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Research Paper

Engagement with medical cannabis information from online and mass media sources: Is it related to medical cannabis attitudes and support for legalization?

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ABSTRACT

Background: The legalization of medical and recreational cannabis is a topic of continued debate in countries around the world. It has been suggested that medical cannabis legalization influences cannabis legalization for recreational purposes through increased media attention toward the positive health effects of cannabis. However, the nature of media coverage is likely to vary across mass media and online sources (internet and social media). In addition, effects of information engagement on attitudes may vary depending on whether information was actively sought or obtained incidentally during patterns of regular media use (scanned).

Methods: This study uses data from an online survey of Israeli adults (N = 554) to test the association between information seeking and scanning about medical cannabis (from mass media and online sources) and attitudes toward medical cannabis. Furthermore, we test indirect effects of media engagement on attitudes toward cannabis legalization through medical cannabis attitudes.

Results: Seeking and scanning for information about medical cannabis from online sources, but not from mass media sources, were associated with positive attitudes toward medical cannabis. Engagement with medical cannabis information from online sources was also indirectly associated with greater support for cannabis legalization, through positive attitudes related to medical cannabis.

Conclusion: The results suggest that one mechanism through which medical cannabis legalization is associated with cannabis legalization for all purposes is public engagement with information about medical cannabis in the media, particularly from the internet and social media channels. As increasingly more jurisdictions are expected to legalize medical cannabis, with resulting increase in media attention, support for recreational cannabis legalization may be expected to grow.

Introduction

During the last two decades, cannabis policy has undergone rapid changes in various jurisdictions around the world (National Conference of State Legislatures, 2017). Currently, cannabis remains illegal at the U.S. federal level, but 33 U.S. states and the District of Columbia have developed different comprehensive medical cannabis policies (National Conference of State Legislatures, 2017; Room, Fischer, Hall, Lenton, & Reuter, 2010). Medical cannabis is also legal in various countries including Canada (Fischer, Kuganesan, & Room, 2015), the Netherlands, and Israel and Israel (Lewis & Sznitman, 2017; Sznitman & Lewis, 2015). Ten U.S. states, Uruguay, as well as other countries have legalized, or are in the process of legalizing cannabis for recreational purposes. As a result, the legal medical cannabis industry is growing.

In parallel with rapid shifts in cannabis policies, cannabis legalization has received widespread media coverage in recent years (Kaiser, 2013; McGinty et al., 2016; Robledo & Jankovic, 2017; Sznitman & Lewis, 2015). Media coverage of cannabis legalization has been found to focus on the benefits of cannabis use on health, as well as its costs to individuals and to society (e.g. Volkow, Baler, Compton, & Weiss, 2014), and the effects of decriminalization of marijuana on crime (Holmes, 2014). Research from Israel has shown that much of the newspaper reporting on medical cannabis is in the format of patient narratives (Lewis, Sznitman, & Broitman, 2015), and that this topic is framed more frequently as a medical treatment for specific diseases, rather than as a drug (Sznitman & Lewis, 2015).

With the continued development of medical cannabis policies, the expansion of the medical cannabis industry, as well as clinical trials

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showing the therapeutic effects of cannabis (Abrams, 2018), it is likely that both commercial and non-commercial media that speak to the medical effects of cannabis will continue to expose the public to very different messages about cannabis than traditional anti-drug public service announcements and public health warnings. The increasing volume of information about medical cannabis in the media raises the question as to whether media coverage about medical cannabis might influence public opinion regarding medical cannabis, as well as support for legalization of cannabis (regardless of the user's intention or motivation) (Khatapoush & Hallfors, 2004). It is possible that individuals who are exposed to media messages describing cannabis as a valid and promising medical therapy to alleviate symptoms and treat diseases may form more positive attitudes toward cannabis. Pro-cannabis messages in the media may also downplay the potential physical and psychological harms associated with cannabis use. Over time, individuals who seek out media content about medical cannabis, or encounter it incidentally, may form more positive attitudes toward cannabis for medical and non-medical purposes, and be more supportive of cannabis legalization policies.

One influential source of information about cannabis in the media is advertisements. Research has found positive associations between exposure to medical cannabis advertisements and attitudes toward cannabis use, as well as reported use of cannabis (D'Amico, Miles, & Tucker, 2015; D'Amico, Rodriguez, Tucker, Pedersen, & Shih, 2018). More specifically, a cohort study of Californian adolescents found that higher average exposure to medical cannabis advertising was associated with higher average use, intentions to use, positive expectancies, and negative consequences (D'Amico et al., 2018). Furthermore, an experimental study found indirect effects of exposure to patient narratives about medical cannabis on support for cannabis legalization, through changes to attitudes toward medical cannabis (Sznitman & Lewis, 2018).

The current study uses an online survey of Hebrew speaking Israeli adults to investigate the mediated effect of engagement with information about medical cannabis from different media sources on support for cannabis legalization, through changes to medical cannabis attitudes. Media coverage of cannabis has become a topic of increased debate in Israel in the past 15 years (Lewis & Sznitman, 2017), which mirrors trends observed in the U.S. and other countries (McGinty et al., 2016). Patterns of online media use among Israelis are comparable to those in other countries. According to recent estimates (Pew Research Center, 2016) a median of 87% of Israelis use the internet at least occasionally, or own a smartphone, which is similar to patterns observed in other developed countries such as the U.S. (89%) and Canada (90%). Israelis also report frequent use of social networks (76%), similar to adults in the U.S. (71%) and Canada (73%). With regard to the use of traditional media sources, Israelis report watching an average of three hours and twenty-nine minutes of TV each day (Mann & Lev-On, 2016). This represents a decrease from previous years, which was also found for print newspaper. In contrast, American adults are estimated to watch five hours and four minutes of television per day, although there has been a sharp decrease among younger adults during the last few years (New York Times, 2016).

Mass media and online media sources

Research on media effects has distinguished between traditional media sources, which include newspapers, television and radio, as well as print media, and digital (online) media sources such as the internet and social media (Chao-Chen, 2013). Although the boundaries between these media types have become somewhat blurred in recent years, information engagement from traditional media sources can be conceptually distinguished from information engagement with digital sources (McQuail, 2012). Central characteristics of digital (new) media include interconnectedness, accessibility to individual users as senders and/or receivers, interactivity and multiplicity of use, and their ubiquity and 'delocatedness' (p. 39). In contrast, traditional mass communication is essentially one-directional, although it has become less massive and centralized over time.

While all types of media messages have the potential to influence public opinion related to cannabis, online media may have a particularly significant influence. Compared with print media or television, internet sites and social media are, particularly for young adults, a readily accessible and influential source of information about cannabis. Social media offers an interactive, immediate, multi-modal, and globally accessible channel for the creation and dissemination of information through platforms such as Facebook, Twitter or Instagram. Through social media, audiences may be exposed to a broader range of information about cannabis, including pro-cannabis information. For example, popular pro-cannabis Twitter users such as @stillblazingtho have been found to be among the top 10% of all Twitter handles followed (Cavazos-Rehg et al., 2015; Cavazos-Rehg, Krauss, Grucza, & Bierut, 2014). This information may also be seen as more relevant and persuasive, due to the effects of social endorsement by trusted peers or by celebrities (Cialdini, 2009).

Research has found that many dispensaries in the U.S. advertise health benefits of cannabis online, some of which remain unsubstantiated by evidence-based research (Bierut, Krauss, Sowles, & Cavazos-Rehg, 2017). Research has also found that user-generated cannabis product reviews published on YouTube often relate to medical and beneficial health effects of cannabis (Cavazos-Rehg, Krauss, Sowles, Murphy, & Bierut, 2018). Another study found that over half of Californian adolescent survey respondents reported seeing a message on social media about the benefits of cannabis or related topics (Roditis, Delucchi, Chang, & Halpern-Felsher, 2016). A recent cross-sectional survey of cannabis users found that over half were exposed to cannabis advertising in the past month: 28% passively observed advertisements; 26% actively sought advertisements. Most respondents (77%) noted that digital media (i.e., social media, online, text/emails) were common sources for marijuana advertisements (Krauss et al., 2017).

In light of the significant presence of medical cannabis media content online and its potential impact on public opinion, this study distinguishes between information engagement about medical cannabis from mass media and online media sources. As mass media coverage of drug use is more heavily regulated, compared with information about cannabis that is accessible online, there may be important differences in the valence of accessible information from each of these media sources. A study examining the sentiment of a random sample of influential cannabis-related twitter posts found that most tweets reflected a positive sentiment toward cannabis use, with pro-cannabis tweets outnumbering anti-cannabis tweets by a factor of more than fifteen (Cavazos-Rehg et al., 2015). Although we do not directly assess the nature of the content in each source, we expect that online information about medical cannabis will include more pro-cannabis information. In contrast, mass media coverage about cannabis is more likely to be neutral or negative in tone (such as anti-drug campaign messages, and news coverage related to cannabis-related crime). Therefore, we expect that engagement with online medical cannabis information will be more likely to be associated with positive attitudes towards cannabis legalization for all purposes, compared with engagement with mass media sources. Furthermore, we expect that the positive association between exposure to information about medical cannabis on support for cannabis legalization support will be mediated, in part, through (positive) attitudes towards medical cannabis.

Information Engagement and attitudes toward cannabis

In addition to distinguishing between online and mass media sources of medical cannabis content, we examine the independent effects of information seeking and information scanning. These represent two distinct information behaviors, and are core concepts within communication research, as well as other disciplines (Case, 2012;

Lewis, 2017). Information seeking has been defined as the "purposeful process by which individuals actively aim to change their state of knowledge through searching for information about a specific topic from one or more information sources" (Lewis, Martinez, & Carmel, 2017). Information seeking behaviors are characterized by active efforts to obtain information about a specific topic, using any source/s to obtain the desired information (Lewis, 2017). Prior research has found evidence that information seeking influences cognitions as well as behaviors, including cancer control behaviors (e.g. Kelly et al., 2010; Shim, Kelly, & Hornik, 2006), as well as a greater likelihood of non-medical drug use behaviors (e.g. Boyer, Lapen, Macaolino, & Hibberd, 2007; Kam & Lee, 2013; Martinez & Lewis, 2016). However, there are no studies, to our knowledge, that have tested effects of drug-related information seeking from media sources on drug-related attitudes and support for cannabis legalization.

While there is a large body of research in communication on information seeking and its impact on a range of outcomes, there is a growing awareness that it is also important to consider the influence of less deliberate forms of information engagement (Lewis, 2017). Information scanning is a less deliberate form of information engagement that may also influence attitudes, including support for cannabis legalization. In contrast to information seeking, which is a purposeful behavior, information scanning has been conceptualized as information acquisition that occurs during routine patterns of exposure to media or interpersonal sources (Hornik & Niederdeppe, 2008; Kosicki & McLeod, 1990). Scanning occurs when individuals encounter a topic that is of interest enough to produce attention and retention of that information. Scanned information generates a memory trace, and can be recalled at a later time with a minimal prompt (Niederdeppe et al., 2007).

On the basis of research on engagement with online and mass media content about cannabis, in addition to literature on effects of information seeking and scanning, we propose the following hypotheses:

H1. There will be a stronger positive association between information seeking (H1a) and scanning (H1b) about medical cannabis from online media sources and attitudes towards medical cannabis, compared with information seeking and scanning from mass media sources.

H2. Effects of information seeking (H2a) and scanning (H2b) about medical cannabis on support for cannabis legalization will be mediated through attitudes toward medical cannabis.

Method

Participants

The participants were 648 Israeli adults, recruited using a Web-based online panel through a survey company (Panel4All). Established in 2006, Panel4All oversees a panel of internet respondents consisting of over 30,000 active panelists, and is a leading provider of online survey data for academic researchers in Israel. The method of recruitment involved sending out invitations to participate to eligible panelists until the quota for the study was met. Participants were free to participate in the panel and were offered vouchers by the survey company in exchange for their participation. The response rate was 28%, which is fairly low, although not atypical of online surveys. Response rates of this magnitude have been shown to produce results that are statistically comparable to surveys with higher response rates (e.g., Keeter, Kennedy, Dimock, Best, & Craighill, 2006). However, based on the low response rate and self-selection recruitment method, the sample cannot be considered to be representative. IRB approval was granted by the Social Welfare and Health Sciences Department at the University of Haifa (nr. 289/13).

We excluded participants who took less than seven minutes or over one hour to complete the online survey (n = 94), leaving an analytic sample of 554 participants. The decision to exclude these respondents was based on an earlier assessment of the minimal time required for participants to complete the survey module. Participants who did not meet this threshold may have not paid sufficient attention to the survey. Similarly, prior to analyses, we decided to exclude participants who spent more than one hour, as they may have been distracted by other tasks, reducing the validity of their responses. Sensitivity analyses including respondents who did not meet the time threshold (N = 648) showed similar results to those reported on in the manuscript (results available upon request from the authors).

Measures: dependent variables

Attitudes toward medical cannabis

Participants were asked to state the extent to which they agreed with each of the following four items relating to medical and policy issues regarding medical cannabis (the first three items were reverse coded): "Cannabis is not a medicine," "Medical cannabis is addictive," "Medical cannabis is more addictive than other prescription drugs," and "Medical cannabis should be in the (Ministry of Health's) treatment 'basket', so that patients don't have to pay for it out of pocket." Research has found that these items relate to support for medical cannabis legalization in different countries (Sznitman & Bretteville-Jensen, 2015). The responses to these questions ranged from 1 ("strongly disagree") to 5 ("strongly agree"). For all four items there was also a "don't know" category which was categorized as missing and excluded from analyses. Because this was a new measure devised for this study, we conducted an exploratory factor analysis of the medical cannabis attitude items. Principal component analysis with varimax rotation demonstrated that all items loaded onto one factor, which accounted for 60.9% of the variance (eigenvalue = 2.44). We calculated a mean of these four items (M = 3.23, SD = 0.99, α = 0.78), such that a higher score indicates more positive attitudes toward medical cannabis.

Attitudes toward cannabis legalization

Respondents were asked to assess the extent to which they agreed that "The use of cannabis for any purpose (medical or recreational) should be legal." Response categories ranged from 1 ("strongly disagree") to 5 ("strongly agree"). There was also a "don't know" category which was categorized as missing and excluded from analyses (M = 3.26, SD = 1.50).

Independent variables

Information seeking from media sources

We adapted a validated measure of information seeking (Lewis et al., 2017) that has been used in previous research (Martinez & Lewis, 2016; Lewis et al., 2012; Niederdeppe et al., 2007; Shim et al., 2006; Tan, Mello, & Hornik, 2012). We asked respondents "Did you actively seek information about medical cannabis during the last 60 days from any of the following sources?" Response options included (1) television (entertainment programs); (2) television (news coverage); (3) radio; (4) newspaper or magazines; (5) Internet (e.g., websites, search engines such as Google, blogs) via personal computer or mobile devices such as phones; and (6) social media (e.g., Facebook, Twitter). Respondents were asked to check all that applied. In addition, each question offered an option for respondents to indicate that they had not actively looked for information, or did not remember.

As the goal of the study was to test the independent association of seeking information about medical cannabis from mass media sources and from online media sources, we created separate measures of information seeking from mass media sources and from online sources. The seeking from mass media measure was a mean of responses to the seeking items for the following sources: (1) television (entertainment programs); (2) television (news coverage); (3) radio; and (4) newspaper or magazines. The measure of seeking from online sources was a mean of response to the following two items: (1) Internet; and (2) social media

Information scanning from media sources

To measure information scanning from media sources, we adapted a validated measure by Kelly et al. (2010) that has been used in prior research (Lewis et al., 2017) to report the frequency with which they recalled coming across information about medical cannabis from a range of media sources. Respondents were first asked whether they had "heard of or come across media coverage about medical cannabis during the last 60 days?" Response options were "Yes", "No", and "I don't recall." Participants who responded "No" or "I don't recall" were coded as non-scanners (n = 343).

Those who answered "yes" (n = 211) were then asked: "Did you come across (scan) information about medical cannabis during the last 60 days from each of the following sources when you were not actively looking for it on any of the following sources? (check all that apply)": Television (entertainment); Television (news); radio; newspaper or magazines; Internet (e.g., websites, search engines such as Google)—via PC or mobile devices such as phones; social media (e.g., Facebook, Twitter). Each source option included the following answer choices in an effort to measure frequency of scanning from each source: "No," "Once," and "More than once."

As with our seeking measures, we created separate measures of information scanning from mass media sources and from online sources (internet and social media). The scanning from mass media measure was a mean of responses to the scanning items for the following sources: (1) television (entertainment programs); (2) television (news coverage); (3) radio; and (4) newspaper or magazines. The measure of scanning from online sources was a mean of response to the following two items: (1) Internet; and (2) social media.

Covariates

Previous research has found that gender, education, income, age, alcohol consumption, and being a cannabis user (past or present) are associated with attitudes toward drug use (Carliner et al., 2017; Cavazos-Rehg et al., 2018; Shanahan, Gerard, & Ritter, 2014; van der Sar, Brouwers, van de Goor, & Garretsen, 2010). In addition, research has found negative associations between religious observance and medical cannabis use, as well as recreational cannabis use (Burdette, Webb, Hill, Haynes, & Ford, 2018). Therefore, the following control variables were included in the analysis: gender (0 = female, 1 = male), age (18+), completed education level (partial secondary = 0, full secondary = 1, some college = 2, BA = 3, MA or above = 4), income (1 = 'Far less than average' to 6 = 'Far more than average'), alcohol consumption during the last month (none = 0, any = 1), cannabis use in the last year (none = 0, any = 1), and religious background (religious or traditional = 0, secular = 1).

Statistical analyses

To test the main effects of information scanning and seeking on attitudes toward medical cannabis we conducted four linear regression models regressing the dependent variable (attitudes toward medical cannabis) on (1) information seeking from online media sources, (2) information seeking from mass media sources, (3) information scanning from online media sources, and (4) information scanning from mass media sources. Covariates (see above) were controlled for in all models. Next, we conducted mediation analyses using PROCESS (Hayes, 2013). This approach involves empirically bootstrapping the sampling distribution of the indirect association and obtaining its bias-corrected confidence interval. Bootstrapping is a recommended method for mediation analysis because of its high power and the fact that it does not assume a normal sampling distribution (Hayes, 2009). The bootstrapping approach was conducted using SPSS Version 22.0 (SPSS Inc., Chicago, IL) with PROCESS macro (version 3, model 4) developed by Preacher and Hayes (2008). The analyses were based on 5000 bootstraps with information seeking and scanning as separate predictor variables, attitudes toward medical cannabis as a mediator, and support for legalization as the dependent variable. All covariates from the main effects analysis were included in the mediation analyses as well.

Table 1
Demographic characteristics of sample (N = 554).

	%	M	SD	Range
Gender				
Female	52.5			
Male	47.5			
Age		44.25	15.61	18-79
Income				
Less than average	42.0			
Around average	21.3			
Higher than average	36.7			
Education				
Up to 12 years	27.6			
Some college	25.1			
BA	34.5			
MA or above	12.7			
Religion				
Secular	66.8			
Religious	33.2			
Cannabis use (last year)				
No	87.0			
Yes	13.0			
Alcohol consumption (last month)				
No	31.4			
Yes	68.6			
Information seeking – online		0.34	0.62	0-2.0
Information seeking – mass media		0.27	0.53	0-2.0
Information scanning - online		0.52	0.71	0-2.0
Information scanning – mass media		0.69	0.82	0-2.5
Attitudes toward medical cannabis		3.23	0.99	1-5.0
Support for cannabis legalization		3.26	1.51	1-5.0

Results

Participants' age ranged from 18 to 78 years (M = 44.25, SD = 15.61). The sample included 291 females (52.5%) and 263 males (47.5%). Most participants (72.3%) had completed more than 12 years of school. Participants reported varying income levels, with over forty percent reporting less than average income (42.0%), approximately one-fifth of participants reported earning around the average income (21.3%), and approximately one third of the sample reported earning higher than average income (36.7%). These characteristics are comparable to those reported in national census reports (Central Bureau of Statistics, 2015).

Table 1 summarizes the demographic characteristics of the sample, as well as the measurement properties of the information seeking measures and parallel measures developed for assessing information scanning. Table 2 shows the correlations between these variables.

Main effects of seeking

The regression model (n = 522) testing the association of information seeking from online media sources on attitudes toward medical cannabis (H1a) was significant: $R^2 = 0.09$, $R^2_{adj} = .07$, $F(9, 513) = 5.62$, $p < .001$. Results showed a direct positive association of information seeking from online media sources and attitudes toward medical cannabis (B = .20, SE = .09, p = .03), when accounting for covariates, supporting H1a. There was no significant association between seeking information from mass

Table 2
Correlation matrix.

	Support –legalization	Attitudes – Medical cannabis	Cannabis use	Gender	Age	Income	Secular	Education	Alcohol	Seeking – Mass media	Seeking – Online media	Scanning – Mass media
Attitudes – Medical cannabis	.382***											
Cannabis use (12 months)	.187***	.223***										
Gender (Male = 1)	-.044	-.079	-.002									
Age	-.048	-.079	-.213***	.041								
Income	-.035	-.078	-.014	.144**								
Secular	.064	.094*	.079	-.014	.186***	.116**						
Education	-.056	.041	-.005	.032	.195***	.149***	.159***					
Alcohol (last month = 1)	-.007	.097*	.065	.215***	-.086	.056	.119**	.030				
Information seeking – Mass media	.078	.107*	.103*	.073	.020	.018	.027	−.021	.071			
Information seeking – Online media	.162***	.183***	.249***	.022	−.139**	-.004	.037	−.013	.056	.668***		
Information scanning – Mass media	.112**	.044	.068	.035	.013	.072	.064	.048	.033	.529***	.386***	
Information scanning – Online media	.106*	.165***	.158***	-.010	−.205***	−.003	−.028	.033	.042	.409***	.556***	.545***

media sources and medical cannabis attitudes (B = .02, SE = 0.11, p > .05). Male respondents were less likely to report positive attitudes towards medical cannabis than female (B = -0.20, SE = .09, p = .02), and cannabis users (B = .48, SE = .13, p < .001) were more likely to report positive medical cannabis attitudes than non-users. The other covariates (age, income, education, religious observance, and alcohol consumption) were not significantly associated with attitudes toward medical cannabis (p > .05).

Main effects of scanning

The regression model (n = 535) testing the association between information scanning from online media and attitudes toward medical cannabis (H1b) was significant: R^2 = 0.10, R^2_{adj} = .08, F(9, 526) = 6.37, p < .001. Results showed a direct positive association of information scanning from online media sources and attitudes toward medical cannabis (B = .24, SE = .07, p = .001), when accounting for covariates, supporting H1b. There was no significant association between scanning from mass media sources and medical cannabis attitudes (B = −0.08, SE = 0.06, p > .05). Male respondents were less likely to report positive attitudes towards medical cannabis than females (B = -0.20, SE = .09, p = .02). Cannabis users (B = .52, SE = .13, p < .001), and those who reported drinking last month (B = .19, SE = .09, p < .05) were more likely to report positive medical cannabis attitudes than non-drinkers. The other covariates (age, income, education, and religious observance) were not significantly associated with attitudes toward medical cannabis (p > .05).

These results support H1, as the findings demonstrate a significant and positive association between information seeking and scanning from online sources on attitudes toward medical cannabis. In contrast, there was no effect of information seeking or scanning from mass media sources (see Table 3).

Mediation analyses

We tested mediation hypotheses for information seeking and scanning from mass media and new media sources. In the mediation analyses we tested whether attitudes toward medical cannabis would mediate the relationship between information seeking (H2a) and scanning (H2b) and support for cannabis legalization.

In a model testing indirect effects of seeking from mass media sources (n = 505), the bootstrapping approach did not find a significant indirect effect of seeking information about medical cannabis from mass media sources on support for legalization through changes to attitudes toward medical cannabis, (b = .008, SE = .052, p > .05), 95% CIs [-0.093, 0.113]. In contrast, a model (n = 505) testing indirect effects of medical cannabis information seeking from online sources on support for legalization through changes to attitudes toward medical cannabis showed a significant indirect effect (b = .111, SE = 0.048, p < .05), 95% CIs [0.017, 0.209], see Fig. 1).

Mediation analyses testing indirect effects of information scanning from mass media sources on support for legalization through changes in attitudes toward medical cannabis (n = 517) did not show a significant indirect effect (b = -0.042, SE = 0.033, p > .05), 95% CIs [-0.108, 0.022]. However, a model (n = 517) testing indirect effects of information scanning from online sources on support for legalization through changes to attitudes toward medical cannabis did show a significant indirect effect (b = .138, SE = .043, p < .05), 95% CIs [0.059, 0.226], see Fig. 2). Respondents who sought or scanned information about medical cannabis from the internet or social media, but not from mass media, expressed more positive attitudes toward medical cannabis, which, in turn, was positively associated with support for legalization of cannabis[1] . Thus, Hypothesis 2 is partially supported.

[1] There was a positive direct association between attitudes toward medical

Table 3
Regression models predicting attitudes towards medical cannabis.

	Model 1: Seeking (n = 522)			Model 2: Scanning (n = 535)		
Predictors	B	S.E.	P	B	S.E.	P
Male	−0.201	.086	.021	−0.201	.086	.019
Age	−0.002	.003	.403	−0.002	.003	.587
Income	−0.041	.026	.116	−0.045	.026	.084
Education	0.045	.038	.242	0.039	.038	.306
Secular	0.092	.092	.317	0.147	.091	.108
Cannabis use	0.478	.127	< .001	0.517	.125	< .001
Alcohol use	0.148	.093	.111	0.185	.092	.045
Information seeking - mass media (medical cannabis)	0.016	.105	.877			
Information seeking - online (medical cannabis)	**0.204**	**.093**	**.029**			
Information scanning - mass media (medical cannabis)				−0.081	.060	.180
Information scanning - online (medical cannabis)				**0.235**	**.072**	**.001**

Note. B = Coefficient, S.E. = Standard Error, P = p value.

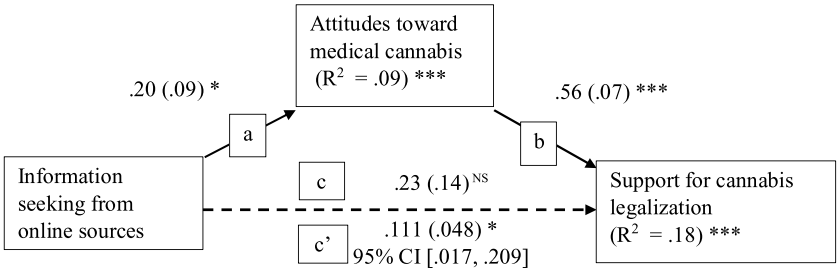

Fig. 1. Standardized coefficients for the mediation model testing H2a (n = 505).
Note. * p < 0.05, *** p < 0.001. N.S. = p > 0.05; c' path is with mediator; c path is without mediator.

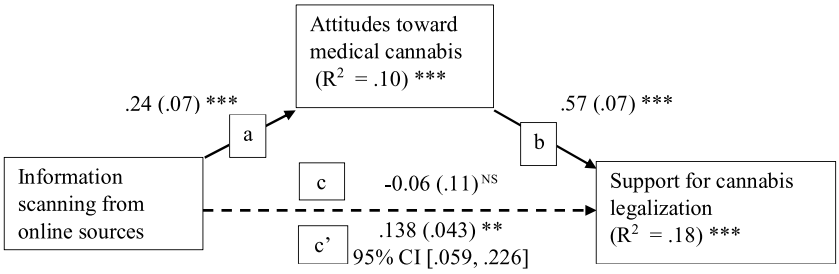

Fig. 2. Standardized coefficients for the mediation model testing H2b (n = 517).
Note. * p < 0.05, *** p < 0.001. N.S. = p > 0.05; c' path is with mediator; c path is without mediator.

Discussion

This study offers a timely and significant contribution to an emerging body of research on factors that shape public opinion and debate about the legalization of cannabis. We focus specifically on the role of medical cannabis-related information in media sources in shaping public attitudes toward cannabis legalization. More specifically, this study examines the independent effects of information seeking and scanning from online as well as traditional media sources on attitudes toward medical cannabis and cannabis legalization, accounting for a range of covariates. Prior research has examined effects of information seeking and scanning when traditional and online sources are combined (e.g., Lewis et al., 2012; Ramirez et al., 2013). In contrast, we distinguish between online sources and mass media sources such as broadcast radio and television. This was done because mass media sources are subject to more stringent regulations with regard to sensitive topics including cannabis. The results suggest that online sources play a more significant role in shaping attitudes toward cannabis than traditional media sources.

The percentage of adults who favor legalization of recreational cannabis is the highest it has ever been in the U.S. A 2017 survey of public opinion by the Pew Research Center found that 61 percent of U.S. adults favored the legalization of cannabis (for all purposes) and 90 percent support legalizing cannabis for medical use. This represents a dramatic shift in public opinion from 2006, when only 32% supported cannabis legalization, and is nearly double the proportion who favored legalization in 2000 (Geiger, 2017).

Research also indicates that there is an association between medical and recreational cannabis policies; in all U.S. states that legalized cannabis for all purposes this policy change was preceded by the legalization of cannabis for medical purposes. Indeed, it has been argued that medical cannabis legalization enables the psychological changes needed to destabilize the "war on drugs" (Kilmer & MacCoun, 2017).

(*footnote continued*)
cannabis and support for legalization, controlling for covariates other than information seeking or scanning (b = .57, SE = .64, p < .001).

Research has found that the adoption of Prop 215 that legalized medical cannabis in California did not bring about any immediate change in attitudes toward full legalization (Khatapoush & Hallfors, 2004). It did, however, weaken the presumption that prohibition was the default policy response to cannabis-related issues.

Research has found that support for medical cannabis legalizations is greater in Israel than in Norway, where medical cannabis is not legal (Sznitman & Bretteville-Jensen, 2015). Furthermore, a recent experimental study using data from Israeli respondents showed that exposure to medical cannabis narratives, akin to those in Israeli news media coverage of this topic, was associated with an increase in positive attitudes towards medical cannabis which, in turn, was associated with more positive attitudes towards recreational cannabis (Sznitman & Lewis, 2018). This suggests that exposure to medical cannabis media content may influence attitudes towards full legalization of cannabis. Indeed, it has been suggested, albeit not directly examined, that the recently observed increase in recreational cannabis use among Israeli adults is related to medical cannabis policies (Harel-Fisch, 2017). At the same time, it should be noted that, although some research suggests that medical cannabis policies influences recreational use, other research has failed to show such a connection (Sznitman & Zolotov, 2015). Furthermore, researchers have noted that while medical cannabis policies per se may not influence recreational use, certain policy dimensions can lead to greater recreational cannabis use (Pacula, Powell, Heaton, & Sevigny, 2015).

The findings of this study contribute to this growing body of knowledge by specifying that one of the ways in which medical cannabis legalization may influence attitudes towards recreational cannabis is through increased population exposure to medical cannabis online media content. More specifically, we show that engagement with information about medical cannabis on the internet and/or social media is indirectly associated with greater support for medical cannabis legalization. As internet-based information about cannabis messages proliferate with little regulatory oversight, the public is exposed to much more diverse perspectives on cannabis than content that is typically found on traditional media channels. As this trend continues, it is possible that support for recreational cannabis legalization will grow.

The study findings raise questions with regard to whether it is in the public interest to (attempt to) regulate cannabis advertising on the internet, similar to regulations that are in place for tobacco and alcohol (Pacula, Kilmer, Wagenaar, Chaloupka, & Caulkins, 2014). On the one hand, proponents of free speech might argue that it is both undesirable and impractical to regulate content accessible on the internet and social media, including content related to cannabis. On the other hand, it could be argued that regulations should be imposed regardless of information source, and that online sources should not be exempt from regulations currently applied to mass media sources.

At present, there is inconsistent and limited regulation for the dissemination of information about medical cannabis online, including advertisements (Cavazos-Rehg et al., 2018). All of the 9 medical cannabis growers in Israel have a presence on social media such as Facebook (Cannabis magazine, 2018) and, to date, there is no policy or legal regulations for advertisement for medical cannabis in Israel. In some U.S. states, there are regulations prohibiting advertising medical cannabis in specific media channels; for example, Delaware and Oregon do not allow advertisements in certain print or broadcast media (see Krauss et al., 2017). However, other states (e.g. Arizona, New Mexico, Vermont) have no cannabis-related advertising regulations at all. This may also be related to the challenges in controlling the dissemination of, and access to, information about cannabis on the internet. For example, although Facebook officially prohibits advertising of illicit drugs, and has shut down cannabis dispensary pages (Breen, 2016; Duggan, 2015; Facebook, 2018), a study by Krauss et al. (2017) found that this platform was the most common source of exposure to advertising for cannabis among young adults in the U.S. It is important to note that cannabis-related advertisements represent only one segment of the online media landscape of medical cannabis messages. A great deal of information about medical cannabis is not in the form of advertisements, but rather found in blogs, posts, and other user generated content relating to cannabis, including health benefits of cannabis use. This type of online content may be even more difficult to regulate than advertisements.

Limitations

This study uses a cross-sectional sample to test hypotheses, which precludes claims of causal inference. Thus, it may be possible that the observed association between information seeking and scanning from online sources and attitudes toward medical cannabis and legalization is bi-directional. Individuals who hold more positive attitudes toward medical cannabis and legalization may be more likely to engage with information about cannabis online. Future research should test these hypotheses using data from multiple time points to address this possibility. Additional countries are in the process of legalizing medical and recreational cannabis use, which may provide opportunities for researchers to conduct longitudinal studies that examine the causal relation between media exposure to medical cannabis messages and public opinion towards legalization. Hopefully, researchers will be able to capitalize on these changes to develop the evidence base further. Another limitation is that we do not know if the content of the media exposure was in the form of an advertisement or not, and whether it was pro- or against cannabis use or legalization. Another limitation relates to the use of an ordinal level variable (support for legalization) as one of our primary dependent variables. Current mediation techniques, including PROCESS, allow for OLS-based estimates to predict ordinal outcomes. We did test the outcome (support for legalization) and found that the standardized residuals were distributed acceptably with approximately normal errors. However, from a methodological standpoint, it would be preferable to use an ordinal logit model to ensure that the observed results do not violate assumptions for OLS-based modeling approaches. As this method was not yet available in PROCESS, we recognize this as a limitation and a challenge for researchers interested in mediation modeling.

Conclusions

Cannabis policies are currently highly contested and in flux. Research on the impact of medical cannabis legalization remains preliminary given that policy changes in many countries have only recently been implemented. There has been a sharp increase in media coverage relating to cannabis as debates over legalization gain traction in different countries (McGinty et al., 2016). Previous research has suggested that medical cannabis policies influence support for cannabis legalization for all purposes (Kilmer & MacCoun, 2017). The current study suggests that one mechanism through which this may occur is public engagement with information about cannabis in the media, and particularly from online media sources. The current study provides preliminary evidence to show that exposure to media messages about medical cannabis on the internet and social media may lead to more positive attitudes toward medical cannabis, which, in turn is associated with increased support for cannabis legalization.

As increasingly more jurisdictions are expected to legalize medical cannabis, with a resulting increase in media attention towards health benefits of cannabis, support for recreational cannabis legalization may be expected to grow. Future research should examine the content of popular social media and internet sites that contain information about cannabis to assess the valence of the information available and diversity of perspectives. Research using longitudinal or experimental designs are also needed to test the direction of causal influence.

Conflict of interests

I declare that my co-author and I have no conflict of interests.

Author contribution statement

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