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Cannabis Use and Perceptions of Cannabis Safety, Effectiveness, and Stigma amongst older Canadians: A Cross-Sectional Survey

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ABSTRACT

Objective: Since legalization in 2018, older Canadians' use of cannabis has increased steadily, yet little is known about their perceptions of cannabis. We aimed to determine cannabis usage, and characterize perceptions of safety, effectiveness and stigma in community dwelling older Canadians. **Method:** Canadians aged 50 years and older were invited to participate in an electronic survey of their experience with cannabis and perceptions of cannabis safety, effectiveness, and stigma. Data were categorized as participants reporting current use, non-use, prior use, and considering use. Perceptions were assessed with a 5-point Likert scale and open text box questions. Logistic regression models were used to assess how age, sex, cannabis usage, and education influenced perceptions. **Results:** One thousand six hundred fifteen participants completed the survey. Current cannabis use was reported by 44% of respondents, followed by non-use (33.2%), prior use (16.5%) and considering use (6.1%). Almost half (49.2%) perceived the risks of using cannabis to be low or very low. The greatest concerns regarding cannabis use were effects on cognition/mental health (40.8%), physical health (19.1%), and available product information (18.0%). Participants somewhat or strongly agreed that there is not enough information on cannabis safety (60.4%) and effectiveness (63.8%), and 34.7% perceived there to be a negative stigma amongst family and friends. Cannabis perceptions were influenced by age, sex, cannabis usage, and education. **Conclusions:** Generational and sex-based differences exist in cannabis usage and perceptions amongst older Canadians. These differences require consideration by health practitioners and public health workers to meet the educational needs of older adults.

Key words: = cannabis; aged; older adults; perceptions; social stigma

Cannabis use has increased in older adults worldwide for both medicinal and recreational purposes (Han & Palamar, 2020; Solomon et al., 2021). In Canada, where cannabis use was legalized in 2018, the rate of new cannabis use is increasing fastest amongst older adults,

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surpassing all other age cohorts (Statistics Canada, 2019). A recent survey found that 30% of Canadians aged 50 years or older use cannabis, of whom 40% used cannabis for the first time since legalization (Smith et al., 2020). Despite this, little is reported on older Canadians' perceptions of cannabis since legalization.

Much of the data on cannabis use and perceptions are from the general adult population, with information on older adults combined into a single age cohort (Statistics Canada, 2019; Keethakumar et al., 2021; Levy et al., 2021; Kleidon et al., 2023). Prior research has shown that age, gender, and education can impact cannabis usage and perceptions of cannabis risk (Cuttler et al., 2016; Levy et al., 2021; Wadsworth et al., 2025). However, this has not been independently explored across the diverse group of older adults. There is substantial heterogeneity in cannabis perceptions, and in older adults this may be exacerbated through the different lived experiences of the Baby Boomers (~57-75 years) and the Silent Generation (~76-95 years). A United States study found Baby Boomers to be unique in their cannabis use, as factors such as gender, ethnicity, and education were less predictive of cannabis use than in other generations (Carlson et al., 2022). However, cannabis use was only compared in Baby Boomers to a single cohort of adults in other generations and lacked data on cannabis perceptions and a specific comparison to other older cohorts. Additionally, it may not be applicable to the Canadian context, where legalization is federally governed and applied nationwide.

Increased understanding of how cannabis usage and perceptions differ amongst older adults will better equip public health agencies and medical practitioners to support older adults who use cannabis or are seeking information on its use. To address this, our objective was to gather self-reported evidence about the use and perceptions of cannabis among community dwelling Canadians aged 50 years and older. We hypothesized that significant differences in cannabis usage and perceptions of safety, effectiveness, and stigma would exist between different cohorts of age, sex, and education.

METHODS

An anonymous survey of older Canadians was conducted online using the Qualtrics XM platform. Recruitment included advertisement through social media, and on websites and email listservs of the Aging in Place Research Cluster, the Institute for Healthy Living and Chronic Disease Prevention, National Association of Federal Retirees and further spread through a snowball effect, whereby participants shared the survey invitation with social contacts (Parker et al., 2019). The emails provided links to the Aging in Place website where potential participants could read about the study and link to the questionnaire. The survey was open from February 5, 2022 to September 6, 2022 and available in both French and English. Canadians aged 50 years and older were invited to participate, regardless of cannabis use history. All participants provided informed consent, which was electronically documented.

The survey had 45 multiple-choice and open-ended questions, intended to be completed in 15 minutes. It was drafted by researchers with extensive experience working with older adults and was informed by literature and clinical experience (Cuttler et al., 2016; Smith et al., 2020; Spackman et al., 2017; Yang et al., 2021). It was pilot-tested by several community-dwelling older adults who were representative of the population of interest, with feedback integrated prior to release of the survey. Data were collected from all participants on demographics, cannabis use, and cannabis perceptions. Postal codes were used to delineate the geographic distribution of respondents. Participants self-reported their cannabis use history and were separated into four categories for analysis: *Non-use* was defined as never having used cannabis; *Current use* was defined as participants who self-identified as currently using cannabis at any frequency (daily to less than once per month); *Prior use* was defined as having used cannabis at least once but no longer using it; those *Considering use* had never used cannabis but were considering use.

Participants were asked to rank their agreement with the following statements on a 5-point Likert scale (1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = strongly agree): "There is not enough data on effectiveness of cannabis in seniors"; "There is a negative stigma within my

family and friend group towards cannabis"; "There is not enough data on safety of cannabis use in seniors"; "Cannabis is safe to use with most medicines." A higher score was interpreted as a higher level of agreement with the statement. Participants were asked how they perceived the risk of using cannabis products (1 = very low, 2 = low, 3 = neutral, 4 = high, 5 = very high) and what they perceived as the greatest risk associated with cannabis use, with answers provided in an open text box. They were asked if their perceptions of cannabis had changed since legalization in Canada, with options of yes, no and unsure. Additionally, their perceptions of cannabis for medicinal purposes were captured and are described elsewhere (Bolt et al., 2024).

The database was cleaned, and incomplete survey data were removed. This included removing any respondents who answered less than 50% of the questions and discarding responses to open ended questions that did not answer the question posed. Responses in French were translated to English by translation software. Responses to open-ended questions were categorized via inductive content analysis (Erlingsson & Brysiewicz, 2017). A codebook was created by reviewing a subset of the responses. The codebook was used by two investigators (JM, MB) to code the dataset, and cross-checked by two additional investigators (JMJ, JB). Codes were collapsed into categories, agreed upon by four investigators (JM, MB, JMJ, JB) for statistical analysis.

The response variables had minimal missing data (< 2%), and, to have a complete dataset were estimated with a Markovian Chain Monte Carlo multiple imputation (MI) algorithm. All missing data were considered to be missing-at-random. The same regressors that were used in the final presented models were used to generate the MI dataset. The MI iterations were initiated at 10 and adjusted to ensure model convergence. Subsequent regression estimates from the MI dataset and complete case analysis were virtually identical. Likert scale dependent variables (perceptions of cannabis stigma, effectiveness and safety) were modelled with an ordinal logistic regression and presented as an odds ratio (OR; 95% confidence interval). Multinomial outcome variables (cannabis use, change in cannabis perceptions and perceived greatest risk with cannabis) were modelled with a multinomial logistic regression and presented as a relative risk ratio (RRR; 95% confidence interval). Independent predictors and reference categories used in the regression models were: age (reference 50-60 years), sex (reference female), cannabis use history (reference current cannabis use), and education (reference graduate/professional education). Interaction between covariates were tested prior to final model specification. The proportional odds assumption for the ordinal and multinomial logistic regressions was assessed with the Brant's test. Statistical significance is defined with $p < .05$. Categorical data is presented as a number and percent. Statistical analysis was performed with STATA 14 I/C.

RESULTS

A total of 1,700 responses were received, of which 85 were deemed incomplete and excluded from analysis, leaving 1,615 respondents that were included in this analysis (Table 1). Most respondents identified as males (49.7%) or females (48.6%), Caucasian (92.1%), and having post-secondary (38.8%) or graduate/professional degrees (40.5%). Forty-four percent of respondents reported current use of cannabis, 16.0% reported prior use, 33.1% had never used cannabis, and 6.1% were considering cannabis use. Current or previous cannabis use was for recreational purposes (47.3%), medicinal purposes (32.7%), or both recreational and medicinal purposes (18.8%).

Since cannabis legalization in Canada, 28.1% of respondents reported that their perceptions of cannabis had changed, 11.3% were unsure, and the perceptions of 60.7% were unchanged. Almost half of respondents (49.3%) reported that they perceive the risks of using cannabis to be low or very low, while 18.4% perceived the risks of cannabis to be high or very high. The greatest perceived risks associated with cannabis were "cognitive or mental health concerns" (i.e., cognitive impairment, brain fog, impact on mood; 40.8%), "physical health concerns" (i.e., lung disease, impaired balance, or interactions with medications; 19.1%), "information or product concerns" (i.e., lack of available information on cannabis, uncertainty around cannabis quality and accessibility; 18.0%), multiple concerns (12.2%), and financial concerns (i.e., cost, affordability; 0.9%), while 8.8 % of respondents reported no concerns. Over half of respondents

reported that they somewhat or strongly agree that there is not enough information on the safety (60.4%) and effectiveness (63.8%) of cannabis in older adults (Figure 1). Approximately one-third reported that they somewhat or strongly agree that cannabis is safe to use with most medicines (34.5%) and somewhat or strongly perceive there to be a negative stigma within family and friends towards cannabis use (34.7%).

Table 1. *Participant Demographics*

	Total (n = 1,615)[a]	**Male (n = 803)**	**Female (n = 784)**
Age (%)			
50-60 years	224 (13.9)	87 (10.8)	132 (16.8)
61-70 years	676 (41.9)	315 (39.2)	351 (44.8)
71-80 years	588 (36.4)	329 (41.0)	247 (31.5)
81+years	127 (7.9)	72 (9.0)	54 (6.9)
Ethnicity (%)			
Caucasian	1488 (92.1)	735 (91.5)	744 (95.0)
Indigenous	35 (2.2)	22 (2.7)	12 (1.5)
Other[b]	41 (2.5)	27 (3.4)	14 (1.8)
Prefer not to say	51 (3.2)	19 (2.4)	14 (1.8)
Urban/Rural Distribution (%)			
Urban	1316 (81.5)	643 (80.1)	650 (82.9)
Rural	263 (16.3)	145 (18.1)	114 (14.5)
Not reported	36 (2.2)	15 (1.9)	20 (2.6)
Education (%)			
Elementary	5 (0.3)	4 (0.5)	1 (0.1)
Secondary	288 (17.8)	135 (16.8)	150 (19.1)
Post-Secondary Degree	627 (38.8)	300 (37.4)	325 (41.5)
Graduate Degree and/or Professional	654 (40.5)	351 (43.7)	289 (36.9)
No formal schooling	2 (0.1)	0	2 (0.3)
Prefer not to say	39 (2.4)	13 (1.6)	17 (2.2)
Cannabis Use History (%)			
Considering use	98 (6.1)	50 (6.2)	46 (5.9)
Current user	709 (43.9)	368 (45.8)	334 (42.6)
Prior user	259 (16.0)	125 (15.6)	129 (16.5)
Non-user	535 (33.1)	254 (31.6)	268 (34.2)
Unknown/not reported	14 (0.9)	6 (0.7)	7 (0.9)

Note. [a]28 Respondents reported a non-binary gender or did not provide a gender. These individuals are not separately reported in this table. [b]Other ethnicities: Asian (9), Afro-Canadian (2), South Asian (7), Hispanic (1), Other (22)

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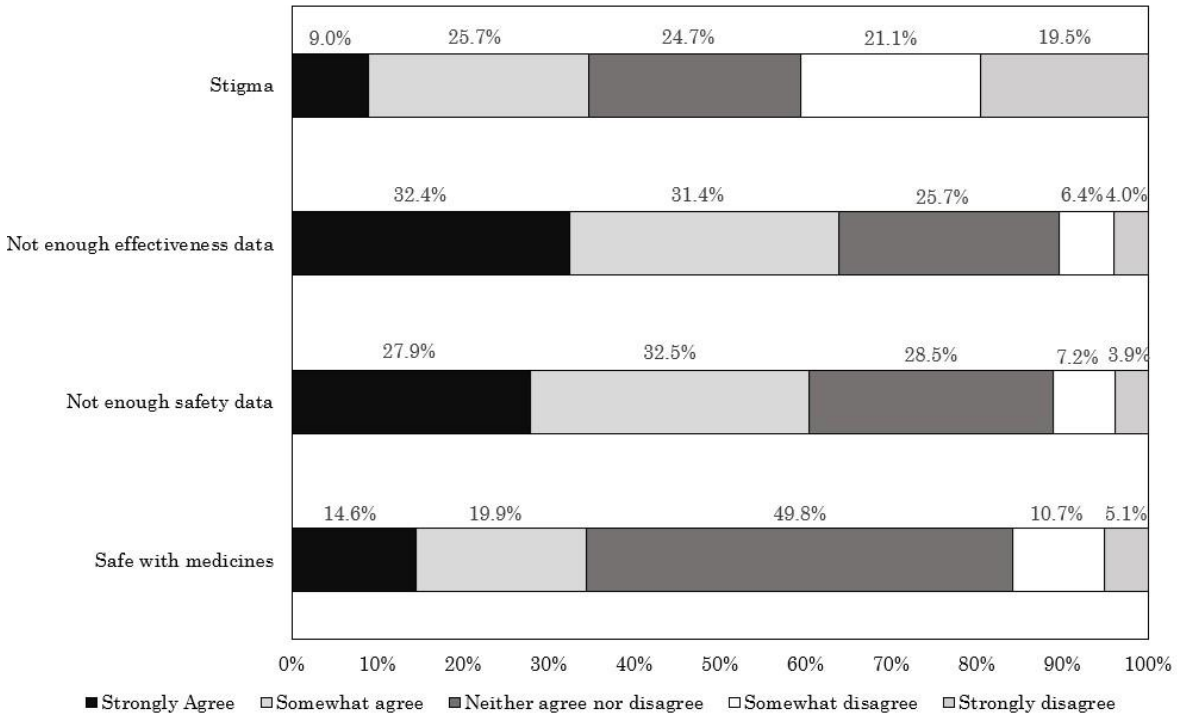
Figure 1. *Perceptions of Cannabis Stigma, Available Information, and Safety with Most Medicines*



Note. Perceptions of stigma (n = 1,603), effectiveness (n = 1,607), safety (n = 1,594), and safety with other medications (n = 1,077) rated on a Likert scale of strongly agree to strongly disagree and reported as a percentage across total respondents

Age

Age significantly influenced cannabis use history (Table 2), perceptions of cannabis effectiveness, safety, and stigma (Table 3), as well as if perceptions of cannabis had changed since legalization (Table 4). Compared to those aged 50-60, there was a lower probability of current or prior cannabis use amongst participants aged 61-70 (current use RRR 0.41, 95% CI 0.24-0.69; prior use RRR 0.43, 95% CI 0.23-0.81), 71-80 (current use RRR 0.23, 95% CI 0.13-0.39; prior use RRR 0.26, 95% CI 0.13-0.50) and greater than 80 years (current use RRR 0.17, 95% CI 0.08-0.36; prior use RRR 0.10, 95% CI 0.03-0.34). There was an increased probability of being uncertain if their perceptions of cannabis had changed since legalization for respondents aged 71 – 80 (RRR 2.45, 95% CI 1.25-4.80) and 81 and above (RRR 3.11, 95% CI 1.36-7.12) compared to those aged 50-60 years.

Compared to those aged 50-60, participants aged 61-70 years (OR 0.72, 95% CI 0.55-0.94) and 71-80 years (OR 0.72, 95% CI 0.54-0.96) had lower odds of reporting agreement that there is a negative stigma within their family and friend group towards cannabis. There were higher odds of reporting agreement that there is not enough information on the effectiveness of cannabis in older adults in all older age cohorts when compared to those aged 50-60 (61-70: OR 1.46, 95% CI 1.11-1.92; 71-80: OR 1.67, 95% CI 1.25-2.22; >80: OR 1.67, 95% CI 1.11-2.51). Additionally, those aged 71-80 years (OR 1.52, 95% CI 1.14-2.02) and 81 years and above (OR 1.75, 95% CI 1.16-2.64) had higher odds of reporting agreement that there is not enough information on cannabis safety in older adults

Sex

Sex influenced cannabis use history (Table 2), perceptions of cannabis effectiveness and safety (Table 3), and if perceptions had changed since legalization (Table 4). Males, compared to females, had lower probability of prior cannabis use, as compared to a non-use of cannabis (RRR 0.20, 95% CI 0.07-0.63), and had a higher probability that their perceptions of cannabis had

not changed (RRR 1.44, 95% CI 1.15-1.82) since legalization.

Males, compared to females, had lower odds of reporting agreement that there is not enough information on the effectiveness (OR 0.73, 95% CI 0.61-0.87) or safety of cannabis in older adults (OR 0.77, 95% CI 0.64-0.92; Table 3) and higher odds of reporting agreement that cannabis is safe to use with most medicines (OR 1.29, 95% CI 1.03-1.62). Males, compared to females, had lower odds of citing information or product concerns as the greatest risk of cannabis use compared to citing no perceived risk (RRR 0.30, 95% CI 0.10-0.94) (Table 5).

Age and Sex

An interaction between the variables of age and sex was present. This resulted in the relationship of each covariate with the outcome of interest being dependent on the value of the other interacting variable. This interaction between age and sex influenced cannabis use history (Table 2) and what was perceived as the greatest risk associated with cannabis use (Table 5). Compared to females of the same age group, males aged 61-70 (RRR 6.56, 95% CI 1.95-22.06), aged 71-80 (RRR 7.08, 95% CI 2.07-24.21), and aged 81 and above (RRR 11.05, 95% CI 2.07-59.06) had a higher probability of prior cannabis use compared to non-use.

Compared to females of the same age, males aged 61-70 years (RRR 4.23, 95% CI 1.09-16.42) had higher probability of citing physical health effects as their greatest concern with cannabis use while males aged 71-80 years (RRR 7.54, 95% CI 1.36-41.69) had higher probability of stating cognitive and mental health concerns. Males aged 71-80 (RRR 3.99, 95% CI 1.04-5.21) and over 80 (RRR 7.41, 95% CI 1.18-46.59) also had higher probability of citing information and product-related concerns to be the greatest risk associated with cannabis.

Cannabis Use History

Cannabis use history influenced the perceptions of cannabis stigma and safety and if perceptions had changed since cannabis legalization (Tables 3 and 4). Participants who reported prior use (RRR 4.86, 95% CI 2.76-8.58), non-use (RRR 5.92, 95% CI 3.74-9.37), and considering use (RRR 4.88, 95% CI 2.6-9.14) had an increased probability of being unsure if their perceptions had changed since legalization compared to participants who reported current cannabis use. Prior use (RRR 2.66, 95% CI 1.86-3.79) and non-use (RRR 2.45, 95% CI 1.85-3.24) was also associated with higher probability of not having experienced a change in perceptions.

Participants who reported non-use, compared to current use, had higher odds of reporting agreement that there is a negative stigma within their family and friend group towards cannabis (OR 1.95, 95% CI 1.58-2.39), that there is not enough information on cannabis safety (OR 1.87, 95% CI 1.52-2.31) and lower odds of reporting agreement that cannabis is safe with most medicines (OR 0.29, 95% CI 0.22-0.39). Non-use, relative to current use (RRR 1.92, 95% CI 1.20-3.07), was also associated with higher odds of citing cognitive and mental health related concerns as the greatest risks associated with cannabis. Compared to those who reported current cannabis use, those considering use had higher odds of reporting agreement that there is not enough information on the safety of cannabis (OR 1.66, 95% CI 1.14-2.41) and lower odds of reporting agreement that cannabis is safe to use with most medicines (OR 0.33, 95% CI 0.22-0.49).

Education

Education influenced cannabis use history (Table 2), perceptions of cannabis safety with medicines (Table 3), and how perceptions have changed since legalization (Table 4). When compared to those with a graduate or professional degree, participants with post-secondary education (RRR 1.57, 95% CI 1.22-2.04) or elementary/secondary school education (RRR 1.44, 95% CI 1.04-1.99) had a higher probability of reporting current cannabis use versus non-use. Those with an elementary or secondary degree had a higher probability of being uncertain if their perceptions had changed since legalization (RRR 1.77, 95% CI 1.08-2.90) and higher odds of reporting agreement that cannabis is safe to use with most medicines (OR 1.62, 95% CI 1.18-2.24).

DISCUSSION

This study describes cannabis use and perceptions of safety, effectiveness, and stigma

among older Canadians reported by age, sex, and education. Cannabis use by older adults was common; however, many perceived there to be a lack of information on cannabis safety and effectiveness, as well as negative stigma amongst family and friends. Almost half of the respondents perceived the risk of cannabis use to be low or very low, with cognitive or mental health concerns being the greatest perceived risks. Age, sex, education and cannabis use were all found to significantly influence perceptions.

Respondents to this survey had a higher prevalence of current cannabis use (43.9%) and lower prevalence of lifetime non-use (33.1%) than previously reported (Smith et al., 2020; Statistics Canada, 2019). A survey by Statistics Canada (2019) found 10.3% of those aged 45-65 years and 6.6% of those aged 65 years reported current cannabis use, while 55.5% and 70.9%, respectively, had never used cannabis. This difference may be influenced by the timeframe of our study (2022) relative to legalization, as evidence suggests increased cannabis use by older Canadians in recent years (Imtiaz et al., 2023; Wadsworth et al., 2025; BC Cannabis Secretariat and BC Stats, 2022). It may also be impacted by responder bias, with greater participation from those who currently use cannabis and individuals more interested in the topic.

The probability of current or prior cannabis use decreased as the age of the cohort increased, with the probability of prior use also higher in older cohorts of males relative to females in the same age category. An age-related trend in cannabis use has been demonstrated in previous studies that have assessed older versus younger populations; however, this study uniquely demonstrates this association across multiple age cohorts of older adults. The age-sex interaction identified with prior cannabis use supports previous findings that sex is less influential on cannabis usage in Baby Boomers, while highlighting the importance of the age-sex interaction in older cohorts such as the Silent Generation (Carlson et al., 2022)

Perceived Risks of Cannabis

Most participants perceived the risk associated with cannabis to be low to neutral, while participants in older cohorts were more likely to perceive an insufficiency of information regarding cannabis' effectiveness and safety. Literature suggests that there has been a reduction in the perceived risk of cannabis amongst older adults in more recent years (Han et al., 2021). In Canada, this has been influenced by legalization, which has increased social acceptability and decreased the risk perception amongst older adults (Health Canada, 2023). However, older cohorts in this study, including those within the Silent Generation, were more likely to be uncertain if their perceptions of cannabis had changed since legalization. Perceptions can be influenced by knowledge and experience, and research suggests older Canadians utilize online sources as a primary avenue for accessing information about cannabis (Butler et al., 2023; Shrestha et al., 2024). Digital literacy does differ across older generations, with greater accessibility amongst Baby Boomers compared to the Silent Generation (Lissitsa et al., 2022). Hence, the uncertainty regarding perceptional change and greater concern regarding information insufficiency amongst older cohorts may be a result of information accessibility, suggesting a need to target educational delivery to the needs and modalities of different generations.

Sex also influenced perceptions of sufficient information on cannabis effectiveness and safety. Sex- and gender- based differences in cannabis perceptions have been identified in younger populations, with females and women perceiving greater risk with cannabis than their male and men counterparts (Matheson & Le Foll, 2023). While a decrease in cannabis risk perception amongst both older males and females has been demonstrated over the past several decades (Levy et al., 2021), our study found differences continue to exist not only in the perception of cannabis information sufficiency, but also of greatest risks associated with cannabis.

Cognitive/mental health and physical health concerns were identified as the two greatest perceived risks of cannabis, both of which were more commonly cited by older cohorts of males compared to females in the same age category. Mobility impairment and memory loss have been identified as two of the most prominent health concerns in older Canadian males, which may have influenced the degree to which males in this study reported physical or cognitive/mental health effects as a primary concern with cannabis

(Tannenbaum, 2012). Conversely, information and product-related concerns were more commonly described by females, aligning with their perceptions of insufficient available information about cannabis. Studies suggest many older adults have unmet cannabis-related educational needs (Butler et al., 2023; Shrestha et al., 2024). The needs may be influenced by gender-based differences that exist in health- and medication-information seeking behavior, including degree of interest, sources consulted, and information sought (Tong et al., 2014). Females are also more likely than males to use cannabis for medicinal purposes (Cuttler et al., 2016; Keethakumar et al., 2021; Wadsworth et al., 2025), which may have influenced their desire for additional information on safety and effectiveness. Further work is required to understand the sex and gender-specific information needs of older adults, including what specific information is desired and how/from whom older adults would prefer to receive such information. However, this study indicates that sex-specific approaches may be necessary to address the greater desire for information on cannabis effectiveness, safety, quality, and accessibility amongst older females.

Cannabis Stigma

Older age cohorts and non-use of cannabis were independently associated with increased perception of cannabis stigma amongst family and friends. Previous studies found that older adults perceive a negative stigma towards cannabis from healthcare professionals and social contacts (Dahlke et al., 2024; Shrestha et al., 2024; Baumbusch & Yip, 2022;). Data suggest that the previous prohibition and views of cannabis as a gateway drug experienced by the Silent Generation continue to contribute to stigmatization (Baumbusch & Yip, 2022; Dalke et al., 2024). Conversely, Baby Boomers perceive legalization to have legitimized cannabis use, increasing social acceptability (Dahlke et al., 2024). The dissimilarities in perceptions of cannabis stigma between age cohorts in this study necessitates consideration when interfacing with older adults and their family members, particularly in the medical context. These data offer health practitioners and public health workers valuable information to effectively tailor education and recommendations to the diverse population of older adults, and caregivers.

Limitations

The participant group in this study was mainly Caucasian, cis-gender, highly educated, and residing in urban settings, and as such, lacks diversity. Aspects of race, culture, and faith may have influenced cannabis use and perceptions and require further study. This study did not separately examine current and previous cannabis use in terms of THC and CBD composition, dose, or route of administration, which could have an impact on cannabis perceptions. Furthermore, this survey did not collect data to allow for the separate analysis of older adults who used cannabis in their youth and resumed cannabis use later in life, nor did it ask prior users why they stopped consuming cannabis products. These factors may provide further context around differences between current and prior use. Additionally, we did not investigate if cannabis use or perceptions differed across regions of Canada, which could have provided greater context to the findings. Our recruitment strategy involved the voluntary completion of an electronic survey, which may have selected for those with greater technological skills and more interest in or experience with cannabis. Finally, the small sample size and greater heterogeneity within some categories resulted in large confidence intervals, which should be interpreted cautiously.

Conclusion

Older adults generally view the risks of cannabis to be low. However, concerns exist amongst this population about the impacts of cannabis on cognition, mental health and physical health, and most perceive there to be a lack of available information on cannabis effectiveness and safety. Generational and sex-based differences exist in cannabis usage, perceptions, and desire for information amongst older adults, with more caution and concern amongst females and older generations. This information warrant consideration from health professionals and public health agencies.

Table 2. *Multilevel Model Results for Cannabis Use for Age, Sex and Education*

		RRR	Standard Error	*p* - value	95% Confidence Interval
		Age			
Current Use	50-60				
	61-70	0.41	0.11	**.00**	0.24-0.69
	71-80	0.23	0.06	**.00**	0.13-0.39
	>80	0.17	0.06	**.00**	0.08-0.36
Prior Use	50-60				
	61-70	0.43	0.14	**.01**	0.23-0.81
	71-80	0.26	0.09	**.00**	0.13-0.50
	>80	0.10	0.06	**.00**	0.03-0.34
Considering Use	50-60				
	61-70	1.12	0.75	.87	0.30-4.14
	71-80	1.70	1.11	.42	0.47-6.12
	>80	1.11	0.90	.90	0.22-5.47
		Sex			
Current Use	Female				
	Male	0.87	0.31	.69	0.43-1.74
Prior Use	Female				
	Male	0.20	0.12	**.01**	0.07-0.63
Considering Use	Female				
	Male	2.34	1.81	.27	0.51-10.63
		Age and Sex			
Current Use	Females of same age category				
	Male 50-60	1.62	0.65	.23	0.74-3.55
	Male 61-70	1.88	0.76	.12	0.85-4.17
	Male 71-80	0.91	0.51	.87	0.31-2.71
Prior Use	Female of same age category				
	Male 50-60	6.56	4.06	**.00**	1.95-22.06
	Male 61-70	7.08	4.44	**.00**	2.07-24.21
	Male 71-80	11.05	9.45	**.01**	2.07-59.06
Considering Use	Females of same age category				
	Male 50-60	0.61	0.53	.57	0.11-3.29
	Male 61-70	0.35	0.29	.21	0.07-1.82
	Male 71-80	0.62	0.63	.64	0.08-4.60
		Education			
Current Use	Graduate or professional				
	Postsecondary	1.57	0.21	**.00**	1.22-2.04
	Elementary or secondary education	1.44	0.24	**.03**	1.04-1.99
Prior Use	Graduate or professional				
	Postsecondary	1.27	0.22	.16	0.91-1.77

	Elementary or secondary education	1.17	0.25	0.46	0.77-1.78
Considering Use	Graduate or professional				
	Postsecondary	1.31	0.32	0.26	0.82-2.10
	Elementary or secondary education	0.77	0.26	0.45	0.40-1.50

Table 3. *Multilevel Model Results Exploring Perceptions of Cannabis Stigma, Effectiveness and Safety for Age, Sex, Cannabis Use, and Education*

		Odds Ratio	Std. Err.	*p* - value	95% Confidence Interval
Age					
Negative stigma amongst family and friends	50-60				
	61-70	0.72	0.10	**.02**	0.55-0.94
	71-80	0.72	0.10	**.02**	0.54-0.96
	>80	0.76	0.15	.18	0.51-1.13
Not enough data on effectiveness	50-60				
	61-70	1.46	0.21	**.00**	1.11-1.92
	71-80	1.67	0.24	**.00**	1.25-2.22
	>80	1.67	0.35	**.01**	1.11-2.51
Not enough data on safety	50-60				
	61-70	1.23	0.17	.14	0.94-1.62
	71-80	1.52	0.22	**.00**	1.14-2.02
	>80	1.75	0.37	**.00**	1.16-2.64
Safe with most medicines	50-60				
	61-70	0.83	0.14	.27	0.60-1.15
	71-80	0.83	0.15	.29	0.59-1.17
	>80	1.14	0.32	.64	0.66-1.98
Sex					
Negative stigma amongst family and friends	Female				
	Male	1.01	0.09	.87	0.85-1.21
Not enough data on effectiveness	Female				
	Male	0.73	0.067	**.00**	0.61-0.87
Not enough data on safety	Female				
	Male	0.77	0.071	**.00**	0.64-0.92
Safe with most medicines	Female				
	Male	1.29	0.15	**.03**	1.03-1.62
Cannabis Use					
Negative stigma amongst family and friends	Current Use				
	Prior Use	1.15	0.15	.26	0.90-1.48
	Non-Use	1.95	0.21	**.00**	1.58-2.39
	Considering Use	1.35	0.26	.12	0.93-1.98
Not enough data on effectiveness	Current Use				
	Prior Use	0.90	0.12	.43	0.70-1.16
	Non-Use	1.17	0.12	.13	0.95-1.44
	Considering use	1.45	0.29	.06	0.99-2.14

Not enough data on safety	Current Use				
	Prior Use	1.12	0.15	.39	0.87-1.44
	Non-Use	1.87	0.20	**.00**	1.52-2.31
	Considering use	1.66	0.32	**.00**	1.14-2.41
Safe with most medicines	Current Use				
	Prior Use	0.29	0.04	**.00**	0.22- 0.39
	Non-Use	0.05	0.08	.05	0.003- 1.02
	Considering use	0.33	0.07	**.00**	0.22- 0.49
Education					
Negative stigma amongst family and friends	Graduate or professional degree				
	Postsecondary degree	1.10	0.11	.32	0.91-1.34
	Elementary or secondary	1.00	0.13	.97	0.78-1.28
Not enough data on effectiveness	Graduate or professional degree				
	Postsecondary degree	0.94	0.095	.55	0.77-1.15
	Elementary or secondary	0.89	0.11	.36	0.69-1.14
Not enough data on safety	Graduate or professional degree				
	Postsecondary degree	0.92	0.09	.40	0.75-1.12
	Elementary or secondary	0.87	0.11	.26	0.68-1.11
Safe with most medicines	Graduate or professional degree				
	Postsecondary degree	1.24	0.16	.09	0.97-1.60
	Elementary or secondary	1.62	0.27	**.00**	1.18-2.24

Table 4. *Multilevel Model Results Exploring Changes in Cannabis Perceptions Since Legalization for Age, Sex, Cannabis Use, and Education*

		RRR	**Std Error**	***p*** **- value**	**95% Confidence Interval**
Age					
No Change	50-60				
	61-70	1.20	0.21	.28	0.86-1.68
	71-80	1.31	0.23	.14	0.92-1.86
	>80	1.06	0.29	.84	0.62-1.80
Uncertain	50-60				
	61-70	1.84	0.62	.07	0.95-3.6
	71-80	2.45	0.84	**.01**	1.25-4.80
	>80	3.11	1.31	**.01**	1.36-7.12
Sex					
No Change	Female				
	Male	1.44	0.17	**.00**	1.15-1.82

Uncertain	Female				
	Male	0.80	0.15	.24	0.56-1.16
Cannabis Use					
No Change	Current Use				
	Prior Use	2.66	0.48	**.00**	1.86-3.79
	Non-Use	2.45	0.35	**.00**	1.85-3.24
	Considering use	0.73	0.18	.20	0.45-1.19
Uncertain	Current Use				
	Prior Use	4.86	1.41	**.00**	2.76-8.58
	Non-Use	5.92	1.39	**.00**	3.74-9.37
	Considering use	4.88	1.56	**.00**	2.60-9.14
Education					
No Change	Graduate or Professional degree				
	Postsecondary degree	1.10	0.14	.44	0.86-1.42
	Elementary or secondary	1.33	0.23	.09	0.96-1.86
Uncertain	Graduate or Professional degree				
	Postsecondary degree	1.33	0.27	.17	0.89-1.99
	Elementary or secondary	1.77	0.45	**.02**	1.08-2.90

Table 5. *Multilevel Model Results Exploring Perceived Greatest Risk with Cannabis for Age, Sex, Cannabis Use and Education*

		RRR	**Standard Error**	***p*-value**	**95% Conf. Interval**
Age					
Physical Health Concerns	50-60				
	61-70	0.96	0.46	.93	0.37-2.44
	71-80	0.50	0.25	.16	0.19-1.32
	>80	0.31	0.21	.09	0.08-1.19
Financial Concerns	50-60				
	61-70	0.78	1.02	.85	0.06-9.97
	71-80	1.79	2.16	.63	0.17- 8.99
	>80	0.00	0.00	.99	-
Cognitive and Mental Health Concerns	50-60				
	61-70	1.04	0.47	.93	0.43-2.50
	71-80	0.65	0.30	.35	0.27-1.60
	>80	0.38	0.22	.10	0.12-1.21
Information and Product Concerns	50-60				
	61-70	0.56	0.26	.21	0.22-1.40
	71-80	0.55	0.26	.21	0.22-1.39
	>80	0.41	0.25	.15	0.12-1.37
More than one concern	50-60				
	61-70	0.79	0.43	.66	0.27-2.29
	71-80	0.58	0.33	.33	0.19-1.74
	>80	0.42	0.32	.25	0.10-1.84

Sex					
Physical Health Concerns	Female				
	Male	0.48	0.28	.21	0.15-1.51
Financial Concerns	Female				
	Male	0.00	0.00	.98	-
Cognitive and Mental Health Concerns	Female				
	Male	0.50	0.27	.20	0.17-1.43
Information and Product Concerns	Female				
	Male	0.30	0.17	**.04**	0.10-0.94
More than one concern	Female				
	Male	0.40	0.28	.19	0.10-1.58
Age and Sex					
Physical Health Concerns	Females of same age category				
	Males 50-60	2.06	1.39	.28	0.55-7.75
	Male 61-70	4.23	2.93	**.04**	1.09-16.42
	Male 71-80	4.97	5.05	.12	0.68-36.38
Financial Concerns	Females of same age category				
	Male 50-60	219393.20	1.36×10^{8}	.98	-
	Male 61-70	450411.10	2.80×10^{8}	.98	-
	Male 71-80	4.73×10^{11}	4.46×10^{11}	.98	-
Cognitive and Mental Health Concerns	Females of same age category				
	Male 50-60	1.77	1.11	.36	0.52-6.06
	Male 61-70	3.03	1.92	.08	0.88-10.49
	Male 71-80	7.54	6.58	**.02**	1.36-41.69
Information and Product Concerns	Females of same age category				
	Male 50-60	1.84	1.27	.38	0.48-7.13
	Male 61-70	3.99	2.72	**.04**	1.04-15.21
	Male 71-80	7.41	6.95	**.03**	1.18-46.59
More than one concern	Females of same age category				
	Male 50-60	2.10	1.70	.36	0.43-10.24
	Male 61-70	2.65	2.18	.24	0.53-13.33
	Male 71-80	2.05	2.57	.57	0.18-23.97
Cannabis Use					
Physical Health Concerns	Current Use				
	Prior Use	0.87	0.26	.63	0.48-1.57
	Non-Use	0.78	0.21	.36	0.46-1.32
	Considering use	0.94	0.44	.90	0.38-2.34
Financial Concerns	Current Use				
	Prior Use	0.48	0.40	.38	0.09-2.43
	Non-Use	0.14	0.15	.07	0.02-1.15
	Considering use	0.67	0.76	.72	0.07-6.24
Cognitive and Mental Health Concerns	Current Use				
	Prior Use	1.35	0.38	.29	0.78-2.34
	Non-Use	1.92	0.46	**.01**	1.20-3.07
	Considering use	1.43	0.60	.40	0.62-3.26

Information and Product Concerns	Current Use				
	Prior Use	0.59	0.19	.11	0.32-1.12
	Non-Use	0.80	0.21	.40	0.48-1.35
	Considering use	1.01	0.46	.99	0.41-2.46
More than one concern	Current Use				
	Prior Use	1.00	0.37	1.00	0.48-2.07
	Non-Use	1.48	0.45	.20	0.81-2.69
	Considering use	0.96	0.56	.94	0.31-2.98
Education					
Physical Health Concerns	Graduate or professional degree				
	Postsecondary degree	1.33	0.33	.25	0.82-2.17
	Elementary or secondary	0.66	0.20	.17	0.37-1.19
Financial Concerns	Graduate or professional degree				
	Postsecondary degree	0.70	0.54	.65	0.16-3.16
	Elementary or secondary	1.57	1.07	.51	0.41-5.98
Cognitive and Mental Health Concerns	Graduate or professional degree				
	Postsecondary degree	1.21	0.28	.41	0.77-1.90
	Elementary or secondary	0.72	0.19	.21	0.43-1.20
Information and Product Concerns	Graduate or professional degree				
	Postsecondary degree	1.07	0.27	.79	0.65-1.76
	Elementary or secondary	0.75	0.22	.32	0.42-1.33
More than one concern	Graduate or professional degree				
	Postsecondary degree	1.11	0.33	.72	0.63-1.97
	Elementary or secondary	0.62	0.22	.18	0.30-1.25

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