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Baby Boomers and Cannabis Delivery Systems

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Abstract

Findings for this article are derived from our National Institute on Drug Abuse (NIDA)-funded study of older and younger Baby Boomers and marijuana use. We explore Baby Boomers' use of a variety of cannabis products and the motives behind the choices they make concerning these preparations. Cannabis concentrates and edible goods have become increasingly popular over the years. With so many new ways to consume marijuana and a growing number of medical marijuana dispensaries, more and more people are using alternative cannabis products to relieve physical ailments, to improve mental health issues, and for recreational purposes. We explore Baby Boomers' motives to use and how aging may change those motives and influence their choices in cannabis delivery systems. As they get older, Boomers' health concerns grow and many have turned to these alternative cannabis products to improve mental and physical well-being, and even to reduce the potential risks of traditional marijuana smoking.

Keywords

cannabis; marijuana; baby boomers; delivery systems; health consequences; harm reduction; drug use

Introduction

As the market for cannabis[1] continues to grow, a wide variety of cannabis products have emerged as alternatives to traditional plant products. Cannabis concentrates and edible goods have become increasingly popular over the years, and many Baby Boomers are beginning to tap into these resources. With so many new ways to consume marijuana and a growing number of medical marijuana dispensaries, more people are using alternative cannabis products to relieve physical ailments, to improve mental health conditions, and for recreational purposes. In this article, we explore Baby Boomers' use of various cannabis products and the motives behind the choices they make concerning these preparations.

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1.For the purposes of this article, we use the botanically correct term *cannabis* to refer to all derivatives of the plant. We use the term *marijuana* to refer only to flowers, which are the most commonly used form of cannabis in the United States.

To clarify these trends, we distinguish between the different marijuana "delivery systems" used by Baby Boomers. The term *delivery systems*, an *in vivo* code derived from our qualitative interviews, includes the various forms of cannabis (plant, edible, concentrate) and the routes of administration used by these older cannabis users. We also explore how Baby Boomers' choices in cannabis delivery systems may have changed with age as their motives to use began to include growing health concerns. Many turned to alternative cannabis products to improve mental and physical well-being and even to reduce the potential risks of traditional marijuana smoking.

We include in our discussion the ways in which medical marijuana has changed Baby Boomers' perceptions of the risks and benefits of using cannabis products, and how this played a role in their choices of cannabis delivery systems. We also explore the impact, if any, of medical marijuana dispensaries on medical users' access to alternative cannabis products and to information about harm reduction techniques, in comparison with non-medical users. We believe Baby Boomers are an important group to study because they provide a window into lifetime cannabis use and how changes in social context and perceptions of risks and benefits impact the ways in which cannabis is used over time.

A key factor in examining Baby Boomers' use practices and motives to use cannabis is understanding the drug itself. Cannabinoids are chemical compounds in the marijuana plant that bind with receptors in the brain, producing psychoactive effects and a variety of medical benefits. Currently, over 80 cannabinoids have been isolated from the plant, all with varying effects. The two most prominent cannabinoids are *delta-9-tetrahydrocannabinol* (THC) and *Cannabidiol* (CBD; Cannlabs, 2014). THC is the most recognized cannabinoid, and as the primary psychoactive compound, it is responsible for the euphoric high familiar to most users (Cannlabs, 2014). THC also has medicinal uses, like appetite stimulation, treatment of nausea, pain relief, and combating depression (Medithrive Direct, 2014). THC can also cause sedation, increased pulse rate, hypothermia, anxiety, or short-term memory impairment (Atakan, 2012). CBD, the second most prominent cannabinoid found in marijuana, has anti-inflammatory, anti-diabetic, anti-epileptic, anti-psychotic, and anti-degenerative properties (Izzo, Borelli, Capasso, Di Marzo, & Mechoulam, 2009). CBD may also protect the liver from damage caused by alcohol abuse (Yang et al., 2013). CBD is actually non-psychoactive and may even inhibit some of the psychoactive effects of THC (Cannlabs, 2014). A U.K. study (Russo & Guy, 2005) revealed that the combination of THC and CBD increased clinical efficacy (analgesic, anti-nausea, and anti-carcinogenic properties) while reducing adverse events (including sedation and tachycardia). As CBD is an antagonist to some effects of THC, it could potentially combat a THC overdose, but clinical trials have not yet been conducted to test this hypothesis.

Research indicates a significant increase over time in the potency of cannabinoids in samples of marijuana. As the primary psychoactive compound, THC has so far been the main clinical focus of potency studies. One study showed an upward trend in the THC content of marijuana, which increased from 3.4% in 1993 to 8.8% in 2008 (Mehmedic et al., 2010). According to the U.S. Drug Enforcement Administration (2013), the average THC potency of marijuana samples increased from 8.7% in 2007 to 11.9% in 2011. In 2014, scientists have tested marijuana samples with THC levels ranging from 11% to 20% THC (Cannlabs,

2014). CBD has been included in only a few of the more recent potency studies conducted. Cannlabs (2014) scientists reported that marijuana historically contained 1% to 4% CBD, but they recently tested samples with up to 20% CBD.

Despite the wide variety of marijuana strains available today, almost all of them are derived from only two species: *Cannabis sativa* and *Cannabis indica*, which differ in chemical composition, physical appearance, and medical application. *Cannabis sativa* strains contain high THC levels and low or no CBD levels (Golden State Collective (GSC) Cannabis Laboratories, 2011). Sativa generally has an uplifting and energetic effect that is mostly cerebral, and can produce feelings of optimism and well-being, heighten the senses, and stimulate creativity (Medithrive Direct, 2014). It is typically preferred for daytime use because it causes less drowsiness than indica counterparts. Unlike sativa, *Cannabis indica* has a more balanced mix of cannabinoids, with moderate THC levels and higher CBD levels (GSC Cannabis Laboratories, 2011). Indica is often characterized by a heavy effect on the body and is generally used in the evening for relaxation, stress relief, pain relief, and insomnia (Medithrive Direct, 2014). Indica and sativa strains may also be cross-bred to create hybrid strains, with some containing higher sativa content and others containing higher indica content (Medithrive Direct, 2014).

Marijuana flowers can be consumed in a variety of ways. Marijuana smokers may break up the flowers and roll cigarettes (joints) or use pipes, water pipes (bongs), and other glass, metal, or ceramic devices. There has been much debate over the benefits and drawbacks of smoking marijuana, but the general belief is that smoking increases the risk of harms to the lungs and respiratory system. Hashibe and colleagues' (2006) work indicates that the association of cancer with marijuana (even with long-term or heavy use) is actually weak and may be "below detectable limits." Their animal models show that THC and other cannabinoids may inhibit the growth of tumors by sending signals to the brain that cease cell growth and promote cell death. Nonetheless, marijuana smoke is an irritant to the lungs, and frequent smokers can experience respiratory issues, such as daily coughing, excess phlegm production, chest illness, and lung infections (National Institute on Drug Abuse [NIDA], 2014). Vaporizers heat cannabinoids in the plant to around 320° F to produce a vapor (fine mist), which is inhaled into the lungs. Vaporization releases about five compounds, with THC in the highest concentration, whereas smoking marijuana releases about 111 compounds (Medical Marijuana Pros and Cons, 2009).

In 2014, the use of concentrated cannabis products extracted from the plant is becoming more popular in cannabis culture. These concentrated cannabis products have significantly higher THC levels than marijuana flowers. One study (Mehmedic et al., 2010) found that the mean THC potencies of concentrated preparations grew from 2.5% in 1993 to 29.3% in 2008. In 2013, the THC content of marijuana flowers averaged 14%, whereas the THC content of concentrates averaged 54% (Leonhart, 2014). Recently, concentrates were tested with more than 80% THC and up to 85% CBD (Cannlabs, 2014). Again, data on CBD were limited, and more research is needed to determine the typical CBD content of concentrates available today. Concentrated cannabis products can be smoked, vaporized, or combined with marijuana in joints and other delivery systems. "Dabbing" is a method of smoking concentrates using a torch or large flame to heat a flattened nail (usually attached to a

glass pipe of some kind) and dropping pieces of concentrated products on top before inhaling (Chambers, 2013). Loflin and Earleywine (2014) suggest that dabbing may lead to symptoms of addiction or dependence, including higher tolerance and withdrawal.

Several forms of concentrates have entered the market, like hash oils and waxes. Other concentrates have been popular for centuries, such as *kief* and *hashish*. Kief is a powdery substance comprised of cannabis trichomes (pollen) that have been separated from the plant matter, typically by running the flowers, trimmings, or leaves back and forth across a fine screen (Medithrive Direct, 2014). Devices used to grind marijuana are sold in head shops and dispensaries and often include a metal screen covering a separate chamber to separate and collect kief from the flowers. Hashish, or "pressed hash," is made by rubbing away kief from the plant matter and pressing the resulting sticky resin into a dense, rigid material using light heat (Medithrive Direct, 2014).

Hash has evolved into several varieties, including oil, wax, and glass, which are made using different methods. Hash oil is one type of concentrate made using pressure, temperature, and sometimes solvents (like butane or alcohol) to squeeze the raw oil from the cannabis, resulting in a sappy fluid from which the solvent is evaporated (Medithrive Direct, 2014). Butane hash oil (BHO) is extracted from the cannabis plant using butane as a solvent. BHO is supposedly more potent than oils extracted using other solvents, but it can also contain residual heavy metals in the finished product (Medwest Distribution, 2014). Hash "wax" comes in a greater variety of textures and shapes than hash oil, mainly due to the different purities and potencies yielded from the different extraction methods. Hash wax has many names among users, including "earwax" and "budder," due to its waxy, smooth texture. "Full melt hash" is a newer approach to making hash and requires solvents like butane, carbon dioxide, ether, or oxygen. Due to its lack of plant material, it melts completely before it begins to burn from a flame, and sometimes tests in the 70 to 85% THC range (Medithrive Direct, 2014).

Marijuana and cannabis concentrates are often smoked or vaporized, but cannabinoids can also be ingested in edible products. Edible cannabis comes in many forms, including baked goods, candies, and drinks. The most common method for preparing edible cannabis is to simmer marijuana in butter or vegetable oil, transferring the cannabinoids to the fatty liquids. The solid plant material is discarded, and the butter or oil is used in baked goods or added to foods like pasta sauce or soup. The high fat content and oily base is needed to extract fat soluble cannabinoids from the plant material (Medical Marijuana Pros and Cons, 2009). Orally consumed cannabis tends to be stronger than inhaled cannabis and has varying effects on different users due to the way the body metabolizes THC. When cannabis is inhaled, THC passes immediately from the lungs into the blood stream and to the brain. When cannabis is eaten, a large portion of THC is converted by the liver into a different chemical, an 11-hydroxy metabolite, which is also psychoactive, thus increasing the overall psychoactive effect. Inhaling cannabis produces trace levels of this chemical, whereas digesting produces the chemical in greater quantities, which persist for a longer period of time (Armentano, 2005). The different metabolic processes of edibles compared to smoked marijuana can lead to instances of unintended cannabis overdose or feeling "too high."

To date, information available to the public about cannabis and its delivery systems is limited. Few clinical studies exist that examine various cannabis delivery systems, and they often focus only on specific populations (typically those with chronic illness, like cancer or AIDS). We found much of the information regarding cannabis delivery systems on websites of either dispensaries or for-profit laboratories that test qualities of cannabis, like potency and purity. Many Baby Boomer interviewees gave us comparable information, but some had ideas that conflicted with the information provided by our general sample and by the literature, underscoring the importance of disseminating accurate information.

Method

Analyses for this article were derived from selected findings from our NIDA-funded study (R01 DA033841) of Baby Boomers and marijuana use in the San Francisco Bay Area. The United States Census Bureau considers those born between 1946 and 1964 as members of the Baby Boom birth cohort. We used several strategies to identify, recruit, and interview 120 cannabis users. Key informants who participated in previous studies were selected according to the quality of their knowledge, the level of involvement they had with older cannabis users, and their contacts with various San Francisco communities. They provided the initial links to the chain of potential study subjects. We then used chain referral sampling by asking participants who had completed the interview to refer up to three of their friends who are cannabis users. We limited referrals to three to include participants from various social worlds.

Potential participants were pre-screened to determine eligibility for enrollment in the study. Participants self-identified as current users, were born between 1946 and 1964, and had used cannabis a minimum of 24 times in the 6 months prior to the interview. We included medical marijuana patients, provided they had also used for relaxation or recreation and met the minimum number of times used in this manner. We excluded potential participants who had been in treatment for heroin, powder or crack cocaine, methamphetamine, other club drugs, psychedelics or prescription drugs in their lifetime, and for alcohol in the year prior to the interview to focus on primary marijuana users. These inclusion and exclusion criteria were designed to focus our study on the range of cannabis users, from low level, intermittent users at one end of the use spectrum to heavy daily users at the other end, to examine variations in cannabis use and choices of delivery systems.

The theoretical model for the analysis of our data is Zinberg's (1984) drug, set, and setting. Zinberg constructed this model as a framework for studying drug experiences. In his model, "drug" refers to the drug's actions or pharmacological aspects of the experience. For the purposes of this article, drug is cannabis in its various forms (plant, edible, concentrate), including variations in potency and intoxication. "Set" refers to the psychological variables involved, such as personality characteristics, past experiences, and the expectations that users bring to the drug use experience. But set is further defined to include uses, purposes, and expectations of cannabis use. "Setting" refers to the physical and social context in which cannabis use takes place and how the settings of use change over time. The social context includes not only the micro contexts of cannabis use but also the broader (macro) social and political contexts that existed when Boomers began using cannabis. The social component

encompasses the immediate social situation and "the set of other people present" (Jansen, 1997), or the broader beliefs and values of the user's social group, which establish the social and cultural milieu at that particular place and time (Moore, 1993; Zinberg, 1984). The physical setting is the place, people, and things present during the time of use. Zinberg argues that to study drug experiences successfully, the researcher must have a thorough understanding of how these three variables interact. Dalgarno and Shewan (2002) found that while the effect of using a drug is the main motivation for a user, the role of set and setting are essential to ensuring that the drug produces effects intended for and expected by the user. We believe this model was effective for studying Baby Boomers' delivery systems, because drug, set, and setting changed at different points in their lives, particularly as they aged and became more concerned with their health.

Data collection consisted of an audio recorded, in-depth life history interview using the focused interview method (Becker & Geer, 1958; Herman-Kinney & Verschaeve, 2003; McCaghy & Skipper, 1969). This allowed us to ask questions we knew (from our own and others' previous work) we wanted to ask using an interview guide, while allowing questions we had not anticipated to surface during the interview as new topics or themes emerged. Depth interviewing from a focused interview guide ensures consistent inquiries with each interview, without precluding the possibility of discovery of other relevant issues. The interview guide serves as a basic check-list, freeing the interviewer to ask questions in a conversational style in a sequence that flows from the interviewee's perspective of the situation. This gives us the flexibility to tailor our questions to each participant and to pursue new lines of inquiry as they become known during the interview. Data analysis was conducted utilizing Constructivist Grounded Theory methods (Charmaz, 2006; A. Strauss & Corbin, 1998).The first few interviews were immediately transcribed and coded using Nvivo 9. Segments of data were labeled to indicate what the segment was about. As the segments were coded, we began to compare coded segments within a particular interview or across multiple interviews as we asked of the data "what is happening here?" We then wrote analytical notes called *memos* in which we named, defined, and described the emerging codes during weekly meetings. These memos formed the core of our theoretical understandings about Baby Boomers and cannabis use. For purposes of this article, we conducted searches of relevant codes, three of which correspond to our theoretical model: Drug, which was later renamed Delivery System (in vivo code), Set, and Setting. Another important code we searched was "Access," which covered the ways participants obtained cannabis, including doctor recommendation, buying from those with a recommendation, faking/exaggerating symptoms to obtain a recommendation, and the more traditional ways of obtaining cannabis from friends, dealers, on the streets, or growing it themselves. The code "Motives" covered reasons for using cannabis at various stages of their lives. These Nvivo searches yielded segments of text, which pieced together the story behind Baby Boomers' choices of cannabis delivery systems.

We aimed for deeper understanding of Baby Boomers' changes in the ways in which they used cannabis, attitudes and perceptions, health and social consequences, and the impact of context on all of the above. People in a particular age cohort tend to share a distinct set of attitudes and behaviors because they all grow up and become of age in a particular period of history (W. Strauss & Howe, 1991). A major theme in our study is that as Baby Boomers

aged, access to cannabis and social context changed, impacting Baby Boomers' motivations to use particular cannabis products.

Findings

Description of the Sample

We have completed 97 out of the 120 targeted interviews. The sample consists of 62 men and 35 women ranging in age from 48 to 68 years (median 58). Seventy-one interviewees (73%) identified as White, 19 (20%) as African American, 3 (3%) as mixed ethnicity, 2 (2%) as Asian, 1 (1%) as Pacific Islander, and 1 (1%) as Native American. Three (3%) study participants were also Latino (one White, one African American, and one mixed ethnicity). Forty-nine (50.5%) participants were single, 27 (28%) were married or living with a significant other, 17 (17.5%) were divorced or separated, and 4 (4%) were widowed. Forty-four (45%) participants had children ranging from one child to five children and a median of two children. As a whole, the sample was highly educated. Only 1 (1%) participant had not graduated high school. Nine (9%) were high school graduates, 28 (29%) had some college education, 11 (11%) had associate degrees, 35 (36%) had bachelor's degrees, 7 (7%) had master's degrees, and 6 (6%) had doctorates. Annual income ranged from $1,248 to $250,000 with a median annual income of $28,800. Thirty-three (34%) participants had a medical cannabis recommendation or card, whereas 64 (66%) did not.

Understanding Cannabis Potency

Study participants generally agreed that the potency of marijuana increased throughout their lifetimes, with 82.5% reporting it was more potent, 11% reporting no change, and 6% reporting it was less potent. Bradley[2] observed that "genetically modified strains" had much higher THC levels than strains available in the '70s:

> Now, with all these genetically modified strains, you're talking about 20 percent THC and higher. There was nothing like that back then. I would guess that the THC content must've been less than half of that. I'm gonna guess it was probably five to ten percent. That was in the mid-70s. And so the intensity level of the marijuana available became higher, and higher, and higher.

Bradley and other participants reported that the rising potency of marijuana lessened the amount of product they needed to consume. For example, at the time of her interview, Alicia felt she needed to use less marijuana to get the desired effect, because the potency of marijuana had increased drastically over time:

> This weed they got today, I can't do it just 'cause it's so strong. It's the quality of it. It's like a billion times potent [*sic*] than it was when I first started. I think they put more chemicals in it. You can just plant a weed seed and it grows. And you just smoke the regular homegrown weed and it'll still get you high, but now when they grow that shit, they putting all kinds of additives and stuff in, THC and this and this, and it's just off the hook. I could smoke on my joint for days.

[2]We use pseudonyms to protect the identity of our study participants. Please see Table 1 for demographic characteristics and other relevant information.

She used marijuana both recreationally and medicinally, and found that marijuana treated her ailments more effectively than her prescription medications. As growing techniques evolved, the potency of marijuana increased and lessened the amount she needed to treat her conditions. However, she expressed concerns that growers added chemicals to commercially grown plants, and thought “homegrown” strains were just as effective and maybe even safer.

The general belief among interviewees was that marijuana potency increased since they began using. However, we did find some variations in participants’ beliefs about changes in potency. Jason, age 56, agreed with his contemporaries that “the weed now is a lot better” and “the high nowadays is more intense.” On the other hand, he also believed that regardless of potency or growing conditions, “weed can only get you a certain high … weed is weed.” Brian, age 59, noticed only a slight increase in potency over his marijuana using career. In fact, he believed that marijuana growers had actually reached a “plateau” in marijuana potency:

> I think they’ve plateaued in terms of how much THC content they can get in a particular strain, but they have so many different kinds and varieties that I think—the one thing that I find the most interesting is their ability to characterize the marijuana and the different effects and moods and swings that it might produce in a particular person. There seems to be some constant there that they’re able to quantify.

Brian was not only aware of the varying potencies of different strains but also indicated that different types of marijuana could be characterized and affect people in different ways. Some interviewees were savvy about marijuana potency and some even learned that different strains of marijuana produced different effects. Importantly, participants’ observations were generally based on experiences rather than research-based information.

Comparing Indica and Sativa

Many Baby Boomer interviewees discussed the newfound freedom to choose from the broad spectrum of marijuana strains available to them. Generally, study participants shared a common understanding of the differences between the “upper” high of sativa strains and the “downer” high of indica strains. Baby Boomer participants had different preferences for each type of marijuana, typically based on their settings of use, motives to use, and expectations of the drug’s effects. When asked in which settings they used cannabis most often, the top setting was “at home” (87%), followed by “outdoors” (5%), and by both “at home” and “at someone else’s home” (3%). Kevin, a chef, discussed his typical settings and motives for using indica or sativa:

> Indica is more of a body high. Sativa’s more if I want to sit up and write my menus for several hours, you’ll want to smoke more of a sativa, which is more of a brain high than a body high. If I needed to work on my menus or want to be more creative, I’d smoke sativa. If I just want to smoke with my friends and go to a movie or get stoned, then you smoke indica.

Kevin’s preferences were primarily based on his experiences and on the settings of use, including with whom he used marijuana. He correctly saw indica as more recreational and

social, whereas sativa helped with his work productivity and creativity. The expected effects produced by each type of marijuana motivated participants' preferences for using different strains in different settings and for different purposes.

Participants also experienced undesired effects, like a lack of focus or motivation. In fact, 50% of participants indicated that at some point in their lives they wanted to quit using marijuana, with the top reason being that they needed to focus and get things done (9%). Nonetheless, they minimized the negative effects by controlling the settings in which they used. For example, Elaine's preferences for marijuana evolved as she aged. She preferred the upper high of sativa, but began to use indica medicinally:

> For relaxation, indica would be good. At first I knew sativa and I usually prefer upper type. But now that I'm older, like [the doctor] said, it's probably good to have the other kind. [Indica] just relaxes me, that's what I needed it for. So that's why for me, it's better to do it at night because if it's relaxing me, I can just relax, whereas during the day, I'm trying to do things.

Her strain preference was based on the settings in which she used and the knowledge about the drug she gained from her physician, who neither discouraged her from using nor wrote her a recommendation, but suggested that she use indica instead of sativa. Like other participants, she chose not to use during the day or in settings where indica would inhibit her focus or work productivity.

Other participants preferred indica over sativa, particularly those with mental health conditions, like anxiety or insomnia. When asked a variety of health questions, 12% of participants indicated they had chronic mental health conditions, and many used cannabis to treat these problems. Rebecca, who suffered from obsessive compulsive disorder (OCD), used indica to help her sleep and avoided sativa because it intensified her condition. She explained,

> I have OCD. It's pretty disabling. So I take meds for that, but it only gets rid of like half of the symptoms and the worries. So actually I use pot to relax at night, to go to sleep. It has to be indica. If I use sativa it exacerbates the OCD.

Her OCD diagnosis was the driving force of her set and thus restricted her settings of use and type of marijuana she used. She did not have a recommendation or card, but she had access to a strain (indica) that helped her sleep, based on information she received from a peer who she felt was informed about the effects of marijuana.

Bradley, who described a spike in marijuana potency over time, preferred to use sativa because it would not make him feel "blown out" like indica would, but he noted the difficulty in finding "pure" sativa strains:

> I like sativa better. Sativa is a milder high. It's a more awake high. See, when I was kid, all there was, was sativa; there was no indica. Then, indica entered into the strains in the '70s, and then took over in the '80s, basically … Sativa's now the minority of it. I prefer sativa. I don't need to get blown out. But it's very hard to find pure sativa strains anymore.

Bradley was not a medical marijuana patient and had difficulty finding sativa strains from his sources. Bradley's distinctions between the effects of each strain, based on his own life experiences, aligned with current knowledge. In contrast, some interviewees gave us information that conflicted with more commonly held beliefs about the effects of each strain.

We spoke with several people who confused the effects of sativa and indica, but did indicate a preference for one effect or the other. Shirley, whose husband had a medical marijuana card, told us, "I think it's sativa that makes you mellow out, so I have preference for marijuana that mellows you out." Juliana, who had her own medical marijuana card, shared this misconception and told us she preferred the downer effect of what she perceived to be a sativa. For both participants, indica would have produced the calming effect they expected. They shared the belief that sativa was the more sedative strain. Shirley and Juliana knew that different strains have different effects, though they had the names confused, which may lead them to purchase the wrong strain.

Some participants enjoyed the effects of both sativa and indica and opted for hybrid strains. Hybrid strains offer marijuana users the analgesic properties of indica combined with the stimulating properties of sativa, which often prevents users from feeling too sedated. Leslie suffered from post-traumatic stress disorder (PTSD). She described what she felt was the perfect strain for her:

> I like Jack Herer because it's a really nice hybrid. I like sativas so that you can take care of business and you're not all like melting into the couch, but if you're in physical pain like really bad sometimes, it is good to have [indica] on hand. I like to have an indica and a sativa and a hybrid, but I mean, realistically speaking, I can't always afford to have all three available at once. So, I mean, Jack Herer is like the perfect blend.

A hybrid like "Jack Herer" provided her with the motivating factor of sativa combined with the relaxing effect of indica. She enjoyed both types of strains for different purposes, but found that hybrids were more economical, took care of her anxiety, and still allowed her to attend to her responsibilities. Our findings indicate that most participants had a preference for either one effect (downer) or the other (stimulant), and few people were aware of or had access to hybrid strains. Marijuana users who seek the calming effects of indica without sedative effects would benefit from access to hybrid strains to obtain their desired drug effects. However, as noted by our participants, buying marijuana from friends, street dealers, or growers sometimes limited their options, or their sources provided inadequate information about the product.

Dispensaries, growers, or even some dealers offer marijuana users the ability to choose from a wide variety of strains, but the labeling of strains is reportedly over-simplified. Sativa and indica are extremes along the spectrum of cannabis varieties and most strains labeled as one or the other are actually mixes of the two. For example, a dispensary owner might label a strain with 54% sativa as simply "sativa," when it is actually a hybrid of indica and sativa (GSC Cannabis Laboratories, 2011). As a result, marijuana users may be surprised to find that the drug effects are different from their expectations based on simplistic categorization of strains by growers, dispensaries, dealers, or people that they know.

Some participants had even more limited information about marijuana varieties or had no preference at all. For example, Spencer only recently learned of the different strains and was still unsure about them, even though he is a medical marijuana patient. “Up until recent legalization of the medical, I was aware of varieties, but nobody ever said, oh, this is sativa or this is—I didn’t care. I still don’t know.” Spencer’s medical marijuana card facilitated access to varieties of strains but did not increase his knowledge about them. Baby Boomers like him will face the dilemma of having to choose as more varieties become available to more people. If marijuana users can make informed decisions based on clinical, scientifically sound data about different strains, they can avoid negative consequences of use (like increased anxiety or lethargy) while maximizing the benefits for targeted problems (like pain or insomnia) with appropriate strains.

Playing With Fire: The Benefits and Drawbacks of Smoking Cannabis

When asked which route of administration participants used most often, 91% said they smoked.[3] We also asked them if they had experienced any physical or mental health problems they attributed to their cannabis use and to name up to three of those problems. Only 10 (10%) interviewees reported such problems. The top three mentions by these 10 participants were respiratory problems (70%), mental health issues, such as depression and panic attacks (30%), and deep, raspy voice (20%). We also asked interviewees what they thought were the risks of using cannabis, whether they had actually experienced these harms or not. The most frequent risks reported were legal risks (34%), lung disease or damage (16.5%), and “none” (15.5%). Other mentions included social stigma, respiratory problems, overeating, dependence, overdose, and memory loss.

The risk of lung damage was an important perceived health risk. For some, this health risk influenced their choice of delivery system. Leslie, who preferred hybrid strains, also described to us some of the negatives of smoking marijuana and worried about her lung health:

> If I smoke too often, I can tend to get like hacking up. It’s gross. And so that’s why I don’t smoke that much and that’s why I try to use a bong more than not. I could be wrong, but it just feels like if I’m filtering it through water it might help a little bit. It’s kinda gross when you are cleaning a pipe or your bong and it’s got resin and you’re like, this is going into my lungs partly, too.

She used a water pipe (bong) as a filtration system instead of joints, but she still felt that the potential for lung damage was not completely ameliorated. For some who worried about the risk of lung cancer or damage, vaporizing was seen as an effective way to reduce the harms of smoking. Cody told us, “If you smoke a lot, there is probably somewhat of a cancer risk. It depends how much you do it. I think if you use a vaporizer, then there’s probably very little drawback at all, physical drawback.” He worried that smoking marijuana posed a lung cancer risk but still chose smoking as his primary delivery system. Kevin clarified the process of using a Volcano, which he deemed the “elite” vaporizer. “The pot burns from a certain temperature and the vaporizer gets it to a certain point that I guess vaporizes it and

[3]Some primary smokers also used alternative cannabis delivery systems.

it doesn't burn it, so you're not getting any carcinogens." Despite this knowledge, Kevin's primary delivery system continued to be smoking.

Like Cody and Kevin, most Baby Boomers chose smoking as their primary delivery system, despite their awareness of the potential harms of smoking. Some participants who smoked primarily also supplemented with alternative cannabis delivery systems to reduce the amount they smoked as a harm reduction strategy. Participants had various reasons for continuing to smoke, including misinformation about alternative delivery systems, preference for the taste or the high of smoking, and the need to control the high with the delivery system with which they were most familiar. For example, Bradley preferred smoking joints instead of using bongs or vaporizing, despite the perceived risks of smoking:

> [The bong] was a very intense delivery method. There's more similarities with a bong to vaporizer, the way it shoots into your lungs. I never really liked that. I just believe in the old fashion way of delivery. I just don't wanna smoke as much as I did when I was younger. I cough easier. The weed's so strong, I don't need as much. I'm thinking more of health as an older person. It's not that I don't like to get high. If I had to say one thing against marijuana, it would be, I don't really think it's good to smoke anything.

As he aged and worried more about his health, he tried to lessen negative health effects like coughing by smoking less frequently and in smaller quantities. The mechanisms of vaporizers are quite different from bongs, yet Bradley felt they were both the same and both too intense, and so he continued to choose smoking as his preferred delivery system. Bradley did not specify what type of vaporizer he had tried (e.g., dry herb or oil). Perhaps with additional information or opportunities to try variations of vaporizers, Bradley may have found that vaporizing can be gentler than smoking.

Gerald preferred joints over other delivery systems. He found joints to be more convenient because he mostly smoked in the car on the way to and from work. He also enjoyed the actual process and taste of smoking marijuana. Vaporizing "did the trick" for him in terms of getting high, but he "lost the enjoyment of the taste" of marijuana, and so he stuck with joints. He explained:

> Vaporizing, that might be something I can look at, but to me, I don't ever wanna get away from the actual, real smoking thing. I don't think smoking anything is ever gonna be a good thing. I don't care what it is, there are associated risks with smoking, period. Not that pot is bad, but that's just the act of smoking.

Gerald had minimal exposure to vaporizers, and had not pursued them further because he enjoyed the ritual and taste of smoking marijuana. Though he acknowledged that smoking had health risks, he chose smoking for the taste and efficiency.

Sarah, a sculptor, used marijuana to boost her creativity and "depth perception" while working. She preferred smoking because it provided a more immediate high than vaporizing or eating. However, at the time of the interview, she had recently discovered the health benefits of vaporizing. "It's not as effective, but it's softer on my throat," she said. When asked what she meant by "effective," she clarified:

> Getting immediately high. It's a slower high. It takes an edge off it and I don't cough as much. So that's the reason I bought it. My husband is also a chronic user and he has a lot of breathing problems, too. I'm trying to get him to smoke less and vape more.

Growing health concerns led some participants to seek out alternate delivery systems as they aged.

Concentrated Cannabis

As concentrated cannabis preparations become more popular, Baby Boomers are exploring the possibility of using cannabis concentrates to replace or supplement marijuana smoking. Our participants did not discuss "dabbing," but used concentrates in vaporizers, joints, or pipes. Study participants were exposed to concentrates in the '60s and '70s when hashish or hash became popular. Several interviewees discussed experiences with "opiated hash" in their youth. Grady fondly remembered the high of opiated hash and described how he used it:

> That was probably my favorite of everything. It was opiated, which would make it stronger and it was like a more dreamy, deeper kind of high. That's like a treat nowadays. I don't see that around too much. You take a little toothpick and just take a wad of it and put it in the pipe. You'd heat it up from underneath. You wouldn't put the flame to it 'cause it was too delicate. It would burn up right away. And as soon as it got hot it would start to smoke and then you would inhale.

Brian, who described a plateau in marijuana potency, also told us about opiated hash that he came across in the summer of 1971:

> A buddy of mine got opiated hash, so we were doing a lot of that sort of over that whole summer, that whole year. There's streaks or what they call veins of opium that run through the hash. Obviously, it has a different impact than just hash. It's probably a slight vein and I'm not sure if it was actually opium, but that's what we called it.

Whether or not hashish actually contained opium, the general belief among participants was that it was much stronger than the marijuana they were used to smoking. Interestingly enough, 60-year-old Zack also remembered an influx of hashish specifically in 1971. He said, "When you lived on the East Coast, [hash] was far more available. This is '71. I mean, the weed you smoked was Colombian; there wasn't any Mexican anything, unless it was Acapulco Gold and imported." Zack tried hashish before he ever smoked marijuana because hashish was more popular on the East Coast. Jeffery explained why this may have been the case:

> If you wanted to get stoned, it was easier to find hash than pot. It was easier to smuggle, it was concentrated, it would keep, it didn't smell as much, it was easier to get across borders and to stash and stuff, it was higher in THC. So the common thing we smoked back then was hash, and you had to have a pipe.

Apparently, hash was easier to smuggle, less product was needed to get high, and it would last longer in storage than marijuana flowers. This was particularly important between

harvest seasons, before marijuana growing techniques evolved to include indoor hydroponic methods that allowed for year-round growing (Reuteman, 2010).

Hashish was not just a fad in the ‘60s and ‘70s, but actually continued to be popular in cannabis culture. Gerald had smoked and sold varieties of hash in the ‘80s, a decade after the opiated hash influx that Brian and Zack described. “We used to get black tar hash. It was sort of like a rock, very hard. I remember specifically 1981. But I like the blonde hash better. It tasted more like pot. It was that sweet, really dense taste.” He generally enjoyed the taste of marijuana, which was a driving force of his set. As a result, he preferred the “blonde hash” that tasted more like marijuana than the “black tar hash.” Notably, Gerald expressed disinterest in vaporizing due to his preference for the ritual and taste of smoking marijuana, which was the reason he chose to continue smoking in spite of the associated health risks. He may have benefitted from vaporizing concentrates with similar flavors to blonde hash as an alternative or supplement to smoking, while still providing him with the taste he enjoyed.

It was also interesting that Gerald used the term *black tar* to describe the hash, as the term is typically associated with heroin. For some, the idea that hash was associated with harder drugs like opiates deterred them from using concentrates. For example, when asked if she had used hash, Shirley told us, “I’m kind of like, oh my god, that’s heroin. I can’t go there.” Aside from a few participants like Shirley who avoided hash, many of our Baby Boomers indulged in this concentrated cannabis product.

BHO is now exploding in the cannabis market, but some Baby Boomer participants questioned the safety of inhaling butane. Bradley was skeptical of the rising BHO trend:

> My friend’s son who’s the grower, he’s in his thirties, and he’s coughing all the time. He’s smoking the oil, the heavy duty oil. They do it with butane. I don’t want anything to do with that. I mean, it’s like 50 percent THC. It’s just like smoking lighter fluid. Why would you do that? You could get just as high on half a joint of good 20 percent THC weed. That’s enough.

Unlike Bradley, most of our interviewees were unaware of the harms that may be associated with products made using butane extraction.

Expense was a common motivation for choosing certain delivery systems in different settings, and for some participants, this had a social impact. Jared defined economic and social aspects of using flowers versus concentrates:

> If I buy two quarters at the start of the month, usually by the eighth, I’m done. Or if I have a lot of friends, I’m done in four days. With my vape pen, I buy a gram of hash oil, gram of wax, gram of shatter, maybe a gram of something else. And each vape hit, because I put a little dab of everything on it, is like five joints. It saves a lot of money ‘cause if you smoke a joint, everybody wants a hit. You’re not gonna smoke your 35, 40 dollars’ worth of wax with just anybody.

He vaporized concentrates and used these products only in private settings, and shared only flowers in social settings because it was less costly than sharing concentrates. Interestingly, he was one of the few participants who mentioned “shatter,” also known as *glass*, which

he bought at a dispensary. This hardened, brittle sheet of BHO purportedly contains less residual heavy metals or solvents than wax products (Black, 2012). In light of recent debates over the safety of using butane-extracted products, we found that interviewees who used concentrated cannabis needed more information about safe and effective methods of using concentrates.

Despite questions about the safety of using concentrates, many participants found that vaporizing concentrates was less harmful and more effective than smoking. Participants used concentrates to get more out of the amount of product used or to prevent potential harms of smoking by vaporizing. The general observation was that concentrated preparations were more expensive or harder to find, but provided a stronger or more efficient high. Douglas enjoyed the efficiency and health benefits of vaporizing hash wax:

> I'll get as high as I want from half a joint, whereas with that wax and that vaporizer, I'll hit it two times and I'm done. And it's the exact same high as the marijuana. And I can regulate it. And then the vaporizing part I like too because it doesn't affect your lungs. I don't have any lung problems … But I'm sixty years old … I'm getting to the point where those things are gonna be important to me. So, just kinda looking towards the future. The problem is though, that the wax is expensive.

Douglas reported that wax was more expensive than marijuana, but he needed to vaporize less concentrate to obtain his desired effects and he believed it was less harmful to his lungs and respiratory health.

Lisa used concentrates to treat a variety of physical and mental health issues, and she felt they were better than any of her prescribed medications. She enjoyed the health benefits and privacy of vaporizing waxes and oils instead of smoking blunts (marijuana wrapped in tobacco leaves):

> I don't do as many blunts as I used to. I now do the waxes and oils. My son bought me my first vapor pen for my birthday. Now, I got my card again last year and I started going and hanging out in the pot clubs and started trying that volcano vaporizer. I like that because no tobacco products involved. But I like this pen because it's convenient. It's odorless and people don't know what the hell I'm doing. The waxes and the oils definitely keep me away from the tobacco products.

As a self-described "visual person," she also found that the exhaled vapor gave her the same satisfaction as smoking, which strengthened her ability to resist smoking blunts. Gaining access to dispensaries opened up a whole new world of delivery systems to Lisa, and vaporizing became her preference.

Many of Lisa's peers also enjoyed using concentrates for medical reasons, but others weren't as enthusiastic about this delivery system. Logan had a medical marijuana card to treat anxiety and insomnia. He explained that concentrates had "too much THC" and produced a "non-functional" high that was too intense for his needs. In contrast, Myra felt that vaporizing concentrates did not get her high but did provide medical benefits:

> I've been trying to use the vaporizers and I got a good one. And for some reason, I cannot get the same effect, experience or whatever with that. I know I'm doing

> something wrong. And I'd rather not have the tar and all that other stuff. There's these little pens, they're like e-cigarettes, and I've also used that. I carry it with me in case my stomach gets upset. They're really great. I just have a couple puffs and it doesn't like make me high, but it does help with the stomach.

She may have vaporized a CBD-rich product with little to no THC, which would explain why she felt the medical benefits without feeling the high. Although Myra was a medical marijuana patient, she was not provided with information about the effects of different concentrations of THC and CBD, which would have clarified why she did not feel the same psychoactive effects she experienced when smoking marijuana. A balanced mixture of THC and CBD would allow her to reduce harms related to smoking and address her medical issues while still feeling the relaxation she enjoyed from smoking flowers. Many Baby Boomers, with or without dispensary access, had limited information about cannabinoids and were unable to choose appropriate ratios of CBD to THC.

Edible Cannabis

In our study, discretion was a reported motive for restricting the settings in which cannabis was used, and 48.5% of participants stated there were people in their lives they did not want to find out about their cannabis use. Several participants (8%) reported that edible cannabis was their primary delivery system at the time of interview, typically due to convenience or privacy. Many others discussed using edibles, even if they chose smoking or vaporizing as their primary delivery system.

Shirley primarily used edibles because she felt that it was the most discreet, private delivery system. She used them to unwind, after taking care of responsibilities and never in situations when she needed "complete clarity, just to be completely present." When asked in which situations, she said,

> Probably just dealing with my kids, going to speak with maybe a doctor. You know, just really important times … I would probably do it after, depending on what the outcome of that is. Like, oh, mommy needs a cookie.

Shirley used harm reduction techniques similar to those used by other Baby Boomer participants, like using privately (29%) and not discussing cannabis use in front of certain people (11%). Steven reported his primary delivery system was using edibles that he made himself. He described settings in which he typically used edibles:

> I might be inclined to eat a cookie earlier in the day if I was gonna be working, but if I was gonna go out and be swimming or doing some stuff out in the world, I may not. I might wait until I get home. And because I'm not smoking, it's made it even less prevalent in my life because smoking is the easiest way to take the pot in. It's so simple. It's like all you need is a lighter and a smoking device and there it is. Cooking, even eating it takes a little more effort, a little more thought into it. So that by itself has kind of limited the amount that I'm doing these days.

Steven's desired drug effects and the settings in which he used played a major role in his delivery system choice (edibles). These settings changed as he aged and became more focused on maintaining his physical health. He believed that using edibles improved his

work productivity and also decreased the amount of cannabis he used as he aged and worried more about his health.

Reducing health risks was indeed a major motivation for interviewees to use edibles. Among participants, lung disease or damage was a common perceived risk of cannabis use (16.5%), but only a few (7%) reported actually experiencing respiratory problems. Some used edibles as healthy alternatives to traditional smoking. For example, Claire used edibles purchased by her husband, who had a medical marijuana card:

> Now that we're on medical marijuana, we can buy our own, which is great. But even before that, actually, [husband] knew how to bake cookies … And I always liked edibles better. One, because I don't like to smoke. It's just bad for you. But it's also a different high. It comes on slowly … and it just feels more organic. It's not like when you smoke and it's right away.

Generally, Claire found that ingesting edibles was healthier than smoking marijuana. However, she and her husband had several overdose experiences. She shared a story in which they were cycling together and had to stop because they felt too high. During this episode, she felt she "couldn't function" to a point of being "incapacitated," so they had to sit down and wait to come down from the high. She also overdosed on "Space Cake" from Holland:

> That was the worst experience of my life ever because I was on an airplane and I was really, really sick and vomiting … and I was shaking. I mean, I was really scared … I really thought I might die … That was the worst, being on an airplane for eight hours.

Claire's overdose experiences with regulated (the cycling incident) and non-regulated (Space Cake) edibles demonstrate the importance in finding ways to standardize edible dosages.

We heard dozens of other stories about edible overdoses in the course of our study. Users were sometimes uncertain of the cannabinoid content in edibles or they took an extra dose before they felt the first one kick in. Edible intoxication has a longer onset and duration than that of smoking. This can be positive or negative depending on what motives an individual has for using them. Cannabis users sometimes take an extra dosage of edibles because they are used to an immediate high and assume that the initial dosage did not work, which could result in an overdose when edible intoxication finally sets in.

Maintaining control was a popular motivation for choosing certain delivery systems. Douglas preferred smoking marijuana or vaporizing concentrates over using other drugs or alcohol. Regulating the dosage and the high was important to him, thus he avoided using edibles:

> I can smoke a joint and I can hit it and blow out the smoke. I can regulate my high because the high is relatively quick after the inhalation. Edibles, I'll eat four or five cookies. And then shit, like forty-five minutes later I'm stuck with it because there's no way to get it off of me. I can't regulate it. So the regulation of it is crucial for me.

He observed that the onset of an edible high typically took longer than expected and lead him to take more than he believed he needed. His set was shaped by his desire for control and his expectations of the marijuana high based on past experiences. This motivated him to choose smoking as his preferred delivery system, as he could gauge the effects of the drug immediately and avoid overdosing.

Troy experimented with medical cannabis edibles on a number of occasions, sometimes suffering negative experiences before finding his proper dose:

> Now that I've learned my dosage, I buy the same thing every time. So I have the dosage down, but when I didn't, I ate a little bit too much. And it's like practically glued to a chair, unable to get out of the chair. I just realized don't eat this much again. The thing with the edibles, now they're labeling them more, but back when I started, they didn't. I ate a half a brownie, which was much too much. One third is very, very strong. So I learned, don't eat this much.

He noticed that dispensaries began labeling products, and since then he has had no problems with dosing. Access to edibles labeled with recommended dosage or cannabinoid content like those found at dispensaries gave some interviewees control over their dosage. However, edible dosing varies between users because of the way the THC is metabolized. Some participants had to titrate their dose through trial and error to find their ideal dose. For example, Shirley obtained medical cannabis edibles from her husband, but she was unsure of her correct dosage:

> When you're consuming a baked good or whatever you're consuming, it's a lot harder to judge how much content is in there as opposed to like oh, it's a joint so I smoked a quarter of a joint. I have no idea how much like pot butter's in there. Is it all pot butter or just a little of it? So it's like yeah, so it's hard to judge. I don't necessarily know the dosage, per se. Like I never really think about like how many grams of stuff is in there, never really thought about that. I just always have like a little bite and see how much that does to me and then figure out from there.

Fortunately, she did not report any overdoses because she usually started with a small amount and built her way up to the right dose. However, she worried that an unequal distribution of butter or oil in a batch of edibles could result in an overdose. Joseph had a medical marijuana recommendation for HIV symptoms and he shared Shirley's concern. He had actually overdosed on homemade edibles due to unequal butter distribution:

> They weren't just made with marijuana, but they also had kief, which is hash. So, I had the worst experience I've ever had. I said to [friend], "Look, this is not good. I'm having this really bad trip, so I'm gonna go lie down." So I was noticing with my eyes closed I was having very frightening hallucinations. Like what I remember was there was this like portal that opened up and all these demons were crawling out. And they just kept coming, like hundreds of them. So the next day the roommate apologized. He said, "Look, I'm really sorry you had a bad trip." And he said, "I ate some of the cookie I gave you and it's so much stronger than the one I ate last night."

Even though he had a medical marijuana recommendation, he obtained homemade edibles from an unregulated source without knowing the potency. Regardless of their sources, Shirley and Joseph both struggled to find the right dosage and feared the potential for overdose.

Claire, who told us about several overdoses, questioned the accuracy of dosage labeling on packages of edibles: “The packages are marked with what they consider to be a dosage, but we’re still careful because it’s not always accurate. It could be stronger.” Dispensaries can give cannabis users information about product dosage, but the recommended dose may be too strong or too weak for some individuals. Due to differences in the physiology of each individual cannabis user, the physical and psychoactive effects of cannabis edibles were magnified in some participants and not others. Other edible users simply did not take advantage of packaging information. Nonetheless, edibles from dispensaries may deliver a more standardized dosage than homemade or “street-purchased” edibles. For example, Karen described a negative experience with hash brownies she purchased at a music festival in Berlin:

> Somebody was selling like, pot brow—or hash brownies. And I obviously should have just eaten maybe a little bite of one. And I ate the whole thing. They didn’t warn me. I was in a strange town, but I was with my friends, and we had to catch all these subways and stuff. And so they really had to kinda help me with the train system. I didn’t know how much was in there, so I didn’t know the dose or anything. And in fact, that’s when I stopped eating those, like in 1990 because that scared me. It was so intense, and it took a long time for me to come down.

She purchased the brownies from an unregulated source without realizing they contained hash instead of just marijuana. Had she been informed by the seller about the potency of the edibles, she could have avoided the overdose.

Some interviewees were concerned that edibles were inconsistent and unreliable. Cody explained, “I mean, sometimes nothing happens, and sometimes you just find yourself rolling on the floor, hysterically laughing an hour later. So I mean, it’s very hit and miss.” In his experience, edibles had varying effects on cannabis users each time they were ingested. We also found that edibles affected different individuals in different ways. Elaine once consumed edibles that were too strong for her but ineffective for her cousin:

> Eating it sometimes makes me too high, feel more like sedated … I had some candy somebody had gave me, just a little, little piece. I was really high and my cousin had some and she didn’t even feel it. I’m like, well, everybody’s different. But usually I don’t like to eat. I don’t really like the feeling of sedation. I guess it could be good if you went somewhere and you can’t smoke.

She recognized edibles afforded more privacy than smoking, yet she chose to smoke for fear of the inconsistent high and sedation produced by edibles.

Some participants used edibles as harm reduction, by reducing the risks of smoking marijuana or using other drugs, or even giving themselves the freedom to use cannabis where smoking would be inappropriate. Reportedly, edibles did not pose the same harms

that smoking did, but consuming cannabis caused other problems. Most often, participants felt they could only use edibles in certain settings or had difficulty ascertaining the correct dosages. Some experienced overdoses with symptoms ranging from feeling too sedated to hallucinating. Overall, Baby Boomers who used edibles would benefit from using products accurately labeled with the cannabinoid content and a regulated dosage.

Medical Marijuana Patients vs. Non-Patients

We expected medical marijuana patients would have more access to information about strains, potency, and alternative cannabis products than non-patients, and that they would also then be more likely to use these various strains of marijuana and alternative cannabis products because they had access to them through dispensaries. We analyzed our data by comparing medical marijuana patients with non-patients by selected variables to see if this held true for our sample. We found there were no significant differences between our subsamples of patients and non-patients in terms of information about potency, strains, or alternative delivery systems. However, when we looked at differences in their primary delivery systems, we found some interesting differences. Patients were less likely to choose smoking as their primary delivery system (75%) than non-patients (94%). Patients were more likely to choose edibles as their primary delivery system (12.5%) than non-patients (3%). Patients were also more likely to choose a combination of delivery systems as their primary route of administration (9.3%) than non-patients (1.5%). Perhaps dispensary access did in fact make it possible for medical marijuana patients to explore alternative delivery systems.

Discussion

As Baby Boomers aged, access to cannabis and social contexts changed, impacting their motivations to use particular cannabis products and delivery systems. As growing techniques evolved, most Baby Boomers observed an increase in the potency of the *drug* (cannabis) and its derivatives. The increasing variety of products changed some participants' chosen delivery systems and *settings* of use. Boomers chose delivery systems depending on their individual *set*, defined by personality traits, peer group, lifestyle, prior knowledge, and expectations of the drug's effects. Over time, Boomers gained more knowledge about the pharmacology of cannabis, and as the medical marijuana industry expanded, they learned about the therapeutic benefits of cannabis; some learned about the different strains of cannabis and their varying effects. Participants' understandings of the different effects and uses of the two marijuana strains varied. Most interviewees' knowledge was based on their experiences with using different varieties or in some cases, from doctors or peers, and they made similar comparisons between indica and sativa. Others confused the two strains or truly did not understand how they were different, either due to misinformation or lack of awareness. Overall, the most important motivation for Baby Boomers' choice of delivery systems was growing concerns about their health. They were interested in both the therapeutic and relaxation benefits of cannabis as well as in reducing the long-term harms of smoking marijuana flowers.

Smoking was the primary delivery system of most Baby Boomer participants and joints were commonly cited as the preferred delivery system, but pipes, bongs, and other devices were also used. Despite knowledge about the risks of smoking, some interviewees continued to smoke due to personal preferences, limited access, or negative experiences with other methods. Others simply lacked sufficient information to make educated decisions about ways to reduce the harms of smoking. Other participants did choose alternative methods of delivery, such as vaporizing marijuana or cannabis oil and ingesting edibles, and found many medical benefits from these as well. On the other hand, unregulated dosage was a major issue for Baby Boomers, particularly when ingesting edible preparations. Experiences with edibles fell along a wide spectrum, ranging from finding no effect to overdosing. Overdose experiences often resulted in heavy sedation, paranoia, anxiety, or hallucinations.

Homemade edibles may have an unequal distribution of cannabis or a higher potency than the consumer expects. Those who continue to use homemade edibles would benefit from information that may help prevent overdose, such as the proper preparation of edibles to achieve a uniform dose and ways of gauging potency, like eating a small quantity and allowing enough time for the full effects to be felt before taking another dose. Dispensary edibles are labeled with the recommended dosage, strain, and THC/CBD content. They may be more regulated than homemade products, but these labeled edibles may be too strong or too weak for some individuals. Patients with access to regulated edibles may also benefit from more information about the proper ways to assess the correct dose so that they may have a better gauge of how much to ingest for their particular needs while avoiding overdose. Participants discussed THC more often than CBD when describing the potency and effects of the products they used and most were unaware that they could reduce the risk of a THC overdose by choosing a product with higher CBD content.

Some participants enjoyed using concentrates because they could get more out of the amount of product used or because vaporized, they were effective and healthy alternatives to smoking. Other interviewees found that concentrates were too potent, whether they ingested, smoked, or vaporized these products. Some Baby Boomer participants were intimidated by today’s hash products, perhaps because of its reputation as being opiated in the ‘70s or due to the questionable safety of certain extraction methods. Others had little to no experience with using concentrates, even back in the hashish days. Concentrated cannabis was new to some participants because of limited access or lack of information.

Newer delivery systems, such as tinctures, capsules, and topical preparations, were less prevalent; the majority of participants did not know about them. They were mostly used for medicinal purposes, typically without the psychoactive effects derived from other methods of delivery. Most participants had limited knowledge about these delivery systems, which could be safer, more beneficial alternatives to more popular delivery systems, particularly for those concerned with being too high in certain settings.

We expected that medical marijuana patients would be more likely to use alternative cannabis products than non-patients, since they can easily access these products at dispensaries. Our analysis proved this to be true. Medical marijuana patients were more likely to choose edibles or a combination of alternative cannabis products as their primary

delivery system than non-patients. Moreover non-patients were more likely to choose smoking as their primary delivery system than patients. We concluded that dispensary access may have exposed medical marijuana patients to alternative cannabis products and facilitated their use. Although we expected medical marijuana patients would be more knowledgeable about the various cannabis products, potency, and strain, our analysis proved otherwise. Medical marijuana patients were no more knowledgeable than non-patients. Though some information is available at dispensaries, it is not actively disseminated (you have to ask and probe), so patients who go to dispensaries to obtain their cannabis may be going in and out without further exploration. This would explain why medical marijuana patients were no more knowledgeable than non-patients. We see dispensaries as one possible venue for the dissemination of valuable information that can educate patients about alternative cannabis products, strains, and potency so that they can make informed choices to maximize the therapeutic benefits of cannabis while minimizing harms. Dispensaries have the potential to provide people with a safe space to learn more about cannabis, yet participants with dispensary access did not gain any more information than non-patients. Dispensaries could improve their methods of providing information to medical marijuana patients. For non-patients, the same types of information could be made more accessible on reliable public websites. The information available to the public about cannabis delivery systems was limited mostly to websites of for-profit businesses or cannabis industry-based organizations.

Most Baby Boomers' knowledge about cannabis was based on past experiences with using cannabis or information shared by their peers. Few clinical studies have examined various cannabis delivery systems, and clinical cannabis studies often focus on specific populations (like patients with cancer or AIDS). Debates over the benefits and drawbacks of using cannabis and its derivatives continue to flood the media as more states begin the process of legalizing adult medical and recreational cannabis use. Thus, it becomes increasingly important to find other ways of distributing this information to anyone who pursues it, such as publishing more clinical studies online or making it easier to find reliable websites that contain details about the different effects, forms, and delivery systems of cannabis. We need to be able to provide systematic, science-based information for all cannabis users, whether they use medicinally or recreationally, in order for them to make informed decisions about the safest, most appropriate preparations and delivery systems for their individual needs. As more states enact varying forms of cannabis legislation, it becomes even more important to make sure the public has access to the knowledge and information that will enable them to make judicious decisions regarding cannabis consumption.

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Table 1.

Pseudonym Chart With Demographics.

Pseudonym	Age	Race	Gender	Span years used	Age first used	Medical marijuana patient
Bradley	58	White	Male	46	12	No
Alicia	55	African American	Female	41	14	No
Jason	56	Asian	Male	45	11	No
Brian	59	White	Male	45	14	No
Kevin	51	White	Male	30	21	No
Elaine	50	African American	Female	34	16	No
Rebecca	57	White	Female	45	12	No
Shirley	49	Asian	Female	33	16	Yes
Juliana	60	African American	Female	43	17	Yes
Leslie	53	White	Female	38	15	No
Spencer	66	White	Male	43	23	Yes
Cody	66	White	Male	48	18	No
Gerald	51	White	Male	37	14	No
Sarah	67	White	Female	37	19	No
Grady	60	White	Male	44	14	No
Zack	60	White	Male	42	18	Yes
Jeffery	60	White	Male	42	18	Yes
Douglas	59	African American	Male	45	13	No
Jared	55	African American	Male	37	18	Yes
Lisa	50	African American	Female	37	13	Yes
Logan	55	White	Male	42	13	Yes
Myra	58	White	Female	45	13	Yes
Steven	53	White	Male	45	8	No
Claire	60	White	Female	45	15	No
Troy	63	White	Male	44	19	Yes
Joseph	48	White	Male	17	32	Yes
Karen	54	White	Female	35	19	No