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Lenton, S., Frank, V. A., Barratt, M. J., Dahl, H. V., & Potter, G. R. (2015). Attitudes of cannabis growers to regulation of cannabis cultivation under a non-prohibition cannabis model. *International Journal of Drug Policy*, 26(3), 257–266.

which has been published in final form at  
<https://doi.org/10.1016/j.drugpo.2014.08.002>

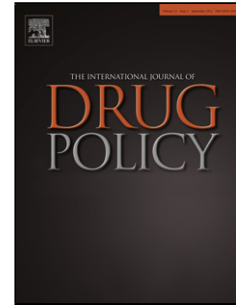
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## Accepted Manuscript

Title: Attitudes of cannabis growers to regulation of cannabis cultivation under a non-prohibition cannabis model

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PII: S0955-3959(14)00216-3  
DOI: <http://dx.doi.org/doi:10.1016/j.drugpo.2014.08.002>  
Reference: DRUPOL 1436

To appear in: *International Journal of Drug Policy*

Received date: 23-4-2014  
Revised date: 5-8-2014  
Accepted date: 10-8-2014

Please cite this article as: Attitudes of cannabis growers to regulation of cannabis cultivation under a non-prohibition cannabis model, *International Journal of Drug Policy* (2014), <http://dx.doi.org/10.1016/j.drugpo.2014.08.002>

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## Attitudes of cannabis growers to regulation of cannabis cultivation under a non-prohibition cannabis model

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Keywords:

Cannabis  
Policy  
Cultivation  
International  
Attitudes

## Abstract

**Background:** How cannabis cultivation is dealt with under various examples of cannabis legalization or regulation is an important consideration in design of such schemes. This study aimed to (i) investigate support among current or recent cannabis growers, for various potential policy options for cannabis cultivation if prohibition were repealed, and (ii) explore the support for these options across countries, scale of growing operations, demographics, drug use and cannabis supply involvement variables.

**Method:** This study utilized data from the online web survey of largely ‘small-scale’ cannabis cultivators, aged 18yrs and over, in eleven countries conducted by the Global Cannabis Cultivation Research Consortium (GCCRC). Data from 1,722 current and recent cannabis growers in Australia, Denmark and the UK, who were all asked about policy, were included in the analysis. It investigated support for various frameworks for cultivation: (no regulation (*free market*); adult only; growing licenses; restrictions on plant numbers; licensed business-only sale; approved commercial growing; etc.). Among current growers, support for these options were compared across countries, across scale of growing operations, and by demographics, drug use and crime variables.

**Results:** Although there were some between country differences in support for the various policy options, what was striking was the similarity of the proportions for each of the eight most popular policy options. Among current growers, many of these positions were predicted by demographic, drug use and cannabis growing variables which were conceptually congruent with these positions.

**Conclusions:** The results have relevance for the provisions regarding cannabis cultivation in the design of new non-prohibitionist models of cannabis which are increasingly under consideration. It should be of interest to policy makers, drug policy researchers, law enforcement and cannabis cultivators.

## Background

How cannabis cultivation is dealt with under various examples of cannabis legalization or regulation is an important consideration in design of such schemes. Legal, regulated schemes for recreational cannabis use are under construction or being implemented in Uruguay, Colorado and Washington, but their treatment of cultivation varies. Under the proposed regulated model in Washington State home growing of cannabis for recreational, as opposed to medical, use remains illegal (Washington State Liquor Control Board, 2013). Under the new Colorado laws, cultivation of up to three cannabis plants for personal recreational use will be permitted (Room, 2014). The scheme in Uruguay allows nationals, but not visitors, to cultivate up to 6 plants per adult member of the household at home. Alternatively, Uruguayans can join users' clubs of not more than 45 members, which are authorised to have up to 99 plants. Club members can purchase up to 40 grams of cannabis per month for their own use (Decorte, T. Personal communication, 10 April, 2014). Other existing models of cannabis law reform dissuade or prohibit cultivation. For example, formally, the Dutch system, characterised by the *de facto legalization* of *coffeeshops*, does not allow for home cultivation, and although at times police policy may have been to ignore instances of people growing five plants or fewer at home (Reuter, 2010), at other times this has been actively policed. Whereas under *prohibition with civil penalty* schemes currently in place in three Australian states, cultivation of small numbers of plants attracts a fine but not a criminal conviction (Lenton, 2011).

There is reason to believe that, even in a regulated legal market where purchasing cannabis from official suppliers is allowed, many current growers would prefer to cultivate their own cannabis. Research suggests cannabis cultivation exists in a rich culture enhanced by internet connections and that many current cannabis users are cannabis connoisseurs: growers who take pride in their quality control and knowing what they are putting into their bodies (Decorte, 2010; Potter, 2010). Cannabis growers give many reasons for growing other than economic ones (notably to save money, or for profit), including: 'the love of the plant'; social capital; personal pride in growing a good plant; a desire to make a political or cultural point; for medicinal use; for sharing with friends; that home grown cannabis was healthier, or milder; and avoiding the criminal element (Decorte, 2010; Hakkarainen, Frank, Perälä, & Dahl, 2011; Potter et al., this volume; Potter, 2010).

It is yet to be seen what proportion of the market small-scale cannabis cultivators will constitute in Washington, Colorado or Uruguay once these markets are established and settle. Furthermore, the new Colorado and Washington schemes, which allow and require industrialised growing, are not the only possible regulated legal models for cannabis. It can be argued that a model in which smaller scale growers have a larger, even if minority, share of the market (akin to a microbrewery model) would be more advantageous than one in which only industrialised growers survive, which, at its extremes, has been called the 'Marlboro-ization of marijuana' (See Nadelmann quoted in Dickinson, 2013).

Small-scale cannabis growers are just one of the categories of stakeholders in the shape of cannabis policy under non-prohibition regimes, but they are one whose policy views have not been systematically studied to date. We took the opportunity to ask the cannabis growers accessed through the Global Cannabis Cultivation Research Consortium (GCCRC) project (Barratt, et al., 2012) about their views on how cannabis cultivation should be regulated under a non-prohibitionist model. Whilst the critique could be made that this is 'akin to asking people who grow tomatoes at home to comment on agricultural policy' (Caulkins, J, personal communication, 22 May 2014), this is an argument which has less currency when considering models like that in Uruguay, or others, which recognise there may be some benefit in small-scale growers being accommodated in a non-prohibitionist model. To that end, this project recognised that current growers bring both experience and specialised knowledge to the consideration of policy options for cannabis, and that their attitudes were worthy of study.

### *Study aims*

This study investigates support among current or recent cannabis growers, for various potential policy options for cannabis cultivation if prohibition were repealed. Further, the study explores support for these options among current growers across countries, scale of growing operations, and by demographics, drug use and cannabis supply involvement.

### **Method**

This paper utilizes data from a subsample of an anonymous web survey of largely 'small-scale' cannabis cultivators, 18yrs and over, in eleven countries conducted by the GCCRC.

The rationale, scope, content, design and limitations of the study have been described in Barratt et al (2012) and further methodological detail in a companion paper in this volume [Barratt et al, this volume]. While all respondents across the eleven countries were asked a core questionnaire of 35 questions titled the *International Cannabis Cultivation Questionnaire* (ICCQ) (Decorte, et al., 2012), different research groups within the GCCRC were able to add additional modules or questions reflecting their own interests which may have been applied across one or more survey countries (see Barratt, et al., 2012). Through this process, respondents in each of Australia, Denmark and the UK, were asked '*If prohibition were repealed, how do you think cannabis growing should be regulated (if at all)?*' Survey data from these three countries have thus been included in this paper (see Table 4). These possible responses were generated by a two-step process: (i) the authors constructed an initial list using their domain knowledge; and then (ii) volunteer moderators of the web forum ozstoners.com reviewed the draft questionnaire and suggested modifications, many of which were incorporated in the final response options (see Barratt, et al., 2012). Following the close of the survey, the 'other' responses were reviewed and the highest frequency responses were used to generate a further 9 response categories which were used to reclassify appropriate 'other' responses. These additional categories are also provided in Table 4. Respondents were eligible for the study if they: were at least 18yrs of age; had last grown cannabis not more than 5yrs ago; and completed at least 50% of 22 key questions in the ICCQ. Overall, 2,595 potentially eligible respondents commenced the questionnaire and after the above exclusions 1,722 cases were eligible for analysis. Table 1 shows the final sample and reasons for exclusion by country.

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Insert Table 1 about here

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## Analysis

As IP addresses were not collected because familiarity with the target group and piloting emphasised the importance of anonymity (Barratt, et al., 2012), it was not possible to eliminate multiple entries from the same IP address. Although it was considered unlikely that any more than a few respondents would bother to complete an on-line questionnaire on more

than one occasion, the data set of eligible cases was scanned for duplicates using SPSS Duplicates command (IBM Corporation, 2012), which revealed 2 possible duplicates from the Australian sample, 5 from the Danish sample and 2 from the UK. Further investigation of these cases suggested that overall, at most, 8 records could have been duplicates from the same 4 respondents, although their records were not identical. As this was a rate of 0.4% which was unlikely to have any effect on the results, these cases were not excluded from the sample. For univariate analyses (Chi square for categorical variables and ANOVA and t-test for continuous variables) a conservative alpha level of 0.01 was applied to account for the possibility of type 1 error due to the multiple comparisons. Variables of interest were subsequently subjected to multivariate logistic regression to explore their unique relationship with the policy attitudinal variables where inter-correlation was accounted for. The logistic regression employed was a backward stepwise model. An alpha level of 0.05 was employed for variables entering the model and variables were retained in the final model if the effect of the variable was significant at an alpha level of 0.10. An alpha level of 0.01 was used to determine the significance of predictors in the final models. As variables describing cannabis production and supply were considered important predictors, but these were only asked of those respondents who had grown cannabis in the previous 12 months, the size of the sample subject to the logistic model was limited to these recent growers and with list-wise deletion of missing cases a reduced sample (n= 865) was available for this analysis.

The descriptive statistics in this paper provide an overview of the country-specific characteristics. As the data are drawn from a self-selected purposive sample, it is not possible to draw conclusions to the broader population of cannabis cultivators. Rather, in this paper, we explore relationships between members of the resultant sample and the analyses should be interpreted in this way. All analyses were conducted using SPSS 21.0 (IBM Corporation, 2012).

Although the majority of survey respondents reported small-scale cultivation, there were some instances of growers who reported growing relatively large amounts of cannabis for profit. In order to identify such 'commercial' growers, a principal component analysis (PCA) was used to reduce data by combining five correlated variables. The five questions selected to indicate commercial growers were: (i) What is the number of juveniles/seedlings/cuttings typically grown per crop?; (ii) What is the number of mature plants typically grown per crop?; (iii) Do you grow cannabis so you can sell it?; (iv) Do you sell all of your cannabis?;



and (v) What proportion of income is made from selling home grown cannabis? Thus, for this paper ‘commercialness’ was dichotomized such that a score of 1 meant the respondent had engaged in high volume, cannabis cultivation and made a recent sale, with a score of 0 meaning not having done so. The distribution of this variable can be seen in Table 4. As there were only 13 missing (0.8%) cases from 1722 in total from the policy attitude variables missing data imputation methods were not employed in this paper but rather an available-case analysis was used. The benefit of utilizing complex data imputation is usually only justified if the proportion of missing data is substantial (Penny & Atkinson, 2012).

## Results

### *Country differences*

Demographic characteristics of the sample and use of other drugs by country of residence are provided in Table 2. Table 3 contains relevant cannabis cultivation and supply involvement variables. Clearly there were differences between respondents from each of the three countries on a number of these variables, and for this reason, ‘country of residence’ was a potential predictor variable entered in to the logistic regressions exploring attitudes to cannabis cultivation policy options.

### *Demographics and other drug use*

With regards to demographics (Table 2) there were significant differences ( $\alpha=0.01$ ) between the three countries with regards to age with the median age of the Australian sample 35yrs compared to 31yrs in Denmark and 33yrs in the UK. As expected, a number of employment-related variables differed between the three country samples. For example, being in any form of employment (full-time, part-time or self-employed) was reported by 69.5% of Australian respondents, 55.1% of Danish respondents and 62.3% of UK respondents. There was also a greater proportion of full time students among the Danish respondents (23.1%), compared to those from the UK (9.5%) and Australia (9.0%). There were similar differences in living situation, with for example 59.0% of Australians saying they lived with their spouse or partner, compared to 42.0% of the Danish sample and 47.2% of the UK sample. Living alone was reported by 13.9% of the Australians, 32.5% of the Danes, and 20.6% of the UK sample. It is notable that there were no significant differences

between the three samples with regards to the proportion who reported that children (their own or their stepchildren) lived with them. With regards to use of drugs other than homegrown cannabis, Table 2 also shows that 42.0% of the Australian sample compared to 21.8% of the Danish sample and 31.1% of respondents from the UK said that they had used ‘other illicit drugs’ (drugs other than: self-grown cannabis; cannabis not self-grown; alcohol; cigarettes; hash or synthetic cannabinoids) in the previous 12 months.

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Insert Table 2 about here

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#### *Extent of cannabis cultivation and supply*

With regards to characteristics of their cannabis cultivation and cannabis supply involvement (Table 3) there were no overall significant differences between the country samples with regards to the number of crops that they had grown. However, there were differences in the number of mature plants they typically grew per crop and the typical area devoted to cannabis growing. For example 80.3% of the Australian respondents, compared to 53.0% of the Danish sample and 77.0% of the UK sample, said that they typically grew fewer than 7 mature plants per crop. Similarly 50.0% of the Australians, compared to 42.8% of the Danes and 77.0% of the UK sample, said they typically used not more than 3 square meters devoted to cannabis growing. Median crop yield also varied between the three samples being 283g among Australian respondents, 300g among the Danes and 227g among the UK sample. Perhaps unsurprisingly, given the different climatic conditions between the three countries, exclusively growing cannabis outdoors was reported by 41.0% of the Australians, 28.0% of the Danes and only 5.1% of the UK sample. The number of people the respondent said they grew with also significantly differed across the samples with growing on one’s own being reported by 74.1% of the Australians, 60.3% of the Danes and 78.3% of the UK sample. There were fewer significant differences between the samples with regards to cannabis supply variables. Selling any of their self-grown cannabis for profit in the last 12 months was reported by 12.1% of the Australian sample compared to 6.4% of the Danes and 11.3% of the UK sample. Sharing or giving away any cannabis during the same period also significantly varied between countries, with similar proportions in Australia (64.6%) and Denmark (64.2%) compared to the UK (53.7%) reported having done so. The proportion of their

income derived from selling their home grown cannabis also varied across the samples, but only a small proportion of each group (6.4% of the Australians, 1.8% of the Danes and 3.8% of the UK sample) said that this activity comprised more than 50% of their income. The Commercial=1(high volume recent sale) variable, as described above, failed to reach significance.

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Insert Table 3 about here

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*Support for policy options by country*

Table 4 presents overall support for each of the cannabis growing policies and Figure 1 shows the support for each of these by country sample. Overall, some 1,709 (99.2%) of the 1,722 eligible respondents from the Australian, Denmark and UK samples responded to the policy question. Whilst there were significant differences between the proportions of the samples endorsing five of the various options, what is apparent from the Figure 1 is that there was consistency across the sample as a whole in which options were endorsed by more than 10% of respondents. It is these eight policy options, which were subject to the logistic regression described below.

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Insert Table 4 about here

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Insert Figure 1 about here

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Table 4 and Figure 1 show that support for the view that ‘Only adults (18+) should be legally able to grow cannabis’ was endorsed by 69.9% of the sample as a whole and comprised 70.8% of the Australian sample, 65.1% of the Danish sample and 78.1% of the UK sample ( $p < 0.001$ ). Endorsement of the view that ‘Anyone could be able to grow for personal use but

only licensed businesses could sell' comprised 63.7% of the sample as a whole, including 56% of the Australians, 67.0% of the Danes and 65.4% of the UK sample ( $p < 0.01$ ). The statement 'Approved commercial growers could get a licence to grow and sell cannabis' was supported by 41.0% of the sample as a whole, 41.2% of Australian respondents, 38.5% of those in Denmark and 45.7% of those in the UK, but the difference between countries was not significant ( $p = 0.131$ ). Support for the view that 'Individual growers could buy a licence to enable them to legally grow cannabis' was endorsed by 29.4% of the sample as a whole, 35.9% of the Australian sample, 23.0% of the Danes and 34.4% of the UK respondents ( $p < 0.001$ ). Some 24.4% of the sample as a whole agreed that 'There should be no restriction on the number of plants one could legally grow' including 21.2% of the Australian sample, 26.5% of the Danes and 24.1% of the UK respondents which was not a significant difference ( $p = 0.083$ ). The view that 'Licenced individual growers would be restricted to growing only for personal use' was supported by 22.6% overall, including 30.0% of the Australians, 17.7% of the Danes and 23.3% of the UK respondents ( $p < 0.001$ ). The view that 'Licenced individual growers would be restricted to growing up to 10 mature plants' was endorsed by 16.6% of the sample as a whole including 20.6% of the Australians, 11.1% of the Danes and 23.1% of the UK sample ( $p < 0.001$ ). Only 14.3% of the overall sample believed 'There should be no regulation: anyone should be able to grow cannabis for personal use or sale' which included 14.1% of the Australians, 15.4% of the Danes and 12.5% of the UK respondents ( $p < 0.001$ ). None of the other policy options which were endorsed by less than 10% of the sample had significant between country differences.

#### *Multivariate logistic regressions of predictors of policy support*

For simplicity of interpretation the same set of predictor variables was entered into the logistic regressions for each of the eight policy options endorsed by more than 10% of the sample. Those variables entered were based, in large part, on: (i) The results of the between country analyses already being presented in this paper; (ii) The need to limit the number of predictors; and (iii) The desirability of a suite of predictors likely to be relevant to all eight policy options. Consequently the variables entered into the equations were: Country of residence; Their age; Their gender; Whether they were employed; Whether they grew cannabis to sell it; Whether they sold any of the cannabis they grew in the last 12 months; The proportion of their income they got from growing cannabis in the last 12 months; The typical area devoted to cannabis growing; Whether they had used illicit drugs other than cannabis, hash or synthetic cannabinoids in the last 12 months; The number of mature plants

they typically grew; The typical size of their crop in grams; How many crops of cannabis they had grown so far; How many times they failed before succeeding with growing; How many people they grew their crop with; How many people know about their crop; Whether they communicated with other growers online that they had not met face-to-face; Whether they typically grew indoors or outdoors; and the dichotomised Commercial\_recode variable which has already been described. As explained above, due to the list-wise deletion of those cases who had not grown cannabis in the past 12 months, each logistic regression was conducted on 865 cases comprising 50.2% of the sample of 1722. Comparisons of those cases subject to logistic regressions with those which were excluded due to missing variables were conducted to determine how well this sub-sample was representative of the sample as a whole. Those in the logistic regression group were not significantly different from the rest of the sample in the terms of age ( $F=0.208$ ,  $df=1, 1522$ ,  $P=0.649$ ); gender (Chi. Squ.=0.162  $df=1$ ,  $P=0.687$ ); having a current full or part-time job (Chi. Squ.=2.482  $df=1$ ,  $P=0.115$ ), or a number of variables relating to their living situation, such as whether they lived alone (Chi. Squ.=3.822  $df=1$ ,  $P=0.051$ ). Unsurprisingly, they were significant differences between the groups in terms of some of the cannabis growing variables, namely those subject to logistic regression, all of whom had grown cannabis in the last 12 months, were more likely to have grown a larger number of cannabis crops (Chi. Squ.=27.816  $df=1$ ,  $P=0.000$ ), were more likely to have said that they had harvested their first crop (Chi. Squ.=53.115  $df=6$ ,  $P=0.000$ ), and reported that a greater number of people knew about their involvement in cannabis growing (Chi. Squ.=24.487  $df=4$ ,  $P=0.000$ ), than those cases who were not included in the logistic regression. However, interestingly there were no differences between the two groups with regards to the number of people they grew with (Chi. Squ.=0.860,  $df=3$ ,  $P=0.835$ ). Overall it was deemed that the two groups were comparable, although they differed in some respects which could be anticipated due to their differences in involvement in cannabis growing in the previous 12 months.

Results of the eight logistic regressions representing the policy statements supported by at least 10% of the total sample are presented in Table 5. Support for the view that ‘Only adults (18+) should be legally able to grow cannabis’ was significantly affected by country of residence and age. UK respondents were 2.63 times less likely than their Australian colleagues to endorse the statement [OR = 0.38; 95% confidence interval (CI) = 0.24, 0.61;  $P<0.01$ ]. For each additional year of age respondents were 2.0% less likely to support for the statement that only adults should be able to legally grow the drug [OR = 0.98; 95%

confidence interval (CI) = 0.97, 0.99;  $P < 0.01$ ]. Furthermore, among those cases in the logistic regression, but not in the sample as a whole, those who lived with their own children (or stepchildren), any of whom could be adults, were less likely (63.4% vs 71.2%) to agree that ‘only adults (18+) should be legally able to grow cannabis’ (Chi. Squ.=5.287 df=1,  $P=0.021$ ).

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Insert Table 5 about here

[or provide as an online supplementary file as deemed appropriate]

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‘Anyone could be able to grow for personal use but only licensed businesses could sell’ was significantly affected by the number of crops that respondents had grown so far ( $P < 0.01$ ), with those that had grown between 6 and 10 crops being almost twice as likely than those who ‘had only harvested one crop or not yet grown a crop’ to endorse the statement [OR = 1.96; 95% confidence interval (CI) = 1.23, 2.98;  $P < 0.01$ ]. Support for limiting sale to licenced growers was also predicted by the number of people with whom they grew their crop ( $p < 0.01$ ), with those that grew with 3 or more other people being more than 9 times more likely than those who grew on their own to endorse this statement [OR = 9.45; 95% confidence interval (CI) = 2.73, 33.04;  $P < 0.001$ ]. Support for the statement ‘Approved commercial growers could get a licence to grow and sell cannabis’ was only significantly predicted by age, with respondents being 2.0% less likely to support the statement with each additional year of age [OR = 0.98; 95% confidence interval (CI) = 0.97, 0.99;  $P < 0.01$ ].

Support for the statement that ‘Individual growers could buy a licence to enable them to legally grow cannabis’ was only significantly predicted by country of residence ( $P < 0.01$ ), with UK residents 1.75 times less likely than their Australian counterparts to support the statement [OR = 0.57; 95% confidence interval (CI) = 0.38, 0.85;  $P < 0.01$ ].

The view that ‘There should be no restriction on the number of plants one could legally grow’ was significantly affected by respondent age, by the number of mature plants they typically grew per crop and by whether they typically grew indoors or outdoors. With each additional year of age respondents were 3.0% less likely to support for the statement [OR = 0.97; 95% confidence interval (CI) = 0.96, 0.99;  $P < 0.001$ ]. Those who typically grew 7-10 mature plants were 3.6 times less likely than those who grew up to 6 plants to say that there should be no

restrictions on plant numbers [OR = 0.28; 95% confidence interval (CI) = 0.18, 0.45;  $P < 0.001$ ], and those who grew seedlings indoors and then planted outdoors were 2.5 times more likely than those who grew indoors only to say that there should be no restrictions on plant numbers [OR = 2.51; 95% confidence interval (CI) = 1.30, 4.85;  $P < 0.01$ ].

None of the predictors of the statement that 'Licenced individual growers would be restricted to growing only for personal use' were significant at the 0.01 level.

The only significant predictor of the statement 'Licenced individual growers would be restricted to growing up to 10 mature plants' was country of residence. UK growers surveyed were 2.1 times less likely than their Australian counterparts to support the statement [OR = 0.47; 95% confidence interval (CI) = 0.27, 0.81;  $P < 0.01$ ].

In contrast support for the statement that 'There should be no regulation: anyone should be able to grow cannabis for personal use or sale' was significantly related to the proportion of income from the sale of home-grown cannabis ( $P < 0.01$ ), the number of plants typically grown per crop ( $P < 0.001$ ) and whether they grew indoors or outdoors ( $P < 0.01$ ). Those whose cannabis growing accounted for more than 50% of their income were 8.1 times more likely than those who did not sell any of their cannabis to endorse the statement [OR = 8.12; 95% confidence interval (CI) = 2.56, 25.89;  $P < 0.001$ ]. Those who grew seedlings indoors and then planted outdoors were 5.5 times more likely than those who grew indoors only to say that there should be no restrictions on plant numbers [OR = 5.51; 95% confidence interval (CI) = 2.05, 14.78;  $P < 0.01$ ].

## Discussion

This study uses data from the first large international survey of recent (last 5 yrs) cannabis growers, to explore this group's attitudes towards specific cannabis cultivation policy options. As expected, the samples varied across the three countries with respect to key demographic, drug use, cannabis growing and supply variables. Some of these differences appeared consistent with known demographic, climatic and cannabis growing trends between the countries whilst other differences may have been due to different recruitment methods employed in each country (see Barratt, et al., this volume). This is why it was important to investigate the predictors of the various policy options using multivariate methods, in this

case logistic regression, which is able to separate out the unique contribution of each variable while controlling for the effects of co-variables.

Whilst there were between country differences in support for the various policy options, what was apparent was the similarity of the proportions for each of the eight most popular policy options. Clearly more than two-thirds of the sample believed ‘only adults should be legally able to grow cannabis’, and only a slightly smaller proportion believed that ‘while anyone should be able to grow, sale should be limited to licensed commercial businesses’, and that ‘commercial growers should be licensed’. These are policy positions which would likely also be accepted by a large proportion of potential law makers, and those in the community who do not grow cannabis.

Levels of support for ‘individual growers having to buy a license’ were lower, at less than a third, which was reflected in a number of text responses where these respondents stated that they should not be charged for growing a plant which they currently did without a fee. Similarly, the views that ‘there should be no restrictions on plant numbers’, ‘that growers should be limited to personal use’ or that ‘licensed growers should be limited to 10 plants’ were supported by less than a quarter of respondents. What is newsworthy, given the survey sample (i.e. recent and current cannabis growers) was that only 14% said that there should be ‘no regulation of cannabis growing’ under a non-prohibitionist model. The finding that 85% would support regulation of some sort bodes well for future negotiations of legal regulatory frameworks for cannabis growing.

The logistic regressions on predictors of current growers’ policy attitudes provided some interesting further insights into these policy views. Predictors of support for ‘adults only’ growing were somewhat curious. The country specific differences may reflect differences in how the interaction of cannabis and young people is viewed between Australia and the UK, with a concern about health matters in the former and a concern about criminalization of young people in the latter. Even more curious is the decreasing support for the statement with older age. Although this seems counter-intuitive, it may be that older growers might be more likely to say ‘well it didn’t do me any harm in my youth’, or be less attentive to health information about cannabis use by the young, and be less likely to support limiting growing to adults.

The finding that support for ‘sale only among licensed businesses’ was stronger among more experienced growers and those who grew with a larger number of people may be that they



saw themselves as likely candidates to be involved in such cannabis sale businesses in a future regulated system. The finding that older respondents were less likely to support ‘commercial growers getting a license to sell cannabis’ was conceptually difficult to interpret as it was not apparent whether the lack of support was due to not being supportive of cannabis *sale* or the *commercialism* aspect. Similarly the finding that Australians were more willing to support ‘individual growers buying a license’ may reflect the strength of the Australian economy.

While other policy findings were less easy to interpret, the findings regarding ‘lack of restrictions on plant numbers’ and the ‘lack of any regulations on growing’, were each predicted significantly by cannabis growing variables. Whilst older respondents were less likely to support no limit on plant numbers under a non-prohibitionist model, it was of interest that those growing 7 to 10 plants were less likely than those growing fewer plants to say there should be no restrictions on plant numbers. Further research would be needed to explore the reasons for this. A couple of possibilities include that these larger scale growers might be more aware of yield and what is likely to be feasible under a regulated model, or might want to remove even larger scale growers from the market. Interestingly, those who grew seedlings indoors and then planted outdoors were more likely to support no restrictions on numbers than other growers. It may be that this growing practice is a proxy marker for more commercialized growing operations which may be less favorable to restrictions on crop size. Alternatively, it may be a proxy for ‘more committed’ growers who are using more complex growing techniques.

The finding that UK growers were less likely than Australians to support ‘licensed individual growers being restricted to 10 plants’ may be a function of growing practices and yield in the UK where most growing is indoors, compared to the Australian context.

It was conceptually coherent that the view that there should be ‘no restrictions on growing or sale’ was strongly predicted by variables suggesting commercial operations, namely earning more than 50% of income from cannabis cultivation and growing seedlings indoors and then planting them outdoors. On face value it would seem that larger scale suppliers will have more to lose in a market characterized by restrictions which may mean they need to change their growing practices to comply with a legal regulated supply market.

### *Limitations*

The main limitation of this study is the non-representative sample. However, as has been pointed out elsewhere in this issue (see Barratt et al paper in this volume), only small numbers of cannabis growers are found in the studies employing representative samples of the general population and the fact that we accessed 1,722 current/recent cannabis growers in this study makes it a useful contribution to the limited existing literature. Nevertheless, whilst this study provides useful exploration of within sample differences, caution needs to be exercised in extrapolating these results beyond the samples accessed here. Other limitations relate to the exploration of predictors of the policy positions explored in this paper. The size of the sample subject to the logistic regressions was roughly half that who answered the policy questions, as it was limited to those who had grown cannabis in the past 12 months, although analysis suggested that apart from their recent growing, this sub-sample was similar to the rest of the sample in many respects. Whilst limiting the earlier parts of the paper to these recent growers was considered, from a future policy perspective it seemed that the views of recent (past 5yrs) as opposed to simply current (past 12mths) growers was important as it is conceivable that at least a proportion of these ‘former’ growers, might consider growing again in a future regulated model. There were also some difficulties in interpreting the meaning of the policy predictors. To some extent this was due to the double-barreled nature of some of the policy items. Future research should where possible keep to single concept response categories. Despite this caveat, the current web-survey data provides a good base for exploring these matters in future qualitative work on the policy views of cannabis cultivators where the nuances can be explored more fully.

### *Conclusions*

This paper showed that among a large sample of current and recent cannabis growers accessed online there was noteworthy consistency in their support for a number of potential policy settings for cannabis cultivation within possible future legal, regulated systems. Further, among current growers, many of these positions were predicted by demographic, drug use and cannabis growing variables which were conceptually congruent with these positions. Whilst only two of the three legal regulated models for cannabis include provision for legal cannabis growing, it is apparent based on earlier research (Decorte, 2010;

Hakkarainen, et al., 2011; Potter, 2010) that many cannabis growers will want to continue growing cannabis under these or other non-prohibitionist models. Finally, when involved in the process and approached in a respectful way, cannabis growers are a potentially valuable part of the policy process, and are keen to express their views about appropriate cannabis cultivation policy settings. Although they are only one of many categories of potential stakeholders, the policy views expressed by the cannabis growers accessed in this study ought to be of interest to policy makers considering the place of cannabis growing in a legal regulated market.

#### Acknowledgements

We would like to thank the thousands of cannabis cultivators who completed our questionnaire. Our research would not be possible without their efforts. Thanks also to all the people and organisations who supported and promoted our research, including but not limited to: Bluelight.org, Chris Bovey, Nimbin Hemp Embassy, NORML-UK, OZStoners.com, shaman-australis.com, and all the coffee shops, grow shops and headshops that helped us. We would like to acknowledge the Nordic Centre for Welfare and Social Issues (NVC) for funding our project meetings. Our team was saddened by the death of Dr Helle Vibeke Dahl whilst this paper was being finalised. Her valuable contribution to the work is rightfully acknowledged by her inclusion as an author of this paper. SL and MJB through their employment at The National Drug Research Institute in the Faculty of Health Sciences at Curtin University were supported by funding from the Australian Government under the Substance Misuse Prevention and Service Improvement Grants Fund. MJB is now funded through a National Health & Medical Research Council Early Career Researcher Fellowship (APP1070140).

Accepted Manuscript

Table 1. Eligibility

	Australia	Denmark	UK	Total
Total questionnaires	574	1230	791	2595
Reason for exclusion				
Under 18yrs of age	0	345	47	392
Had not grown in past 5 yrs	83	253	270	606
Had not completed 50% of 22 key ICCQ items	2	328	314	644
Remaining cases in final sample	491	813	418	1722

Table 2. Demographic characteristics and other drug use

	Australia	Denmark	UK	Total	Sig
Gender	(n=489)	(n=809)	(n=397)	(n=1695)	
Male(%)	87.5	91.6	94.7	91.1	.001
Age (yrs)	(n=485)	(n=809)	(n=381)	(n=1675)	
Median	35	31	33	33	
Mean Age	37.2	33.8	33.8	34.8	.000
IQR	27-47	23-43	25-41	25-43	
Range	18-71	18-70	18-63	18-71	
Employment (%)	(n=488)	(n=810)	(n=398)	(n=1696)	
Full-time work	44.1	38.0	41.0	40.4	.094
Part-time or casual work	13.3	11.0	7.8	10.9	.032
Self-employed	17.2	9.1	17.1	13.3	.000
Any employment (FT, PT or self)	69.5	55.1	62.3	60.0	.000
Full-time student	9.0	23.1	9.5	15.9	.000
Part-time student	2.5	3.2	2.5	2.8	.668
Unemployed - looking for work	4.9	8.3	9.0	7.5	.034
Benefits/pension	6.8	3.2	10.1	5.8	.000
Disability/Sickness benefits	2.0	5.5	5.5	4.5	.007
Home duties	2.3	1.5	8.0	3.2	.000
Retired	3.9	8.4	1.3	5.4	.000
Not seeking work	9.0	2.7	1.3	4.2	.000
Other	0.0	0.2	0.0	0.1	.335
Refused	0.4	0.7	1.3	0.8	.353
Living situation (%)	(n=488)	(n=810)	(n=398)	(n=1696)	
No-one, I live alone	13.9	32.5	20.6	24.3	.000
My (step)child/ren	28.5	22.0	24.4	24.4	.029
My friends	4.3	4.3	4.8	4.8	.716
My grandparents	0.4	0.5	1.3	0.6	.221
My housemates	11.5	11.5	39.7	7.2	.000
My (step)parents	9.8	29.4	12.3	10.2	.270
My spouse / partner / boy(girl)friend	59.0	42.0	47.2	48.1	.000
My siblings or other family members	6.8	0.4	8.0	6.0	.041
Homeless	0.0	2.7	1.6	0.1	.006
I don't want to answer	2.7	6.8	4.6	2.7	.006
Other	0.2	0.2	0.0	0.2	.622
Drugs other than self-grown cannabis used in last 12 months (%)	(n=459)	(n=781)	(n=391)	(n=1631)	
Alcohol	79.3	77.1	74.2	77.0	.355
Cannabis that is not home-grown	61.4	47.2	64.5	55.3	.000
Cigarettes	60.3	70.9	68.8	67.4	.000
Hash (resin)	28.8	60.0	48.3	48.4	.000
Synthetic cannabinoids (e.g. Spice, Kronic, K2)	13.9	0.9	5.9	5.8	.000
Other illicit drugs	42.0	21.8	36.8	31.1	.000

Table 3. Cannabis cultivation and supply involvement

	Australia	Denmark	UK	Total	Sig
How many crops have grown so far (%)	(n=497)	(n=795)	(n=398)	(n=1671)	.037
I have not yet harvested a crop	3.1	1.1	2.0	1.9	
1 crop	11.9	10.6	10.3	10.9	
2-5 drops	33.3	37.5	36.2	35.9	
6-10 crops	18.6	20.5	20.4	19.9	
11-20 crops	17.2	14.5	13.1	14.9	
21-50 crops	10.5	10.4	8.3	10.0	
More than 50 crops	5.4	5.4	9.8	6.5	
Mature plants typically grow per crop(%)	(n=463)	(n=787)	(n=308)	(n=1650)	.000
Up to 6 plants	80.3	53.0	77.0	66.5	
7-10 plants	11.2	19.9	14.0	16.1	
More than 10 plants	8.4	27.1	9.0	17.5	
Typical area devoted to cannabis growing(%)	(n=448)	(n=771)	(n=391)	(n=1610)	.000
Up to 3 squ m	50.0	42.8	63.4	66.5	
More than 3 squ m	50.0	57.2	14.0	36.6	
Typical yield per crop (grams)	(n=427)	(n=718)	(n=312)	(n=1457)	.000
Median	283	300	227	284	
Mean	682	759	435	667	
95% confidence intervals	570-793	556-964	351-519	560-774	
IQR	113-709	100-600	113-510	100-600	
Range	0g-10kg	0g-50kg	0g-10kg	0g-50kg	
Typically grow indoors or outdoors(%)	(n=490)	(n=790)	(n=413)	(n=1693)	.000
Indoors only	27.3	39.7	76.3	45.0	
Outdoors only	41.0	28.0	5.1	26.2	
Both indoors and outdoors	25.5	20.0	15.3	20.5	
Seedlings indoors then planted outdoors	6.1	12.3	3.4	8.3	
Number of people typically grow with (%)	(n=487)	(n=801)	(n=415)	(n=1703)	.000
I grow alone	74.1	60.3	78.3	68.6	
I grow with 1 other person	20.9	26.0	16.4	22.2	
I grow with 2-3 other people	4.1	10.7	4.1	7.2	
I grow with more than 3 other people	0.8	3.0	1.2	2.0	
Distribution of own-grown cannabis last 12m (%)	(n=314)	(n=614)	(n=257)	(n=1185)	
Any Personal use	96.8	97.2	98.8	97.5	.270
Any Shared or gave away	64.6	64.2	53.7	62.0	.008
Any Kept	18.2	23.3	16.7	20.5	.044
Any Swapped	17.5	15.1	15.2	15.8	.616
Any Sold (Cover costs or profit)	24.2	17.1	22.2	20.1	.024
Any Sold (Cover costs)	19.4	14.7	19.8	17.0	.076
Any Sold (Profit)	12.1	6.4	11.3	8.9	.005
Proportion of income from selling home-grown cannabis (%)	(n=314)	(n=614)	(n=257)	(n=1185)	.003
Didn't sell	75.8	82.9	77.8	79.9	
0-10%	12.1	11.7	9.7	11.4	
11-50%	3.2	2.8	3.9	3.1	
51-100%	2.5	0.8	3.1	1.8	
Missing (sold but didn't specify proportion)	6.4	1.8	5.4	3.8	
Commercial =1 (High volume or recent sale)(%)	15.6	12.0	16.5	14.1	.061

Table 4. Policy question, response options and % of total sample endorsing this option

<i>If prohibition were repealed, how do you think cannabis growing should be regulated (if at all)?</i>	<i>% Endorsement</i>
Response options:	
There should be no regulation: anyone should be able to grow cannabis for personal use or sale	14.4
Only adults (18+) should be legally able to grow cannabis	69.9
Individual growers could buy a licence to enable them to legally grow cannabis	29.5
There should be no restriction on the number of plants one could legally grow	24.4
Licensed individual growers would be restricted to growing only for personal use	22.6
Licensed individual growers would be restricted to growing up to 10 mature plants	16.7
Licensed individual growers would be restricted to growing up to 20 mature plants	8.1
Anyone could be able to grow for personal use but only licensed businesses could sell	63.7
Approved commercial growers could get a licence to grow and sell cannabis	41.4
Other (specify) _____	7.4
I don't know	1.0
I don't want to answer.	0.1
Further responses recoded after analysis of 'Other' responses:	
Licensed growers restricted to (unspecified) plant numbers	0.5
Licensed growers restricted to 3-6 plants	0.6
Personal growers should not need license	2.5
Comments regarding Medicinal cannabis policy issues	0.9
Commercial growers should be taxed	0.4
Buyers' Clubs and Co-ops as per Spain or Belgium	0.2
Quality control important	0.9
Availability through pharmacies	0.6



Table 5. Logistic regressions predicting support for cannabis growing policy options

<b>Cannabis growing policy option supported and predictors (n=865)</b>	<b>OR</b>	<b>95%C.I.</b>	<b>Sig</b>
<b><i>Only adults (18+) should be legally able to grow cannabis</i></b>			
<i>Country</i>			.000
Australia	1.00		
Denmark	0.55	(0.33-0.92)	.023
UK	0.38	(0.24-0.61)	.000
<i>Age (per year)</i>	0.98	(0.97-0.99)	.003
<i>Number of mature plants</i>			.031
Up to 6 plants	1.00		
7-10 plants	1.67	(1.12-2.47)	.012
More than 10 plants	1.23	(0.76-1.99)	.392
<b><i>Anyone could grow but only licenced growers should be able to sell cannabis</i></b>			
<i>Country</i>			.009
Australia	1.00		
Denmark	0.70	(0.45-1.12)	.135
UK	1.21	(0.80-1.84)	.373
<i>Any Employment</i>			
No	1.00		
Yes (FT, PT or self emp)	0.68	(0.50-0.93)	.014
<i>Number of crops of cannabis grown so far</i>			.005
Not yet harvested or 1 crop	1.00		
2-5 crops	1.54	(0.87-2.72)	.139
6-10 crops	1.96	(1.23-2.98)	.002
11-20 crops	1.26	(0.80-1.99)	.316
More than 20 crops	0.97	(0.60-1.55)	.890
<i>Number other people they grow their crop with</i>			.002
Grow alone	1.00		
1 other person	3.18	(1.13-8.97)	.029
2-3 others	3.99	(1.34-11.35)	.013
More than 3 others	9.45	(2.73-33.04)	.000
<i>Typically grow indoors or outdoors</i>			.048
Indoors only	1.00		
Outdoors only	0.63	(0.35-1.14)	.129
Both indoors and outdoors	0.44	(0.24-0.81)	.009
Seedlings indoors then outdoors	0.54	(0.29-1.02)	.058
<b><i>Approved commercial growers could get a licence</i></b>			
<i>Age (per yr older)</i>	0.98	(0.97-0.99)	.006
<i>Proportion of income from selling home-grown cannabis</i>			.061
Didn't sell	1.00		
0-10%	1.23	(0.81-1.87)	.332
11-50%	2.76	(1.28-5.95)	.010
51-100%	0.90	(0.30-2.69)	.849
<i>Size of cannabis growing area</i>			
Up to 3 squ. meters	1.00		
More than 3 squ. meters	1.51	(1.05-2.17)	.026

\*Covariates retained had a P-value less than 0.10. We apply an  $\alpha$  level of .01 to determine the significance of values in this table.

Table 5 cont. Logistic regressions predicting support for cannabis growing policy options

<b>Cannabis growing policy option supported and predictors (n=865)</b>	<b>OR</b>	<b>95%C.I.</b>	<b>Sig</b>
<b>Individuals buy a licence</b>			
<i>Country</i>			.002
Australia	1.00		
Denmark	0.99	(0.64-1.53)	.955
UK	0.57	(0.38-0.85)	.006
<i>Any selling of homegrown cannabis (to cover costs or for profit) in last 12 months</i>			
No	1.00		
Yes	0.41	(0.18-0.94)	.034
<i>Proportion of income from selling home-grown cannabis</i>			.023
Didn't sell	1.00		
0-10%	0.38	(0.15-0.94)	.036
11-50%	1.22	(0.41-3.57)	.713
51-100%	0.81	(0.22-3.00)	.757
<i>Size of cannabis growing area</i>			
Up to 3 squ. meters	1.00		
More than 3 squ. Meters	1.30	(0.95-1.77)	.100
<i>Used any Illicit drugs other than cannabis, hash, or synthetic cannabis in last 12m</i>			
No	1.00		
Yes	1.51	(1.05-2.17)	.026
<b>No restrictions on plant numbers</b>			
<i>Country</i>			.039
Australia	1.00		
Denmark	1.11	(0.68-1.84)	.069
UK	0.67	(0.42-1.08)	.104
<i>Sold cannabis in the last 12 months</i>			.064
No	1.00		
Yes	0.59	(0.32-1.08)	.089
<i>Age (per yr older)</i>	0.97	(0.96-0.99)	.000
<i>Any Employment</i>			
No	1.00		
Yes (FT, PT or self emp)	1.35	(0.97-1.88)	.073
<i>Number of mature plants</i>			.000
Up to 6 plants	1.00		
7-10 plants	0.28	(0.18-0.45)	.000
More than 10 plants	0.57	(0.34-0.95)	.032
<i>Typically grow indoors or outdoors</i>			.004
Indoors only	1.00		
Outdoors only	1.25	(0.67-2.34)	.488
Both indoors and outdoors	1.54	(0.80-2.96)	.200
Seedlings indoors then outdoors	2.51	(1.30-4.85)	.006

\*Covariates retained had a P-value less than 0.10. We apply an  $\alpha$  level of .01 to determine the significance of values in this table.

Table 5 cont. Logistic regressions predicting support for cannabis growing policy options

<b>Cannabis growing policy option supported and predictors (n=865)</b>	<b>OR</b>	<b>95%C.I.</b>	<b>Sig</b>
<b><i>Licensed growers restricted to personal use</i></b>			
<i>Country</i>			.030
Australia	1.00		
Denmark	1.75	(1.07-2.87)	.025
UK	1.12	(0.68-1.84)	.652
<i>Number of mature plants</i>			.064
Up to 6 plants	1.00		
7-10 plants	1.43	(0.85-2.42)	.181
More than 10 plants	0.82	(0.42-1.57)	.541
<i>Number other people who know about their cannabis cultivation</i>			.060
None	1.00		
1 other person	1.94	(0.94-3.99)	.072
2-5 others	1.79	(0.96-3.34)	.067
6-10 others	0.99	(0.60-1.65)	.979
More than 10 others	1.38	(0.79-2.40)	.255
<i>Communicate with other cannabis growers online they have not met face</i>			
No	1.00		
Yes	0.71	(0.51-1.00)	.048
<i>Commercialness (High volume recent sale)</i>	1.60	(0.94-2.72)	.084
<b><i>Licensed growers should be restricted to 10 plants</i></b>			
<i>Country</i>			.001
Australia	1.00		
Denmark	1.15	(0.68-1.97)	.600
UK	0.47	(0.27-0.81)	.006
<i>Age (per yr older)</i>	0.98	(0.96-1.00)	.067
<i>Proportion of income from selling home-grown cannabis</i>			.075
Didn't sell	1.00		
0-10%	0.48	(0.23-1.00)	.480
11-50%	0.15	(0.02-1.66)	.148
51-100%	0.59	(0.07-5.11)	.632
<i>Number of mature plants</i>			.052
Up to 6 plants	1.00		
7-10 plants	2.78	(1.16-6.62)	.022
More than 10 plants	1.97	(0.74-5.23)	.174
<i>Number others who know about their cannabis cultivation</i>			.092
None	1.00		
1 other person	2.16	(0.96-4.89)	.064
2-5 others	1.66	(0.80-3.45)	.176
6-10 others	0.96	(0.52-1.78)	.893
More than 10 others	1.06	(0.52-2.16)	.867
<i>Typically grow indoors or outdoors</i>			.029
Indoors only	1.00		
Outdoors only	0.68	(0.35-1.30)	.240
Both indoors and outdoors	0.43	(0.21-0.89)	.023

Seedling indoors then outdoors	0.38	(0.18-0.80)	.012
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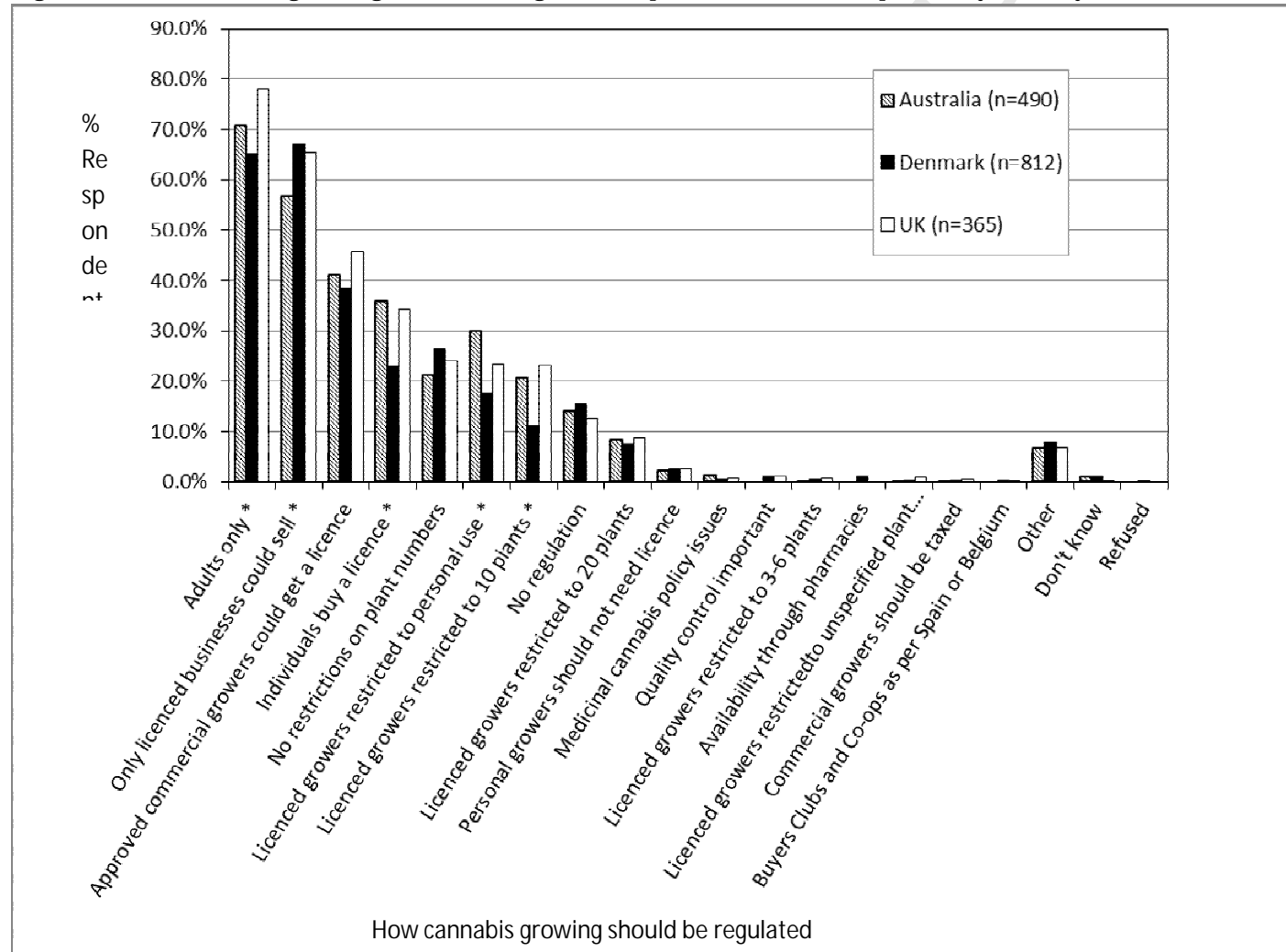
\*Covariates retained had a P-value less than 0.10. We apply an  $\alpha$  level of .01 to determine the significance of values in this table.

Table 5 cont. Logistic regressions predicting support for cannabis growing policy options

<b>Cannabis growing policy option supported and predictors (n=865)</b>	<b>OR</b>	<b>95%C.I.</b>	<b>Sig</b>
<b><i>There should be no regulation of cannabis growing</i></b>			
<i>Gender</i>			
<i>Male</i>	1.00		
<i>Female</i>	0.51	(0.27-0.95)	.034
<i>Proportion of income from selling home-grown cannabis</i>			
Didn't sell	1.00		.003
0-10%	1.28	(0.70-2.35)	.417
11-50%	0.63	(0.18-2.22)	.475
51-100%	8.13	(2.56-25.89)	.000
<i>Number of mature plants</i>			
Up to 6 plants	1.00		.071
7-10 plants	0.57	(0.34-0.97)	.038
More than 10 plants	0.86	(0.46-1.63)	.647
<i>Typically grow indoors or outdoors<sup>a</sup></i>			
Indoors only	1.00		.000
Outdoors only	1.94	(0.72-5.17)	.186
Both indoors and outdoors	3.25	(1.22-8.64)	.018
Seedlings indoors then outdoors	5.51	(2.05-14.78)	.001

\*Covariates retained had a P-value less than 0.10. We apply an  $\alpha$  level of .01 to determine the significance of values in this table.

Figure 1: How cannabis growing should be regulated if prohibition were repealed by country



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Policy paper IJDP

Conflict of interest statement.

None of the authors have any known conflict of interest, but this will be updated at the review stage.

Accepted Manuscript

Highlights:

- Websurvey of 1,722 cannabis growers in Australia, Denmark and the UK, who gave their attitudes to cannabis growing policy.
- Despite between country differences, overall there was a great deal of consistency in support for various policy settings.
- The results have relevance for the design of new non-prohibitionist models for cannabis.
- It will be of interest to policy makers, drug policy researchers, law enforcement and cannabis cultivators.