vandalism. Notably, there was also a significant difference ($p < .05$) in the pairwise comparisons between recreational and medical-only markets for both theft and violence. In other words, recreational markets were distinct from other markets in elevating certain victimization risks. At the same time, being compliant with local laws and regulations was not significantly associated with any type of victimization. Perceived enforcement risk, on the other hand, was associated with a significant increase in the odds of all types of victimization. For instance, when a grower perceived no risk of enforcement action (due to growing in a legal jurisdiction), the predicted probability of a violent outcome was .06. But, when enforcement risk was viewed as very high, that probability increased to .19. Finally, having prior contact with the police was associated with a near quadrupling (OR = 3.88) of overall victimization risk, with similar-sized effects for each type of victimization.

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Predictors of Social Control Response among Victimized Cannabis Growers

The multiply imputed logistic regression results investigating the social control response among victimized cannabis growers are presented in Table 7. For all outcomes, omnibus model tests were statistically significant ($p < .001$), and the *C*-statistic indicated acceptable to excellent goodness of fit ($.76 \leq C \leq .80$). Also, all VIFs were less than 5 (maximum VIF = 3.30), indicating acceptable levels of multicollinearity. FMI indicates that the increase in total variance attributable to missing data would have been as much as 30% to 60% across models, and that there were an adequate number of imputed datasets, *m*, to ensure MI reproducibility (e.g., $145 \geq .60$ x 100). As above, when presenting results in Table 7, we rescaled the variables for *typical grow size* and *lifetime grows* by a divisor of 10 to improve interpretability.

Looking at grower demographics, age was only significantly related to avoidance (positive) and retaliation (negative), although the effects were small. Interestingly, males had 89% greater odds of negotiating a resolution in response to being victimized but 52% lower odds of legal mobilization. Otherwise, gender was not significantly related to social control response. Regarding education, growers with a college/advanced degree had 52% lower odds of engaging in retaliation relative to those without a high school diploma. Pairwise comparisons between growers with a college versus high school degree revealed the former group was significantly less likely to engage in avoidance ($p < .05$) but significantly more likely to tolerate victimization ($p < .05$). Lastly, urbanicity had no significant effects on social control response.

Cultivation practices had limited effects on growers' social control responses. Only growing experience, measured as the number of lifetime grows, was significantly, and inversely, related to both negotiation and avoidance. These effects were small, however, with a standard deviation increase in the number of lifetime grows predicting a .02 decrease in the probability of a negotiation or avoidance response. Among motives for growing, only a profit/compensation justification significantly predicted social control response, but in different directions. Specifically, growing for profit was associated with 51% greater odds of avoidance but 46% lower odds of legal mobilization.

[INSERT TABLE 7 ABOUT HERE]

The legal environment had variable effects on growers' social control response. Relative to places where cannabis cultivation remained illegal, growers in adult recreational markets had nearly three times the odds (OR = 2.70) of a negotiation response, whereas those operating in medical-only markets had 63% greater odds of an avoidance response. Cultivation laws did not significantly impact social control response in any other way. Running a legally compliant grow significantly lowered the odds of growers negotiating a response to victimization by 64% while also increasing the odds of legal mobilization more than five-fold (OR = 5.55). Prior police contact also had a significant and strong effect on legal mobilization, more than quadrupling the odds (OR = 4.35), but also significantly reducing the odds of toleration by 40%. We observed no other significant effects of either legal compliance or prior police contact, nor was perceived enforcement risk predictive of any type of social control response.

When considering whether the type of victimization elicited a certain social control response, violent victimization was the most relevant and ubiquitous factor. In particular, growers subject to violent predation were 2-3 times more likely to respond with retaliation (OR = 2.11), negotiation (OR = 1.97),

avoidance (OR = 3.33), and legal mobilization (OR = 2.05). By the same token, violent predation significantly lowered the odds of toleration by 70%. The only other significant factor by victimization type was a doubling of the odds of retaliation (OR = 2.08) in response to theft.

The type of perpetrator provoked or mitigated certain social control responses. In particular, when victimized by family, friends, or other close associates, growers were significantly more likely to respond with retaliation (OR = 1.45) and avoidance (OR = 1.66) but less likely to tolerate the affront (OR = 0.47). Similarly, victimization by market actors was significantly more likely to elicit retaliation (OR = 2.92), negotiation (OR = 1.86), and avoidance (OR = 1.57), but less likely to engender toleration (OR = 0.46). On the other hand, victimization by distal contacts and police/authorities was not significantly predictive of social control outcomes.

Lastly, the underlying reason for the conflict was significantly related to certain social control responses. Specifically, the odds of retaliation more than doubled (OR = 2.09) when property or crops were stolen, and the odds of negotiation increased more than three-fold (OR = 3.57) when cannabis exchange issues were implicated. Avoidance was also a statistically likely response when the underlying conflict involved cannabis exchange (OR = 1.66), cannabis cultivation (OR = 1.63), or interpersonal issues (OR = 2.11). By the same token, the odds of toleration were significantly less likely in response to cannabis exchange (OR = 0.55) and interpersonal (OR = 0.46) issues.

Discussion

Illegal drug markets are commonly assumed to be inherently violent and predatory, as there is no neutral third-party oversight when disputes and conflicts arise among market actors. This generalization has been challenged by scholarship showing instances of illegal markets developing and remaining stable without third-party enforcement (Koivu, 2016; Wilkins, 2001) and by research highlighting the normative nature of nonviolent social control responses in many drug market contexts (Adler, 1993; Jacques & Moeller, 2023; Reuter & Haaga, 1989; Zaitch, 2002). By comparison, relatively little empirical research has centered these questions in the context of either cannabis cultivation (Hafley & Tewksbury, 1995; Hammersvik, 2015; Potter & Klein, 2020; Wilkins & Casswell, 2003) or the evolving legal landscape characterized by ongoing cannabis liberalization (Belackova et al., 2018; Jacques et al., 2016).

Key Findings

A key finding of our study is that most growers (76%) never directly experienced violence or other victimization due to their cannabis cultivation. Hence, most growers appear to have been able to keep their cultivation activities private and secure in order to avoid conflicts within their social environment. This suggests that small-scale cannabis growing is relatively well integrated into the everyday lives of people and their communities. Notwithstanding the fact that about one-quarter of the growers in our sample were growing legally and in compliance with the law, this finding may challenge popular assumptions about the use of violence in the drug trade, although it is consistent with perspectives on the commonality of peaceful exchanges in illegal drug markets (Jacques & Wright, 2008).

The flipside, obviously, is that roughly one-quarter of the cannabis growers in our sample reported ever

being victimized due to their cannabis growing. Most victimization took the form of theft; actual physical violence was rare. We also found that the perpetrators of predatory actions were mostly unknown to the growers, which is consistent with the predominance of theft victimization. Also, while drug market actors were involved in only about one-fifth of victimization incidents, growers were actually more likely to be victimized by friends and family. By comparison, victimization of growers by legal authorities (e.g., crop eradication, seizures) occurred least often, in about one-sixth of incidents. Not surprisingly, we found that stolen property/crops and issues related to cultivation were the primary sources of conflict among cannabis growers, whereas cannabis exchange and interpersonal issues were less often implicated.

Notably, nonviolent social control responses predominated among the victimized growers in our sample—mostly characterized by toleration but also avoidance and negotiation—which is consistent with research on the use of social control in retail cannabis markets (Jacques & Moeller, 2023). Given that many growers in our sample operated in legal markets, mobilization of the police, courts, and regulatory authorities in response to victimization was also not that uncommon, but legal mobilization is also a characteristic of illegal and quasi-legal markets (Jacques & Wright, 2013; Moeller & Jacques, 2021). Despite the predominance of these nonviolent responses, growers still resorted to retaliatory social control measures, ranging from direct violence to deception, in more than one in every ten instances of predation.

Our multivariate analyses of victimization among cannabis growers revealed that cultivation practices increased certain victimization risks. In particular, findings suggest that growing outdoors, growing with others, growing more plants, and sowing more crops were riskier endeavors, ostensibly because concealment of growing activities from potential predators becomes more difficult with larger grower networks and bigger and more frequent grows (Belackova & Zabransky, 2014). Also, one might expect more seasoned growers to learn how to better protect themselves from predation over time, but the observation that growing experience increased victimization risk is likely more a function of increased exposure than any inherent risk of being a veteran grower.

Our findings related to motivation for growing were mixed. Growers who emphasized profit/compensation were more susceptible to theft, which could be explained by a number of mechanisms, including the fact that larger distribution networks organized to maximize profits also tend to have higher security risks (Desroches, 2007). We also found that growers who emphasized risk reduction motives were more likely to be vandalized and targeted violently, but this association could be confounded by the fact that previously victimized growers are more likely to prioritize risk reduction. Lastly, we found that growers who had an ideological reason for cultivating cannabis had a greater likelihood of experiencing all types of victimization. We can only speculate as to the underlying reason for this, including whether certain ideological stances attract undue attention from others. For example, some types of ideological growers (e.g., activist growers) may be less secretive about their activities than others, making them more obvious targets (Klein & Potter, 2018; Potter & Klein, 2020). Future research is needed to better understand how motivations for growing impact conflict in cannabis markets.

Surprisingly, our results indicated that growers in legal recreational jurisdictions experienced greater levels of theft and violent victimization than growers in illegal jurisdictions. This runs counter to arguments that the illegal status of cannabis creates more opportunities for drug market conflict (e.g., Jacques et al., 2016). However, legal markets do not completely eliminate illicit markets or criminal opportunities.

Moreover, legal growers may be less secretive about their growing and, therefore, be more susceptible to predation, until and unless they engage in target-hardening or other countermeasures. It is also possible that many growers will remain "illegal" in legal markets and thus upend or stall market transition (Henning et al., 2022; Reid, 2022), but we find no effects of legal (non)compliance on victimization risk. On the other hand, the effects of our two measures of policing—enforcement risk and prior police contact related to cultivation—are consistent with research suggesting that pervasive and aggressive drug market policing promotes conflict and disorder (Jacques & Allen, 2015; Lessing, 2017; Moeller & Hesse, 2013).

Our investigation also revealed insights into the social control responses of victimized cannabis growers. For instance, compared to those with less education, victimized growers with a college/advanced degree were less likely to engage in retaliation and avoidance but more likely to respond with toleration. This finding is consistent with other studies describing how middle-class drug dealers, due to their socially mainstream upbringing, often eschew overt violence or ostracism of others in favor of toleration (Adler, 1993; Mohamed & Fritsvold, 2010). Although legal environment factors did not predict social control responses as consistently as they did victimization risk, we observed some interesting findings. For instance, growers in legal compliance with local cultivation laws were much less likely to negotiate a response to victimization but much more likely to get the police involved, which makes sense given the legal recourse available to them and potential drawbacks to settling outside the law. Findings regarding the type of perpetrator were largely consistent across outcomes, with distal contacts and police/authorities eliciting no strong responses. However, when the perpetrator was a close personal associate or drug market actor, retaliation, negotiation, and avoidance were all more likely outcomes. At the same time, victimized growers were not as willing to tolerate predatory actions from these individuals. Together, these findings suggest that closer contacts (e.g., friends, family, business partners) elicit stronger informal social control responses, whether retaliatory or nonviolent, than more distal contacts (e.g., strangers, police). Future research should seek to better understand how relational distance impacts social control decisions among cannabis growers (e.g., Phillips, 2003). Lastly, the specific reason behind the conflict predicted social control response. For instance, cannabis exchange issues were more likely to result in negotiation and avoidance responses but less likely to lead to toleration. The complexity of these kinds of exchanges issues has been documented in the literature and warrants further investigation (Bræmer & Søgaard, 2023)

Theoretical and Policy Implications

When it comes to their own victimization, the cannabis growers in our sample responded with various formal and informal social control measures. Consistent with drug market research across different contexts (Bouchard et al., 2021; Jacques & Wright, 2008; Morselli et al., 2017), these responses were mostly informal and nonviolent, whether that meant tolerating the harm, avoiding further contact with the perpetrator, exiting the market altogether, or negotiating a settlement to the conflict. Less prevalent responses involved informal retaliation (including overt violence) and formal legal mobilization (enjoining police and courts in dispute resolution). While existing theory on conflict management in drug markets provides a useful framework for understanding social control responses among cannabis cultivators (e.g., Jacques & Wright, 2008), certain responses that were freely reported by our respondents were not always neatly encapsulated within these frameworks. In particular, certain reactions such as replanting a stolen crop or increasing the physical security around a grow, which we categorized as a toleration response,

may warrant a different theoretical classification compared to the grudging toleration of inaction, that is, "doing nothing." A potential theoretical enhancement, then, is to incorporate a social control response to drug market conflict for *self-agency*,[4] defined as self-directed action that seeks to remedy a prior harm (e.g., relocate crop) and/or prevent future victimization (e.g., build a fence).

Practically, our findings indicate that small-scale cannabis growers experienced greater risk of all types of victimization as their lifetime cultivation experience accumulated over time, which could be understood simply as the cost of "doing business." Still, certain cultivation practices that growers employed and the specific legal environments in which they operated elevated these risks even further. Growing larger plots, outdoors, and/or in collaboration with others significantly increased certain victimization risks. Moreover, all else equal, the likelihood of grower victimization increased in jurisdictions with legal recreational markets versus those that prohibited cannabis cultivation or only allowed cultivation for medical purposes. These findings may give pause to policymakers considering transitioning to a legal recreational market, but they could also signal that cannabis liberalization was initiated as a public safety response to endemic levels of drug market conflict and disorder (Kavousi et al., 2022). Our data do not allow us to make a strong claim either way. Nevertheless, our findings offer some potential policy prescriptions for lowering predatory risks in legal cannabis markets, namely by implementing regulations concerning the visibility and accessibility of grows, the number of cannabis plants allowed, and whether communal or collaborative growing is allowed (e.g., Johnson & Kierkus, 2022). Based on our results, allowances for concealed small-scale growing by individuals would appear to be less risky than more permissive alternatives. Our study also found that pervasive police presence and aggressive law enforcement were linked to greater risk of victimization (including violence), a finding that is consistent with previous research on police crackdowns in retail cannabis markets (Moeller & Hesse, 2013). To be clear, these kinds of policing outcomes are not strictly limited to illegal jurisdictions, as law enforcement agencies must adjust to periods of regulatory uncertainty following legalization (Henning et al., 2022) and may even engage in dubious forms of "postlegalization prohibition" (Polson & Petersen-Rockney, 2019). This speaks to the need for establishing clear enforcement guidelines and regulations in jurisdictions that have liberalized or decriminalized cannabis cultivation in order to reign in misappropriated or overaggressive policing.

Concerning social control responses to victimization, growers in legal recreational jurisdictions were more likely to negotiate a solution to conflict whereas growers in medical-only jurisdictions were more likely to actively avoid the perpetrator or to stop growing cannabis altogether. These findings suggest, on the one hand, that mediation or arbitration programs could be an amenable intervention for growers in legal markets, especially if they can prevent unnecessary and burdensome entanglements with the police and courts (Harms, 2021). On the other hand, that growers in legal medical jurisdictions were more likely to extricate themselves from business dealings or leave the market altogether after being victimized suggests a need for better social equity protections, especially for marginalized growers (e.g., Lu et al., 2022). Furthermore, although many growers choose to remain illegal in legal markets, our findings show that growers who complied with local cultivation laws were much more likely to mobilize police/court intervention, just like other legal businesses following disputes. This suggests that the purported benefits of legal cannabis markets may not be fully realized until high barriers to regulatory compliance are eased,

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[4] This should not be confused with Black's (1983) notion of *self-help*, which is defined as an aggressive mode of social control.

especially among smaller-scale growers (Bodwitch et al., 2021). We also found that prior police contact was strongly associated with legal mobilization. Although our survey question about police contact concerned previous criminal activity, we surmise that such contact may normalize grower willingness to seek formal justice (Jacques & Wright, 2013; Moeller & Jacques, 2021). Of particular note, both theft and violent victimization were positively associated with a retaliatory response. These findings suggest two possible violence reduction interventions among cannabis growers, one indirect and one direct. First, installing fencing, lighting, and other security features around cannabis grows can deter crop theft, and therefore preventively thwart retaliation (Johnson & Kierkus, 2022). Second, violence interruption programs, similar to those used to prevent gun violence (Webster et al., 2022), could potentially prevent retaliatory violence among cannabis growers, especially in cases of repeat predation and victimization.

Limitations

This study has several limitations. First, the survey is a self-selecting online convenience sample that may not necessarily be representative of the wider cannabis cultivator population. As this population remains largely hidden, we are unable to directly ascertain the representativeness of our sample, although the characteristics of our sample are consistent with other population-based studies of cannabis growers (Aguiar & Musto, 2022; Azofeifa et al., 2021; Wadsworth et al., 2022). Drug research often involves convenience samples as the best way to reach small hidden stigmatized populations that do not respond well to traditional survey techniques. Our survey is unique in gathering a very large sample of small-scale cannabis cultivators across many countries—it is neither feasible nor practical to collect this kind of information using probability sampling methods (Barratt et al., 2017). Second, data are collected by self-report with all the attendant biases related to recollection, social desirability, and so forth. However, anonymous web surveys with no payment incentives provide a more favorable setting for people to disclose information on sensitive topics (Kays et al., 2013). Additionally, in a recent systematic review, self-report was found to reliably predict drug use when also measured using biological markers, with the researchers concluding that self-report alone should be considered reliable (Bharat et al., 2023). Third, our data are cross-sectional and do not allow us to address issues of causality due to an inability to establish temporal precedence. Moreover, many of our questions have divergent time anchors, such as when we ask about victimization ('ever') and social control response ('most recent incident'). For these analyses, we make the key assumption that the factors we measure are relatively time stable. Future surveys addressing this topic should design questions that align the measures temporally.

Conclusion

This study informs our understanding of the level of conflict and social control among cannabis growers. It employs a novel survey and robust statistical methods to answer questions that have been largely confined to qualitative research. Although the majority of the growers in our sample seemingly cultivated cannabis without major conflict or problems, we found that conflict and victimization is not uncommon among cannabis growers. Still, the markets are often peaceable and typically do not result in violent retaliation. Our findings have implications for policymakers and other stakeholders in the cannabis policy space.

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Table 1. Lifetime Victimization Related to Cannabis Growing

Description	Total %
Any victimization	24.3
Theft victimization	18.8
Theft of crops	17.2
Theft of equipment	3.4
Theft of money	4.0
Vandalism victimization	7.4
Destruction/sabotage of crops	7.2
Destruction/sabotage of equipment	2.0
Violent victimization	9.7
Threats of violence/intimidation	5.1
Extortion or blackmail	2.9
Forced to stop growing	5.1
Actual physical violence	2.2
Total N	5,667

Note: Categories are not mutually exclusive.

Table 2. Perpetrator of Most Recent Predatory Action by Victimization Type

Description	Any (%)	Theft (%)	Vandalism (%)	Violent (%)
Proximal relation	33.3	29.7	29.5	44.2
Friend/family	22.4	18.8	19.9	32.0
Neighbor	13.5	13.5	13.9	16.9
Distal contact	39.5	44.4	50.4	28.0
Acquaintance/workers/locals	3.6	2.9	3.6	4.0
Stranger	36.0	41.5	47.0	24.2
Market actor	19.3	20.8	23.3	30.0
Criminal group/gang	8.2	8.7	12.9	16.5
Drug seller	7.0	7.6	8.6	12.4
Grower or grower partner	5.7	6.3	8.2	8.5
Cannabis buyer	4.5	5.2	4.8	5.8
Police/authorities	17.0	14.9	27.6	30.9
Missing	14.2	16.1	10.6	6.9
Did not know	10.2	12.2	7.0	1.5
Refused	4.1	3.9	3.6	5.5
Total N	1,378	1,063	417	550

Note: Categories and groups are not mutually exclusive.

Table 3. Reason for Most Recent Conflict by Victimization Type

Description	Any (%)	Theft (%)	Vandalism (%)	Violent (%)
Stolen property/crops	28.2	34.7	24.2	22.4
Cannabis exchange issues	8.7	8.4	10.6	14.5
Disagreement about money/payment	3.9	3.8	4.6	7.3
Disagreement about quantity	1.7	2.0	2.6	2.7
Disagreement about quality	1.8	2.1	3.6	3.5
Disagreement about sharing/social supply	3.4	3.2	4.3	5.8
Cannabis cultivation issues	25.8	19.3	40.8	49.5
Pressure to discontinue growing	20.0	15.0	35.3	36.9
Pressure to continue growing for others	5.3	5.3	8.4	12.0
Illegal status of cannabis cultivation	2.8	1.5	3.1	6.2
Interpersonal issues	4.3	2.7	3.4	6.4
Other reason	6.1	5.6	5.3	4.7
Missing	34.0	37.1	27.3	17.3
Did not know	21.8	25.7	15.8	5.5
Refused	12.3	11.4	11.5	11.8
Total *N*	1,378	1,063	417	550

Note: Categories and groups are not mutually exclusive.

Table 4. Social Control Response by Victimization Type

Description	Any (%)	Theft (%)	Vandalism (%)	Violent (%)
Retaliation	11.2	12.0	12.9	16.7
Retaliated with violence/vandalism	4.1	4.2	4.3	6.0
Reclaimed stolen property by force	3.0	3.6	4.1	4.9
Recovered losses by force	1.6	1.9	1.9	2.5
Recovered losses by deception	3.6	3.5	3.8	5.8
Engaged others in retaliatory response	2.8	3.2	4.3	5.3
Negotiation	7.4	7.1	8.6	11.6
Negotiated compensation/settlement	5.4	4.9	6.5	9.1
Reclaimed stolen property peacefully	2.4	2.7	3.4	3.3
Avoidance	27.1	21.3	26.9	48.2
Ceased further personal/business contact	16.4	15.4	17.3	25.5
Ceased growing cannabis	13.4	7.5	12.0	28.2
Toleration	43.8	48.4	43.9	23.8
Did nothing	39.6	44.5	37.6	20.4
Replanted/relocated grow	2.6	2.3	4.6	2.2
Increased physical security	1.6	1.7	1.7	1.3
Legal mobilization	6.7	7.1	6.7	8.5
Other response	0.9	0.8	1.9	0.9
Missing	11.5	12.5	12.2	7.3
Did not know	3.2	3.2	3.4	1.1
Refused	8.3	9.3	8.9	6.2
Total *N*	1,378	1,063	417	550

Note: Categories and groups are not mutually exclusive.

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Table 5. Descriptive Sample Statistics

Variables	Range	% Miss	Main Sample Complete Case Mean	(SD)	Multiply Imputed Mean	(SD)	% Miss	Victimization Subsample Complete Case Mean	(SD)	Multiply Imputed Mean	(SD)
Lifetime Victimization											
Any victimization	0-1	0.0	0.24	(0.43)	0.24	(0.43)	0.0	1.00	(0.00)	1.00	(0.00)
Theft victimization	0-1	0.0	0.19	(0.39)	0.19	(0.39)	0.0	0.77	(0.42)	0.77	(0.42)
Vandalism victimization	0-1	0.0	0.07	(0.26)	0.07	(0.26)	0.0	0.30	(0.46)	0.30	(0.46)
Violent victimization	0-1	0.0	0.10	(0.30)	0.10	(0.30)	0.0	0.40	(0.49)	0.40	(0.49)
Perpetrator											
Proximal relation	0-1	--	--	--	--	--	14.2	0.39	(0.49)	0.38	(0.49)
Distal contact	0-1	--	--	--	--	--	14.2	0.46	(0.50)	0.48	(0.50)
Market actor	0-1	--	--	--	--	--	14.2	0.23	(0.42)	0.22	(0.41)
Police/authorities	0-1	--	--	--	--	--	14.2	0.20	(0.40)	0.18	(0.39)
Reason for Conflict											
Stolen property/crops	0-1	--	--	--	--	--	34.0	0.43	(0.50)	0.45	(0.50)
Cannabis exchange issues	0-1	--	--	--	--	--	34.0	0.13	(0.34)	0.12	(0.33)
Cannabis cultivation issues	0-1	--	--	--	--	--	34.0	0.39	(0.49)	0.33	(0.47)
Interpersonal issues	0-1	--	--	--	--	--	34.0	0.06	(0.25)	0.08	(0.26)
Social Control Response											
Retaliation	0-1	--	--	--	--	--	11.5	0.13	(0.33)	0.12	(0.33)
Negotiation	0-1	--	--	--	--	--	11.5	0.08	(0.28)	0.08	(0.28)
Avoidance	0-1	--	--	--	--	--	11.5	0.31	(0.46)	0.29	(0.46)
Toleration	0-1	--	--	--	--	--	11.5	0.50	(0.50)	0.51	(0.50)
Legal mobilization	0-1	--	--	--	--	--	11.5	0.08	(0.26)	0.07	(0.26)
Grower Demographics											
Age	18-80	0.0	43.08	(14.77)	43.08	(14.77)	0.0	42.64	(14.63)	42.64	(14.63)
Male	0-1	1.1	0.84	(0.36)	0.84	(0.36)	1.6	0.86	(0.35)	0.86	(0.35)
Educational attainment	1-3	2.0					2.8				
Less than High School			0.14		0.14			0.17		0.17	
High School or Equivalent			0.49		0.49			0.51		0.51	
College/Advanced			0.37		0.37			0.32		0.32	
Urbanicity	1-3	1.2					1.0				
Urban			0.43		0.42			0.38		0.38	
Suburban			0.31		0.31			0.31		0.31	
Rural			0.26		0.27			0.31		0.31	
Cultivation Practices											
Grows outdoors	0-1	0.5	0.53	(0.50)	0.53	(0.50)	0.5	0.68	(0.47)	0.68	(0.47)
Grows with others	0-1	0.7	0.18	(0.39)	0.19	(0.39)	1.4	0.27	(0.44)	0.27	(0.44)
Typical grow size	1-303	1.3	20.04	(38.64)	20.12	(38.78)	1.4	35.70	(57.70)	35.91	(57.94)
Lifetime grows	0-101	5.6	18.48	(27.63)	18.71	(27.81)	7.3	27.11	(32.55)	27.46	(32.78)
Motivation for Growing											

	Range										
Profit/compensation	0-1	0.1	0.08	(0.28)	0.08	(0.28)	0.1	0.13	(0.34)	0.13	(0.34)
Ideological	0-1	0.1	0.36	(0.48)	0.36	(0.48)	0.1	0.43	(0.50)	0.43	(0.50)
Risk reduction	0-1	0.1	0.57	(0.49)	0.57	(0.49)	0.1	0.57	(0.49)	0.57	(0.49)
Legal Environment											
Cultivation law	1-3	4.0					2.6				
Prohibited			0.63		0.64			0.62		0.62	
Medical only			0.13		0.13			0.11		0.11	
Any recreational			0.24		0.24			0.27		0.27	
Legally compliant grow	0-1	5.3	0.26	(0.44)	0.26	(0.44)	3.8	0.26	(0.44)	0.27	(0.44)
Enforcement risk	1-6	3.7	2.90	(1.44)	2.90	(1.43)	3.6	3.16	(1.58)	3.17	(1.58)
Prior police contact	0-1	0.7	0.13	(0.34)	0.13	(0.34)	1.5	0.30	(0.46)	0.30	(0.46)
Total *N*			5,667					1,378			

Table 6. Lifetime Victimization among Cannabis Growers

Variables	Any Victimization			Theft Victimization			Vandalism Victimization			Violent Victimization		
	OR	SE	p	OR	SE	p	OR	SE	p	OR	SE	p
Grower Demographics												
Age	0.99	.003	.078	1.00	.004	.976	0.98	.006	<.001	0.98	.004	<.001
Male	1.18	.182	.289	1.14	.227	.516	1.33	.262	.149	0.89	.148	.475
Educational attainment												
HS or Equivalent	1.07	.121	.521	1.07	.148	.610	0.98	.116	.853	0.92	.114	.478
College	0.86	.095	.166	0.86	.125	.302	0.87	.082	.146	0.76	.073	.005
Urbanicity												
Suburban	1.08	.095	.402	1.11	.099	.235	0.92	.123	.553	1.14	.085	.077
Rural	1.00	.072	.980	1.04	.114	.691	0.84	.120	.218	0.98	.066	.744
Cultivation Practices												
Grows outdoors	2.22	.249	<.001	2.74	.324	<.001	2.76	.416	<.001	1.04	.125	.782
Grows with others	1.26	.141	.041	1.31	.144	.013	1.10	.180	.566	1.09	.152	.549
Typical grow size (÷ 10)	1.07	.010	<.001	1.06	.011	<.001	1.05	.012	<.001	1.05	.009	<.001
Lifetime grows (÷ 10)	1.08	.024	.001	1.08	.021	<.001	1.09	.012	<.001	1.07	.021	.001
Motivation for Growing												
Profit/compensation	1.27	.114	.009	1.28	.137	.020	1.11	.161	.481	1.11	.148	.424
Ideological	1.32	.111	.001	1.23	.089	.004	1.32	.117	.002	1.52	.150	<.001
Risk reduction	1.00	.108	.982	0.95	.092	.569	1.41	.189	.010	1.29	.146	.023
Legal Environment												
Cultivation law												
Medical only	1.05	.135	.698	1.01	.144	.952	1.34	.297	.183	1.24	.189	.151
Any recreational	1.67	.182	<.001	1.72	.203	<.001	1.16	.247	.473	1.72	.228	<.001
Legally compliant grow	1.18	.239	.406	1.16	.266	.518	0.98	.233	.936	1.17	.229	.433
Enforcement risk	1.27	.052	<.001	1.21	.057	<.001	1.14	.043	<.001	1.35	.062	<.001
Prior police contact	3.88	.458	<.001	3.28	.411	<.001	3.75	.604	<.001	3.90	.268	<.001
Constant	0.05	.011	<.001	0.03	.008	<.001	0.02	.007	<.001	0.04	.009	<.001
Model (*N* = 5,667; *m* = 145)	$F(18, 32{,}068) = 242$, *p* < .001; *C* = .75; Largest FMI = .06			$F(18, 36{,}000) = 344$, *p* < .001; *C* = .76; Largest FMI = .06			$F(18, 29{,}591) = 100$, *p* < .001; *C* = .77; Largest FMI = .24			$F(18, 29{,}591) = 100$, *p* < .001; *C* = .76; Largest FMI = .08		

Note: Reported SE is the standard error of the odds ratio (OR), with SEs adjusted for clustering by country; *m* = number of imputed datasets; FMI = fraction of missing information; *C* = concordance statistic.

Table 7. Social Control Response among Victimized Cannabis Growers

Variables	Retaliation			Negotiation			Avoidance			Toleration			Legal Mobilization		
	OR	SE	p	OR	SE	p	OR	SE	p	OR	SE	p	OR	SE	p
Grower Demographics															
Age	0.98	.007	.027	1.00	.006	.441	1.02	.005	.001	1.00	.004	.712	0.99	.008	.497
Male	0.92	.239	.735	1.89	.569	.034	1.30	.207	.104	0.94	.153	.701	0.48	.097	<.001
Educational attainment															
HS or Equivalent	0.71	.133	.066	1.39	.453	.309	1.27	.164	.069	0.83	.136	.266	0.88	.359	.757
College	0.48	.114	.002	1.27	.422	.466	0.92	.145	.593	1.25	.249	.273	1.13	.539	.791
Urbanicity															
Suburban	1.00	.161	.993	1.06	.247	.790	1.15	.144	.275	0.89	.086	.211	0.98	.355	.949
Rural	0.87	.218	.585	1.21	.240	.330	1.13	.176	.421	1.01	.181	.964	0.51	.243	.159
Cultivation Practices															
Grows outdoors	1.24	.265	.305	0.91	.205	.677	0.87	.169	.484	1.26	.163	.076	0.89	.177	.553
Grows with others	0.82	.263	.532	1.37	.335	.196	1.13	.204	.487	0.84	.138	.296	0.67	.188	.149
Typical grow size (÷ 10)	0.99	.013	.316	1.01	.015	.719	1.00	.017	.856	0.98	.021	.299	1.05	.031	.108
Lifetime grows (÷ 10)	1.08	.043	.065	0.93	.035	.041	0.96	.018	.046	1.03	.021	.158	0.95	.033	.180
Motivation for Growing															
Profit/compensation	0.97	.173	.864	1.51	.332	.062	1.51	.269	.020	1.02	.171	.893	0.54	.140	.017
Ideological	1.12	.141	.384	1.13	.325	.671	1.01	.157	.960	0.90	.105	.385	1.16	.223	.443
Risk reduction	1.02	.139	.863	1.10	.262	.678	1.26	.188	.129	0.91	.103	.428	0.78	.198	.334
Legal Environment															
Cultivation law															
Medical only	1.38	.326	.174	1.51	.560	.271	1.63	.303	.009	0.66	.148	.063	0.78	.480	.689
Any recreational	1.37	.485	.375	2.70	.851	.002	1.00	.352	.991	0.86	.279	.635	0.76	.336	.539
Legally compliant grow	0.51	.216	.111	0.36	.112	.001	1.00	.331	.989	0.76	.291	.470	5.55	2.801	.001
Enforcement risk	0.93	.078	.384	0.84	.085	.084	1.12	.080	.112	0.96	.054	.455	0.99	.114	.946
Prior police contact	1.15	.234	.506	1.27	.296	.299	1.06	.149	.663	0.60	.114	.007	4.35	1.337	<.001
Lifetime Victimization															
Theft victimization	2.08	.624	.014	1.32	.371	.328	0.76	.154	.168	1.38	.242	.064	0.92	.491	.871
Vandalism victimization	0.93	.197	.737	1.18	.294	.512	0.83	.123	.200	1.21	.174	.195	1.10	.231	.639
Violent victimization	2.11	.381	<.001	1.97	.633	.034	3.33	.503	<.001	0.30	.067	<.001	2.05	.496	.003
Perpetrator															
Proximal relation	1.45	.277	.050	1.55	.476	.156	1.66	.296	.005	0.47	.064	<.001	1.42	.417	.237
Distal contact	0.90	.194	.623	0.87	.326	.713	0.80	.093	.053	1.16	.171	.307	1.28	.394	.415
Market actor	2.92	.467	<.001	1.86	.508	.023	1.57	.245	.004	0.46	.063	<.001	1.13	.338	.687
Police/authorities	0.98	.250	.934	0.66	.209	.191	1.11	.185	.523	0.93	.210	.737	0.96	.387	.910
Reason for Conflict															
Stolen property/crops	2.09	.558	.006	1.02	.291	.936	0.88	.187	.544	0.91	.186	.639	1.53	.451	.152
Cannabis exchange issues	0.79	.217	.399	3.57	.940	<.001	1.66	.410	.041	0.55	.162	.043	1.31	.483	.470
Cannabis cultivation issues	1.71	.520	.078	1.33	.465	.412	1.63	.381	.036	0.75	.181	.233	0.45	.213	.092
Interpersonal issues	1.60	.975	.444	0.93	.571	.901	2.11	.725	.031	0.46	.169	.035	0.74	.389	.563

Constant	0.06	.044	<.001	0.02	.015	<.001	0.04	.018	<.001	4.36	1.307	<.001	0.05	.042	<.001
Model (N = 1,378; m = 145)	$F(29, 21,333) = 11, p <$ .001; C = .76; Largest FMI = .30			$F(29, 17,697) = 7, p <$ .001; C = .77; Largest FMI = .34			$F(29, 20,274) = 16, p <$ .001; C = .79; Largest FMI = .42			$F(29, 17,727) = 18, p <$ .001; C = .79; Largest FMI = .60			$F(29, 17,924) = 9, p <$ .001; C = .80; Largest FMI = .48		

Note: Reported SE is the standard error of the odds ratio (OR), with SEs adjusted for clustering by country; m = number of imputed datasets; FMI = fraction of missing information; C = concordance statistic.

Conflict and Social Control among Cannabis Growers

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1

Abstract

Aims - Illegal drug markets are often assumed to be violent and predatory due to the absence of third-party enforcement. While cannabis markets are generally considered to be relatively more peaceful, there has been little investigation of the levels of conflict and victimization among small-scale cannabis growers, particularly under different cannabis policy and enforcement settings. This paper explores prevalence and predictors of conflict and social control among small-scale cannabis growers.

Methods – The data were obtained from an online convenience survey of small-scale cannabis growers from 13 countries (Austria, Canada, Denmark, Finland, France, Germany, Israel, New Zealand, Portugal, Switzerland, United Kingdom, United States, and Uruguay) from August 2020 to September 2021 (N = 5,667). Key measures collected included the types of victimization due to cannabis growing, the perpetrators of these predatory actions, reasons for the conflict, and the grower's response to being victimized. Multivariate logistic regression models were used to identify predictors of different types of victimization and social control responses among cannabis cultivators.

Results – Most growers (76%) never directly experienced violence or other victimization related to their cannabis cultivation. However, about one-quarter of growers had been victimized at some point, mostly involving theft, with physical violence rare. Growing outdoors, growing with others, growing more plants, and being a more seasoned grower increased the risk of victimization. Growers who were motivated by profit were more susceptible to theft. Surprisingly, growers in legal recreational jurisdictions experienced greater levels of theft and violent victimization than growers in illegal jurisdictions. Nonviolent social control responses predominated among the growers, mostly characterized by toleration but also avoidance and negotiation.

Conclusion -While most growers reported no victimization, a substantial minority did so, largely theft rather than violence, and typically did not report employing retaliatory violence. Social control responses were mostly nonviolent. These findings varied under different cannabis policy and enforcement environments. Cannabis legalization does not eliminate opportunities for theft and violence related to cannabis cultivation.

Keywords
Cannabis cultivation, victimization, drug markets, violence, social control

CRediT Author Statement
Eric L. Sevigny: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Visualization. **Gary Potter**: Conceptualization, Methodology, Investigation, Writing – reviewing and editing. **Chris Wilkins**: Conceptualization, Investigation, Writing – reviewing and editing. **Monica J. Barratt**: Methodology, Investigation, Data Curation, Writing - review and editing. **Thomas Friis Søgaard**: Investigation, Writing – reviewing and editing. **Pekka Hakkarainen**: Investigation, Writing – reviewing and editing. **Jodie Grigg**: Methodology, Data Curation, Writing - review and editing. **Marie Jauffret Roustide**: Writing - review and editing.

Declaration of Conflicting Interests

All authors have no conflicts of interest or other declarations.

Introduction

Like other prohibited goods and services, the market for illegal drugs operates as a 'stateless' system, lacking third-party enforcement of contracts and property rights (Wilkins, 2001). Without access to formal institutions of dispute resolution, drug market participants cannot call upon the police, courts, or official mediators in cases of theft, fraud, destruction or loss of property, or other disagreements. Absent such recourse, violence is often held up as the primary method of conflict resolution in the drug trade (Friman, 2009; Goldstein, 1985; Reuter, 2009).

While the nature and extent of drug market violence remains contested (Coomber, 2015; Dickinson, 2017; Jacques & Wright, 2008; Reuter, 2009), researchers generally agree that not all market types or segments are equally prone to violence (Bouchard et al., 2021; Morselli et al., 2017). Illegal cannabis markets, for instance, are often viewed as more peaceful than other drug markets, such as those for heroin, cocaine, and methamphetamine (Paoli et al., 2015; Reuter, 2009; Søgaard et al., 2021). It has been argued that a key reason for the relative peace of cannabis markets is the long-term shift away from large-scale, commercial operations run by criminal enterprises toward small-scale, local, and indoor cultivation focused on social supply (Ancrum & Treadwell, 2017; Belackova & Zabransky, 2014; Decorte, 2010; Potter & Klein, 2020; Weisheit, 2011). According to this argument, organized criminal groups have a comparative advantage in the use of violence (Bouchard et al., 2021) and are more likely than small-scale growers to employ it as a means of maintaining social control and competitive advantage (Reuter, 2016; Wilkins & Casswell, 2003).

It has also been argued that lower levels of conflict in illegal cannabis markets can be explained by the fact that participants are often embedded in friendship networks and cultural groups that emphasize tolerance, cooperation, and sharing, and that these established norms mitigate the violence, predation, and deception endemic in other profit-driven drug markets (Dickinson, 2017; Hammersvik, 2015; Sandberg, 2013). Moreover, small-scale indoor cultivation within closed networks presents less risk for opportunistic predation (Belackova & Zabransky, 2014).

Given the paucity of rigorous studies investigating violence and conflict in cannabis markets, the evidence on these interconnections remains inconclusive (Athanassiou et al., 2023). Moreover, we know even less about other predatory behaviors that may be more deeply embedded in cannabis cultures, including crop theft and property vandalism, as well as the responses to such victimization (Potter & Klein, 2020; Reuter, 2016). Jacques and Wright (2008, 2011, 2013) have elaborated a conflict theory of retail drug markets that emphasizes the predominance of nonviolent outcomes, such as toleration, negotiation, and avoidance (see, e.g., Jacques & Moeller, 2023). How these factors may operate upstream in the market among cannabis growers remains unclear. It would therefore be valuable to understand the nature and extent of conflict and social control among cannabis growers.

Complicating such an inquiry is the heterogeneity of cannabis markets under alternative enforcement and policy regimes. For instance, drug market research suggests that indiscriminate and repressive drug market crackdowns can spur elevated levels of systemic and spillover violence (Castillo & Kronick, 2020; Jacques & Allen, 2015; Lessing, 2017), even in retail cannabis markets (Moeller & Hesse, 2013). Moreover, with proponents of drug liberalization highlighting the benefits of eliminating illegal markets, including

reductions in systemic violence, a growing number of national and subnational jurisdictions have legalized cannabis cultivation and distribution for medical and/or adult recreational use (Decorte et al., 2020). Although the evidence is inconclusive regarding the effects of cannabis liberalization on aggregate (e.g., state-level) and localized (e.g., around dispensaries) crime rates (e.g., Athanassiou et al., 2023; Callaghan et al., 2023; Thacker et al., 2021), the few studies that have examined conflict more directly among cannabis market participants suggest that liberalization tends to reduce such harms (Belackova et al., 2018; Gavrilova et al., 2019; Jacques et al., 2016). In short, this body of evidence suggests that a 'softer' regulatory and enforcement approach toward cannabis could mitigate much of the conflict, violence, and disorder observed in these markets.

Against this backdrop, the current study investigates conflict and social control among small-scale cannabis growers from 13 countries based on a large-*N* online survey fielded in 2020-21. We had three main objectives for this study. First, we sought to describe the nature and extent of market-related victimization among cannabis growers, including information on the perpetrators, underlying reasons for the conflict, and the formal and informal social control measures taken in response to predation. Second, we sought to predict the risk of grower victimization as a function of grower demographics, cultivation practices, motivations for growing, and the overarching legal and enforcement environment. Third, we sought to predict the social control response among victimized growers as a function of the type of predation, knowledge of the perpetrator, and the underlying reason for the conflict, while also controlling for the aforementioned factors. This study contributes to an emerging body of literature on conflict and its management in cannabis markets in the context of ongoing cannabis liberalization.

Methods

Data

The data used in this study were collected by the Global Cannabis Cultivation Research Consortium (GCCRC) through an online Qualtrics survey using the International Cannabis Cultivation Questionnaire 2 (ICCQ 2). Building on GCCRC's previous ICCQ 1 survey (Barratt et al., 2012; Barratt et al., 2015), the current ICCQ 2 survey ran between August 2020 and September 2021 in 18 countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Georgia, Germany, Israel, Italy, Netherlands, New Zealand, Portugal, Switzerland, UK, USA, and Uruguay) in 12 languages. Ethical approval for the survey was granted by the Human Research Ethics Committee of Curtin University, Perth, Australia, with additional ethical approval obtained through national or institutional review processes where required. Potential respondents were directed to the online ICCQ 2 survey (https://worldwideweed.nl/) using a broad-based recruitment strategy to maximize respondent heterogeneity. These strategies included internet ads, social media, outreach to cannabis associations and grower forums, traditional television/radio and print media, direct marketing (email, post), flyers, and related efforts. The ICCQ 2 includes a Core module of 40 questions fielded by all respondents (e.g., growing experience, methods and scale of growing, reasons for growing), plus 12 optional modules covering a range of additional topics (e.g., growing for medical purposes, cannabis activism, harvesting and processing methods). Teams in each country chose which modules to field, with some modules also requiring respondents to deliberately 'opt in' before answering additional questions.

Over the 14-month data collection period, 19,444 respondents initiated the online survey. After screening for and removing duplicates, pilot surveys, and surveys with very low response rates (i.e., <10% of Core module questions), we retained N = 19,444 – 3,855 = 15,589 respondents. Then, after applying project-wide eligibility criteria (i.e., aged 18+, grew cannabis within past 5 years, resided in one of the 18 target countries, and validly answered ≥50% of the Core module questions), we retained N = 15,589 – 4,110 = 11,479 respondents, which constitutes GCCRC's core international dataset for the ICCQ 2. Additional data management procedures included translating free text responses from other languages to English and upcoding free text responses into existing, amended, or new response options. We employed automated translation services with quality control provided by research team members with relevant language fluency. Upcoding was directed by module leads, with quality control provided by the GCCRC data subteam.

Sample

The current study uses data from both the Core module and Module 1 on 'Conflicts and victimization,' comprised of six questions. Respondents from 13 countries (N = 6,663) were eligible to complete supplementary Module 1.[1] Respondents from 10 countries (Austria, Denmark, France, Germany, Israel, New Zealand, Portugal, UK, USA, and Uruguay) were automatically filtered to Module 1, whereas respondents from 3 countries (Canada, Finland, and Switzerland) had to opt into the module. Module response rates were higher for the former group of countries (87.2%; range: 69.0-94.7%) than the latter (76.4%; range: 58.2-82.5). Overall, the main analytic sample for this study includes the 5,667 respondents who validly answered the first Module 1 question on lifetime victimization related to cannabis growing,[2] representing 85.1% of all potential Module 1 respondents and 49.4% of core international dataset respondents. The distribution of the sample by country from largest to smallest was United States (28.6%), Denmark (13.5%), Germany (12.6%), France (10.7%), Finland (7.8%), Canada (7.3%), United Kingdom (5.5%), Uruguay (4.2%), New Zealand (3.2%), Switzerland (2.9%), Portugal (1.9%), Israel (1.2%), and Austria (0.7%).

Measures

We describe our measures in two subsections. First, we focus on Module 1 variables measuring conflict and social control constructs related to cannabis cultivation, including victimization, knowledge of the perpetrator, reason for the conflict, and social control response. Descriptively, we report on these measures to describe the nature and extent of these behaviors. These measures were also used as dependent and/or independent variables in multivariate analyses, depending on the specific model. Second, we describe the operationalization of additional covariates from the Core module that are used in all multivariate analyses, including grower demographics, cultivation practices, motivation for growing, and the legal environment. Further details on variable operationalization are provided in Supplementary File 1.

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[1] Module 1 was not fielded in Australia, Belgium, Georgia, Italy, or Netherlands.
[2] Note that 100 respondents who either did not know or refused to answer the initial lifetime victimization question were excluded from this study.

Conflict and Social Control Variables

We measured lifetime victimization related to cannabis cultivation using four non-mutually exclusive indicator variables. *Theft victimization* measures theft of crops, equipment, or money. *Vandalism victimization* captures the destruction or sabotage of crops or equipment. *Violent victimization* comprises threats of violence or intimidation, extortion or blackmail, being forced to stop growing, or experiencing actual physical violence. *Any victimization* measures lifetime experience of any type of aforementioned predation. These measures serve as dependent variables in the first set of regression analyses, with the first three also serving as independent variables in the second set of regression analyses.

We captured the identity of the perpetrator of the last predatory action targeting the grower using four non-mutually exclusive indicator variables. *Proximal relation* captures close personal associates such as friends, family members, and neighbors. *Distal contact* covers acquaintances, locals, strangers, and other socially remote individuals. *Market actor* identifies individuals engaged in criminal or drug market activity, including gangs, drug sellers, other cannabis growers or grower partners, and cannabis buyers. *Police/authorities* identifies law enforcement or other government officials as the perpetrator. These measures serve as independent variables in the second set of regression analyses.

We measured the reason for the last conflict related to cannabis growing using five non-mutually exclusive indicator variables. *Stolen property/crops* captures conflict related to the robbery or theft of money, drugs, or growing equipment. *Cannabis exchange issues* measures disagreements over money, the quality or quantity of transacted cannabis, and the sharing or social supply of cannabis. *Cannabis cultivation issues* measures conflicts related to external pressure to either continue or discontinue growing cannabis, or to problems emanating from the illegal status of cannabis cultivation. *Interpersonal issues* measures feuds and conflicts with other people, including family and business partners. *Other reason* is a remnant category capturing an assortment of reasons not described above. We examine the last indicator descriptively, but do not include it in the multivariate analyses. The other four measures serve as independent variables in the second set of regression analyses.

We operationalized the social control response to the most recent victimization using six non-mutually exclusive indicator variables. Conceptualization of these measures draws upon conflict theory of illegal drug markets (Bouchard et al., 2021; Jacques & Wright, 2011, 2013). *Retaliation* involves acts of violence and vandalism, the reclamation of stolen property and recovery of losses by force or deception, or directly engaging others to facilitate these types of vengeful actions. *Negotiation* involves reaching a compensation/settlement agreement for incurred losses or otherwise peacefully reclaiming stolen property/goods. *Avoidance* is characterized by ceasing further personal or business interactions with the perpetrator, or to exiting the market altogether by ceasing to grow cannabis. *Toleration* refers to simply doing nothing or to implementing actions such as replanting/relocating a crop or target-hardening a grow operation. *Legal mobilization* refers to enjoining government actors and resources—mainly law enforcement but also the courts and regulatory officials—in dispute resolution. *Other response* is a remnant category for other social control measures not described above. We examine the last indicator descriptively, but do not include it in the multivariate analyses. The other five measures serve as dependent variables in the second set of regression analyses.

Other Independent Variables

We operationalized several grower demographic measures. *Age* measures how old the grower was at the time of the survey. *Male* measures whether the grower identified as male versus ~~nonmale~~female/nonbinary. ~~Nonmale aggregates female and nonbinary gender identifications~~We aggregated female and nonbinary ~~–~~because less than 1% of respondents in the main sample (*n* = 45) identified as the latter, and victimization risk for female and nonbinary gender groups is likely to be more similar compared to males. *Educational attainment* measures the highest level of schooling completed across three ordinal categories: less than high school, high school or equivalent, and college or advanced degree. *Urbanicity* measures whether the grower lived in an urban, suburban, or rural setting.

We captured grower cultivation practices using four measures. *Grows outdoors* indicates whether the grower typically grows all or part of their cannabis crop outside versus exclusively indoors. *Grows with others* indicates whether the grower cultivated their most recent crop with others versus growing exclusively alone. *Typical grow size* measures the total number of plants (seedlings, mature, and mother) typically sown per crop. *Lifetime grows* measures the overall number of crops respondents have grown in their lifetimes.

We operationalized three non-mutually exclusive variables capturing motivations for growing cannabis. *Profit/compensation* motive measures whether the respondent reported growing to earn a profit or to pay for their own cannabis and/or other drug use. *Ideological* motive measures whether cannabis was grown for any professed political, environmental, fair trade, countercultural, spiritual, or human rights purpose. *Risk reduction* motive measures whether cannabis was grown to avoid contact with criminals or because growing is viewed as less risky than buying cannabis.

We operationalized four variables to measure the legal and enforcement environment under which the grower operates. *Cultivation law* captures the respondent's understanding of the legality of cannabis cultivation in their home jurisdiction, including whether it is prohibited, legal for medical purposes only, or legal for any adult/recreational purpose. *Legally compliant grow* indicates whether the respondent's most recent grow was both legal and in full compliance with local laws versus being either illegal or not in compliance with local laws. *Enforcement risk* measures the respondent's perception of getting caught for growing cannabis, measured on a six-point ordinal scale ranging from 'none' (i.e., growing in a legal market) to 'very high.' *Prior police contact* indicates whether the grower has ever come into contact with law enforcement due to cultivating cannabis.

Analytic Approach

We performed both descriptive and multivariate analyses to better understand the patterns and predictors of conflict and social control among cannabis cultivators. Descriptively, we report prevalence distributions for key conflict and victimization measures for both the main sample of cannabis growers (*N* = 5,667) and the subsample of growers who were ever victimized due to their cannabis growing (*N* = 1,378). We then report two sets of multivariate logistic regression analyses. First, we investigate predictors of lifetime victimization among the main sample of cannabis growers, focusing on four outcomes: any victimization, theft victimization, vandalism victimization, and violent victimization.

Second, we investigate predictors of social control responses among the subsample of victimized cannabis growers, focusing on five outcomes: retaliation, negotiation, avoidance, toleration, and legal mobilization. Due to the potential bias and inefficiency of listwise deletion, (17.7% and 50.2% of cases would be dropped from the first and second set of regressions, respectively), we used multiple imputation to handle missing data in a statistically robust manner. All analyses were conducted using Stata SE 18.0 (StataCorp, 2023b).

Multiple Imputation of Missing Data

Multiple imputation (MI) is a state-of-the-art method for addressing missing data. MI works by generating m complete datasets, analyzing these datasets using a common statistical model, and then pooling the results into single set of parameter estimates in a manner that approximates a complete case analysis while accounting for imputation uncertainty (Little & Rubin, 2019; Woods et al., 2021). We employed multiple imputation by chained equations (MICE) to fill in missing values via an iterative sequence of steps (Azur et al., 2011; White et al., 2011). First, missing values for all independent and dependent variables used in our analyses were randomly sampled from their respective distributions of observed values to serve as initial placeholders. Second, the placeholder values for x_1 (i.e., the variable with the least amount of missing data) were set back to missing, predicted from all other variables in the imputation model, and then replaced with these new imputations. This cycle was repeated for each additional variable, $x_2...x_i$, with missing data. Third, this process was repeated for a total of 40 cycles, with imputations being updated at each cycle. We chose 40 cycles as the burn-in period based on preliminary analyses and inspection of trace plots that showed imputation means and standard deviations stabilized by the 40th iteration. Fourth, at the end of the burn-in period, a final imputed dataset, m, was created. Fifth, steps 1-4 were repeated to produce a total of m = 145 imputed datasets. This number, m, was chosen to maximize the replicability of our least stable regression model based on the two-stage procedure outlined by von Hippel (2020).

A key advantage of MICE is that the imputation model can be fully customized to different types of variables and data generating processes (DGP). Our imputation model used (augmented) binary, multinomial, or ordinal logistic regression for categorical variables and predictive mean matching (using five nearest neighbors) for skewed continuous variables. To overcome the problem of perfect prediction with categorical outcomes, the data were augmented if needed by adding a few temporary observations with small weights (Royston & White, 2011). Our imputation model also omitted variables that were selectively measured among the victimization subsample from being used to impute variables measured across the entire sample, as this would violate the DGP and lead to convergence issues. A standard assumption of MI is that the data are missing at random (MAR), meaning that missingness can be fully accounted for by the observed information in the dataset. The plausibility of the MAR assumption can be improved with the use of auxiliary variables that correlate with overall missingness or with an incompletely observed variable (Collins et al., 2001). Our imputation model therefore incorporated several auxiliary variables that met these conditions, including the Module 1 screener, world region, race (i.e., White vs non-White), and reason for missingness indicators (see Supplementary File 1 for a description of, and justification for using, these auxiliary variables). Multiple imputation diagnostics examining observed versus imputed variable distributions did not identify obvious problems with the imputation model (Eddings & Marchenko, 2012).

Logistic Regression Modeling

We used multivariate logistic regression with cluster robust standard errors (by country) to analyze the series of binary victimization and social control outcomes, controlling for a range of theoretically and empirically relevant covariates (Long & Freese, 2014). All parameters and model statistics were combined and adjusted to account for variability between imputations (Little & Rubin, 2019). For each model, we report the omnibus test of significance (based on the *F* rather than χ^2 statistic under MI), the fraction of missing information (FMI), and the concordance (*C*) statistic. FMI provides an estimate for each coefficient of the total variance increase due to missing data. The largest FMI provides a rule-of-thumb criterion for MI reproducibility, which is satisfied if $m \geq 100$ x FMI (StataCorp, 2023a). To assess logistic regression model fit, we consider a *C*-statistic of $0.7 \leq C < 0.8$ to be acceptable and $0.8 \leq C < 0.9$ to be excellent (Giancristofaro & Salmaso, 2003). We also examine the presence of multicollinearity using the variance inflation factor (VIF), where VIF < 3 is preferred and VIF < 5 is acceptable.

When presenting the results of the logistic regression analyses, we report odds ratios (ORs) in the tables. We adopted a $p < .05$ criterion for determining statistical significance of predictors. Discussion of specific effects implies holding all other variables constant. To aid interpretation in certain instances, we reported average marginal effects (AMEs), calculated as the change in predicted probability of the outcome associated with a defined change in the values of a target independent variable (Klein, 2014; Long & Freese, 2014).

Results

We start by presenting pre-imputation descriptive results on the nature and extent of conflict and victimization, both to present the data at a finer level of granularity than was included in the imputation model and to understand patterns of nonresponse on these key measures. Next, we present descriptive statistics for both the main sample (*N* = 5,667) and victimization subsample (*N* = 1,378), stratified by complete case versus multiply imputed data. Lastly, we present a series of MI logistic regression estimates predicting lifetime victimization and social control responses.

Nature and Extent of Conflict and Social Control among Cannabis Growers

As shown in Table 1, about one-quarter of growers reported lifetime victimization related to cannabis growing. ~~Most of the victimized growers experienced theft~~Theft victimization was most common (18.8%), particularly theft of crops (17.2%). Vandalism was less common, reported by about one in every thirteen growers (7.4%), mostly involving the destruction or sabotage of crops (7.2%). Personal aggression in the form of violence and coercion was directed at nearly one in ten growers (9.7%), with physical threats (5.1%) and forced stoppage of cultivation (5.1%) being the most common violations. Notably, reports of actual physical violence were rare (2.2%). In short, most victimization of cannabis growers involved the theft of a valuable illegal commodity. Other types of victimization, especially physical violence, were much less prevalent.

[INSERT TABLE 1 ABOUT HERE]

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Focusing on the most recent perpetrator, Table 2 shows that distal contacts were implicated in four out of ten (39.5%) victimization incidents, mostly involving strangers (36.0%). Proximal relations were identified in one-third (33.3%) of cases, typically involving friends or family (22.4%). Drug market actors were implicated in about one-fifth (19.3%) of cases, with one of every twelve (8.2%) incidents reportedly instigated by organized criminal groups or gangs. ~~Surprisingly, p~~ Police or government authorities were identified as the perpetrator in one-sixth (17.0%) of incidents, with the perpetrator going unidentified one-seventh of the time (14.2%). Perpetration varied across types of victimization. Proximal relations and drug market actors were relatively more likely to commit violent acts, whereas distal contacts were more likely to engage in theft and vandalism. In comparison, police/authorities were more likely to be identified as perpetrators of vandalism and violence. It is also noteworthy that ~~overall item missingness declined as the salience of victimization increased from theft to violence~~ growers were relatively more successful in identifying the perpetrators of violent acts than perpetrators of theft or vandalism.

[INSERT TABLE 2 ABOUT HERE]

Table 3 shows that both stolen property/crops (28.2%) and problems linked to cannabis cultivation (25.8%) were the most common sources of conflict among growers, each occurring in more than one-quarter of incidents. Interestingly, pressure to discontinue growing was the most common cultivation-related source of conflict, noted as a factor in one-fifth (20.0%) of predatory actions. By comparison, cannabis exchange issues (8.7%) and interpersonal issues (4.3%) were less common sources of conflict among cannabis growers. Overall, nonresponse was comparatively high on these items, although missingness ~~also decreased with the salience of victimization~~varied by victimization type. Specific types of conflict were closely linked to certain victimization types. For instance, both cannabis exchange and interpersonal issues were more closely linked to violent victimization, whereas cannabis cultivation issues were more prevalent with both vandalism and violent incidents. Intuitively, stolen property/crops was the most common factor for theft victimization.

[INSERT TABLE 3 ABOUT HERE]

Table 4 shows that toleration is by far the most common response (43.8%) to victimization, which mostly translates to simply doing nothing (39.6%). Avoidance, whether ceasing further contact with the perpetrator or ceasing to grow altogether, was the next most common response, occurring in roughly two out of seven (27.1%) incidents. Retaliation was the third most frequent social control response, reported in one-ninth (11.2%) of cases, with direct violence or vandalism representing the modal (4.1%) retaliatory response. Negotiation (7.4%) and legal mobilization (6.7%) were the least common responses to victimization by cannabis growers. Overall, nonresponse was generally lower for these items (11.5%), but also followed similar patterns across victimization types. Notably, when growers were targeted with violence or coercion, responses of retaliation, negotiation, avoidance, and legal mobilization were all relatively more likely. The one exception was toleration, which was more common when growers were victimized by theft and vandalism.

[INSERT TABLE 4 ABOUT HERE]

Descriptive Sample Statistics

Table 5 presents descriptive statistics for the two samples used in our multivariate analyses, reporting the percentage missing for each variable, as well as both complete case and multiply imputed means and standard deviations.[3] Across both samples, we discern no troubling statistical deviations in summary statistics, affirming previous imputation diagnostics. We focus our discussion here on the summary statistics from the multiply imputed main sample.

The typical respondent in our sample was a mid-aged (median [M] = 41) male (84.3%) urbanite (42.3%) living in Europe (55.5%) and possessing a high school but not college/advanced degree (48.8%). At the same time, our sample was also diversely represented by age (1st-3rd quartiles [Q] = 31-55), gender (15.7% female/nonbinary), geography (30.7% suburban, 26.9% rural), world region (40.1% Americas, 4.4% other), and education (14.2% without a high school diploma, 36.9% with a college/advanced degree).

The typical cannabis grower in our sample is an experienced (M = 7 lifetime grows), small-scale (M = 9 plants) cultivator, who prefers to grow alone (81.5%) and outdoors (52.5%). The generally small-scale character of the growers in our sample is also evident in cultivation experience (Q = 3-20 lifetime grows) and typical crop sizes (Q = 4-18 plants per crop).

[INSERT TABLE 5 ABOUT HERE]

Motivationally, most of the growers in our sample grew to reduce the risks of interacting with criminal elements and/or purchasing cannabis illegally (57.3%), but a sizable number also reported growing for ideological reasons (36.3%). In contrast, relatively few growers reported a profit/compensation motive (8.4%) for cultivating cannabis, which is consistent with the predominance of small-scale cultivation practices in our sample.

With respect to the legal environment, most growers lived in a jurisdiction where cannabis cultivation remained illegal (63.5%) versus being legal for recreational (23.9%) or medical-only (12.6%) cultivation. Notably, about one-quarter (25.8%) of growers reported being in legal compliance with local cultivation laws and regulations. Lastly, mean enforcement risk most closely corresponded to 'low risk' on the ordinal scale, and relatively few growers reported having prior police contact (13.2%).

In summary, the picture that emerges about this sample is that it represents a demographically broad cross-section of society, and tends to be comprised of committed, small-scale growers whose own cultivation is motivated more by risk minimization than tangible economic benefits. Although key differences exist, our sample is not dissimilar to population-level characteristics of small-scale cannabis growers observed from other data sources (Aguiar & Musto, 2022; Azofeifa et al., 2021; Barratt & Lenton, 2015; Wadsworth et al., 2022).

Predictors of Victimization among Cannabis Growers

The multiply imputed logistic regression results investigating lifetime victimization among cannabis

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[3] Note that the variable distributions reported in Table 5 will be dissimilar to those reported in Tables 2-4 due to missing data and different base *N*s.

growers are presented in Table 6. For all outcomes, omnibus model tests were statistically significant ($p <$ .001) and the *C*-statistic indicated acceptable goodness of fit ($.75 \leq C \leq .77$). Also, all VIFs were less than 5 (maximum VIF = 3.03), indicating acceptable levels of multicollinearity. FMI indicates that the increase in total variance attributable to missing data would have been as much as 6% to 24% across models, and that there were an adequate number of imputed datasets, *m*, for MI reproducibility (e.g., $145 \geq .24$ x 100). When presenting results in Table 6, we rescaled the variables for *typical grow size* and *lifetime grows* by a divisor of 10 to improve interpretability.

Demographically, gender and urbanicity were not significantly related to any type of victimization, whereas age was inversely associated with both vandalism and violence. In each case, a one standard deviation increase in age, about 15 years, was associated with a significant yet small .02 decrease in the probability of victimization. Relative to those without a high school diploma, growers with a college/advanced degree had 24% lower odds of experiencing violence. Otherwise, education had null effects across victimization outcomes.

Cannabis cultivation practices were consistently linked to victimization. Growing outdoors nearly tripled the odds of both theft (OR = 2.74) and vandalism (OR = 2.76) but was not significantly linked to violence. Growing with others significantly increased the odds of theft by 31% but was not a significant factor for other types of victimization. Larger grows and more experience with growing both significantly increased the odds of all types of victimization, but these effects were small. For instance, a standard deviation increase in the number of plants per crop (~39 plants) raised the probability of any victimization by .04, and a standard deviation increase in the number of lifetime grows (~28 crops) raised the probability of any victimization by .03. Results for specific types of victimization were comparable or smaller.

[INSERT TABLE 6 ABOUT HERE]

The specific motivations for growing cannabis that we examined in this study tended to be associated with increased victimization risk. Growing for profit/compensation was associated with 28% greater odds of theft but was not significantly linked to vandalism or violence. In contrast, growing to reduce unwanted external market risks significantly increased the odds of vandalism and violence by 41% and 29%, respectively, but had null effects for theft. Lastly, growing for ideological reasons significantly increased the odds of victimization, depending on the specific outcome, between by 23% and to 52%.

The legal environment was consistently linked to victimization. Relative to illegal jurisdictions, growers in adult recreational markets experienced 72% greater odds of both theft and violence, but effects were null for vandalism. Notably, there was also a significant difference ($p < .05$) in the pairwise comparisons between recreational and medical-only markets for both theft and violence. In other words, recreational markets were distinct from other markets in elevating certain victimization risks. At the same time, being compliant with local laws and regulations was not significantly associated with any type of victimization. Perceived enforcement risk, on the other hand, was associated with a significant increase in the odds of all types of victimization. For instance, when a grower perceived no risk of enforcement action (due to growing in a legal jurisdiction), the predicted probability of a violent outcome was .06. But, when enforcement risk was viewed as very high, that probability increased to .19. Finally, having prior contact with the police was associated with a near quadrupling (OR = 3.88) of overall victimization risk, with

similar-sized effects for each type of victimization.

Predictors of Social Control Response among Victimized Cannabis Growers

The multiply imputed logistic regression results investigating the social control response among victimized cannabis growers are presented in Table 7. For all outcomes, omnibus model tests were statistically significant ($p < .001$), and the *C*-statistic indicated acceptable to excellent goodness of fit ($.76 \leq C \leq .80$). Also, all VIFs were less than 5 (maximum VIF = 3.30), indicating acceptable levels of multicollinearity. FMI indicates that the increase in total variance attributable to missing data would have been as much as 30% to 60% across models, and that there were an adequate number of imputed datasets, *m*, to ensure MI reproducibility (e.g., 145 $\geq$ .60 x 100). As above, when presenting results in Table 7, we rescaled the variables for *typical grow size* and *lifetime grows* by a divisor of 10 to improve interpretability.

Looking at grower demographics, age was only significantly related to avoidance (positive) and retaliation (negative), although the effects were small. ~~Specifically, a one standard deviation increase in age (~15 years) was associated with a .02 decrease in the probability of retaliation and a .04 increase in the probability of avoidance.~~ Interestingly, males had 89% greater odds of negotiating a resolution in response to being victimized but 52% lower odds of ~~mobilizing the police~~legal mobilization. Otherwise, gender was not significantly related to social control response. Regarding education, growers with a college/advanced degree had 52% lower odds of engaging in retaliation relative to those without a high school diploma. Pairwise comparisons between growers with a college versus high school degree revealed the former group was significantly less likely to engage in avoidance ($p < .05$) but significantly more likely to tolerate victimization ($p < .05$). Lastly, urbanicity had no significant effects on social control response.

Cultivation practices had limited effects on growers' social control responses. Only growing experience, measured as the number of lifetime grows, was significantly, and inversely, related to both negotiation and avoidance. These effects were small, however, with a standard deviation increase in the number of lifetime grows ~~, about 33 in the victimization subsample,~~ predicting a .02 decrease in the probability of ~~victimized growers employing either~~ a negotiation or avoidance response~~s~~. Among motives for growing, only a profit/compensation justification significantly predicted social control response, but in different directions. Specifically, growing for profit was associated with 51% greater odds of avoidance but 46% lower odds of legal mobilization.

[INSERT TABLE 7 ABOUT HERE]

The legal environment had variable effects on growers' social control response. Relative to places where cannabis cultivation remained illegal, growers in adult recreational markets had nearly three times the odds (OR = 2.70) of a negotiation response, whereas those operating in medical-only markets had 63% greater odds of an avoidance response. Cultivation laws did not significantly impact social control response in any other way. Running a legally compliant grow significantly lowered the odds of growers negotiating a response to victimization by 64% while also increasing the odds of ~~mobilizing the police~~legal mobilization more than five-fold (OR = 5.55). Prior police contact also had a significant and strong effect on legal mobilization, more than quadrupling the odds (OR = 4.35), but also significantly reducing the odds of toleration by 40%. We observed no other significant effects of either legal compliance or prior police

contact, nor was perceived enforcement risk predictive of any type of social control response.

When considering whether the type of victimization elicited a certain social control response, violent victimization was the most relevant and ubiquitous factor. In particular, growers subject to violent predation were 2-3 times more likely to respond with retaliation (OR = 2.11), negotiation (OR = 1.97), avoidance (OR = 3.33), and legal mobilization (OR = 2.05). By the same token, violent predation significantly lowered the odds of toleration by 70%. The only other significant factor by victimization type was a doubling of the odds of retaliation (OR = 2.08) in response to theft.

The type of perpetrator provoked or mitigated certain social control responses. In particular, when victimized by family, friends, or other close associates, growers were significantly more likely to respond with retaliation (OR = 1.45) and avoidance (OR = 1.66) but less likely to tolerate the affront (OR = 0.47). Similarly, victimization by market actors was significantly more likely to elicit retaliation (OR = 2.92), negotiation (OR = 1.86), and avoidance (OR = 1.57), but less likely to engender toleration (OR = 0.46). On the other hand, victimization by distal contacts and police/authorities was not significantly predictive of social control outcomes.

Lastly, the underlying reason for the conflict was significantly related to certain social control responses. Specifically, the odds of retaliation more than doubled (OR = 2.09) when property or crops were stolen, and the odds of negotiation increased more than three-fold (OR = 3.57) when cannabis exchange issues were implicated. Avoidance was also a statistically likely response when the underlying conflict involved cannabis exchange (OR = 1.66), cannabis cultivation (OR = 1.63), or interpersonal issues (OR = 2.11). By the same token, the odds of toleration were significantly less likely in response to cannabis exchange (OR = 0.55) and interpersonal (OR = 0.46) issues.

Discussion

Illegal drug markets are commonly assumed to be inherently violent and predatory, as there is no neutral third-party oversight when disputes and conflicts arise among market actors. This generalization has been challenged by scholarship showing instances of illegal markets developing and remaining stable without third-party enforcement (Koivu, 2016; Wilkins, 2001) and by research highlighting the normative nature of nonviolent social control responses in many drug market contexts (Adler, 1993; Jacques & Moeller, 2023; Reuter & Haaga, 1989; Zaitch, 2002). By comparison, relatively little empirical research has centered these questions in the context of either cannabis cultivation (Hafley & Tewksbury, 1995; Hammersvik, 2015; Potter & Klein, 2020; Wilkins & Casswell, 2003) or the evolving legal landscape characterized by ongoing cannabis liberalization (Belackova et al., 2018; Jacques et al., 2016).

Key Findings

A key finding of our study is that most growers (76%) never directly experienced violence or other victimization due to their cannabis cultivation. Hence, most growers appear to have been able to keep their cultivation activities private and secure in order to avoid conflicts within their social environment. This suggests that small-scale cannabis growing is relatively well integrated into the everyday lives of people and their communities. Notwithstanding the fact that about one-quarter of the growers in our

sample were growing legally and in compliance with the law, this finding may challenge popular assumptions about the use of violence in the drug trade, although it is consistent with perspectives on the commonality of peaceful exchanges in illegal drug markets (Jacques & Wright, 2008).

The flipside, obviously, is that roughly one-quarter of the cannabis growers in our sample reported ever being victimized due to their cannabis growing. Most victimization took the form of theft; actual physical violence was rare. We also found that the perpetrators of predatory actions were mostly unknown to the growers, which is consistent with the predominance of theft victimization. ~~Still, d~~Also, while drug market actors ~~were relatively common perpetrators~~were involved in only about one-fifth of victimization incidents, growers were actually more likely to be victimized by friends and family. ~~which might be expected, but so were police/authorities, which is less intuitive. However, any~~By comparison, victimization of growers ~~infringement~~ by legal authorities ~~on growers~~ (e.g., crop eradication, seizures) ~~is likely to be viewed as a predatory action~~occurred least often, in about one-sixth of incidents. Not surprisingly, we found that stolen property/crops and issues related to cultivation were the primary sources of conflict among cannabis growers, whereas cannabis exchange and interpersonal issues were less often implicated.

Notably, nonviolent social control responses predominated among the victimized growers in our sample—mostly characterized by toleration but also avoidance and negotiation—which is consistent with research on the use of social control in retail cannabis markets (Jacques & Moeller, 2023). Given that many growers in our sample operated in legal markets, mobilization of the police, courts, and regulatory authorities in response to victimization was also not that uncommon, but legal mobilization is also a characteristic of illegal and quasi-legal markets (Jacques & Wright, 2013; Moeller & Jacques, 2021). Despite the predominance of these nonviolent responses, growers still resorted to retaliatory social control measures, ranging from direct violence to deception, in more than one in every ten instances of predation.

Our multivariate analyses of victimization among cannabis growers revealed that cultivation practices increased certain victimization risks. In particular, findings suggest that growing outdoors, growing with others, growing more plants, and sowing more crops were riskier endeavors, ostensibly because concealment of growing activities from potential predators becomes more difficult with larger grower networks and bigger and more frequent grows (Belackova & Zabransky, 2014). Also, one might expect more seasoned growers to learn how to better protect themselves from predation over time, but the observation that growing experience increased victimization risk is likely more a function of increased exposure than any inherent risk of being a veteran grower.

Our findings related to motivation for growing were mixed. Growers who emphasized profit/compensation were more susceptible to theft, which could be explained by a number of mechanisms, including the fact that larger distribution networks organized to maximize profits also tend to have higher security risks (Desroches, 2007). We also found that growers who emphasized risk reduction motives were more likely to be vandalized and targeted violently, but this association could be confounded by the fact that previously victimized growers are more likely to prioritize risk reduction. Lastly, we found that growers who had an ideological reason for cultivating cannabis had a greater likelihood of experiencing all types of victimization. We can only speculate as to the underlying reason for this, including whether certain ideological stances attract undue attention from others. For example,

some types of ideological growers (e.g., activist growers) may be less secretive about their activities than others, making them more obvious targets (Klein & Potter, 2018; Potter & Klein, 2020). Future research is needed to better understand how motivations for growing impact conflict in cannabis markets.

Surprisingly, our results indicated that growers in legal recreational jurisdictions experienced greater levels of theft and violent victimization than growers in illegal jurisdictions. This runs counter to arguments that the illegal status of cannabis creates more opportunities for drug market conflict (e.g., Jacques et al., 2016). However, legal markets do not completely eliminate illicit markets or criminal opportunities. Moreover, legal growers may be less secretive about their growing and, therefore, be more susceptible to predation, until and unless they engage in target-hardening or other countermeasures. It is also possible that many growers will remain "illegal" in legal markets and thus upend or stall market transition (Henning et al., 2022; Reid, 2022), but we find no effects of legal (non)compliance on victimization risk. On the other hand, the effects of our two measures of policing—enforcement risk and prior police contact related to cultivation—are consistent with research suggesting that pervasive and aggressive drug market policing promotes conflict and disorder (Jacques & Allen, 2015; Lessing, 2017; Moeller & Hesse, 2013).

Our investigation also revealed insights into the social control responses of victimized cannabis growers. For instance, compared to those with less education, victimized growers with a college/advanced degree were less likely to engage in retaliation and avoidance but more likely to respond with toleration. This finding is consistent with other studies describing how middle-class drug dealers, due to their socially mainstream upbringing, often eschew overt violence or ostracism of others in favor of toleration (Adler, 1993; Mohamed & Fritsvold, 2010). Although legal environment factors did not predict social control responses as consistently as they did victimization risk, we observed some interesting findings. For instance, growers in legal compliance with local cultivation laws were much less likely to negotiate a response to victimization but much more likely to get the police involved, which makes sense given the legal recourse available to them and potential drawbacks to settling outside the law. Findings regarding the type of perpetrator were largely consistent across outcomes, with distal contacts and police/authorities eliciting no strong responses. However, when the perpetrator was a close personal associate or drug market actor, retaliation, negotiation, and avoidance were all more likely outcomes. At the same time, victimized growers were not as willing to tolerate predatory actions from these individuals. Together, these findings suggest that closer contacts (e.g., friends, family, business partners) elicit stronger informal social control responses, whether retaliatory or nonviolent, than more distal contacts (e.g., strangers, police). Future research should seek to better understand how relational distance impacts social control decisions among cannabis growers (e.g., Phillips, 2003). Lastly, the specific reason behind the conflict predicted social control response. For instance, cannabis exchange issues were more likely to result in negotiation and avoidance responses but less likely to lead to toleration. The complexity of these kinds of exchanges issues has been documented in the literature and warrants further investigation (Bræmer & Søgaard, 2023)

Theoretical and Policy Implications

When it comes to their own victimization, the cannabis growers in our sample responded with various formal and informal social control measures. Consistent with drug market research across different contexts (Bouchard et al., 2021; Jacques & Wright, 2008; Morselli et al., 2017), these responses were

mostly informal and nonviolent, whether that meant tolerating the harm, avoiding further contact with the perpetrator, exiting the market altogether, or negotiating a settlement to the conflict. Less prevalent responses involved informal retaliation (including overt violence) and formal legal mobilization (enjoining police and courts in dispute resolution). While existing theory on conflict management in drug markets provides a useful framework for understanding social control responses among cannabis cultivators (e.g., Jacques & Wright, 2008), certain responses that were freely reported by our respondents were not always neatly encapsulated within these frameworks. In particular, certain reactions such as replanting a stolen crop or increasing the physical security around a grow, which we categorized as a toleration response, may warrant a different theoretical classification compared to the grudging toleration of inaction, that is, "doing nothing." A potential theoretical enhancement, then, is to incorporate a social control response to drug market conflict for *self-agency*,[4] defined as self-directed action that seeks to remedy a prior harm (e.g., relocate crop) and/or prevent future victimization (e.g., build a fence).

Practically, our findings indicate that small-scale cannabis growers experienced greater risk of all types of victimization as their lifetime cultivation experience accumulated over time, which could be understood simply as the cost of "doing business." Still, certain cultivation practices that growers employed and the specific legal environments in which they operated elevated these risks even further. Growing larger plots, outdoors, and/or in collaboration with others significantly increased certain victimization risks. Moreover, all else equal, the likelihood of grower victimization increased in jurisdictions with legal recreational markets versus those that prohibited cannabis cultivation or only allowed cultivation for medical purposes. These findings may give pause to policymakers considering transitioning to a legal recreational market, but they could also signal that cannabis liberalization was initiated as a public safety response to endemic levels of drug market conflict and disorder (Kavousi et al., 2022). Our data do not allow us to make a strong claim either way. Nevertheless, our findings offer some potential policy prescriptions for lowering predatory risks in legal cannabis markets, namely by implementing regulations concerning the visibility and accessibility of grows, the number of cannabis plants allowed, and whether communal or collaborative growing is allowed (e.g., Johnson & Kierkus, 2022). Based on our results, allowances for concealed small-scale growing by individuals would appear to be less risky than more permissive alternatives. Our study also found that pervasive police presence and aggressive law enforcement were linked to greater risk of victimization (including violence), a finding that is consistent with previous research on police crackdowns in retail cannabis markets (Moeller & Hesse, 2013). To be clear, these kinds of policing outcomes are not strictly limited to illegal jurisdictions, as law enforcement agencies must adjust to periods of regulatory uncertainty following legalization (Henning et al., 2022) and may even engage in dubious forms of "postlegalization prohibition" (Polson & Petersen-Rockney, 2019). This speaks to the need for establishing clear enforcement guidelines and regulations in jurisdictions that have liberalized or decriminalized cannabis cultivation in order to reign in misappropriated or overaggressive policing.

Concerning social control responses to victimization, growers in legal recreational jurisdictions were more likely to negotiate a solution to conflict whereas growers in medical-only jurisdictions were more likely to actively avoid the perpetrator or to stop growing cannabis altogether. These findings suggest, on the one hand, that mediation or arbitration programs could be an amenable intervention for growers in legal

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[4] This should not be confused with Black's (1983) notion of *self-help*, which is defined as an aggressive mode of social control.

markets, especially if they can prevent unnecessary and burdensome entanglements with the police and courts (Harms, 2021). On the other hand, that growers in legal medical jurisdictions were more likely to extricate themselves from business dealings or leave the market altogether after being victimized suggests a need for better social equity protections, especially for marginalized growers (e.g., Lu et al., 2022). Furthermore, although many growers choose to remain illegal in legal markets, our findings show that growers who complied with local cultivation laws were much more likely to mobilize police/court intervention, just like other legal businesses following disputes. This suggests that the purported benefits of legal cannabis markets may not be fully realized until high barriers to regulatory compliance are eased, especially among smaller-scale growers (Bodwitch et al., 2021). We also found that prior police contact was strongly associated with legal mobilization. Although our survey question about police contact concerned previous criminal activity, we surmise that such contact may normalize grower willingness to seek formal justice (Jacques & Wright, 2013; Moeller & Jacques, 2021). Of particular note, both theft and violent victimization were positively associated with a retaliatory response. These findings suggest two possible violence reduction interventions among cannabis growers, one indirect and one direct. First, installing fencing, lighting, and other security features around cannabis grows can deter crop theft, and therefore preventively thwart retaliation (Johnson & Kierkus, 2022). Second, violence interruption programs, similar to those used to prevent gun violence (Webster et al., 2022), could potentially prevent retaliatory violence among cannabis growers, especially in cases of repeat predation and victimization.

Limitations

This study has several limitations. First, the survey is a self-selecting online convenience sample that may not necessarily be representative of the wider cannabis cultivator population. As this population remains largely hidden, we are unable to directly ascertain the representativeness of our sample, although the characteristics of our sample are consistent with other population-based studies of cannabis growers (Aguiar & Musto, 2022; Azofeifa et al., 2021; Wadsworth et al., 2022). Drug research often involves convenience samples as the best way to reach small hidden stigmatized populations that do not respond well to traditional survey techniques. Our survey is unique in gathering a very large sample of small-scale cannabis cultivators across many countries—it is neither feasible nor practical to collect this kind of information using probability sampling methods (Barratt et al., 2017). Second, data are collected by self-report with all the attendant biases related to recollection, social desirability, and so forth. However, anonymous web surveys with no payment incentives provide a more favorable setting for people to disclose information on sensitive topics (Kays et al., 2013). Additionally, in a recent systematic review, self-report was found to reliably predict drug use when also measured using biological markers, with the researchers concluding that self-report alone should be considered reliable (Bharat et al., 2023). Third, our data are cross-sectional and do not allow us to address issues of causality due to an inability to establish temporal precedence. Moreover, many of our questions have divergent time anchors, such as when we ask about victimization ('ever') and social control response ('most recent incident'). For these analyses, we make the key assumption that the factors we measure are relatively time stable. Future surveys addressing this topic should design questions that align the measures temporally.

Conclusion

This study informs our understanding of the level of conflict and social control among cannabis growers.

It employs a novel survey and robust statistical methods to answer questions that have been largely confined to qualitative research. Although the majority of the growers in our sample seemingly cultivated cannabis without major conflict or problems, we found that conflict and victimization is not uncommon among cannabis growers. Still, the markets are often peaceable and typically do not result in violent retaliation. Our findings have implications for policymakers and other stakeholders in the cannabis policy~~ye~~ space.

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Table 1. Lifetime Victimization Related to Cannabis Growing

Description	Total %
Any victimization	24.3
Theft victimization	18.8
Theft of crops	17.2
Theft of equipment	3.4
Theft of money	4.0
Vandalism victimization	7.4
Destruction/sabotage of crops	7.2
Destruction/sabotage of equipment	2.0
Violent victimization	9.7
Threats of violence/intimidation	5.1
Extortion or blackmail	2.9
Forced to stop growing	5.1
Actual physical violence	2.2
Total *N*	5,667

Note: Categories are not mutually exclusive.

Table 2. Perpetrator of Most Recent Predatory Action by Victimization Type

Description	Any (%)	Theft (%)	Vandalism (%)	Violent (%)
Proximal relation	33.3	29.7	29.5	44.2
Friend/family	22.4	18.8	19.9	32.0
Neighbor	13.5	13.5	13.9	16.9
Distal contact	39.5	44.4	50.4	28.0
Acquaintance/workers/locals	3.6	2.9	3.6	4.0
Stranger	36.0	41.5	47.0	24.2
Market actor	19.3	20.8	23.3	30.0
Criminal group/gang	8.2	8.7	12.9	16.5
Drug seller	7.0	7.6	8.6	12.4
Grower or grower partner	5.7	6.3	8.2	8.5
Cannabis buyer	4.5	5.2	4.8	5.8
Police/authorities	17.0	14.9	27.6	30.9
Missing	14.2	16.1	10.6	6.9
Did not know	10.2	12.2	7.0	1.5
Refused	4.1	3.9	3.6	5.5
Total *N*	1,378	1,063	417	550

Note: Categories and groups are not mutually exclusive.

Table 3. Reason for Most Recent Conflict by Victimization Type

Description	Any (%)	Theft (%)	Vandalism (%)	Violent (%)
Stolen property/crops	28.2	34.7	24.2	22.4
Cannabis exchange issues	8.7	8.4	10.6	14.5
Disagreement about money/payment	3.9	3.8	4.6	7.3
Disagreement about quantity	1.7	2.0	2.6	2.7
Disagreement about quality	1.8	2.1	3.6	3.5
Disagreement about sharing/social supply	3.4	3.2	4.3	5.8
Cannabis cultivation issues	25.8	19.3	40.8	49.5
Pressure to discontinue growing	20.0	15.0	35.3	36.9
Pressure to continue growing for others	5.3	5.3	8.4	12.0
Illegal status of cannabis cultivation	2.8	1.5	3.1	6.2
Interpersonal issues	4.3	2.7	3.4	6.4
Other reason	6.1	5.6	5.3	4.7
Missing	34.0	37.1	27.3	17.3
Did not know	21.8	25.7	15.8	5.5
Refused	12.3	11.4	11.5	11.8
Total *N*	1,378	1,063	417	550

Note: Categories and groups are not mutually exclusive.

Table 4. Social Control Response by Victimization Type

Description	Any (%)	Theft (%)	Vandalism (%)	Violent (%)
Retaliation	11.2	12.0	12.9	16.7
Retaliated with violence/vandalism	4.1	4.2	4.3	6.0
Reclaimed stolen property by force	3.0	3.6	4.1	4.9
Recovered losses by force	1.6	1.9	1.9	2.5
Recovered losses by deception	3.6	3.5	3.8	5.8
Engaged others in retaliatory response	2.8	3.2	4.3	5.3
Negotiation	7.4	7.1	8.6	11.6
Negotiated compensation/settlement	5.4	4.9	6.5	9.1
Reclaimed stolen property peacefully	2.4	2.7	3.4	3.3
Avoidance	27.1	21.3	26.9	48.2
Ceased further personal/business contact	16.4	15.4	17.3	25.5
Ceased growing cannabis	13.4	7.5	12.0	28.2
Toleration	43.8	48.4	43.9	23.8
Did nothing	39.6	44.5	37.6	20.4
Replanted/relocated grow	2.6	2.3	4.6	2.2
Increased physical security	1.6	1.7	1.7	1.3
Legal mobilization	6.7	7.1	6.7	8.5
Other response	0.9	0.8	1.9	0.9
Missing	11.5	12.5	12.2	7.3
Did not know	3.2	3.2	3.4	1.1
Refused	8.3	9.3	8.9	6.2
Total *N*	1,378	1,063	417	550

Note: Categories and groups are not mutually exclusive.

Table 5. Descriptive Sample Statistics

Variables	Range	% Miss	Complete Case Mean	(SD)	Multiply Imputed Mean	(SD)	% Miss	Complete Case Mean	(SD)	Multiply Imputed Mean	(SD)
			Main Sample					**Victimization Subsample**			
Lifetime Victimization											
Any victimization	0-1	0.0	0.24	(0.43)	0.24	(0.43)	0.0	1.00	(0.00)	1.00	(0.00)
Theft victimization	0-1	0.0	0.19	(0.39)	0.19	(0.39)	0.0	0.77	(0.42)	0.77	(0.42)
Vandalism victimization	0-1	0.0	0.07	(0.26)	0.07	(0.26)	0.0	0.30	(0.46)	0.30	(0.46)
Violent victimization	0-1	0.0	0.10	(0.30)	0.10	(0.30)	0.0	0.40	(0.49)	0.40	(0.49)
Perpetrator											
Proximal relation	0-1	--	--	--	--	--	14.2	0.39	(0.49)	0.38	(0.49)
Distal contact	0-1	--	--	--	--	--	14.2	0.46	(0.50)	0.48	(0.50)
Market actor	0-1	--	--	--	--	--	14.2	0.23	(0.42)	0.22	(0.41)
Police/authorities	0-1	--	--	--	--	--	14.2	0.20	(0.40)	0.18	(0.39)
Reason for Conflict											
Stolen property/crops	0-1	--	--	--	--	--	34.0	0.43	(0.50)	0.45	(0.50)
Cannabis exchange issues	0-1	--	--	--	--	--	34.0	0.13	(0.34)	0.12	(0.33)
Cannabis cultivation issues	0-1	--	--	--	--	--	34.0	0.39	(0.49)	0.33	(0.47)
Interpersonal issues	0-1	--	--	--	--	--	34.0	0.06	(0.25)	0.08	(0.26)
Social Control Response											
Retaliation	0-1	--	--	--	--	--	11.5	0.13	(0.33)	0.12	(0.33)
Negotiation	0-1	--	--	--	--	--	11.5	0.08	(0.28)	0.08	(0.28)
Avoidance	0-1	--	--	--	--	--	11.5	0.31	(0.46)	0.29	(0.46)
Toleration	0-1	--	--	--	--	--	11.5	0.50	(0.50)	0.51	(0.50)
Legal mobilization	0-1	--	--	--	--	--	11.5	0.08	(0.26)	0.07	(0.26)
Grower Demographics											
Age	18-80	0.0	43.08	(14.77)	43.08	(14.77)	0.0	42.64	(14.63)	42.64	(14.63)
Male	0-1	1.1	0.84	(0.36)	0.84	(0.36)	1.6	0.86	(0.35)	0.86	(0.35)
Educational attainment	1-3	2.0					2.8				
Less than High School			0.14		0.14			0.17		0.17	
High School or Equivalent			0.49		0.49			0.51		0.51	
College/Advanced			0.37		0.37			0.32		0.32	
Urbanicity	1-3	1.2					1.0				
Urban			0.43		0.42			0.38		0.38	
Suburban			0.31		0.31			0.31		0.31	
Rural			0.26		0.27			0.31		0.31	
Cultivation Practices											
Grows outdoors	0-1	0.5	0.53	(0.50)	0.53	(0.50)	0.5	0.68	(0.47)	0.68	(0.47)
Grows with others	0-1	0.7	0.18	(0.39)	0.19	(0.39)	1.4	0.27	(0.44)	0.27	(0.44)
Typical grow size	1-303	1.3	20.04	(38.64)	20.12	(38.78)	1.4	35.70	(57.70)	35.91	(57.94)
Lifetime grows	0-101	5.6	18.48	(27.63)	18.71	(27.81)	7.3	27.11	(32.55)	27.46	(32.78)
Motivation for Growing											

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	Range										
Profit/compensation	0-1	0.1	0.08	(0.28)	0.08	(0.28)	0.1	0.13	(0.34)	0.13	(0.34)
Ideological	0-1	0.1	0.36	(0.48)	0.36	(0.48)	0.1	0.43	(0.50)	0.43	(0.50)
Risk reduction	0-1	0.1	0.57	(0.49)	0.57	(0.49)	0.1	0.57	(0.49)	0.57	(0.49)
Legal Environment											
Cultivation law	1-3	4.0					2.6				
Prohibited			0.63		0.64			0.62		0.62	
Medical only			0.13		0.13			0.11		0.11	
Any recreational			0.24		0.24			0.27		0.27	
Legally compliant grow	0-1	5.3	0.26	(0.44)	0.26	(0.44)	3.8	0.26	(0.44)	0.27	(0.44)
Enforcement risk	1-6	3.7	2.90	(1.44)	2.90	(1.43)	3.6	3.16	(1.58)	3.17	(1.58)
Prior police contact	0-1	0.7	0.13	(0.34)	0.13	(0.34)	1.5	0.30	(0.46)	0.30	(0.46)
Total *N*			5,667					1,378			

Table 6. Lifetime Victimization among Cannabis Growers

Variables	Any Victimization			Theft Victimization			Vandalism Victimization			Violent Victimization		
	OR	*SE*	*p*	*OR*	*SE*	*p*	*OR*	*SE*	*p*	*OR*	*SE*	*p*
Grower Demographics												
Age	0.99	.003	.078	1.00	.004	.976	0.98	.006	<.001	0.98	.004	<.001
Male	1.18	.182	.289	1.14	.227	.516	1.33	.262	.149	0.89	.148	.475
Educational attainment												
HS or Equivalent	1.07	.121	.521	1.07	.148	.610	0.98	.116	.853	0.92	.114	.478
College	0.86	.095	.166	0.86	.125	.302	0.87	.082	.146	0.76	.073	.005
Urbanicity												
Suburban	1.08	.095	.402	1.11	.099	.235	0.92	.123	.553	1.14	.085	.077
Rural	1.00	.072	.980	1.04	.114	.691	0.84	.120	.218	0.98	.066	.744
Cultivation Practices												
Grows outdoors	2.22	.249	<.001	2.74	.324	<.001	2.76	.416	<.001	1.04	.125	.782
Grows with others	1.26	.141	.041	1.31	.144	.013	1.10	.180	.566	1.09	.152	.549
Typical grow size (÷ 10)	1.07	.010	<.001	1.06	.011	<.001	1.05	.012	<.001	1.05	.009	<.001
Lifetime grows (÷ 10)	1.08	.024	.001	1.08	.021	<.001	1.09	.012	<.001	1.07	.021	.001
Motivation for Growing												
Profit/compensation	1.27	.114	.009	1.28	.137	.020	1.11	.161	.481	1.11	.148	.424
Ideological	1.32	.111	.001	1.23	.089	.004	1.32	.117	.002	1.52	.150	<.001
Risk reduction	1.00	.108	.982	0.95	.092	.569	1.41	.189	.010	1.29	.146	.023
Legal Environment												
Cultivation law												
Medical only	1.05	.135	.698	1.01	.144	.952	1.34	.297	.183	1.24	.189	.151
Any recreational	1.67	.182	<.001	1.72	.203	<.001	1.16	.247	.473	1.72	.228	<.001
Legally compliant grow	1.18	.239	.406	1.16	.266	.518	0.98	.233	.936	1.17	.229	.433
Enforcement risk	1.27	.052	<.001	1.21	.057	<.001	1.14	.043	<.001	1.35	.062	<.001
Prior police contact	3.88	.458	<.001	3.28	.411	<.001	3.75	.604	<.001	3.90	.268	<.001
Constant	0.05	.011	<.001	0.03	.008	<.001	0.02	.007	<.001	0.04	.009	<.001
Model (*N* = 5,667; *m* = 145)	$F(18, 32{,}068) = 242$, *p* < .001; *C* = .75; Largest FMI = .06			$F(18, 36{,}000) = 344$, *p* < .001; *C* = .76; Largest FMI = .06			$F(18, 29{,}591) = 100$, *p* < .001; *C* = .77; Largest FMI = .24			$F(18, 29{,}591) = 100$, *p* < .001; *C* = .76; Largest FMI = .08		

Note: Reported SE is the standard error of the odds ratio (OR), with SEs adjusted for clustering by country; *m* = number of imputed datasets; FMI = fraction of missing information; *C* = concordance statistic.

Table 7. Social Control Response among Victimized Cannabis Growers

Variables	Retaliation			Negotiation			Avoidance			Toleration			Legal Mobilization		
	OR	SE	p	OR	SE	p	OR	SE	p	OR	SE	p	OR	SE	p
Grower Demographics															
Age	0.98	.007	.027	1.00	.006	.441	1.02	.005	.001	1.00	.004	.712	0.99	.008	.497
Male	0.92	.239	.735	1.89	.569	.034	1.30	.207	.104	0.94	.153	.701	0.48	.097	<.001
Educational attainment															
HS or Equivalent	0.71	.133	.066	1.39	.453	.309	1.27	.164	.069	0.83	.136	.266	0.88	.359	.757
College	0.48	.114	.002	1.27	.422	.466	0.92	.145	.593	1.25	.249	.273	1.13	.539	.791
Urbanicity															
Suburban	1.00	.161	.993	1.06	.247	.790	1.15	.144	.275	0.89	.086	.211	0.98	.355	.949
Rural	0.87	.218	.585	1.21	.240	.330	1.13	.176	.421	1.01	.181	.964	0.51	.243	.159
Cultivation Practices															
Grows outdoors	1.24	.265	.305	0.91	.205	.677	0.87	.169	.484	1.26	.163	.076	0.89	.177	.553
Grows with others	0.82	.263	.532	1.37	.335	.196	1.13	.204	.487	0.84	.138	.296	0.67	.188	.149
Typical grow size (÷ 10)	0.99	.013	.316	1.01	.015	.719	1.00	.017	.856	0.98	.021	.299	1.05	.031	.108
Lifetime grows (÷ 10)	1.08	.043	.065	0.93	.035	.041	0.96	.018	.046	1.03	.021	.158	0.95	.033	.180
Motivation for Growing															
Profit/compensation	0.97	.173	.864	1.51	.332	.062	1.51	.269	.020	1.02	.171	.893	0.54	.140	.017
Ideological	1.12	.141	.384	1.13	.325	.671	1.01	.157	.960	0.90	.105	.385	1.16	.223	.443
Risk reduction	1.02	.139	.863	1.10	.262	.678	1.26	.188	.129	0.91	.103	.428	0.78	.198	.334
Legal Environment															
Cultivation law															
Medical only	1.38	.326	.174	1.51	.560	.271	1.63	.303	.009	0.66	.148	.063	0.78	.480	.689
Any recreational	1.37	.485	.375	2.70	.851	.002	1.00	.352	.991	0.86	.279	.635	0.76	.336	.539
Legally compliant grow	0.51	.216	.111	0.36	.112	.001	1.00	.331	.989	0.76	.291	.470	5.55	2.801	.001
Enforcement risk	0.93	.078	.384	0.84	.085	.084	1.12	.080	.112	0.96	.054	.455	0.99	.114	.946
Prior police contact	1.15	.234	.506	1.27	.296	.299	1.06	.149	.663	0.60	.114	.007	4.35	1.337	<.001
Lifetime Victimization															
Theft victimization	2.08	.624	.014	1.32	.371	.328	0.76	.154	.168	1.38	.242	.064	0.92	.491	.871
Vandalism victimization	0.93	.197	.737	1.18	.294	.512	0.83	.123	.200	1.21	.174	.195	1.10	.231	.639
Violent victimization	2.11	.381	<.001	1.97	.633	.034	3.33	.503	<.001	0.30	.067	<.001	2.05	.496	.003
Perpetrator															
Proximal relation	1.45	.277	.050	1.55	.476	.156	1.66	.296	.005	0.47	.064	<.001	1.42	.417	.237
Distal contact	0.90	.194	.623	0.87	.326	.713	0.80	.093	.053	1.16	.171	.307	1.28	.394	.415
Market actor	2.92	.467	<.001	1.86	.508	.023	1.57	.245	.004	0.46	.063	<.001	1.13	.338	.687
Police/authorities	0.98	.250	.934	0.66	.209	.191	1.11	.185	.523	0.93	.210	.737	0.96	.387	.910
Reason for Conflict															
Stolen property/crops	2.09	.558	.006	1.02	.291	.936	0.88	.187	.544	0.91	.186	.639	1.53	.451	.152
Cannabis exchange issues	0.79	.217	.399	3.57	.940	<.001	1.66	.410	.041	0.55	.162	.043	1.31	.483	.470
Cannabis cultivation issues	1.71	.520	.078	1.33	.465	.412	1.63	.381	.036	0.75	.181	.233	0.45	.213	.092
Interpersonal issues	1.60	.975	.444	0.93	.571	.901	2.11	.725	.031	0.46	.169	.035	0.74	.389	.563

Constant	0.06	.044	<.001	0.02	.015	<.001	0.04	.018	<.001	4.36	1.307	<.001	0.05	.042	<.001
Model (N = 1,378; m = 145)	$F(29, 21,333) = 11$, $p <$ .001; C = .76; Largest FMI = .30			$F(29, 17,697) = 7$, $p <$ .001; C = .77; Largest FMI = .34			$F(29, 20,274) = 16$, $p <$ .001; C = .79; Largest FMI = .42			$F(29, 17,727) = 18$, $p <$ .001; C = .79; Largest FMI = .60			$F(29, 17,924) = 9$, $p <$ .001; C = .80; Largest FMI = .48		

Note: Reported SE is the standard error of the odds ratio (OR), with SEs adjusted for clustering by country; m = number of imputed datasets; FMI = fraction of missing information; C = concordance statistic.

Conflict and Social Control among Cannabis Growers

Supplementary File 1: Measurement Operationalization

This supplementary file describes the operationalization of dependent, independent, and auxiliary variables for in study. Auxiliary variables are specific to multiple imputation.

Lifetime Victimization Related to Cannabis Cultivation

Data on lifetime victimization related to cannabis cultivation were obtained from the multiple response question "Have you ever experienced any of the following due to your cannabis cultivation activity?," from which we operationalized the following four non-mutually exclusive indicator variables.

Theft victimization codes responses for 'theft of crops,' 'theft of equipment,' and 'theft of money.'

Vandalism victimization codes responses for 'destruction or sabotage of crops' and 'destruction or sabotage of equipment.'

Violent or coercive victimization codes responses for 'threats of violence or intimidation (to yourself or others),' 'actual physical violence (to yourself or others),' 'forced to stop growing,' and 'extortion or blackmail.'

Any victimization codes all of the preceding types of victimization.

Perpetrator of Last Predatory Action

Data on the perpetrator of the last predatory action related to cannabis growing were obtained from the multiple response question "The LAST time this occurred, who committed these actions against you?," from which we operationalized the following four non-mutually exclusive indicator variables.

Proximal relation identifies the perpetrator as 'a friend or family member' or 'a neighbor.'

Distal contact identifies the perpetrator as 'a stranger or person you do not know,' 'acquaintance,' 'employee/hired worker,' 'property owner,' or 'someone else.' The latter category includes free text responses mainly describing locals such as "a poor guy," "a high school kid," "local meth heads," and "street punks."

Market actor identifies the perpetrator as 'a criminal group/gang,' 'a drug seller,' 'another grower (I don't work with),' 'a person who grows cannabis with or for me,' 'a person for whom I grow cannabis,' or 'a buyer of your cannabis.'

Police/authorities identifies the perpetrator as 'law enforcement/government authorities.'

Reason for Last Conflict

Data on the reason for the last conflict related to cannabis growing were obtained from the multiple response question "What was the reason for the conflict the LAST time it occurred?," from which we operationalized five non-mutually exclusive indicator variables.

Stolen property/crops codes the reason as 'robbery/theft of property/crops.'

Cannabis exchange issues codes the reason as 'disagreement about money/payment,' 'disagreement about the quantity of cannabis,' 'disagreement about the quality of cannabis,' or 'disagreement about sharing/social supply.'

Cannabis cultivation issues codes the reason as 'pressure to stop growing,' 'pressure/intimidation to continue growing for others,' or 'illegal status of cannabis cultivation.'

Interpersonal issues codes the conflict reason as 'interpersonal issues,' which was upcoded from free-text responses indicating, e.g., "personal tiff," "jealousy," "abusive relationship," and "divorce."

A catch-all *other reason* category codes a range of explanations such as being reported on (e.g., "snitching," "somebody ratted me out," and "loose lips") and unlucky or opportunistic incidents (e.g., "outdoor flight," "bad luck," and "coincidence"). We report this category descriptively, but do not include it in the multivariate analyses.

Social Control Response to Last Victimization

Data on the social control response to the most recent victimization were obtained from the multiple response question "How did you personally respond to the LAST victimization?", from which we operationalized six non-mutually exclusive indicator variables.

Retaliation codes responses for 'retaliated with violence/vandalism,' 'reclaimed stolen property by force,' 'recovered losses by force,' 'recovered losses by deception,' and 'engaged others in retaliatory response.'

Negotiation codes responses for 'negotiated compensation/settlement' and 'reclaimed stolen property peacefully.'

Avoidance codes responses for 'ceasing further personal or business contact with the perpetrator' and 'ceased growing cannabis' by exiting the market altogether.

Toleration codes responses for 'did nothing,' 'replanted/relocated grow,' and 'increased physical security.'

Legal mobilization codes responses for 'reported victimization to police or other authorities.'

Other response is a remnant category of free-text responses not captured by the preceding measures, such as a stymied response (e.g., "couldn't find them," "didn't find out who") or institutional response

(e.g., "voted to change government"). We report this category descriptively, but do not include it in multivariate analyses.

Demographics

Age measures how old the grower was at the time of the interview ("How old are you?").

Gender is measured as *male* versus nonmale ("What is your gender?"). We aggregated 'female' and 'nonbinary' responses because less than 1% of respondents in the main sample (*n* = 45) identified as the latter, and victimization risk among these two gender groups is likely to be "less different" compared to males.

Data on *educational attainment* ("What is the highest educational qualification you have completed?") was collected across seven response options, which we aggregated into three ordinal categories as follows: less than high school ('no formal schooling,' 'primary/elementary,' 'lower secondary/middle school'), high school or equivalent ('higher secondary school or equivalent' and 'technical/trade/vocational certificate or diploma'), and college/advanced ('university undergraduate degree' and 'university postgraduate degree').

Urbanicity measures whether the respondent lived in an urban ('urban/city'), suburban ('semi-rural/small town'), or rural ('rural/countryside') setting ("How would you describe the area in which you live?").

Cultivation Practices

Based on the question "Do you typically grow indoors or outdoors?," *grows outdoors* measures whether the grower typically grows all or part of their cannabis crop outdoors ('outdoors (including greenhouses),' 'indoors and outdoors,' 'seedlings grown indoors, then planted outdoors') versus exclusively indoors ('indoors').

Based on the question "Do/did you grow your most recent crop alone or with others?," *grows with others* indicates whether the grower cultivated with any others ('grew with others,' 'grew alone and with others') or grew exclusively alone ('grew alone').

Typical grow size reflects the total number of plants typically grown per crop, calculated as the sum of the reported number of seedlings ("How many juveniles/seedlings/cuttings do you typically grow per crop?"), mature plants ("How many mature plants do you typically grow per crop?"), and mother plants, from which clones are usually cut ("How many mother plants do you typically grow per crop?"). Missing data on any one item was treated a 0 when summing the total. However, when all three items contained missing data, the total count was reflected as missing. Note that each item was censored at 101 (i.e., 'more than 100 plants'), so the min-max range for this computed variable is 1 to 303.

Based on the question "About how many crops of cannabis have you grown so far?," *lifetime grows* measures the total number of crops the respondent has ever grown. Note that this item was censored at

101 (i.e., 'more than 100 plants') and could also be recorded as 0 if the grower had not yet harvested their first crop, so the min-max range for this variable is 0 to 101.

Motivation for Growing

Data on motivations for growing were obtained from the multiple response question "Why do/did you grow cannabis?," from which we operationalized three non-mutually exclusive indicator variables.

Profit/compensation motive codes responses related to selling own cannabis for profit or compensation, specifically 'so I can sell it (to pay for my own cannabis use),' 'so I can sell it (to pay for other drug use),' and 'so I can sell it (to profit, beyond paying for my own drug use).'

Ideological motive codes various ethical and political reasons for growing cannabis, including 'for political reasons (e.g., anti-consumerism, "grow your own" policy),' 'for ecological/environmental reasons (e.g., lower pollution, no packaging),' 'for fair trade reasons (e.g., to avoid potential workers' exploitation),' 'for countercultural/lifestyle reasons,' 'for spiritual/religious reasons,' and 'growing cannabis is a civil/human right.'

Risk reduction motive codes motivations related to reducing risk, including 'to avoid contact with criminals or supporting criminal networks' and the belief that 'growing is not as risky as buying.'

Legal Environment

Cultivation law measures whether the respondent perceived cannabis cultivation to be prohibited, legal for medical use only, or legal for any adult/recreational use ("To the best of your knowledge, how is the law applied to growing a small number of cannabis plants where you live?"). For both medical and recreational laws, we aggregated the following three responses as indicating cannabis cultivation was prohibited: 'illegal and actively pursued by police,' 'illegal but tolerated (i.e., illegal, but mostly not actively pursued by police),' and 'civil penalty (i.e., illegal, but mostly only a ticketing offence, like speeding).' Similarly, for both medical and recreational laws, we aggregated the following two responses as indicating cannabis cultivation was legal: 'legal with conditions (e.g., license needed, plant limits)' and 'legal with no restrictions.' When combining legal status of cultivation across both medical and recreational laws, any mention of either law was coded according to the following hierarchy: legal recreational, legal medical, prohibited. Thus, this measure was set to missing only if the respondent did not know or refused to answer both the medical and recreational legal status questions.

Legally compliant grow indicates whether the respondent's most recent medical and/or recreational grow was both legal and in full compliance with local laws versus being either illegal or not in full compliance with local laws ("To the best of your knowledge, does/did your most recent crop adhere to the law where you live for growing medical cannabis?" and "To the best of your knowledge, does/did your most recent crop adhere to the law where you live for growing recreational cannabis?"). This measure was set to missing only if the respondent did not know or refused to answer both the medical and recreational legal compliance questions.

Based on the question "What do you estimate is the risk of you getting caught by police for growing cannabis?," *enforcement risk* measures the respondent's perception of getting caught for growing cannabis according to a six-point ordinal scale: 1 'none' (i.e., grows in legal market), 2 'very low,' 3 'low,' 4 'moderate,' 5 'high,' and 6 'very high.'

Prior police contact measures whether or not the grower has had any previous contact with law enforcement due to cultivating cannabis ("Have you ever come into contact with the police because of your cannabis growing?").

Auxiliary Measures (Multiple Imputation)

To reduce imputation bias and imprecision, we used several auxiliary measures that were either correlated with missingness or with the distribution of observed outcomes.

The Module 1 *screener* question asked "Are you willing to answer some extra questions on conflicts related to growing cannabis?". Respondents who answered 'yes' to this question (versus being automatically screened into the module) were more likely to be motivated to complete the survey. For example, the *screener* variable was significantly correlated with a complete case analysis missingness indicator (17.7% missing) drawn from the first set of regression analyses, χ^2 (1, N = 5,677) = 5.1, p = .24.

Both *country* (χ^2 [12, N = 5,677] = 100.8, p < 0.001) and world *region* (i.e., Americas, Europe, Other) (χ^2 [2, N = 5,677] = 20.3, p < .001) were significantly correlated with complete case missingness. We employed cluster robust standard errors by country in our analyses, but accounting for country effects in MI requires including them as covariates. However, because including dummies for countries with small N in the imputation model caused convergence issues, we used world *region* as the auxiliary variable.

We used race, measured as *White* versus non-White, as an auxiliary variable only, rather than including it in our analytic models. The variable had a high rate of missingness (50.4% in our main sample) because 5 of the 13 countries in our sample did not field race/ethnicity questions. Not suprisingly, a missingness indicator for *white* was significantly correlated with complete case missingness, χ^2 (1, N = 5,677) = 31.6, p < .001. Missingness on white was also correlated with missingness indicators and observed distributions for other variables in our models.

Lastly, when imputing indicator variables collected only for the victimization subsample (i.e., perpetrator, reason for conflict, social control response), we conditionally included three missingess indicators for *why* these data were missing. Specifically, we included indicators for 'don't know' responses among each group of indicators (i.e., *q2_dk*, *q3_dk*, *q4_dk*) because these patterns of missingness were significantly correlated with observed outcome distributions. For example, consider the association between *q3_dk* and *retaliation*, χ^2 (1, N = 1,219) = 15.2, p < .001.

Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Ethics approval

☒ The authors declare that they have obtained ethics approval from an appropriately constituted ethics committee/institutional review board where the research entailed animal or human participation.

Curtin University (Australia) Human Research Ethics Committee, HRE2019-0542, Aug-6-2019

Humboldt State University (USA) Institutional Review Board for the Protection of Human Subjects, IRB 19-133, Mar-9-2020

☐ The authors declare that the work reported herein did not require ethics approval because it did not involve animal or human participation.

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