Understanding lower-risk cannabis consumption from the consumers' perspective: A rapid evidence assessment

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Abstract

In the current rapid evidence assessment, we summarize the existing research on lower-risk cannabis consumption as understood by those who consume cannabis. We identified 7111 unique articles published between 1900 and 2021 using search terms related to a) cannabis consumption, b) beliefs and behaviors, and c) positive outcomes. Twelve articles met our inclusion criteria. Three themes emerged that reflect lower-risk cannabis beliefs and behaviors (informed self-regulation, protective behavioral strategies, and the normalization of cannabis consumption) and one theme reflected motivations that undermine lower-risk cannabis consumption (e.g., using cannabis to cope). Results suggest a need for targeted lower-risk cannabis consumption research—research focused on how those who consume cannabis do so in a positive, non-problematic manner. Such research would help to inform policy and practice and, ultimately, help promote lower-risk cannabis consumption strategies.

Keywords: lower-risk cannabis, cannabis use, rapid evidence assessment, harm minimization

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Cannabis is the most frequently consumed controlled substance in the world (Substance Abuse and Mental Health Service Administration, 2016). The United Nations Office on Drugs and Crime (2019) estimated that about 188 million people worldwide have consumed cannabis in the previous year, compared to 53 million people who consume opioids, 29 million people who consume amphetamines and prescription stimulants, 21 million people who consume ecstasy, and 18 million people who consume cocaine. However, cannabis use exists on a continuum. Whilst some people use cannabis excessively and thus place themselves at high-risk for cannabis dependence, other people use cannabis in moderation and experience little or no problems. Yet, existing research has focused almost exclusively on people who have developed problems, which has created a blind spot as it pertains to the attitudes and behaviors that yield non-problematic use of cannabis (Subritzky, 2018). The purpose of the current research was to assess and synthesize what is known (and not known) about the beliefs and behaviors of lower-risk cannabis consumers that may help keep their cannabis use non-problematic. To this end, we conducted a rapid evidence assessment (REA) of the academic literature (1900-2021).

Existing debates on cannabis use and the need to understand lower-risk consumption

From a public health perspective, widespread use of cannabis is a concern given the associated array of negative consequences, such as impaired cognitive performance, decreased pulmonary function, and elevated blood pressure (Goyal et al., 2017; Leung, 2011; Volkow et al., 2014). Moreover, akin to the consumption of many other substances, prolonged and heavy cannabis consumption may lead to dependence, which is associated with decrements in well-being (Lev-Ran et al., 2014). Additionally, for people at risk for psychotic disorders, high

potency cannabis use (i.e., higher amounts of tetrahydrocannabinol) has been linked to greater risk of acute psychosis (Di Forti et al., 2019; Hall & Degenhardt, 2009; Moore et al., 2007; Volkow et al., 2014) and increased likelihood of being diagnosed with schizophrenia (Andréasson et al., 1987).

Given the potential harms associated with cannabis consumption, research and public health policy have historically adopted a *deficit model* that frames cannabis (and other drugs) as inherently problematic (e.g., Southgate & Hopwood, 1999). In the deficit model, substance use is anomalous, destructive to both health and well-being, and reflects a flaw in the person who consumes the substance (Southgate & Hopwood, 1999). Public policy based on the deficit model focused on prohibition and abstinence (Pacula et al., 2014), despite an extensive body of research showing that an abstinence approach to cannabis use is largely ineffective at helping people with substance use problems (e.g., Lenton, 2000). For instance, the deficit model's framing of people who consume psychotropic drugs (such as cannabis) to be deviant and immoral has been critiqued as being dehumanizing and counterproductive (see Lunze et al., 2015). Stemming, in part, from debates about the utility of the deficit model, there has been a fundamental shift toward a harm reduction model (Becker, 1963/2008; Kruger et al., 2021; Lunze et al., 2015; Marlatt, 1996).

Researchers and policy makers who adopt the harm reduction model focus their attention on reducing cannabis-related harms whilst recognizing that most cannabis-related harm is concentrated among a minority of high-risk consumers (Crepault, 2014). For instance, focus is placed on biopsychosocial risk factors for developing cannabis dependency (e.g., Khan et al., 2013; Lopez-Quintero et al., 2011). Additionally, research stemming from the harm reduction model is often directed at possible cognitive impairments resulting from cannabis consumption,

dependency on cannabis that hinders interpersonal relationships and employment, and associated mental and physical health problems (Cohen et al., 2019; Fischer et al., 2009; Room et al., 2010).

The advantage of the harm reduction model is that when high-risk factors are identified, the knowledge created can be mobilized toward strengthening each of the four pillars of the public health approach to substance use: prevention, treatment, enforcement, and harm reduction (see Broughton, 2014; Fischer et al., 2009). Indeed, those who adhere to the harm reduction model believe educational efforts are needed to facilitate informed decision making (see Bedrouni, 2018). Moreover, those who are at high-risk of dependency (as well as those who have developed a dependency) are encouraged to take consumption "one step at a time" to reduce the harmful consequences of their behavior (Marlatt, 1996). In sum, research and public policy that apply the harm reduction model tends to concentrate their attention almost exclusively on the beliefs and behaviors of problematic cannabis consumers.

Critically, however, most people who consume cannabis (~90%) do so without developing a dependency, and most cannabis consumption does not pose a risk to public health (Caulkins et al., 2016; Kleiman 2014; Room et al., 2010). Yet, there is a dearth of knowledge on the beliefs and behaviors of lower-risk cannabis consumers (see Hathaway, 2004; Shukla, 2006; Subritzky, 2018). Like others (Allen & Walsh, 2017; Subritzky, 2018), we argue that knowledge about the beliefs and behaviors that motivate and maintain non-problematic use of cannabis among people who use cannabis without problems would complement the harm reduction model and associated public health policy and programing (see Allen & Walsh, 2017; Subritzky, 2018). Moreover, we contend that the harm reduction model will be strengthened by better understanding the perspective of people who consume cannabis without problems, particularly in jurisdictions where cannabis has been legalized or jurisdictions considering legalization.

Accordingly, the purpose of the current research was to assess and synthesize what is known (and not known) in the scientific literature on the lower-risk cannabis consumption of cannabis consumers.

Overview of the current research

Herein, we report the results of a rapid evidence assessment (REA) of the academic literature that appraised the density and quality of the existing evidence on lower-risk cannabis consumption beliefs and behaviors as identified by those who use cannabis in a non-problematic manner, and then we synthesized this evidence (1900-2021). We chose to conduct an REA because it allows for a structured and rigorous search as well as a quality assessment of the uncovered evidence but is not as exhaustive as a systematic review (Thomas et al., 2013). In their relative brevity, REAs provide a solid base for informed, evidence-based conclusions (Wen et al., 2015). Put differently, identifying and synthesizing lower-risk cannabis use strategies—strategies that go beyond simply abstinence or high-risk behaviors—will facilitate prevention, treatment, enforcement, and harm reduction efforts. Additionally, REAs can point to gaps in the existing knowledge base that require research attention. This is especially important considering the rapid shift toward legalization of cannabis use in many jurisdictions world-wide and the associated concern that legalization may increase the rate of problematic cannabis use.

Method

Inclusion and Exclusion Criteria

Records were included if they (a) reported quantitative or qualitative research on lower-risk (i.e., minimizing harm and maximizing benefits) cannabis consumption or lower-risk cannabis consumption beliefs in which participants were 18 years or older, (b) were published between 1900 and August 2021 (i.e., the last 121 years of cannabis research), and (c) were

available in English or French. Records were excluded if they (a) did not involve research (e.g., commentaries and editorials) or a review of research (e.g., meta-analysis, systematic review) or (b) exclusively examined harms (or potential harms) and risk factors stemming from cannabis consumption. Studies meeting all of the inclusion criteria and none of the exclusion criteria were retained for further inspection.

A detailed table of all inclusion and exclusion criteria is available on Open Science Framework (OSF): https://osf.io/fn7z3/?view_only=13acef4d4fa643fbbd6d1f968ee9a4c1.

Selection of Studies

A comprehensive database search was to identify relevant records published between January 1, 1900 and August 30, 2021 using PsycInfo, PubMed, and ProQuest Dissertations and Theses (to capture relevant grey academic literature). The search included terms related to a) cannabis consumption, b) beliefs and behaviors, and c) positive outcomes. Also, when available in the database, we used thesaurus terms from the controlled vocabulary to locate relevant records. A detailed summary of the search development and the Boolean search statements for each database can be accessed using the previously provided OSF link.

The comprehensive database search identified 7110 records after removing duplicates (see PRISMA chart in Figure 1). An additional record (Subritzky, 2018) was included after it was located by a member of the research team while reviewing the references of a previously identified article. Thus, in total, the search yielded 7111 records. Two members of the research team independently screened the abstract and title of these records using the inclusion and exclusion criteria. Thirty-five were included for full-text screening using the inclusion and exclusion criteria. There was 100% agreement between the coders on the 12 records that were included in the REA.

Results

Quality Assessment

The 12 articles included in the current REA used 11 distinct samples (the two articles authored by Sandberg were based on the same sample). The samples varied in size from *N*=30 (Mostaghim & Hathaway, 2013) to *N*=2,226 (Richards et al., 2021) with the average number of participants *M*=580.27 (*SD*=787.98). Although no article mentioned using a power analysis to determine sample size, at least two used systematic approaches to participant recruitment. Namely, Hathaway et al. (2011) used a random dialing sample of inhabitants of Toronto from which frequent cannabis consumers were selected based on predetermined criteria. Duff and Erickson (2014) used Respondent-Driven Sampling (Heckathorn, 2002) which is an established systematic method of accessing hidden populations. Unfortunately, the authors did not report enough detail on the exact sampling strategy employed in their own study.

Additionally, Sandberg (2012, 2013) reported using a wide range of methods to access a diverse sample (e.g., drawing from researchers' social networks, students, organizations, internet advertisement, prison). However, again, little detail was provided on the larger sample from which his (*N*=100) participants were selected. The remaining studies used student samples recruited from student pools (Bravo et al., 2017; Glodosky & Cuttler, 2019; Lee et al., 2009; Pedersen et al., 2016; Richards et al., 2021) or from among students taking part in the authors' courses (Mostaghim & Hathaway, 2013); or they recruited a sample of adults using a newspaper ad (Hathaway, 2004) and snowball sampling (Shukla, 2006). Across all studies that reported participants' race/ethnicity (Sandberg 2012 and 2013, and Hathaway, 2004 did not), the samples were on average 76.1% White (range: 57%-87%). Of the five non-student samples (except the sample used in Sandberg's articles and Hathaway (2005) where this information was not

reported, but the sample was described as comprised of lower-class consumers among whom only 41% were employed full-time), participants were also well educated, with 65.2% having completed at least some university or college. Lastly, although there was gender balance across the identified studies (average percentage of women was 51.34%, men: 48.57%), there were large gender disparities in individual studies. For instance, in Sandberg (2012, 2013) only 12% identified as women, whereas only 31.2% of the Richards et al. (2021) and 22% of the Pederson et al. (2016) samples identified as men.

Emerging Themes

The authors of the present REA read all 12 identified articles to become acquainted with the reported lower-risk cannabis attitudes and behaviors. These were then discussed collectively to identify similarly expressed meanings. Discrepancies in the interpretation of the findings were discussed until consensus was reached. Four broad themes emerged from the results of the twelve articles identified in this review: 1) informed self-regulation, 2) protective behavioral strategies, 3) normalization and stigma, and 4) cannabis consumption motives. A summary of the identified articles is provided in Table 1.

1. Informed Self-Regulation

Duff and Erickson (2014) demonstrated that most individuals who engaged in non-problematic cannabis consumption engaged in informed self-regulation, which entails following self-imposed rules and strategies to keep their cannabis consumption non-problematic and ultimately beneficial. Shukla (2006), Hathaway (2004), and Hathaway and colleagues (2011) also highlighted the various informal rules and strategies individuals employed to keep their cannabis consumption under control. Additionally, Mostaghim and Hathaway (2016) underlined that both individuals who do and do not consume cannabis believe in people's right to choose

their own approach to cannabis as well as their ability to self-determine what quantity and frequency of cannabis consumption aligns best with their tolerance and lifestyles.

When self-regulation emerged as having lower-risk cannabis utility, it was often coupled with an acknowledgment of the risks and potential harms associated with cannabis consumption. There was also a general understanding that moderation—regardless of how that might look from one person to the next, depending on one's subjective experience—would result in pleasures and benefits perceived to be associated with cannabis consumption whilst avoiding the negative consequences (Duff & Erickson, 2014; Hathaway, 2004; Hathaway et al., 2011; Shukla, 2006). This intrinsic motivation to keep cannabis consumption pleasurable and maintain self-control was evidenced by the various strategies and rules that some individuals who consume cannabis abide by to control the quantity, frequency, setting and timing of their use (Duff & Erickson, 2014; Hathaway, 2004; Shukla, 2006). Such strategies included: a) reducing one's use or taking frequent abstinence breaks when deemed necessary (Duff & Erickson, 2014; Hathaway et al., 2011), b) adopting alternative routes of administration (e.g., edibles, vaping; Duff & Erickson, 2014; Hathaway, 2004), c) opting for cannabis products with low THC content or reducing the quantity consumed when THC potency is higher (Hathaway et al., 2011), d) restricting one's consumption to optimal times (e.g., when use won't interfere with social roles or responsibilities; Duff & Erickson, 2014; Hathaway, 2004; Hathaway et al., 2011; Shukla, 2006), e) consuming 'clean' cannabis (i.e., that has not been mixed with other substances), or not mixing cannabis with other substances (Hathaway, 2004), and f) following cannabis-related social norms (Duff & Erickson, 2014). Hence, self-regulation (i.e., self-monitoring) may be an effective lower-risk cannabis use strategy.

2. Protective Behavioral Strategies

Inspection of the items on Pedersen et al.'s (2016) Protective Behavioral Strategies for Marijuana Use scale reveals considerable overlap with many of the strategies outlined in the other papers identified in the REA. This is perhaps unsurprising given Pedersen and colleagues (2016) developed the scale to assess the behavioral strategies employed by those who consume cannabis at all stages of cannabis consumption or non-consumers (before, during, after, or instead of use) to moderate their consumption and mitigate potential negative outcomes. For instance, Shukla (2006), Duff and Erickson (2014), Hathaway (2004) and Hathaway and colleagues (2016) reported findings that were in line with Pedersen et al.'s items that assessed taking periodic breaks, consuming solely when not bound by other obligations or responsibilities for the entirety of the day or night, avoiding consuming cannabis in suboptimal settings or states-of-mind, and avoiding potential legal complications.

Additionally, Pedersen and colleagues (2016) reported a negative association between the number of protective behaviors a person engaged in and their number of symptoms of cannabis use disorder—an association that is reminiscent of Bravo et al. (2017) who reported that engagement in lower-risk behavioral strategies protected against the negative consequences of cannabis consumption. Moreover, Bravo and colleagues (2017) demonstrated that protective behavioral strategies akin to those assessed by Pedersen et al.'s (2016) scale were particularly helpful for a) men, b) individuals high in sensation-seeking (i.e., having a preference for and a readiness to experience novel and intense stimuli), and c) individuals prone to consuming cannabis to either cope, enjoy themselves, expand their awareness, or to fit in with their peers. Indeed, more frequent engagement in protective behavioral strategies mitigated the risks associated with coping and expansion motives, whilst seemingly reversing the risks associated

with enhancement motives altogether. The use of protective behavioral strategies when consuming cannabis for social reasons was also suggested to serve as a protective factor.

More recently, Richards et al. (2021) replicated the negative association between the use of cannabis protective behavioral strategies and cannabis-related consequences among students. The authors expanded on this finding by also testing interactions between these protective behavioral strategies and various risks (e.g., mood disorder) and protective (e.g., self-esteem) factors on cannabis-related consequences. Richards et al. (2021) found a consistent pattern in that greater use of cannabis protective behavioral strategies weakened the positive associations between risk factors and cannabis-related consequences. In other words, the use of protective behavioral strategies mitigated harms among students who reported greater risk factors and lower protective factors. Therefore, employing more protective behavioral strategies might clearly relate to lower-risk cannabis consumption.

3. Normalization and Stigma

Despite the prevalence of cannabis consumption evidenced in the studies identified in the REA, individuals still face a great deal of stigma regarding their cannabis consumption. Hathaway (2004), for instance, reported that some lower-risk cannabis consumers keep their use a secret from others (e.g., from non-consumers, family, coworkers) to avoid social stigma and disapproval. Consequently, they felt guilty about their use, less genuine, and more distanced from others. Likewise, Shukla (2006) reported that participants tended to keep their use hidden and only disclosed to trusted others to avoid legal consequences.

Interestingly, Hathaway and colleagues (2011) found that, despite living in a jurisdiction where cannabis was illegal, people who consume cannabis reported being more anxious about the social stigma associated with consuming cannabis than the legal consequences. This was

echoed by participants in a study by Sandberg (2012), who feared judgment from others and being perceived as deviant for consuming cannabis. In both studies, participants detailed their efforts to conceal their cannabis consumption from others out of fear of being perceived as one of 'those people' (e.g., a 'pothead' or 'druggie'; Hathaway et al., 2011; Sandberg, 2012). Concealment of use was especially the case when participants judged their cannabis consumption to be incompatible with their role expectations (e.g., motherhood, social status, professional identity) and sense of self (Hathaway et al., 2011; Mostaghim & Hathaway, 2013).

Despite the perceived stigma associated with consuming cannabis, there was no meaningful difference between consumers and non-consumers in terms of their beliefs about consuming cannabis. For instance, Mostaghim and Hathaway (2013) reported that most participants, regardless of whether or not they consumed cannabis, believed that there has been a normalization of cannabis consumption. Moreover, the results of Hathaway et al. (2011), Mostaghim and Hathaway (2013) as well as Sandberg (2012) suggest that the normalization of cannabis has engendered a more fluid understanding of its consumption as an accessory rather than an identity—a notion first introduced by Shukla (2006) who found that cannabis consumption was not a central aspect of participants' self-identity but rather a recreational, leisure activity they engaged in that did not define who they are. Additionally, there was no difference between consumers and non-consumers in terms of their belief that those who consume cannabis have an intrinsic motivation to keep their consumption within the non-problematic realm (Hathaway et al., 2011; Mostaghim & Hathaway, 2013; Sandberg, 2012). In this light, normalizing cannabis consumption and focusing on the likeness of consumers and non-consumers may help combat stigma and promote lower-risk cannabis consumption.

4. Cannabis Use Motives

Although there are a variety of motives underlying cannabis consumption, five were identified as having the potential to undermine lower-risk cannabis consumption: sleep, coping, conformity, self-enhancement, and self-expansion. For example, consuming cannabis to enhance sleep/rest or cope with sleeping difficulties (sleep/rest motives; Lee et al., 2009) or to reduce negative affect (i.e., coping motives; Bravo et al., 2017; Lee et al., 2009) was associated with experiencing more cannabis-related consequences. Some of those consequences were explored by Glodosky and Cuttler (2019). For instance, they found that individuals experiencing high levels of stress who consumed cannabis to cope with their stress reported more symptoms of depression. Similarly, individuals experiencing high levels of stress who consumed cannabis to fit in (i.e., conformity motives) or to increase their cognitive awareness (i.e., self-expansion motives) reported more symptoms of anxiety (Glodosky & Cuttler, 2019).

Bravo et al. (2017) found that conformity motives were associated with a reduced frequency of cannabis consumption, however, such motives left individuals at a higher risk of experiencing cannabis-related consequences. Similarly, Richards et al. (2021) found that when controlling for frequency of cannabis consumption, conformity motives put students at greater risk of experiencing cannabis-related consequences if they used fewer protective behavioral strategies. Conversely, there were associations between increased frequency of cannabis consumption and consuming cannabis to enjoy oneself (i.e., expansion motives), to cope, or to expand one's awareness amongst those individuals who employed fewer protective behavioral strategies (Bravo et al., 2017). Associations were also found between increased frequency of use and consuming cannabis to relieve boredom (i.e., boredom motives), to opt for a safer substance (i.e., relative low-risk motives), to enhance sleep, and for enjoyment motives (Lee et al., 2009).

However, when controlling for frequency of use, the latter motive (i.e., enjoyment) was associated with fewer cannabis-related consequences (Lee et al., 2009).

In contrast to the motives that may place people at risk for cannabis-related harms, consuming cannabis for social motives (e.g., to enjoy oneself at a party) appears to be unrelated to cannabis use frequency (Bravo et al., 2017; Glodosky & Cuttler, 2019). Rather, consuming cannabis for social reasons may be protective. For instance, Sandberg (2013) reported that the social aspect of cannabis consumption can help people form a group identity, which strengthens social bonds and personal relationships. This sense of community can in turn motivate people to adhere to a set of shared rituals and keep their consumption lower risk. Providing empirical support for this supposition, Bravo and colleagues (2017) found that students who consumed cannabis for social reasons did so less often and, when they did consume cannabis, also used more protective behavioral strategies. Therefore, social motives may have the potential to keep cannabis consumption positive and lower-risk (so long as those in the social consumption circle are consuming responsibly).

Discussion

The aim of the current REA was to summarize the available academic literature on the beliefs and behaviors of lower-risk cannabis consumers that they believe helps keep their consumption from becoming problematic. In line with our expectations, as well as the sentiments expressed by others in the field of cannabis studies (see Hathaway, 2004; Shukla, 2006; Subritzky, 2018), a paucity of research has been conducted on the topic. Indeed, of the 7111 unique papers we found that were published between 1900 and 2021 using our search terms, only 12 articles met our inclusion criteria. With that said, we were able to extract four broad lower-risk themes from this literature. Three of the four themes identified beliefs and behaviors that

facilitate lower-risk cannabis consumption (informed self-regulation, protective behavioral strategies, and normalization and stigma) and one theme reflected motivations for consuming cannabis that may undermine (i.e., sleep, coping, conformity, enhancement, and self-expansion) or enhance (i.e., enjoyment, social) lower-risk cannabis consumption.

In terms of the informed self-regulation theme, results from the REA suggest that many lower-risk cannabis consumers understand that using cannabis is not risk-free. As such, they create informal rules to monitor and manage the amount of cannabis consumed to reduce the harms associated with their cannabis consumption (Duff & Erickson, 2014; Hathaway, 2004; Hathaway et al., 2011; Mostaghim & Hathaway, 2016; Shukla, 2006). This finding extends the harm reduction model by demonstrating that although policies and programmes that aim to minimize harms have utility, lower-risk cannabis consumers are willing and able to self-monitor their cannabis intake for risky consumption patterns (see Subritzky, 2018). Of course, it is possible that some lower-risk consumers self-regulate because they have been educated to do so via harm reduction-oriented policies and programs. However, it is also likely that many lower-risk consumers inherently understand that it is ultimately their choice to consume cannabis, and consequently they need to be well informed of the risks and benefits. Unfortunately, an understanding that many lower-risk cannabis consumers engage in informed self-regulation is often missing from the public health approach to cannabis consumption (Subritzky, 2018). One implication of the current findings is that lower-risk cannabis policy should focus on providing opportunities for consumers to inform themselves on the risks, harms, and benefits of cannabis so that they may make informed decisions and practice self-regulation regarding their cannabis consumption.

The second theme, protective behavioral strategies, complements both the informed self-regulation theme as well as the motives for cannabis consumption theme by demonstrating that lower-risk cannabis consumers report that they actively engage in behaviors they believe reduce cannabis-related harms and optimize cannabis' benefits. For instance, the rules outlined in consumers' informed self-regulation strategies (e.g., taking periodic breaks, consuming only when not bound by other obligations or responsibilities for the entirety of the day or night, avoiding cannabis intake in less-than-ideal settings or states-of-mind, and avoiding legal complications; Duff & Erickson, 2014; Hathaway, 2004; Hathaway et al., 2016; Shukla, 2006) were echoed by Pedersen et al.'s (2016) protective behavioral strategies. Informing consumers on protective behavioral strategies may thus increase lower-risk cannabis consumption.

Additionally, the negative consequences associated with coping motives for consuming cannabis were mitigated and the protective factors associated with social motives were enhanced when consumers employed protective behavioral strategies (Bravo et al., 2017; Richards et al., 2021). This was especially true for individuals who identified as men, who were high in sensation-seeking, and who habitually consumed cannabis for reasons such as coping, enhancement, expansion, and conformity (Bravo et al., 2017). Finding ways to promote the use of protective behavioral strategies amongst these individuals should thus be a priority in order to reduce cannabis-related harms and promote lower-risk cannabis consumption.

In addition to themes that focused on lower-risk cannabis consumption at the individual level, we also identified a theme (normalization and stigma) that highlights the important role societal values and beliefs about cannabis play in the harms associated with cannabis consumption. We found that lower-risk consumers believe that the social stigma facing cannabis consumers undermines lower-risk cannabis consumption initiatives. Specifically, the concern

that others (and society more broadly) will judge them for their use leads them to conceal their cannabis consumption, which undermines lower-risk use (Hathaway, 2004; Hathaway et al., 2011; Mostaghim & Hathaway, 2013; Sandberg, 2012; Shukla, 2006). Research substantiates this concern. Concealing behaviors of any kind is associated with poorer mental health (Davis et al., in press). Additionally, perceiving and internalizing stigma associated with substance abuse has downstream negative consequences on health and well-being (Brown et al., 2015). Because stigma is deeply embedded into cultural and societal norms, it can interfere with lower-risk cannabis beliefs and experiences, even among those whose cannabis consumption is recreational (Sandberg, 2012).

Lastly, lower-risk cannabis consumers tend to report five motivations that undermine lower-risk cannabis consumption: sleep, coping, conformity, self-enhancement, and self-expansion (Bravo et al., 2017; Glodosky & Cuttler, 2019; Lee et al., 2009). It would behoove policy makers and those who create harm reduction programs to educate consumers on the potential negative consequences of consuming cannabis for these reasons. We also found that lower-risk consumers believe that social motives may be protective against cannabis-related harms. This finding is in line with research by Brodbeck and colleagues (2007) who found that consuming cannabis for social reasons was negatively associated with distress, poor mental health, and pathology, but was unrelated to cannabis use frequency (Bravo et al., 2017; Glodosky & Cuttler, 2019). Promoting mindfulness of one's motivations to consume cannabis could thus be a strategy that increases lower-risk cannabis consumption.

Limitations

The present REA is not without limitations. First, only a small number of studies were identified via our extensive literature search. Thus, the lower-risk cannabis beliefs and behaviors

themes we identified were based on relatively scarce evidence, and consequently are likely not exhaustive. The paucity of available research may be the result of the deficit and harm reduction approaches that have dominated the field of cannabis studies—approaches that tend not to focus on positive and lower-risk cannabis consumption. Regardless of the reason, a key takeaway from this REA is the need for research in this domain.

Second, most studies included in the REA used a convenience sampling strategy. As well, sample composition across studies involved people who were white, middle-class, and undergraduate students from Western countries. Together, these observations limit the external validity or generalizability of the results to the broader and more diverse population of people who consume cannabis. Indeed, although student populations are convenient for researchers and younger people tend to consume cannabis more frequently (The United Nations Office on Drugs and Crime, 2019), students are neither representative of their national populations nor of the world population (e.g., Henrich et al., 2010). As such, results obtained from these samples likely do not generalize to wider populations of people who consume cannabis and so should be interpreted with caution.

Lastly, the papers included in the REA were conducted prior to cannabis legalization and so results may not generalize directly to a post-legalization context. The illegal status of cannabis most likely impacted the level of stigma associated with cannabis consumption and the general social perceptions of cannabis, which could have subsequently influenced participants' beliefs and behaviors regarding their own cannabis consumption. There could be notable differences in individuals' use of lower-risk cannabis consumption strategies from pre- to post-legalization, which should be explored in future research.

Conclusion

The purpose of the current REA was to assess the existing knowledge base on the beliefs and behaviors of lower-risk cannabis consumers that they believe help keep their consumption from becoming problematic. Four overarching themes emerged: self-regulation, employing an array of protective behaviors, the need to normalize cannabis to de-stigmatize cannabis consumption, and being cognizant of one's motives for using cannabis. Together, these findings suggest that some people believe they can consume cannabis in a lower-risk manner and reap the perceived benefits whilst minimizing the negative consequences. However, the paucity of research (only twelve empirical articles) in general, the use of select samples, and the lack of research conducted in a post-legalization setting, lower confidence in the external validity of the results to the broader population of people who consume cannabis. As such, we call for more research on the antecedents and consequences of various perceived lower-risk cannabis consumption strategies employed by those who consume cannabis that addresses these methodological limitations. Such research is important from both a basic and applied perspective because it will help advance lower-risk cannabis policy and practice.

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Table 1

Summary of All Studies Included in the Review

Study	Aim	Sample	Methods	Key Findings
Bravo et al., 2017	To determine whether the use of cannabis protective behavioral strategies buffers or amplifies known risk and protective factors.	2,093 college students who used cannabis in the past month (60% women)	Cross-sectional analysis of survey data	The use of protective behavioral strategies was associated with lower cannabis use frequency and cannabis-related consequences. Protective behavioral strategies are especially encouraged among men, people high in sensation-seeking, as well as those motivated to use cannabis to enjoy themselves, expand awareness, cope with negative emotions, and fit in with others.
Duff & Erickson, 2014	To examine the recreational use of cannabis in the context of risk and mitigating risk.	165 long-term cannabis consumers in four Canadian provinces (43% women)	Semi-structured interviews	Participants reported being aware of the risks of consuming cannabis and used strategies to mitigate these risks, such as adopting alternate modes of use, using clean cannabis, restricting cannabis use to optimal times, reducing use when necessary, and following social norms.
Glodosky & Cuttler, 2019	To examine the relationship between cannabis use motives, stress, and negative affect.	988 college students who have used cannabis at least once in their	Cross-sectional analysis of online survey data	Using cannabis for coping motives significantly moderated the relationship between stress and depression, where depression is heightened

		lifetime (73% women)		among those who use cannabis to cope. Using cannabis for conformity and expansion motives significantly moderated the association between stress and anxiety, where anxiety is heightened among those who use cannabis to fit in or expand awareness.
Hathaway, 2004	To examine risk perception and risk management in relation to cannabis use.	104 adults in Toronto who use cannabis (38.5% women)	Qualitative interviews	Participants reported having informal rules and strategies to manage perceived risks associated with their own cannabis use. The dominating themes centered on moderation, discretion (i.e., amounts and frequency of use), and exercising self-control (e.g., avoid using with certain people or in certain situations, such as at work and whilst driving).
Hathaway et al., 2011	To determine how stigma indirectly impacted attitudes and behaviors regarding cannabis.	92 adults in Toronto who use cannabis (39% women)	Qualitative interviews	Participants reported consuming cannabis in moderation and taking frequent abstinence breaks to prevent harms and prefer low potency cannabis. Participants also reported refraining from cannabis use in contexts that would interfere with commitments.

Lee et al., 2009	To develop a scale assessing motives for cannabis use.	346 college students who currently use cannabis (55.2% women)	Cross-sectional analysis of survey data	Participants endorsed 12 different motives for consuming cannabis. Motives pertaining to enjoyment, sleep, low-risk, boredom, and altered perceptions were positively associated with use, whereas availability and experimentation motives were negatively associated with use. Motives pertaining to sleep and coping were associated with more cannabis-related consequences, whereas the enjoyment motive was associated with less consequences.
Mostaghim & Hathaway, 2013	To assess the beliefs and attitudes of young adults as they pertain to the normalization of cannabis consumption as well as the role cannabis might play in identity formation.	30 undergraduate students comprising those who currently use cannabis, who formerly used cannabis, and who do not use cannabis (63% women)	Qualitative interviews	Most participants (regardless of prior cannabis use) believed that cannabis is less dangerous than other controlled substances, and that there are no differences between those who use and those who do not, and that it is a person's personal choice to use cannabis. Cannabis consumers reported abstaining from cannabis due to prior commitments, whereas non-consumers abstained entirely in order to maintain their public image.

Pederson et al., 2016	To develop a scale assessing protective behavioral strategies for cannabis use.	210 undergraduate students who reported using cannabis in the past 6 months (78% women)	Cross-sectional analysis of survey data	Most frequently endorsed protective behavioral strategies focused on avoiding cannabis use in certain situations or states-of-mind, taking periodic breaks, consuming cannabis only when there are no other responsibilities or commitments, avoiding potential conflicts with the law.
Richards et al., 2021	To examine interactions between use of cannabis protective behavioral strategies and various risk and protective factors for cannabis-related consequences.	2,226 college students in the United States who used cannabis in the past month (69% women)	Cross-sectional analysis of online survey data	Cannabis protective behavioral strategy use was negatively related to cannabis-related consequences, controlling for risk and protective factors. Interaction effects revealed that greater use of cannabis protective behavioral strategies weakened the positive association between risk factors and cannabis-related consequences.
Sandberg, 2012	To examine perceptions about cannabis use as it relates to personal life and society at large.	100 cannabis users in Norway (12% women)	Qualitative interviews	Participants reported cannabis use as a normalized activity yet maintained anxiety around public perception. Participants also reported gaining many benefits from their cannabis use, while also downplaying the risks associated with their use.

Sandberg, 2013	To understand the lived experiences of those who use cannabis as a member of a cannabis subculture.	100 cannabis users in Norway (12% women)	Secondary analysis of qualitative interviews	Participants reported that shared rituals around cannabis have a social function which creates and strengthens social bonds, providing people with a sense of community and order.
Shukla, 2006	To examine the lived experiences of those who use cannabis in a society where cannabis is illegal and unconventional.	29 cannabis users in Oklahoma (41% women)	Semi-structured interviews	Participants viewed their cannabis use as a private recreational activity and reported informal rules and strategies to keep their use from becoming problematic (e.g., limiting consumption to free time, keeping use from interfering with other responsibilities, consuming in moderation, etc.).

Figure 1

PRISMA Diagram