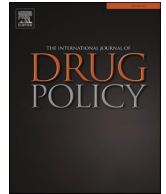




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## Research Paper

## Global patterns in small-scale cannabis growers' distribution practices: Exploring the grower-distributor nexus

Thomas Friis Sogaard<sup>a,\*</sup>, Julie Elizabeth Brummer<sup>a</sup>, Chris Wilkins<sup>b</sup>, Sharon R. Sznitman<sup>c</sup>, Eric L. Sevigny<sup>d</sup>, Vibeke Asmussen Frank<sup>e</sup>, Gary Potter<sup>f</sup>, Pekka Hakkarainen<sup>g</sup>, Monica J. Barratt<sup>h,i</sup>, Bernd Wersé<sup>j</sup>, Jodie Grigg<sup>k</sup>, Davide Fortin<sup>l</sup>, Daniel Bear<sup>m</sup>, Simon Lenton<sup>k</sup>, Marie Jauffret-Roustide<sup>n,o,p,q</sup>, Irma Kirtadze<sup>r</sup>

<sup>a</sup> Centre for Alcohol and Drug Research, Aarhus University, Denmark<sup>b</sup> SHORE & Whariki Research Centre, Massey University, Auckland, New Zealand<sup>c</sup> School of Public Health, University of Haifa, Israel<sup>d</sup> Department of Criminal Justice and Criminology, Georgia State University, 55 Park Place NE, Atlanta, GA 30303, USA<sup>e</sup> Research Centre for Management, Organisation and Social Sciences, VIA University College, Denmark<sup>f</sup> Law School, Lancaster University, UK<sup>g</sup> Alcohol, Drugs and Tobacco Unit, Finnish Institute for Health and Welfare, Helsinki, Finland<sup>h</sup> Social and Global Studies Centre and Digital Ethnography Research Centre, RMIT University, Melbourne, Vic, Australia<sup>i</sup> National Drug and Alcohol Research Centre, UNSW Sydney, NSW, Australia<sup>j</sup> Dept. of Education, Centre for Drug Research, Goethe University, Frankfurt, Germany<sup>k</sup> National Drug Research Institute, enAble Institute, Curtin University, Perth, WA, Australia<sup>l</sup> Aix Marseille Univ, INSERM, IRD, SESSTIM, Sciences Economiques & Sociales de la Santé & Traitement de l'Information Médicale, ISSPAM, Marseille, France<sup>m</sup> Humber College, Faculty of Social and Community Services, Toronto, Canada<sup>n</sup> Centre d'Études des Mouvements Sociaux (Inserm U1276/CNRS UMR8044/EHESS), France<sup>o</sup> Baldy Center on Law and Social Policy, Buffalo University, NY, USA<sup>p</sup> British Columbia Center on Substance Use, Vancouver, Canada<sup>q</sup> Institut Interuniversitaire sur les Dépendances, Montréal, Canada<sup>r</sup> School of Arts and Sciences, Ilia State University, Tbilisi, Georgia

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## ABSTRACT

**Background:** While the supply of cannabis is commonly assumed to be dominated by criminal gangs, a sizable share of the domestic cannabis supply is provided by small-scale growers. This article examines the nature and scope of small-scale growers' distribution practices, with a particular focus on cross-country differences and variations between different types of grower-distributors, i.e., "non-suppliers", "exclusive social suppliers", "sharers and sellers" and "exclusive sellers".

**Methods:** Based on a large convenience web survey sample of predominantly small-scale cannabis growers from 18 countries, this article draws on data from two subsamples. The first subsample includes past-year growers in all 18 countries who answered questions regarding their market participation ( $n = 8,812$ ). The second subsample includes past-year growers in 13 countries, who answered additional questions about their supply practices ( $n = 2,296$ ).

**Results:** The majority of the cannabis growers engaged in distribution of surplus products, making them in effect "grower-distributors". Importantly, many did so as a secondary consequence of growing, and social supply (e.g., sharing and gifting) is much more common than selling. While growers who both shared and sold ("sharers and sellers"), and especially those who only sold ("exclusive sellers"), grew a higher number of plants and were most likely to grow due to a wish to sell for profits, the majority of these are best described as small-scale sellers. That is, the profit motive for growing was often secondary to non-financial motives and most sold to a limited number of persons in their close social network.

**Conclusion:** We discuss the implications of the findings on the structural process of import-substitution in low-end cannabis markets, including a growing normalization of cannabis supply.

\* Corresponding author at: Centre for Alcohol and Drug Research, Aarhus University, Denmark.

E-mail address: [tfs.crf@psy.au.dk](mailto:tfs.crf@psy.au.dk) (T.F. Sogaard).

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## Introduction

Cannabis cultivation, Potter argues, is “an act of drug distribution, albeit a slightly unusual one” (Potter, 2010, p. 6). While traditional producer countries, in the Global South, continue to illicitly cultivate cannabis for export to consumers in other countries, recent decades have seen a growing decentralization of production (Decorte, 2010a). Many countries have thus witnessed an increase in large-scale outdoor plantations and indoor “cannabis farms” (Wilkins & Casswell, 2003; Moeller & Lindholm, 2014), along with an increase in small-scale cannabis growing. Researchers generally agree that small-scale cultivation represents a substantial segment of the illegal cannabis supply in many countries (Decorte, 2010a; Potter et al., 2011). In some countries, such as the United States, Canada and Uruguay, the increase in domestic cannabis cultivation has in recent decades also been fueled by legalization policies (Borodovsky & Budney, 2017; Decorte et al., 2020; Aguiar & Musto, 2022; Wadsworth et al., 2022). Importantly, while some domestic cannabis growers grow exclusively for personal use, qualitative studies show that many are likely to share their product, give it away, or sell any surplus (Hough et al., 2003; Potter, 2010), resulting in a situation where many countries are now able to supply their domestic cannabis markets to varying extents (Potter et al., 2011). For an outline of the various factors which have driven the structural shift from primary reliance on import to (relative) reliance on local grower-distribution, see Wilkins and Casswell (2003), Bouchard and Dion (2009), Decorte (2010a), Potter (2008), and Potter et al. (2011).

Existing research examining the role and position of domestic cannabis cultivation in relation to wider national/local distribution networks has predominantly employed either qualitative methods with small samples (see Weisheit, 1991; Hough et al., 2003; Potter, 2010; Bouchard & Nguyen, 2011; Potter et al., 2011; Hammersvik, 2010), or large *N* surveys often targeting just one or a few countries (see Decorte, 2010a; Nguyen & Bouchard, 2010; Hakkarainen et al., 2011; Wilkins et al., 2018). One exception is the study by Potter et al. (2015), which provided a multi-country-perspective, but only briefly covered distribution. To strengthen our understanding of the mounting importance of domestic grower-distribution, this article uses data from our survey-study of primarily small-scale cannabis growers in 18 countries to make observations about cross-country differences in cannabis growers’ distribution practices and to develop a descriptive typology of grower-distributors. In the analysis, we distinguish between supply as a *motive for growing* and supply as a *behavioral practice*, and we identify different and overlapping motives for, and behavioral practices of, supplying. Based on growers’ distribution behavior, we furthermore identify four types of grower-distributors: “non-suppliers”, “exclusive social suppliers”, “sharers and sellers” and “exclusive sellers”. While existing research on grower-distributor typologies has often paid primary attention to growers’ motivations (Nguyen & Bouchard, 2010) and to variations between different types of growers, we demonstrate how a more behavioral-centered typology can be used to shed light on the important similarities that also exist between different grower-distributors, including overlaps in motives for growing, scale of supply, level of own cannabis use, socio-economic status, and involvement with other types of crime. We use our findings to discuss domestic cannabis growers’ varied involvement in the wider cannabis market, and how a relative normalization of supply might be an adjunct to the increased normalization of cannabis use and small-scale growing.

## The grower-distribution matrix

In exploring domestic cannabis growers’ varied involvement in wider distribution networks, researchers have typically drawn on interview- and ethnographic data to outline typologies of “grower-distributors”, defined as individuals who supply others with cannabis from their own harvest. Existing typologies have often been based on factors such as: the *size of grower-distribution operations* (e.g., number of

plants), *motives for* and *modes of grower-distribution* (monetary or non-monetary exchange), and *organizational form* (individuals, groups or gangs, and degree of professionalism) (Weisheit, 1991; Hough et al., 2003; Hammersvik, 2010; Potter, 2010; Potter et al., 2011; Bouchard & Nguyen, 2011). To distinguish between “small-scale” and “large-scale” growing, previous research has often referred to a cut-off point of 20 plants (Hough et al., 2003; Nguyen & Bouchard, 2010; Weisheit, 1991). This somewhat arbitrary plant threshold may not be consonant with official classifications triggering trafficking charges, which are often less than 20 plants but vary from country to country (see Pardal, 2018).

Based on interviews with growers in the United States, Weisheit (1990; 1991) was one of the first to explore how different individuals and groups of domestic cannabis growers fit together in wider distribution networks. Weisheit found that economic considerations were important drivers for grower-distribution, but that non-financial motives also played an important role. More specifically, Weisheit identified three broad types of grower-distributors: “hustlers” who were entrepreneurial, profit-oriented, and tended to grow on a larger scale; “pragmatists” who were driven by economic necessity and grew on varying scales; and “communal growers” who were ideologically motivated and grew on a smaller scale for personal consumption and to supply friends. Hafley and Tewksbury (1996) expanded on Weisheit’s typology by adding the categories of “young punks” (young men who occupy low-level roles) and “entrepreneurs” who were motivated by economic rewards and innovativeness. The work of Weisheit has continued to inspire later studies and the construction of more recent grower-distributor typologies. Based on interviews with cannabis growers in United Kingdom, Hough et al. (2003) identified five grower types: the “sole growers” who cultivated as a hobby and exclusively for personal consumption; the “medical growers” who grew for the perceived therapeutic benefit of cannabis; the “social growers” who grew to ensure good quality supply of cannabis for themselves and friends; the “social/commercial growers” who grew to supply friends but who sometimes also sold cannabis to supplement their income; and finally, “commercial growers” who grew to make money and sold to any potential customer. Potter (2010) also distinguished between not-for-profit and for-profit motivated growers, identifying three types of not-for-profit grower-distributors: “personal use growers”, “medical cultivators” (who grew small-scale to supply themselves or others with cannabis for medical use), and “activist growers”. In Potter’s typology, for-profit grower-distributors included “one-off opportunists”, who started growing with the intention of personal use, but later realized the potential for profit that could be derived from selling; “self-employed growers” who grew regularly for personal use but sold surplus to friends; and “corporate growers” who had a criminal entrepreneurial approach, ran larger operations, and sometimes relied on helpers.

The above typologies generally rest upon a distinction between commercially and non-commercially motivated grower-distributors. Research, however, also indicates that this boundary is often blurred in practice. Weisheit (1991), for instance, showed that even for commercial grower-distributors, intangible rewards such as the pleasure of growing and provision for personal use played a key role. At the same time, high purchasing prices of cannabis have also been identified as drivers for some people who use cannabis to begin cultivating (Decorte, 2010a). Hough et al. (2003) and Potter (2010) also recognize that many grower-distributors are motivated by a combination of financial and non-financial concerns, a finding also confirmed in previous survey studies of small-scale cannabis growers (see Decorte 2010b; Nguyen & Bouchard, 2010; Hakkarainen et al., 2011; Potter et al., 2015, Lenton et al., 2015).

While the above provides valuable insights into the grower-distributor matrix, the findings are based predominantly on studies conducted in one or a limited number of countries, most notably the United States, Canada, United Kingdom, Netherlands and Belgium. Furthermore, as noted by Nguyen and Bouchard (2010), existing classifications of grower-distributors have largely been based on differences

in motivations, and tended to give priority to a focus on variations between different types of growers. While this research has significantly contributed to our understanding of grower-distributors, as [Potter \(2009\)](#) reminds us, any attempts to clearly delineate differences run the risk of glossing over “the complexity of drug distribution and the overlap and interplay between what come to be seen as different patterns of supply” ([Potter, 2009](#), p. 52). By drawing on a large sample of small-scale cannabis growers in 18 countries, across five continents, and by adopting a more behavioral-centered typology, this article presents a typology based on growers’ mode of supply, and uses this to assess differences but, equally importantly, similarities between different supplier types on parameters such as motives for growing, scale of supply, own cannabis use, socio-economic status, and involvement in other crime.

In the analysis, we distinguish between “non-suppliers”, “exclusive social suppliers”, “sharers and sellers” and “exclusive sellers”. The construction of this typology is inspired by criminal justice categorizations and research, which tend to classify activities such as non-supply, social supply (including sharing, gifting, and swapping) and sales on a continuum regarding severity, degrees of professionalism and involvement in wider drug markets. For instance, national criminal justice systems often distinguish between possession and supply and tend to reserve severe sanctions for the latter. Furthermore, much research has argued that “social supply” – defined as “non-commercial (or non-profit making) distribution of cannabis to non-strangers” ([Hough et al., 2003](#), p. 36) or as “supplying friends, where profit is not the primary motive” ([Potter, 2009](#), p. 58) – represents a qualitatively different, lesser and relatively benign form of supply compared to drug dealing proper ([Hough et al., 2003](#); [Coomber & Turnbull, 2007](#); [Potter, 2009, 2010](#); [Taylor & Potter, 2013](#); [Coomber & Moyle, 2014](#); [Bræmer & Sogaard, 2023](#)). The distinction between social supply and drug dealing proper is also reflected in criminal justice systems around the globe. While social supply is rarely recognized as a distinct legal category, many countries have sentencing guidelines or some level of juridical discretion or tolerance which act as mitigations in sentencings of cannabis supply deemed less severe ([Coomber et al., 2018](#)).

Since Weisheit developed his original typology in the early 1990s, the field of cannabis growing has undergone a number of important changes, including a mainstreaming of cannabis use for medical purposes, the invention of new strains and methods for indoor cultivation, and in some countries, cannabis growing has been legalized or decriminalized. In light of such changes, it remains important to continuously develop and refine grower-distributors typologies, as this can enable nuanced understandings of the ever-changing nature of the field of cannabis growing and the links between cannabis growing and the wider drug market.

## Methods

Data were collected through a standardized online convenience web survey called the International Cannabis Cultivation Questionnaire (ICCQ 2) developed by the Global Cannabis Cultivation Research Consortium (GCCRC) to measure and compare patterns of cannabis cultivation across different countries (see <https://worldwideweeds.nl>). The methodology used in this study was closely based on that described in detail from an earlier phase 1 survey (ICCQ 1) conducted in 2012–13 (see [Barratt et al., 2012, 2015](#)). In the most recent survey, data were collected in 18 countries, from August 2020 to September 2021.

Use of purposive sampling combined with online methods have advantages and disadvantages. A key advantage is that this approach enable researchers, at relatively low costs, to engage with large samples of otherwise hidden populations, such as people who use, grow or supply illicit and stigmatized drugs, who are likely appear in too small numbers in representative national surveys to make analysis meaningful (cf. [Miller & Sønderlund, 2010](#); [Barratt & Lenton, 2015](#)). The online nature of the survey also enables researchers better to access geographically and

linguistically diverse samples (i.e. the same set of questions can be presented in multiple languages), responses can be gathered rapidly, and flexibility and convenience are enhanced for both respondents and researchers ([Barratt et al., 2017](#)). The disadvantages are that participation is based on self-selection, that it is impossible to determine the representativeness of samples, and that participation is biased towards those who have access to and are familiar with the internet ([Barratt & Lenton, 2015](#); [Barratt et al., 2017](#)). The findings presented in this article should be interpreted with this in mind.

We used a broad-based recruitment strategy to maximize the heterogeneity of respondents. The online survey was promoted in participating countries via a range of channels including an international website (<https://worldwideweeds.nl>), Facebook, Twitter, other online forums, drug policy influencers, mainstream media, flyers, street press, events and grow shops. The mix of recruitment strategies varied between countries, but all potential recruits were directed to the project website where they could choose the survey and language associated with their country of residence (see also [Barratt et al., 2015](#)). 19,444 respondents initiated the online survey. After (i) screening for data quality, completeness, and duplicates and (ii) applying eligibility criteria (i.e., 18+ years old, grew cannabis within past 5 years, resided in one of the 18 target countries and had completed at least 50 % of the ICCQ 2), we retained 11,479 cases, which comprise the core international dataset.

The core questionnaire (ICCQ 2), which was used in all of the 18 countries, included questions on methods and scale of growing, reasons for growing, personal use of cannabis, demographic characteristics of growers, contact with the criminal justice system, drug use, and participation in cannabis and other drug markets. Only past-year growers were asked about their market participation. In addition, participating countries could deploy optional modules covering topics such as conflict and victimization, medical growing, activism, and distribution.

This article draws on data from two subsamples. The first (subsample 1) includes respondents from all 18 countries who reported they were currently growing or grew cannabis in the last 12 months, and did not explicitly report they had not yet harvested a crop in the past year ( $n = 8812$  of 11,479 respondents).<sup>1</sup> The second (subsample 2) includes past-year growers in the 13 countries that included the optional module on cannabis distribution.<sup>2</sup> Here, respondents, who had indicated past year involvement in supply in the core questionnaire, were asked to answer additional questions regarding their supply practices. Across the 13 countries, a total of  $n = 2296$  of 6191 respondents (37.1 %) answered additional questions regarding their supply practices. The two subsets are not directly comparable, but rather complementary, in that they can be used to shed light on different aspects of growers’ supply involvement.

We used descriptive statistics to analyze key patterns in respondents’ grower-distribution. More specifically, we present frequency distributions for categorical variables, medians for ordinal variables, and the means and medians for continuous variables. Country-level findings are described using frequency distributions only. Wilcoxon rank sum and chi-square tests were used to analyze associations between supply behavior (yes vs. no) and various growing practices for the aggregated

<sup>1</sup> For the purpose of simplicity, in the tables presented in the analysis, the different countries are identified by their official 3-digit ISO country code. The 18 countries are: Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Switzerland (CHE), Germany (DEU), Denmark (DNK), Finland (FIN), France (FRA), United Kingdom of Great Britain and Northern Ireland (GBR), Georgia (GEO), Israel (ISR), Italy (ITA), Netherlands (NLD), New Zealand (NZL), Portugal (PRT), United States (USA) and Uruguay (URY).

<sup>2</sup> The 13 countries that included additional questions on distribution were: Austria, Canada, Switzerland, Germany, Denmark, Finland, Georgia, Israel, New Zealand, Portugal, United Kingdom, United States and Uruguay.

sample. We also identify four different supply groups based on the behavioral practices of a) *selling* cannabis (> 0 % of the cannabis the respondent has grown in the past 12 months) for a profit or to cover the cost of growing; and b) *sharing* cannabis (> 0 % of the cannabis the respondent has grown in the past 12 months) by swapping with other growers or by it giving away. *Non-suppliers* have neither sold nor shared; *exclusive social suppliers* have shared but not sold; *sharers and sellers* have both shared and sold; and *exclusive sellers* have sold but not shared. Cross-tabulations and bivariate analyses (Kruskal-Wallis, chi-square and ANOVA tests) were used to examine the associations between supply group and various sociodemographic, drug use, growing practice and criminal activity variables. All results are based on valid responses, excluding any missing data.<sup>3</sup> In the presentation of results, all percentages are rounded up or down.

## Results

In presenting the results, we have chosen a thematic structure of organization, where we interchangeably draw on complementary findings from the analyses of subsamples 1 and 2. In the text, we indicate when shifts between subsamples are made. The results section is divided into four parts. The first focuses on supply as a motive for growing. The second outlines key patterns in growers' supply behavior. In the third part, we zoom in on growers' involvement in selling, and the final part outlines key variations and similarities between grower-distributors involved in different modes of supply.

### Supply as motive for growing

Participants in subsample 1 (past year growers in all 18 countries) usually reported more than one reason for engaging in cannabis growing. Most stated that they grew because they derived "pleasure from growing" (77 %), to "provide themselves with cannabis for recreational use" (68 %), or because it was "healthier" (66 %). However, one third (33 %) stated that they grew cannabis, in part, to supply others in one way or another. The most dominant *supply motives* were "to provide others with cannabis for medical use" (21 %) and "to provide others with cannabis for recreational use" (19 %). Only 8 % stated they grew cannabis for the purpose of selling it. While 3 % grew with the intention of selling surplus products "to pay for my own cannabis use", 6 % did so with the intention of making profits.

As illustrated in Table 1, the extent to which different supply motives were nominated by growers varied between countries. Considering different kinds of supply motives, supplying others for recreational use was reported as a motivating factor by around one third of growers in Canada (39 %), New Zealand (31 %) and the United States (31 %). Growing to supply others with cannabis for medical use was reported by a substantial proportion of growers in New Zealand (49 %), the United States (38 %), Canada (30 %), Finland (30 %) and Australia (29 %). In contrast, only 8 % of growers in Italy and Belgium reported growing to supply others for medical purposes. These variations may reflect national differences in the availability and societal acceptance of "medical cannabis" (Hakkaraianen et al., 2019; Sogaard & Lerkkanen, 2021; Fortin et al., 2022). The extent to which commercial supply (i.e., "selling") was

<sup>3</sup> Missing data for subsample 1: supply motives (n = 14), supply behavior (n = 917), number of crops grown in past year (n = 2,710), number of seedlings (n = 204) and mature plants (n = 153) typically grown per crop, growing alone vs. with others (n = 52), household composition (n = 962), labor market participation (n = 936), educational participation (n = 939), days of cannabis use (n = 864), non-drug related crimes (n = 783), selling of other drugs (n = 949), other drug use (n = 495), profit amount (n = 252) and percent of total income from selling (n = 70) for profit-selling participants; Missing data for subsample 2: number shared with (n = 24) or sold to (n = 60), types of people gave (n = 77) or sold to (n = 115).

**Table 1**  
Supply motives for respondents who harvested a crop in the past 12 months (subsample 1)<sup>a</sup>.

|                                                      | AUS | AUT | BEL  | CAN | CHE | DEU | DNK | FIN | FRA | GBR | GEO | ISR | ITA  | NLD | NZL | PRT | USA  | URY | Total             |
|------------------------------------------------------|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|------|-----|-------------------|
| Any supply motive,%                                  | 35  | 30  | 21   | 53  | 33  | 29  | 31  | 41  | 25  | 34  | 27  | 23  | 13   | 44  | 61  | 17  | 52   | 22  | 33                |
| Motive to provide others with medical cannabis,%     | 29  | 19  | 8    | 30  | 15  | 19  | 22  | 30  | 16  | 26  | 12  | 17  | 8    | 27  | 49  | 11  | 38   | 13  | 21                |
| To provide others w. cannabis for recreational use,% | 16  | 19  | 15   | 39  | 18  | 17  | 16  | 22  | 12  | 14  | 22  | 13  | 6    | 24  | 31  | 8   | 31   | 11  | 19                |
| Any selling motive,%                                 | 7   | 11  | 5    | 7   | 15  | 6   | 6   | 18  | 7   | 3   | 4   | 6   | 4    | 7   | 15  | 5   | 12   | 6   | 8                 |
| Total N                                              | 525 | 37  | 1618 | 471 | 220 | 558 | 678 | 399 | 522 | 274 | 170 | 64  | 1028 | 290 | 131 | 76  | 1507 | 230 | 8798 <sup>a</sup> |

<sup>a</sup> Missing data on supply motives for 14 of 8812 subsample 1 participants; percentages calculated on valid responses.

highlighted as a motivating factor also varied, with Finland (18 %), New Zealand (15 %) and Switzerland (15 %) reporting the highest proportions, and Georgia (4 %), Italy (4 %) and the United Kingdom (3 %) the lowest.

Overall, our study supports findings from previous research, showing that while economic concerns and motives can be drivers for some people to begin and to continue cultivating (see [Decorte, 2010a](#)), most growers are not motivated by profit-making, and have no intention of becoming involved in wider commercial drug markets (see [Potter 2010](#)).

### Supply as behavioral practice

Prior studies indicate that discrepancies sometimes exist between growers' motivations and their actual supply behavior ([Potter, 2010](#); [Potter et al., 2015](#)). In line with this, our study showed that while about only one-third (33 %) of growers in subsample 1 stated that they grew with the intention to supply others in one form or another, 69 % had in fact supplied others with cannabis they themselves had grown. Similarly, while only 8 % of those who had grown within the last year acknowledged selling as a reason for growing, 19 % had in fact sold surplus products to others in the past 12 months (see [Table 2](#)). This implies that many engage in supply almost by default i.e., as a secondary consequence of growing.

As also evidenced in other surveys of cannabis growers ([Hakkarainen et al., 2011](#); [Potter et al., 2015](#); [Wilkins et al., 2018](#)), [Table 2](#) illustrates how "social supply", that is supply for non-commercial purposes ([Hough et al., 2003](#)), is by far the most common form of distribution among the growers in our study. In all countries, with the exception of Israel, more than half of the growers reported sharing or giving away some of the cannabis they produced. In addition, a total of 13 % reported swapping some of their harvest with other growers.

Among participants in subsample 1, a total of 64 % reported either swapping, sharing, or giving away cannabis they had grown in the past 12 months. While some distinction seems to exist between the majority of growers who either only self-supply (31 %) or engage in social supply only (50 %), on the one hand, and those who (also) engage in selling (to cover cost or for profit), on the other hand, the boundary between these groups is not always clear. As illustrated in [Table 3](#), a notable minority (14 %) had for instance engaged both in social supply and in selling of surplus products in the past 12 months. Only a very small proportion (5 %) had sold but not engaged in social supply.

Growers involved in social supply were typically small-scale suppliers. As an indication of this, 50 % of growers who had engaged in social supply in the past year had shared or given away 10 % or less of their product. Findings from subsample 2 (i.e., respondents from the 13 countries, which included additional questions on distribution in the survey) also showed that social suppliers mainly supplied cannabis to more proximal contacts in their social network. Of those who had shared or given away cannabis from their last crop, most had provided to

**Table 3**

Past year growers' involvement in different types of supply (subsample 1)<sup>a</sup>.

|                                               |             |
|-----------------------------------------------|-------------|
| NOT shared/swapped/given NOR sold,% (n)       | 31 % (2459) |
| Shared/swapped/given away BUT NOT sold,% (n)  | 50 % (3937) |
| BOTH sold AND shared/swapped/given away,% (n) | 14 % (1112) |
| Sold BUT NOT shared/swapped/given away,% (n)  | 5 % (387)   |

<sup>a</sup> Missing data on supply behavior for 917 of 8812 participants; percentages calculated on valid responses.

friends (91 %) and family members (57 %). In contrast, fewer growers provided cannabis to acquaintances (24 %), and just 5 % reported supplying to strangers. Of those who answered the distribution module, most (66 %) had shared with only 1–5 people, while a smaller proportion had shared with a larger group (e.g., 6 % with 11 or more people).

While the above findings illustrate how grower-distribution predominantly involves gifting, sharing, and swapping, and is thus best characterized as "social supply", in the following we focus on those growers who engage in selling of surplus products.

### Grower-selling: key patterns

As aforementioned, among participants in subsample 1 (all 18 countries), about one fifth (19 %) had also sold surplus products to others in the past 12 months. As illustrated in [Table 2](#), there are, however, important national variations in selling behavior. Selling was declared by most growers in Finland (36 %), New Zealand (34 %), and Switzerland (30 %), and least common among growers in Georgia (3 %), United Kingdom (12 %), Denmark (12 %) and Canada (13 %). Among the three countries with the highest prevalence of selling, New Zealand has the highest share of growers who sold only to cover the costs of growing (20 %), compared to 13 % in Switzerland and 12 % in Finland. Finland had the highest number of growers who sold for profit (24 %), compared to 17 % in Switzerland and 14 % in New Zealand.

Most of the grower-sellers participating in our study are, however, best categorized as small-scale sellers. For instance, across the 18 countries, more than half of those who sold cannabis did so solely to cover the costs of growing. Furthermore, most grower-sellers (including both those who sold for profit and to cover costs) grew a relatively small number of crops (discussed further below), and sold to a relatively small number of people, mainly close personal contacts. Findings from the 13 countries which had additional questions on supply (subsample 2), for instance, show that grower-sellers reported primarily selling cannabis from their last crop to friends (75 %), acquaintances (34 %), or family members (24 %). A substantial minority, however, did report selling surplus products to a commercial dealer (24 %), while few had sold to a stranger (5 %).

Across all 18 countries (subsample 1), 43 % of grower-sellers reported that the profits they made from selling their own cultivated cannabis in the past 12 months constituted 10 % or less of their total

**Table 2**

Patterns in supply behavior for respondents who harvested a crop in the last 12 months (subsample 1)<sup>a</sup>.

|                                                       | AUS | AUT | BEL  | CAN | CHE | DEU | DNK | FIN | FRA | GBR | GEO | ISR | ITA | NLD | NZL | PRT | USA  | URY | Total             |
|-------------------------------------------------------|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-------------------|
| Any supply activity, %                                | 63  | 85  | 70   | 75  | 79  | 70  | 59  | 67  | 63  | 61  | 87  | 58  | 67  | 72  | 77  | 68  | 71   | 75  | 69                |
| Swap with other growers,%                             | 12  | 15  | 13   | 19  | 12  | 14  | 7   | 22  | 13  | 9   | 19  | 12  | 16  | 8   | 23  | 14  | 10   | 21  | 13                |
| Give away or share, %                                 | 55  | 79  | 65   | 71  | 68  | 65  | 55  | 55  | 56  | 56  | 87  | 48  | 64  | 64  | 72  | 62  | 60   | 74  | 62                |
| Sell (includes either to cover costs or for profit),% | 19  | 18  | 15   | 13  | 30  | 24  | 12  | 36  | 17  | 12  | 3   | 28  | 16  | 19  | 34  | 18  | 25   | 16  | 19                |
| Sell to cover costs of growing (only),%               | 10  | 6   | 8    | 8   | 13  | 17  | 7   | 12  | 9   | 9   | 0   | 8   | 10  | 9   | 20  | 15  | 10   | 7   | 10                |
| Total N <sup>a</sup>                                  | 450 | 34  | 1450 | 439 | 195 | 528 | 602 | 363 | 471 | 256 | 140 | 50  | 929 | 254 | 124 | 71  | 1361 | 178 | 7895 <sup>a</sup> |

<sup>a</sup> Missing data on supply behavior for 917 of 8812 subsample 1 participants; percentages calculated on valid responses.

income, while 27 % reported earning more than 50 % of their income from selling cannabis. Importantly, the reason why more than one-quarter reported earning more than 50 % of their income from selling cannabis is due in large part to grower-sellers in the United States, where 50 % ( $n = 91$ ) earned more than half their income from selling their own cultivated cannabis. If responses from the United States are removed from the analysis, only 18 % reported such a high share of income from growing-selling. The relatively large share of grower-sellers in the United States who reported earning the majority of their income from selling cultivated cannabis might reflect the fact that growing and selling of cannabis is a legal and commercialized activity in many US states (although cannabis growing and selling is still illegal at the federal level). In most of the other participating countries, selling of cannabis is illegal, and thus liable to criminal prosecution, which may be why more growers concur with the principle that “small is beautiful” (Bouchard & Ouellet, 2011, p. 71). Differences in legal context might also explain variations in terms of the profit grower-sellers made based on sales from their last crop, as illustrated in Table 4.

Of the grower-sellers who reported earning money from selling their last crop, 40 % had earned  $\leq$  \$1000 USD, 55 %  $\leq$  \$2000 USD, with a median profit of \$1840 USD. If participants from the United States, some of whom can be presumed to operate under a legal licensed framework, are excluded from the analysis, the median earning drops to \$1227 USD, which in large part can be explained by the fact that 47 % of the growers reporting to have made  $\geq$  \$5001 USD from their last crop are from the United States. Only 14 growers, 10 of whom were from the United States, reported making more than \$100,000 USD from selling their last crop. Extracting Canadian and Uruguayan growers (some of whom can also be presumed to grow under a legal licensed framework) from the analysis does not influence the overall picture to any substantial degree. This in part because only a smaller proportion of Canadian and Uruguayan growers answered this question (see Table 4). The highest proportion of large-scale growers and sellers in our sample are from the United States.

#### Differences and similarities between types of grower-distributors

In the following, we explore the characteristics of grower-distributors involved in different modes of supply. Based on Table 3, describing growers' past year supply behavior (subsample 1), we identified four mutually exclusive categories of grower-distributors: “non-suppliers”, “exclusive social suppliers”, “sharers and sellers” and

**Table 4**  
Profits made from selling from last crop\*.

|                                                     | All countries <sup>a</sup> | All countries, excluding the US <sup>b</sup> | All countries, excluding Canada and Uruguay <sup>c</sup> |
|-----------------------------------------------------|----------------------------|----------------------------------------------|----------------------------------------------------------|
| Mean profit from selling last cannabis crop (USD)   | 26,041.82                  | 13,480.15                                    | 26,983.21                                                |
| Median profit from selling last cannabis crop (USD) | 1840                       | 1227                                         | 1840                                                     |
| Profit categories, % (n)                            |                            |                                              |                                                          |
| $\leq$ 100 USD                                      | 13 (62)                    | 13 (48)                                      | 13 (56)                                                  |
| 101–1000 USD                                        | 27 (126)                   | 32 (116)                                     | 26 (116)                                                 |
| 1001–2000 USD                                       | 15 (69)                    | 16 (56)                                      | 15 (68)                                                  |
| 2001–5000 USD                                       | 19 (87)                    | 19 (67)                                      | 19 (87)                                                  |
| $\geq$ 5001 USD                                     | 27 (124)                   | 21 (74)                                      | 27 (121)                                                 |

\* Note: Only asked of participants who reported selling for profit in last 12 months ( $n = 723$ ). Those participants who reported a loss (3 persons) were excluded from the analysis. 29 participants reported 0 profit (included in the analysis). Percentages and mean and median values calculated on valid responses.

<sup>a</sup> Missing data for 252 of 723 participants; <sup>b</sup>Missing data for 166 of 528 participants; <sup>c</sup>Missing data for 232 of 683 participants.

“exclusive sellers”. While differences exist, as we will illustrate, there is also much cross-category similarity.

Similarly to other types of drug offending (Fleetwood & Leban, 2023) there is a vast overrepresentation of men in all four categories of grower-distributors. Furthermore, there is also little age variation between categories. The median ages of “non-suppliers” and “exclusive sellers” were 41 and 40, followed by “exclusive social suppliers” (median age 38), while “sharers and sellers” were the youngest (median age 33). Across the four categories not much variation exists in terms of the number of crops grown in the past year (see Table 5). However, “sharers and sellers”, and especially “exclusive sellers” grew the highest number of seedlings and mature plants per crop. “Exclusive sellers” were also the most likely to grow with others and to grow together with a greater number of people.

Not surprisingly, “supply motives” as an incentive for growing play a much greater role for growers involved in selling. While 44 % of “exclusive sellers” and 42 % of “sharers and sellers” stated that they grew at least in part to supply others with cannabis for recreational use, only 19 % did so among “exclusive social suppliers”, and less so among “non-suppliers” (4 %) ( $p < 0.001$ ). Similarly, more “sharers and sellers” (40 %) and “exclusive sellers” (31 %) grew to supply others with cannabis for medical use, compared to “exclusive social suppliers” (22 %), and “non-suppliers” (10 %) ( $p < 0.001$ ). As shown in Table 6, the two categories of grower-sellers are also much more likely to grow due to a desire to sell surplus products, with “exclusive sellers” being the most likely to grow for profit.

Importantly, however, even among those growers who exclusively engaged in selling, the majority did not state “selling” as a key motive for growing. In fact, selling is not among the top-four motives in any of the four categories. In terms of most prevalent motives for growing, there is a pronounced overlap between categories, but commercial motives were always secondary to non-commercial ones. Across all categories the four most prevalent motives for growing were: “I get pleasure from growing cannabis”, “to provide myself with recreational cannabis”, “the cannabis

**Table 5**  
Composition and scale of growing among four categories (subsample 1)<sup>a-f</sup>.

|                                                                                    | Non-suppliers <sup>a</sup> | Exclusive social suppliers <sup>a</sup> | Sharers & sellers <sup>a</sup> | Exclusive sellers <sup>a</sup> | P value             |
|------------------------------------------------------------------------------------|----------------------------|-----------------------------------------|--------------------------------|--------------------------------|---------------------|
| Number of crops in past year, median <sup>b</sup>                                  | 2                          | 2                                       | 2                              | 3                              | <0.001 <sup>g</sup> |
| Plants typically grown per crop, median                                            |                            |                                         |                                |                                |                     |
| Seedlings <sup>c</sup>                                                             | 4                          | 4                                       | 6                              | 10                             | <0.001 <sup>g</sup> |
| Mature plants <sup>d</sup>                                                         | 3                          | 3                                       | 5                              | 8                              | <0.001 <sup>g</sup> |
| Growing most recent crop with others (as opposed to alone), % (n) <sup>e</sup>     | 13 % (317)                 | 18 % (725)                              | 27 % (298)                     | 35 % (135)                     | <0.001 <sup>h</sup> |
| Number of growing partners (among those who grew with others), median <sup>f</sup> | 1                          | 1                                       | 1                              | 2                              | <0.001 <sup>g</sup> |

\*Note: Median values and percentages calculated on valid responses.

<sup>a</sup> Missing data on supply behavior for 917 of 8812 subsample 1 participants;

<sup>b</sup>Missing data for 2710 of 8812 subsample 1 participants; <sup>c</sup>Missing data for 204 of 8812 subsample 1 participants; <sup>d</sup>Missing data for 153 of 8812 subsample 1 participants; <sup>e</sup>Missing data for 52 of 8812 subsample 1 participants; <sup>f</sup>Missing data for 140 participants; <sup>g</sup>Kruskal–Wallis test; <sup>h</sup>Chi-square test.

**Table 6**  
Variations in the importance of selling as motive for growing (subsample 1)<sup>a,b</sup>.

|                            | "to pay for my own cannabis use"% (n) | P value <sup>c</sup> | "to make profits"% (n) | P value <sup>c</sup> |
|----------------------------|---------------------------------------|----------------------|------------------------|----------------------|
| Non-suppliers              | 1 (13)                                | <                    | 1 (19)                 | <                    |
| Exclusive social suppliers | 1 (28)                                | 0.001                | 1 (22)                 | 0.001                |
| Sharers & sellers          | 15 (162)                              |                      | 22 (242)               |                      |
| Exclusive sellers          | 15 (58)                               |                      | 40 (155)               |                      |

\*Note: Percentages calculated on valid responses.

<sup>a</sup> Missing data on supply behavior (used to create supplier categories) for 917 of 8812 subsample 1 participants; <sup>b</sup>Missing data on supply motives for 14 participants subsample 1 participants <sup>c</sup>Chi-square test.

I grow is healthier" and "because the plant is beautiful". The high prevalence of growers stating they grow "to provide myself with recreational cannabis" (average across all categories: 67 %) is indicative of a relatively high level of cannabis use across all four categories. For "exclusive sellers" the mean days of cannabis use in the past 30 days was 19, while it was 21 for "exclusive social suppliers" and "sharers and sellers" and 22 for "non-suppliers" ( $p < 0.001$ ). This suggests that across the four categories, a substantial number of grower-distributors are first and foremost cannabis users. Supporting this analysis is the fact that even among "exclusive sellers", the majority reported selling to a relatively small number of individuals: 68 % had sold to 5 or fewer people in the past year, 17 % to 6–10 people and only 13 % had sold to 20 or more people. Among "sharers and sellers", 82 % had sold to 5 or fewer people. While an almost equal percentage of "exclusive sellers" sell to cover costs of growing (60 %) and for profit (63 %), a substantially higher proportion of "sharers and sellers" sell to cover costs of growing (83 %) compared to for profit (43 %). When focusing on sales for profit, data also indicate that "exclusive sellers" sell at a larger scale (frequency or volume) than "sharers and sellers", given that the profits the former makes from sales constitutes a larger proportion of their total income (see Table 7).

In accordance with prior research showing that involvement in the drug economy is often done to supplement or 'double up' income from legal employment (Fader, 2019; Salinas, 2023), our data showed that across all four categories, growing and supplying (including selling) is, for most, a past-time activity. As illustrated in Table 8, across the four categories, most growers are either students or in full- or part-time employment.

As illustrated in Table 8, most grower-distributors in this study are relatively socially included in mainstream society. Not only are most labor market or educational participants, across the four categories, only about one-fifth live alone. The remaining live with a spouse, a partner, parents, and/or children. Involvement in non-drug related crimes is also declared by respondents to be low. Across the four categories, the overall totals were 0.6 % for involvement in property offences (e.g., burglary, fraud, theft, robbery, blackmail) and 0.3 % for violent offences (e.g., assault, stabbing, shooting, rape) in the past year. Analyses did, however, reveal that "sharers and sellers" (19 %) and "exclusive sellers" (18 %) are much more likely to have engaged in past year selling of cannabis

**Table 7**  
Percentage of total income made from selling own cannabis<sup>a</sup>.

| Supplier group          | ≤10 %    | 11–50 %  | 51–100 % | P value <sup>b</sup> |
|-------------------------|----------|----------|----------|----------------------|
| Sharers & sellers,% (n) | 52 (229) | 30 (130) | 18 (79)  | <0.001               |
| Exclusive sellers,% (n) | 25 (54)  | 29 (63)  | 46 (98)  |                      |

\*Note if US participants are excluded from the analysis, the percentages for "exclusive sellers" changes to 36 % (0–10 %), 34 % (11–50 %) and 29 % (51–100 %). For "sharers and sellers", the percentages remain more or less stable. All percentages calculated on valid responses.

<sup>a</sup> Data missing for 70 of 723 participants who reported selling for profit

<sup>b</sup> Chi-square test.

**Table 8**  
Socio-economics (subsample 1)<sup>a,c,e</sup>.

|                                                                                | Non-suppliers <sup>a</sup> | Exclusive social suppliers <sup>a</sup> | Sharers & sellers <sup>a</sup> | Exclusive sellers <sup>a</sup> | P value <sup>b</sup> |
|--------------------------------------------------------------------------------|----------------------------|-----------------------------------------|--------------------------------|--------------------------------|----------------------|
| <b>Household composition<sup>c</sup>, % (n)</b>                                |                            |                                         |                                |                                |                      |
| Living with spouse/partner/boyfriend/girlfriend                                | 61 % (1405)                | 55 % (2090)                             | 46 % (482)                     | 58 % (211)                     | <0.001               |
| Living with child/ren (< 18 years old)                                         | 23 % (531)                 | 22 % (839)                              | 19 % (203)                     | 25 % (93)                      | 0.037                |
| Living with parent/s                                                           | 11 % (261)                 | 18 % (691)                              | 23 % (242)                     | 11 % (41)                      | <0.001               |
| No-one, I live alone                                                           | 20 % (469)                 | 18 % (692)                              | 22 % (233)                     | 22 % (80)                      | 0.019                |
| <b>Labor market<sup>d</sup> / educational participation<sup>e</sup>, % (n)</b> |                            |                                         |                                |                                |                      |
| Studying                                                                       | 15 % (341)                 | 22 % (827)                              | 28 % (297)                     | 16 % (58)                      | <0.001               |
| Working (full or part-time)*                                                   | 56 % (1296)                | 61 % (2321)                             | 54 % (573)                     | 56 % (204)                     | <0.001               |
| Retired                                                                        | 13 % (294)                 | 10 % (390)                              | 7 % (75)                       | 10 % (38)                      | <0.001               |
| Permanently ill/unable to work                                                 | 12 % (273)                 | 8 % (293)                               | 8 % (81)                       | 6 % (22)                       | <0.001               |

\* Note: If US participants are excluded from the analysis, the percentage of participants in 'full or part-time work' slightly increases for the two first categories (58 % & 64 %), but slightly drops for the latter two (53 % & 49 %). All percentages calculated on valid responses.

<sup>a</sup> Missing data on supply behavior for 917 of 8812 subsample 1 participants.

<sup>b</sup> Chi-square test.

<sup>c</sup> Missing data on household composition for 962 of 8812 subsample 1 participants.

<sup>d</sup> Missing data on labor market participation for 936 of 8812 subsample 1 participants.

<sup>e</sup> Missing data on educational participation for 939 of 8812 subsample 1 participants.

not grown by themselves, compared to "exclusive social suppliers" (4 %) and "non-suppliers" (3 %) ( $p < 0.001$ ). They – and especially "sharers and sellers" – are also more likely to have sold other drugs (7 % and 4 %) compared to the latter categories (less than 1 %) ( $p < 0.001$ ). "Sharers and sellers" and "exclusive sellers" also have a higher level of other drug use. For instance, while 17 % and 16 % of these, respectively, had used cocaine in the past year, this was only the case for 9 % of "exclusive social suppliers" and for 7 % of "non-suppliers" ( $p < 0.001$ ). This indicates that while similarities exist across the four categories, growers engaged in selling of cannabis from their own crops are generally more embedded in the wider drug culture and in the wider drug market.

## Discussion

This study confirms findings from qualitative studies (Weisheit, 1991; Hough et al., 2003; Potter, 2010; Potter et al., 2011; Hammersvik, 2010) showing that many cannabis growers also engage in some form of cannabis distribution. Most had engaged in social supply, while a sizable minority had also sold their own cultivated cannabis. Importantly, however, while supply behavior is relatively common, only about one-fifth stated "supply to others" as an incentive for growing, and only a few reported being motivated by a desire to make money. We urge our readers to interpret our findings with the limitations of our study design in mind (see limitations section below for further detail).

The discrepancy that exists between growers' motivations and their

supply behavior indicates that many engage in supply as a secondary consequence of growing (see Potter, 2010; Potter et al., 2015). Involvement in social supply may, for instance, result from a gradual drift process, rather than a conscious strategy (see Taylor & Potter, 2013; Sogaard & Bræmer, 2023). While some might produce a higher crop yield than expected, and then decide to give surplus products to others rather than letting it go to waste, others might, post-growing, decide to share their cannabis because they find that their own user experience becomes better when shared with others. Qualitative research also shows that sharing is a “fundamental ritual” (Sandberg, 2012, p. 71) in cannabis culture, which is rooted in reciprocity norms (Coomber et al., 2016). Furthermore, similar to people who only use cannabis, growers, are also likely, at times, to be faced by “demand sharing” i.e., explicit or subtle demands made by others wanting them to give or share (Bræmer & Sogaard, 2023). The social embeddedness of growers’ supply behavior is confirmed by our study showing that ethical and ideological concerns (such as wanting to provide others with cannabis for medical or recreational use) are the primary “supply motives”, and that most growers tend to give to or share with a limited number of individuals, usually within their personal social networks.

Similarly, while few (8 %) nominated “to sell” as a motive for growing, almost one-fifth had engaged in sales of surplus products, again suggesting a subtle drift process. Most were small-scale sellers, who sold to a limited number of people through their personal networks. Most grower-sellers were themselves frequent users of cannabis and more than half of those who sold cannabis did so solely to cover the costs of growing. This suggests that much of growers’ sales practices might best be described as “minimally commercial supply” (Coomber & Moyle, 2014, p. 158), in that many of these money-for-cannabis exchanges are driven by a desire to reduce cultivation-related expenses. Viewed from this perspective, it is likely that much of the gain derived from sales relates to securing resources for the growers’ own (future) supply.

Growers’ involvement in sales varied between countries. While Finland had the highest percentage reporting to sell for profit, New Zealand had the highest percentage reporting to sell to cover costs of growing. New Zealand also had the highest percentage stating they grew to supply others with medical cannabis. As also suggested by Wilkins et al. (2018), it is thus possible that many of the New Zealand growers are “medical cultivators”, a term used by Potter (2010) for growers who grow to supply themselves or others with cannabis to relieve medical conditions. The high percentage of growers reporting to sell for profit in Finland is difficult to explain. Part of the explanation might relate to fact that our survey was conducted during the height of the COVID-19 pandemic. It is likely that global travel and transport restrictions might have made importation of cannabis to Finland more difficult (being located in the northern corner of Europe, far away from central supply routes), resulting in an increased demand for domestic production, and creating more room for small-scale entrepreneurs. Not surprisingly, legal context also seems to influence growers’ sales practices. Most large-scale growers, for instance, were found in the United States, where many states have legalized commercial production.

To shed further light on the differences as well as the similarities between growers involved in different kinds of supply, we adopted a behavioral-based typological approach. Similar to Hough et al.’s (2003) “sole-use grower”, Nguyen and Bouchard’s (2010) “hobbyist”, and Potter’s (2010) “personal use growers”, the category of *non-suppliers* identified in our study is characterized by growing a small number of plants, mostly alone, and for intangible rewards (e.g. joy or health concerns). A second category identified was *exclusive social suppliers*. Contrary to “non-suppliers”, these growers give to or share with others, and thus resemble Hough et al.’s (2003) “social grower”. Supplying others for either medical or recreational purposes is a much more prevalent motive for these growers. However, similar to non-suppliers, they also tend to grow a limited number of plants, alone, and for non-commercial purposes. The third category, *sharers and sellers*, resembles Hough et al.’s “social/commercial grower”, in that they both

share and sell. These growers tend to grow a slightly higher number of plants, be slightly more likely to grow with others, and compared to “exclusive social suppliers”, they are also more likely to grow due to social supply or selling motives. They primarily sell to cover the costs of growing. However, they resemble non-suppliers and exclusive social suppliers both in terms of their most prevalent motives for growing, their mainstream socio-economic status, and their relatively high levels of cannabis use and low involvement in other crime (except for sales of other drugs and not self-grown cannabis). This category includes the highest proportion of students (28 %), and some might be similar to Weisheit’s (1990) “pragmatists”, who sell out of economic necessity. Others are likely to be “one-off opportunists” (Potter, 2010), who start growing with the intention of covering their personal consumption, but later realize there is a market for their products. The last category is *exclusive sellers*. They grow the largest number of plants, are most likely to grow in a group, most profit-oriented, and much more likely to have sold their own cultivated cannabis for profit. In fact, 63 % of exclusive sellers have sold to make profits. Importantly, however, they also resemble the abovementioned three categories, for instance, in terms of their socio-economic mainstream status, their high level of own cannabis use, their generally low involvement in other crime (again the exception is sales of other cannabis and other drugs), the high prevalence of ethical and ideologically rooted motives for growing, and the fact that most distribute (sell) to a small number of people. As the above indicates, while differences certainly exist, there are also many important similarities between cannabis growers involved in different types of supply.

Overall, most grower-suppliers in this study did not fit conventional stereotypes envisioning “the drug dealer” either as a profit-driven “organized criminal”, who earns large sums of money through illegal means (Coomber, 2006), or as a socio-economically marginalized person, who stands outside and in opposition to mainstream society (Salinas, 2018). While acknowledging that the structural process of import-substitution in some sections of the cannabis market has resulted in a heightened level of criminal organization and professional production (Decorte, 2010a), our study instead indicates that in the bottom level cannabis market, the rise in small-scale cannabis production seems to have contributed to a more general process of normalization of low-level supply (see also South, 1999; Chatwin & Potter, 2014; Coomber et al. 2016). Not only do a majority of growers in this study engage in supply, most also belong to otherwise law-abiding and socially included segments of the population, thus indicating a gradual move of low-level cannabis supply from the margins to the center of mainstream society (see also Chatwin & Potter, 2014). Furthermore, while the image of “drug dealer” remains stigmatized, which in our study is reflected in the fact that only a few stated profit-making as a motive for growing, about one-third of growers did, however, highlight social supply as a motive for growing. This indicates a certain level of cultural accommodation, where, at least from the perspective of some growers, social supply has become an accepted cultural norm. However, bearing in mind the discrepancy between growers’ supply motives and their higher-level supply behavior, it may be more accurate to say that while supply might not be the “true norm” among growers, it has become part of “everyday life” (South, 1999) among most small-scale cannabis growers.

The relatively normalized nature of supply among small-scale cannabis growers has implications for policy and criminal justice. In countries considering legalizing or decriminalizing small-scale cannabis growing, it is, for instance, important to include provisions that will allow for some level of small-scale supply, and possibly also some minimal financial gain or cost recovery. As illustrated in this article, some financial gain will often be involved even in non-commercially motivated supply, as, for instance, when growers sell to cover the costs of growing, such as power, lights, growing equipment, and their time commitment. If provisions that accommodate small-scale supply are not included in alternative regulatory models, many growers are likely to

remain on the outskirts of legality and continue to be targets of regulatory and criminal sanctions (Bodwitch et al., 2021). In countries where criminal justice approaches remain the norm, it has been suggested that one avenue forward is to modify sentencing guidelines to repeal low-level social supply and “minimal commercial supply” from penalties (Coomber & Moyle, 2014). While we acknowledge that it may be challenging to develop feasible and workable criteria for what constitutes “small-scale”, “low-level” and “minimal”, it is nevertheless an important task for policy-makers, if we are to develop policies that are more in line with the reality of cannabis use and small-scale growing. Developing legalization models that accommodate small-scale supply or, in the case of criminal justice models, clearly distinguish between social and commercial supply, might also be tools for avoiding the reproduction of social inequalities and injustices, especially because factors like race and social class tend to negatively inform and impact the enforcement of drug legislation (Beckett et al., 2006; Shiner et al., 2018; Campbell et al., 2022).

### Limitations

This study has several limitations. First, the online recruitment method clearly restricts respondents to those who have access to the internet, although all the countries in our survey had very high penetration of internet access. Second, since the survey is a convenience sample, it is not necessarily representative of the broader population of cannabis growers (Barratt & Lenton, 2015). Convenience surveying is commonly used in drug research, as people who use drugs are often a small and stigmatized group who, due to the illegality of their activity, do not respond well to standard population surveying techniques. Furthermore, among cannabis using populations, the demographic characteristics of people who volunteer to complete household surveys and purposive web surveys are not vastly different (Barratt et al., 2017). Third, given that the survey was unpaid and involved a substantial time commitment to complete (median time: 28 min), we may have attracted growers with a particularly strong interest in and enthusiasm for cannabis growing and cannabis issues. On the other hand, the lack of financial inducement eliminates incentives for fraud or duplication of responses. Fourth, there is likely a bias towards smaller scale growers, who are less concerned about the possibility of criminal sanctions, although we tried to mitigate this issue by maintaining anonymity, not collecting IP addresses or any other identifying information, and publishing a list of actions taken to reduce risks for participants on our website. Fifth, given that selling, more so than sharing and swapping, of cannabis is easily associated with the stigmatized figure of the ‘drug dealer’ (Taylor & Potter, 2013), it is possible that a social desirability bias may have led to some underreporting of profit-oriented sales as both a motive for and as a secondary effect of cannabis growing. Even through social desirability biases are generally lower in surveys that are self-administered because there is no interaction between the respondent and the researcher (Tourangeau & Yan, 2007), societal norms might nevertheless have influenced some respondents’ answers particularly with regard to selling. Sixth, given that some of the participating countries did not include questions regarding the race and ethnicity of participants, we decided to exclude this variable from the analysis. Future studies could fruitfully explore links between cannabis growing and race/ethnicity. Lastly, while our study did include cannabis growers across five continents, most of the participating countries were from the Global North. A future study should strive to include more countries from the Global South, as this would enable a more comprehensive understanding of global patterns in cannabis growing, including differences in motivations and in market supply structures.

### Conclusion

This research informs our understanding of the role of distribution among small-scale cannabis growers. It comprises novel quantitative

survey measures to answer questions that have been largely confined to qualitative research. Although most growers grow for their own consumption, we found that supply of surplus cannabis is relatively normalized among growers and that most engage in social supply and fewer in profit-oriented supply. These findings can inform policymakers as the landscape of cannabis policy continues to develop.

### CRedit authorship contribution statement

**Thomas Friis Sogaard:** Writing – original draft, Visualization, Supervision, Investigation, Conceptualization. **Julie Elizabeth Brummer:** Writing – review & editing, Validation, Formal analysis, Data curation. **Chris Wilkins:** Writing – review & editing, Investigation. **Sharon R. Sznitman:** Writing – review & editing, Investigation. **Eric L. Seigny:** Writing – review & editing, Software, Investigation, Data curation. **Vibeke Asmussen Frank:** Writing – review & editing, Investigation. **Gary Potter:** Writing – review & editing, Investigation. **Pekka Hakkarainen:** Writing – review & editing, Investigation. **Monica J. Barratt:** Writing – review & editing, Methodology, Data curation. **Bernd Wersé:** Writing – review & editing, Investigation. **Jodie Grigg:** Writing – review & editing, Investigation, Data curation. **Davide Fortin:** Writing – review & editing, Investigation. **Daniel Bear:** Writing – review & editing, Investigation. **Simon Lenton:** Writing – review & editing, Investigation. **Marie Jauffret-Roustide:** Writing – review & editing, Investigation. **Irma Kirtadze:** Writing – review & editing, Investigation.

### Declaration of competing interest

Thomas Friis Sogaard – no conflicts of interest  
 Julie Elizabeth Brummer - no conflicts of interest  
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 Sharon R. Sznitman – no conflicts of interest  
 Eric L. Seigny – no conflicts of interest  
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 Gary Potter - no conflicts of interest  
 Pekka Hakkarainen – no conflicts of interest  
 Monica J. Barratt – no conflicts of interest  
 Bernd Wersé – no conflicts of interest  
 Jodie Grigg – no conflicts of interest  
 Davide Fortin – no conflicts of interest  
 Daniel Bear – no conflicts of interest  
 Simon Lenton – no conflicts of interest  
 Marie Jauffret-Roustide – no conflicts of interest  
 Irma kirtadze – no conflicts of interest

### Declarations of ethics

The study has been registered with the Danish Data Protection Agency and follows the ethical standards required by the Danish social sciences.

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