

Young Adults' Knowledge of State Cannabis Policy: Implications for Studying the Effects of Legalization in Vermont

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ABSTRACT

Objectives. Cannabis policy evaluations commonly assume equal policy exposure across a state's population using date of implementation as the key independent variable. This study aimed to explore policy knowledge as another measure of exposure and describe the sociodemographic, cognitive, and behavioral correlates of cannabis policy knowledge in young adults in Vermont. **Methods.** Data are from the PACE Vermont Study (Spring 2019), an online cohort study of Vermonters (12-25). Bivariate and multivariable analyses estimated prevalence ratios (PR) for correlations between knowledge of Vermont's cannabis policy (allowed possession for adults 21 and older) and sociodemographics, cannabis use, and harm perceptions in 1,037 young adults (18-25). **Results.** Overall, 60.1% of participants correctly described the state's cannabis policy. Being younger, Hispanic, non-White race, and less educated were inversely correlated with policy knowledge. Ever (PR=1.37; 95% CI 1.16-1.63) and past-30-day cannabis use (PR=1.27; 95% CI 1.12-1.45) were positively correlated with policy knowledge. Policy knowledge was more prevalent among young adults who perceived slight risk of harm from weekly cannabis use (vs. no risk; aPR=1.28; 95% CI 1.11-1.48) or agreed that regular cannabis use early in life can negatively affect attention (vs. disagree; aPR=1.55; 95% CI 1.22-1.97). **Conclusion.** Findings suggest that 40% of Vermont young adults in the study were unaware of current state cannabis policy and that policy knowledge was lower in younger, less educated, Hispanic, and non-White young adults. Future research should explore using a measure of policy knowledge as an exposure or moderator variable to better quantify the effects of changes in cannabis legal status on perceptions and use in young people.

Key words: = marijuana; legalization; cannabis; marijuana policy; cannabis policy; policy exposure; young adults

In 2018, Vermont became the first state to legalize possession of cannabis for adults aged 21+ through the legislative process distinguishing Vermont from prior states that legalized cannabis

through ballot initiatives (Zezima, 2018). As of July 1, 2018, individuals aged 21+ could legally possess up to an ounce of cannabis, as well as two mature and four immature plants per household,

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and the state eliminated penalties for limited possession by those aged 21+ (General Assembly of the State of Vermont, 2018). Vermont legalized medical cannabis and decriminalized possession prior to the 2018 policy changes (General Assembly of the State of Vermont, 2004, 2013). In 2020, Vermont became the eleventh state to legalize a taxed and regulated retail cannabis market and the second through the legislature (National Conference of State Legislatures, 2021a)—the state plans to open the market in 2022 (General Assembly of the State of Vermont, 2021). As of December 2021, other states—Connecticut, New York, Virginia, and New Mexico—have legalized a regulated retail cannabis market through state legislation (National Conference of State Legislatures, 2021a). Vermont's 2018 cannabis policy mirrors cannabis policies in Washington, DC at the time, and resembles legislation in Montana, Maine, New Mexico, New York, Virginia, and Connecticut during transitions to a regulated market (Commonwealth of Virginia; "Connecticut General Assembly," 2021; Lahut & Lee, 2021; Lopez, 2020; Maine State Legislature, 2021; Metropolitan Police Department, 2014; "Montana Marijuana Regulation and Taxation Act," 2020; National Conference of State Legislatures, 2021a; Victor, 2021).

Previous studies (Brooks-Russell et al., 2019; Cerda et al., 2017; Fleming et al., 2016; Paschall & Grube, 2020) have identified cannabis harm perceptions and use as key outcomes for evaluating the impact of changes to cannabis legal status on youth and young adults. Data from national surveillance have shown Vermont young adults report lower perceptions of harm from cannabis use and higher average annual cannabis initiation rates compared to the U.S. overall (SAMHSA, 2019). This is consistent with national cross-sectional data suggesting that higher cannabis harm perceptions protect against cannabis use (Terry-McElrath et al., 2017). Young adults in particular may be impacted by cannabis policy changes given cannabis is increasingly the first substance tried in adolescence (Keyes et al., 2019) and the high prevalence of alcohol and drug use among this age group (Dawson et al., 2004; Grant et al., 2004; Pearson et al., 2012; Rath et al., 2012). Since substance use behaviors developed in young adulthood may persist throughout life (Arnett, 2005), substance use

prevention and early intervention are beneficial to public health. Additionally, data from a national sample of young adults suggest that changes to cannabis policies may affect behavior change, with 9% of current non-users of cannabis reporting that they would use cannabis if legalized and 14% of current users reporting they would use cannabis more often after legalization (Cohn et al., 2017). Results from studies using National Survey on Drug Use and Health data showed that young adults (aged 18–25) from states with medical cannabis had lower cannabis risk perceptions compared to young adults in states without medical cannabis policies (Schuermeyer et al., 2014; Wen et al., 2019). While many aspects of cannabis legal status may impact individual beliefs and behavior (e.g., retail market, social norms; Carliner et al., 2017), these findings highlight that policy implementation may impact use behaviors and individual attitudes and beliefs about cannabis.

Cannabis policies vary by state. These variations may include how the policy is enacted (i.e., ballot initiative vs. state legislative process) and specific components of the law (e.g., legal to buy or sell, number of plants legal to own). A systematic review of the effect of cannabis legal status on individual beliefs highlights that these differences, including knowledge of the policy and its specific components, may impact individual beliefs about cannabis (Carliner et al., 2017). Given the relationship between cannabis policy knowledge and attitudes and beliefs about cannabis (Carliner et al., 2017), state measures of policy awareness could inform state public health communication efforts. Colorado's Responsibility Grows Here campaign, for example, focuses on responsible cannabis consumption and includes messages targeting understanding of the state's cannabis policy (Colorado Department of Public Health and Environment, 2021). Outcome evaluations may also benefit from accounting for policy knowledge in their analyses.

Existing evaluations of changes in cannabis legal status assess policy implementation based on the year in which the policy was implemented (Johnson & Guttmanova, 2019), which assumes equal policy awareness and exposure across the population. However, policy awareness may differ based on sociodemographic characteristics or experience with cannabis, which would suggest the need for more nuanced evaluations of policy

implementation that account for differences between population subgroups. The goal of this study was twofold: first, to explore policy knowledge as an alternate measure of policy exposure and second, to describe the prevalence and correlates of knowledge of Vermont's cannabis policy in young adults, the age group with the highest past-month cannabis use in the state (SAMHSA, 2019).

METHODS

The Policy and Communication Evaluation (PACE) Vermont Study is an ongoing online cohort study conducted in Vermont youth and young adults aged 12-25 designed to understand the impact of state-level policies and communication campaigns on substance use beliefs and behaviors in young Vermonters. Eligible participants were Vermont residents aged 12 to 25 years who were willing to complete three 10- to 15-minute web-based surveys over a 6-month period. Recruitment was conducted by Hark, a Vermont-based digital design and marketing firm (Hark Inc), over a 10-week period (March 26-June 4, 2019). Participants were recruited via the following three main mechanisms: 1) web-based recruitment including both paid and unpaid advertising, 2) community recruitment through partner organizations, and 3) participant referrals via a personalized link. Further details on study methods are available elsewhere (Villanti et al., 2020). Participants represented each of the 14 counties in the state, with the distribution by county generally reflecting 2018 population estimates for Vermont youth and young adults and past 30-day substance use estimates in the PACE Vermont sample were similar to those estimated in the National Survey on Drug Use and Health (Vermont Department of Health, 2019; Villanti et al., 2020). The study was approved by the University of Vermont and Vermont Department of Health's Institutional Review Boards and received a Certificate of Confidentiality from the National Institutes of Health. Data for the current analyses were limited to the 1,037 young adults aged 18-25 who completed Wave 1 (March 26-June 4, 2019) of the PACE Vermont Study. The current study focuses on young adults—the age group with the highest prevalence of past 30-day cannabis use in the Vermont (SAMHSA, 2019).

Measures

Knowledge of state cannabis policy. The term "marijuana" was used throughout the survey rather than "cannabis" to reflect language used by large national and state-level surveys (e.g., Vermont Youth Risk Behavior Survey, Monitoring the Future, National Survey on Drug Use and Health; Jones et al., 2020; Miech et al., 2020; SAMHSA, 2019; Schulenberg et al., 2020). To assess knowledge of cannabis law, all participants were asked, "Marijuana law recently changed in Vermont. Which of the following best describe Vermont's new marijuana law?" with the following response options: 1) "Legal for anyone to use," 2) "Legal for people 21+ to use," 3) "May use in public," 4) "Allowed for medical use," 5) "May own up to two plants," and 6) "Legal to sell." Respondents were asked to select all applicable choices. All responses to this item were categorized as either "correct marijuana policy" or "incorrect marijuana policy knowledge." Participants were incorrect if they selected "Legal to sell," "May use in public," or "Legal for anyone to use" as these were incorrect statements about key components of the law. Young adults who did not select any of the incorrect responses were considered to have correct knowledge if they 1) selected "Legal for people 21+ to use" and "May own up to two plants," or 2) selected "Allowed for medical use," "Legal for people 21+ to use," and "May own up to two plants." Correct responses were considered with or without inclusion of "Allowed for medical use" as medical use has been legal in Vermont since 2004 but was not included in the 2018 legal status change (National Conference of State Legislatures, 2021a, 2021b); therefore, some participants may not have selected "Allowed for medical use" despite it being part of current cannabis law.

Cannabis beliefs. Cannabis harm perceptions were assessed with the item "how much do you think people risk harming themselves (physically or in other ways) if they use marijuana weekly?" Response choices were "great risk," "moderate risk," "slight risk," and "no risk." Participants were also asked to identify the substance in cannabis that makes a person high, with response options "CBD," "THC," "Neither," "Both," or "Don't know." Responses were collapsed to three categories: 1) correctly identified THC only, 2) did not identify THC only (i.e., "CBD," "Neither,"

“Both”), and 3) don’t know. Beliefs about the effects of cannabis use were assessed by agreement (“Strongly agree,” “Agree,” “Disagree,” “Strongly disagree,” or “Don’t know”) with the following statements developed from evidence presented in a government report by the Vermont Department of Health (Vermont Department of Health, 2016): a) “Regular marijuana use during early years of life can negatively affect attention and memory in adulthood;” b) “Teens who use marijuana weekly or more often have twice the risk of depression or anxiety;” c) “Approximately 1 in 6 teens who start using marijuana before age 14 develop addiction;” and d) “Teens who use marijuana have lower academic performance and worse job prospects—and those who continue using marijuana regularly show a decrease in IQ 20 years later.” Responses were collapsed into three categories: agree (“strongly agree” and “agree”), disagree (“strongly disagree” and “disagree”), and don’t know.

Cannabis use. Respondents received the following statement before cannabis use survey items “The next questions are about marijuana use. Marijuana also is called pot, weed, or cannabis. Marijuana is usually smoked, either in cigarettes, called joints, or in a pipe. It is sometimes cooked in food or used in concentrates. Hashish is a form of marijuana that is also called ‘hash.’ One form of hashish is hash oil. These questions do not relate to the use of cannabidiol (CBD) products.” Ever use of cannabis was measured with “Have you ever, even once, used marijuana or hashish?” Respondents chose from the following response options “yes,” “no,” and “I don’t know” with ever use defined as binary with ever use=1 and never use and “don’t know”=0. Ever users were asked “How long has it been since you last used marijuana or hashish?” with current use collapsed into a dichotomous variable 1=use in the past 30 days, and 0=no use in the past 30 days.

Covariates. Sociodemographic measures included age (grouped as 18-20 years and 21-25 years), sex assigned at birth, race, ethnicity, and education completed. Subjective financial status was included as a proxy for socioeconomic status in young adulthood (Williams et al., 2017). Respondents were asked “Considering your own income and the income from any other people who help you, how would you describe your overall personal financial situation? Would you say you:”

with the following response options: 1) “Live comfortably,” 2) “Meet needs with a little left,” 3) “Just meet basic expenses,” and 4) “Don’t meet basic expenses.”

Data Analysis

Survey weights were developed post-hoc from population estimates of females and males between the ages of 12 and 25 (year by year) residing in each of Vermont’s 14 counties in 2017 (the most current data available at the time of analysis) to correct for higher response by females and those residing in the most populous county (Chittenden County). All analyses were conducted using survey (svy) procedures in Stata/SE statistical software version 16 (StataCorp LP) to account for survey weighting. Missing data (range of item-level missingness: 0%-2.8%) were handled through listwise deletion. Bivariate analyses examined differences in sociodemographics and ever and past-30-day cannabis use stratified by cannabis policy knowledge (correct vs. incorrect knowledge). Given the high prevalence of cannabis policy knowledge, multivariable modified Poisson regression models (Zou, 2004) were used to estimate the association between cannabis policy knowledge and cannabis harm perceptions, and knowledge of the psychoactive substance in cannabis, adjusted for age, sex, race and ethnicity, subjective financial status, and past-30-day cannabis use.

RESULTS

The weighted sample of 1,037 young adults was primarily non-Hispanic White (84.3%) and approximately half were female (52.1%) with a mean age of 21.2 (SD=2.2) years (Table 1). When asked about their subjective financial status, most young adults in the sample met their needs with a little left or lived comfortably (69.9%). In addition, most had at least some college education (69.7%). Most of the sample reported ever cannabis use (70.6%), with 41.3% reporting past 30-day cannabis use.

Sixty percent of respondents reported correct knowledge of all aspects of Vermont’s cannabis policy (Table 2). When asked, “Marijuana law recently changed in Vermont. Which of the following best describe Vermont’s new marijuana

law?” most young adults correctly indicated that cannabis was legal for people 21+ to use (91.5%) and for medical use (71.8%). Most participants accurately indicated that cannabis was not legal for anyone to use (98.3%), not allowed for public use (93.9%), and not legal to sell (94.8%). Most

young adults correctly stated that the state’s cannabis policy allowed the ownership of up to two plants (71.6%). A small proportion of young adults with correct knowledge responded “No” to whether cannabis was allowed for medical use (12.4%).

Table 1. *Sociodemographic Correlates of State Cannabis Policy Knowledge Among Vermont Young Adults, PACE Vermont Study, Spring 2019*

	Incorrect Knowledge (n = 400; 39.9%)	Correct Knowledge (n = 637; 60.1%)	Total (n = 1,037; 100%)	PR	(95%CI)
	Weighted % (n)	Weighted % (n)	Weighted % (n)		
Young adults					
Age group					
18-20	53.7 (191)	37.5 (234)	44.0 (425)	0.76	(0.66, 0.88)
21-25	46.3 (209)	62.5 (403)	56.0 (612)	Ref.	
Sex assigned at birth					
Female	47.2 (285)	55.3 (496)	52.1 (781)	Ref.	
Male	52.8 (114)	44.7 (141)	47.9 (255)	0.88	(0.77, 1.01)
Race/ethnicity					
Non-Hispanic White	74.0 (312)	91.1 (580)	84.3 (892)	Ref.	
Non-Hispanic Asian, Black, other*/multiple	13.7 (46)	6.7 (44)	9.5 (90)	0.65	(0.47, 0.90)
Hispanic	12.3 (42)	2.3 (13)	6.3 (55)	0.34	(0.20, 0.58)
Education completed					
Less than high school	9.8 (41)	6.2 (45)	7.6 (86)	0.79	(0.60, 1.05)
High school/GED	31.0 (97)	17.1 (99)	22.7 (196)	0.74	(0.59, 0.92)
Some college/AA	44.5 (175)	46.8 (284)	45.9 (459)	Ref.	(0.00, 0.00)
BA or more	14.6 (87)	29.9 (209)	23.8 (296)	1.23	(1.09, 1.39)
Subjective financial status					
Don't meet basic expenses	6.7 (22)	5.6 (29)	6.0 (51)	0.89	(0.64, 1.24)
Just meet basic expenses	22.8 (100)	24.9 (156)	24.1 (256)	0.99	(0.85, 1.16)
Meet basic expenses with a little left	35.1 (147)	38.9 (273)	37.4 (420)	Ref.	
Live comfortably	35.4 (129)	30.6 (179)	32.5 (308)	0.90	(0.77, 1.06)
Ever marijuana use					
Yes	61.3 (254)	76.7 (488)	70.6 (742)	1.37	(1.16, 1.63)
No/don't know	39.9 (146)	23.3 (149)	29.4 (295)	Ref.	
Past 30-day marijuana use					
Yes	32.3 (127)	47.2 (285)	41.3 (412)	1.27	(1.12, 1.45)
No	67.7 (271)	52.8 (349)	58.7 (620)	Ref.	

Note. Abbreviations: PR, prevalence ratio. All findings account for survey weights. Number of observations missing data on the following variables: sex assigned at birth (n = 1); subjective financial status (n = 2); past 30-day marijuana use (n = 5). *“Other” race categorized by respondents who selected one of the following races: American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander. Number of observations responding “don’t know” to ever marijuana use: n = 5.

Table 2. *Distribution of Responses to a Measure of State Cannabis Policy Knowledge*

	Incorrect Knowledge (n = 400; 39.9%)	Correct Knowledge (n = 637; 60.1%)	Total (n = 1,037; 100.0%)
	Weighted % (n)	Weighted % (n)	Weighted % (n)
Young Adults			
Legal for people 21+ to use			
No	21.2 (90)	0.0 (0)	8.5 (90)
Yes	78.8 (310)	100.0 (637)	91.5 (947)
Allowed for medical use			
No	52.0 (197)	12.4 (75)	28.2 (272)
Yes	48.0 (203)	87.7 (562)	71.8 (765)
May own up to two plants			
No	71.1 (260)	0.0 (0)	28.4 (260)
Yes	28.9 (140)	100.0 (637)	71.6 (777)
Legal for anyone to use			
No	95.6 (382)	100.0 (637)	98.3 (1019)
Yes	4.4 (18)	0.0 (0)	1.7 (18)
May use in public			
No	84.8 (330)	100.0 (637)	93.9 (967)
Yes	15.2 (70)	0.0 (0)	6.1 (70)
Legal to sell			
No	87.0 (337)	100.0 (637)	94.8 (974)
Yes	13.0 (63)	0.0 (0)	5.2 (63)

Note. Items in bold indicate key components of Vermont 2018 marijuana policy.

In bivariate analyses, being aged 18-20 (vs. 21-25; PR 0.76; 95% CI, 0.66-0.88), identifying as Hispanic (vs. non-Hispanic White; PR=0.34; 95% CI, 0.20-0.58), non-Hispanic American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Island, or more than one race (vs. non-Hispanic White; PR=0.65; 95% CI, 0.47-0.90), and having high school/GED as highest level of education (vs. some college; PR=0.74; 95% CI, 0.59-0.92) were inversely correlated with knowledge of Vermont's cannabis policy at the time of the survey (Table 1). Having a bachelor's degree or more (vs. some college; PR=1.23; 95% CI, 1.09-1.39), ever cannabis use (vs. never; PR=1.37; 95% CI, 1.16-1.63), and past-30-day cannabis use (vs. no use; PR=1.27; 95% CI, 1.12-1.45) were positively correlated with correct knowledge of the cannabis law.

In a series of multivariable analyses adjusting for age, sex, race and ethnicity, subjective financial status, and past-30-day cannabis use, young adults who reported slight risk of harm from weekly cannabis use had a higher prevalence of cannabis policy knowledge (aPR=1.28; 95% CI, 1.11-1.48) than those who reported no risk (Table

3). Young adults who identified THC as the substance in cannabis that makes a person high had a greater prevalence of correct knowledge of cannabis policy (aPR=1.91; 95% CI, 1.30-2.79) than those who incorrectly identified THC as the psychoactive substance in cannabis. Participants who agreed that "regular marijuana use early in life can negatively affect attention" (aPR=1.55; 95% CI, 1.22-1.97) and young adults who did not know if early cannabis use impacts attention (PR=1.44; 95% CI, 1.06-1.95) had higher prevalence of cannabis policy knowledge than those who disagreed with this statement. Policy knowledge was more prevalent among young adults who responded that they did not know whether "one in six teens who start using marijuana before age 14 develop addiction" than those who disagreed with the statement (aPR=1.20; 95% CI, 1.01-1.43). Correct knowledge of the policy was not associated with responses to the following items: 1) "Teens who use marijuana have lower academic performance and worse job prospects" and 2) "Teens who use marijuana weekly or more often have twice the risk of depression."

Table 3. *Marijuana Belief and Harm Perception Correlates of State Cannabis Policy Knowledge*

	Incorrect Knowledge (n = 400; 39.9%)	Correct Knowledge (n = 637; 60.1%)	Total (n = 1,037; 100%)	aPR	(95%CI)
	Weighted % (n)	Weighted % (n)	Weighted % (n)		
Young Adults					
Harm risk from weekly marijuana use					
Great risk	13.9 (52)	4.5 (31)	8.2 (83)	0.66	(0.43, 1.01)
Moderate risk	25.3 (101)	19.3 (128)	21.7 (229)	1.09	(0.90, 1.32)
Slight risk	32.2 (143)	48.8 (309)	42.2 (452)	1.28	(1.11, 1.48)
No risk	28.5 (103)	27.4 (169)	27.8 (272)	Ref.	
Regular marijuana use during early years of life can negatively affect attention					
Agree	73.9 (303)	82.1 (508)	78.8 (811)	1.55	(1.22, 1.97)
Disagree	16.3 (53)	8.3 (67)	11.5 (120)	Ref.	
Don't know	9.8 (43)	9.5 (62)	9.7 (105)	1.44	(1.06, 1.95)
Approximately 1 in 6 teens who start using marijuana before age 14 develop addiction					
Agree	57.2 (230)	54.5 (337)	55.6 (567)	1.09	(0.93, 1.28)
Disagree	28.3 (104)	24.8 (165)	26.2 (269)	Ref.	
Don't know	14.4 (65)	20.7 (134)	18.2 (199)	1.20	(1.01, 1.43)
Teens who use marijuana have lower academic performance and worse job prospects					
Agree	46.5 (178)	43.3 (261)	44.6 (439)	1.07	(0.93, 1.23)
Disagree	37.8 (146)	38.6 (259)	38.3 (405)	Ref.	
Don't know	15.6 (75)	18.1 (116)	17.1 (191)	1.10	(0.93, 1.29)
Teens who use marijuana weekly or more often have twice the risk of depression					
Agree	60.6 (230)	58.8 (363)	59.5 (593)	1.05	(0.91, 1.22)
Disagree	21.9 (91)	23.2 (159)	22.7 (250)	Ref.	
Don't know	17.5 (78)	18.0 (114)	17.8 (192)	1.02	(0.85, 1.23)
What substance in marijuana makes a person high?					
Incorrect	19.1 (59)	4.9 (32)	10.6 (91)	Ref.	
Correct (THC)	74.3 (309)	93.6 (594)	85.9 (903)	1.91	(1.30, 2.79)
I don't know	6.6 (32)	1.4 (11)	3.5 (43)	0.77	(0.38, 1.58)

Note. Abbreviations: aPR, adjusted prevalence ratio. All modified Poisson models adjusted for age, sex, race/ethnicity, subjective financial status, and past 30-day marijuana use and account for survey weights. Number of observations missing data on the following variables: perceived risk of harm from weekly marijuana use (n = 1); effect of marijuana on attention (n = 1); effect of early marijuana use on addiction (n = 2); effect of early marijuana use on academic performance (n = 2); effect of weekly marijuana use on depression risk (n = 2).

DISCUSSION

Approximately 60% of Vermont young adults in the study correctly identified the state's cannabis policy in 2019 in the survey. This is a high proportion of Vermont young adults respondents with correct policy knowledge given that the law was enacted by the state legislature and likely received less political advertising than a public ballot measure. Correct knowledge of cannabis policy was associated with being older, non-Hispanic White, and more educated, as well as with past-month and ever cannabis use.

Compared to those who believed weekly cannabis use poses no risk, policy knowledge was more prevalent among young adults who believed cannabis use poses a slight risk of harm. Cannabis policy knowledge was associated with several cannabis beliefs, including identifying THC as the substance in cannabis that makes a person high, agreement that regular cannabis use early in life can negatively affect attention, and the impact of early cannabis use on addiction. Cannabis policy knowledge among young adults was not associated with other beliefs that cannabis use leads to depression or low academic and work

performance. Differences in cannabis harm perceptions and knowledge among young adults may be explained by cannabis use status (Berg et al., 2015; Terry-McElrath et al., 2017), with more experienced users having a higher awareness of the policy.

On the other hand, 40% of young adult respondents did not demonstrate knowledge of state cannabis policy, highlighting variation in policy knowledge after implementation. Given that existing evaluations of state-level changes in cannabis legal status in youth and young adults rely on the dates of policy implementation, our findings indicate it may be important to account for policy knowledge in these evaluations (Brooks-Russell et al., 2019; Cerda et al., 2017; Fleming et al., 2016; Paschall & Grube, 2020). Associations between ever and current cannabis use and policy knowledge may indicate how policy awareness impacts population subgroups differently. Policy knowledge, therefore, could be used in several ways in sensitivity analyses to gain a more unbiased estimate of the effect of cannabis legalization on young adult beliefs and behaviors – as an alternate measure of policy exposure, as a control variable, or as a potential moderator. For example, current estimates may underestimate the effect of cannabis policy on behavior by grouping those without knowledge unlikely to change their behavior with those who have knowledge of the policy and may have considered or changed their behavior as a result. Using policy knowledge as an exposure variable in sensitivity analyses may identify an upper bound for the likely effect of cannabis policy change on key outcomes of interest; these estimates would be useful in modeling the expected long-term impacts of the policy. Second, findings that cannabis policy knowledge may differ by cannabis harm perceptions and use behavior in young adults are particularly salient as more states legalize cannabis and seek to evaluate policy effects (National Conference of State Legislatures, 2021b). Controlling for policy knowledge may reduce variability in findings across states and provide greater insight into the effects of changes in cannabis legal status on youth and young adult beliefs and behaviors. Third, using policy knowledge as a potential moderator of the relationship between date of policy implementation and outcomes of interest may identify differential patterns in change relevant to

public health education efforts – for example, there may be greater changes in certain beliefs about cannabis use among those with policy knowledge that could be targeted in health communication programs. Assessment of policy knowledge may also identify subgroups of the population at risk for greater cannabis use following policy implementation and inform efforts to prevent cannabis uptake and use.

Strengths of the current study are a large online sample of young adults from across the state of Vermont, relevance to changes in state cannabis policy across the U.S., and data collection within nine months of the policy implementation. While this timeframe allowed for Vermonters to be affected by the policy, news about the change in legal status likely occurred months before our data collection. Other limitations of this study include: a convenience sample, the use of cross-sectional data, no questions about medical cannabis use, and a lack of data prior to the policy implementation in 2018. The sample was limited to participants from a small, largely rural, and non-Hispanic White state. Vermont's homogeneity was represented in the sample and prevented detailed analyses of cannabis policy knowledge by race and ethnicity. Prior to the 2018 cannabis policy change, Vermont young adults had a higher prevalence of past 30-day cannabis use (SAMHSA, 2017) and reported lower perceptions of harm from cannabis use compared to the national prevalence (Moss et al., 2018). A high prevalence of use and low harm perceptions may impact the representativeness of the current study results and may influence the associations between cannabis policy knowledge and beliefs. Additionally, policy knowledge is only one of several mechanisms by which policy impacts beliefs and behaviors (e.g., access, availability of cannabis, retailer licensing; Pedersen et al., 2021) and there are other outcomes related to cannabis legalization relevant to population health (e.g., criminal justice; Firth et al., 2019). Our analysis is limited to policy knowledge, though future policy evaluations will need to consider the various mechanisms by which changes in cannabis legal status impacts a range of health outcomes to adapt state-level programming – and potentially, the policies themselves – to protect public health.

Conclusion

Evidence from Vermont young adult respondents suggests that knowledge of changes in cannabis legal status is greater in older young adults (aged 21-25 years) and of legal age to possess cannabis in Vermont, females, non-Hispanic White young adults, those with the highest education, and ever and current cannabis users. While sociodemographic factors are typically treated as covariates in existing policy studies, future evaluations of changes in state cannabis legal status that account for policy knowledge may improve estimation of the impact of policy change on harm perceptions and use of cannabis. The large proportion of young adults with correct policy knowledge, combined with a higher prevalence of policy knowledge among past 30-day cannabis users and young adults with low perceived risk of regular cannabis use, signals novel opportunities for state-level education on cannabis to ensure all young adults have accurate policy knowledge and are informed of the potential harms of cannabis use. Most young adults correctly understood the policy and nearly all respondents correctly identified that cannabis was not “legal for anyone to use” and that was “legal for people 21+ to use. A notable portion (40%); however, did not accurately identify all aspects of the policy, underscoring the potential to misattribute behavior change to policy implementation. Assessment of policy knowledge could be used in future evaluations to better estimate the effects of change to cannabis legal status on cannabis use behavior and beliefs and to inform public health efforts to prevent or reduce cannabis use in young people.

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